INTERNATIONAL FOUNDATION FOR SCIENCE

MESIA Impact Studies

Report No. 8

IFS and OPCW Joint Support to African Scientists

Malin Åkerblom

IFS

The International Foundation for Science, IFS, is an international, non-governmental organisation, founded in 1972. The mission of IFS is to contribute to strengthening the capacity of developing countries to conduct relevant and high quality research on the sustainable management of biological and water resources. This may 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 to achieve this objective is to identify young, talented scientists who have the potential for becoming the future research leaders and lead scientists in their nations, and to effectively support them in their early careers.

The primary form of support, and the entry point to the "IFS system", is the small grant awarded in international competition. Once a Grantee, the researcher can be supported in many other ways - invited to workshops, purchasing services, travel grants, training, scientific contacts, participation in networks, publishing reports, etc. More information about the activities of IFS, as well as research grant application forms, are available at www.ifs.se.

To date, more than 4,500 researchers in Africa, Asia and the Pacific, and Latin America and the Caribbean have been awarded research grants by IFS.

OPCW

The Chemical Weapons Convention is an international treaty which bans the development, production, stockpiling, transfer and use of chemical weapons, and also stipulates their timely destruction. The Convention entered into force in 1997 and mandated the Organisation for the Prohibition of Chemical Weapons (OPCW) to eliminate the scourge of chemical weapons forever and to verify the destruction of the declared chemical weapons stockpiles within stipulated deadlines. The goal is a world in which cooperation in the peaceful uses of chemistry is fostered. The Organisation's division for International Cooperation focuses on capacity building for the peaceful applications of chemistry in areas which are relevant to the Chemical Weapons Convention. A number of programmes are being implemented by the Organisation which are primarily designed for Member States whose economies are either developing or in transition.

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An Assessment

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Preface

The International Foundation for Science (IFS) was as one of the first organizations to explicitly address the needs of young scientists in developing countries. The IFS Programme was conceived in the 1970s as a response to the brain drain: unfavourable conditions in scientific institutions in these countries resulted in the migration of many of the most promising young researchers. IFS created an alternative by offering competitive research grants with supporting services and occasional workshops. By 2008, IFS has awarded 6,500 grants to over 4,500 young scientists in the developing countries of Africa, Asia and the Pacific and Latin America and the Caribbean.

The Organization for the Prohibition of Chemical Weapons (OPCW) is a long time partner of IFS. The International Cooperation and Assistance Division of the OPCW is tasked with capacity building for the peaceful applications of chemistry. IFS and OPCW have been jointly disbursing grants since 1998 to a number of researchers in developing countries. IFS and OPCW decided to undertake an evaluation of IFS/OPCW joint funding, in order to assess its impact and consider ways to improve their capacity strengthening efforts.

This assessment concerns joint IFS/OPCW grantees based in African countries. The analysis is based on the monitoring programme which was established at the IFS Secretariat in 2000 by Dr Jacques Gaillard. The Monitoring and Evaluation System for Impact Assessment (MESIA) produces and analyses data on grantees and undertakes surveys of the conditions under which young scientists work. To date nine impact studies (MESIA Reports) have been published including this study (see inside back cover).

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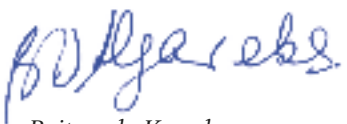
Stockholm, September 2008 The Hague, September 2008

Michael Ståhl
Director
IFS



Boitumelo Kgarebe
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Summary

The International Foundation for Science (IFS) and the Organisation for the Prohibition of Chemical Weapons (OPCW) have a common aim to facilitate high quality research in developing countries. IFS is focussing on sustainable management of biological and water resources. The International Cooperation and Assistance Division of the OPCW is tasked with capacity building for the peaceful applications of chemistry as stipulated under article XI of the Chemical Weapons Convention. Under their respective mandates, the IFS and OPCW have been jointly disbursing grants since 1998 to a number of researchers in developing countries. As part of an ongoing assessment process, the IFS and OPCW decided to undertake an evaluation of IFS/OPCW joint funding, in order to assess its impact and consider ways to improve their capacity building efforts. To this end, an extensive questionnaire was sent out to the 71 African grantees, and a workshop was held that brought together 28 African grantees in Nairobi in December 2006.

The questionnaire, based on the one developed for IFS MESIA[1] studies by Gaillard and co-workers and modified in collaboration with the IFS, OPCW and the evaluator, was prepared. Both English and French versions were produced. In October 2006, these questionnaires were sent to the 71 African scientists who received the joint grant between 1998 and 2005. By February 2007, 77% of the grantees had responded. Thirteen of the 54 respondents had received two or three IFS or IFS/OPCW grants; five respondents received their first grants in the period 1993-1996. The survey covered a wide geographic area of the African continent with respondents from all sub-regions. The IFS/OPCW grant had been given to 38 grantees from countries with a per capita GNI[2] in 2005 of 160-560 USD, and 33 grantees from countries with per capita GNI of 1010-5260 USD; 27 grantees from each category responded to the questionnaire.

The age at which the grantees got their first grant varied between 24 and 44 years, with a median of 36 years which is similar to figures found in previous MESIA reports, but with an increase of younger grantees over the last few years. Five were above the "classical" IFS age limit of 40, all men. Overall, 27% of all grantees were female. In recent years there has been an increased share of IFS/OPCW grants to females. This can be partly attributed to the greater efforts to attract more female applicants by the IFS/OPCW but also reflects sustained efforts by African universities to attract more female students to higher education. Nearly half of the responding women were single. Married females had up to four children but pursued their studies at the same pace as the men.

In total, 76% of the 54 respondents were holding at least a PhD or a Doctorat de 3ème cycle. Half of these had performed post-doctoral studies or received a Doctorat d'Etat. Eleven of the grantees had reached a higher degree after receiving their first IFS/OPCW grant, and more were on their way. The basic degree was in most cases obtained in the home country, whereas 30% of the MSc degrees and 33% of the PhD degrees were obtained abroad, primarily in Europe. Corresponding figures in the MESIA report from 2001[3] were 49% of the MSc and 65% of the PhD degrees, showing the increasing capability in Africa to give a higher degree.

[1] IFS Monitoring and Evaluation System for Impact Assessment

[2] Gross National Income per capita, World Bank statistics

[3] Questionnaire Survey of African Scientists

In many cases the degrees were of a "sandwich" or "split site" nature regardless of where the degree is given. This type of studies enables a continuous transfer of knowledge, and research tends to be based on subjects of relevance for the home country. In these cases, the IFS/OPCW grant can be a decisive factor in allowing part of the research to be based at the home institution. In total, 45 grantees had spent 2 months or more at a foreign institution. The experiences and learning opportunities during these periods create multi-skilled researchers with experiences both from home and from abroad. The OPCW internship grant is very valuable in this respect.

The majority of grantees were well positioned prior to receiving the IFS/OPCW grants, often being lecturers at university or research officers at a research institute. Eight were associate professors or professors. By far the most important criterion for promotion, regardless of country, is to publish internationally and 91% of all respondents gave this the highest priority with a maximum score of 5. Seven of the respondents had been offered a job abroad and two had accepted, in Africa and Europe, respectively.

Most of the respondents worked at public universities (72%), or at public institutions (28%). A minority worked at private universities or institutes in addition to their public work. Four fifths were regularly teaching, with a median of 10 hours, but with a span of 1 to 40 hours per week. The median time devoted to research was 22 hours per week, spanning 4 to 70 hours; all responding grantees were engaged in research. Twenty-one of the grantees had extra work outside their ordinary work, most frequently either teaching or undertaking consultancy work. As for future ambitions, the grantees had several goals. 72% aimed at a national scientific career; 35% could think of a scientific career abroad and 41% to work with an international organisation. Private business or politics were not considered to be attractive options.

Nearly all grantees were working with other scientists. Contacts had increased markedly after receiving the grant; 32% of the grantees had daily or monthly contacts with other institutions in the country before the grant and 77% after. The figures for other countries in Africa had increased from 10% to 31%, for Europe from 31% to 53%, and for USA or Canada from 18% to 32%.

Only 17 of the respondents reported other funding since they received their first IFS/OPCW grant. Funding from national sources was generally 500-6000 USD per year; the higher amounts in countries with the highest per capita GNI. Funding from international donors varied from 3000 to 44000 USD per year. 37 grantees were presently relying mainly on the IFS/OPCW grant. From the start of their research career, 32 grantees had received funding from approximately 50 other donors, but 22 had received only IFS/OPCW funding. It is suggested that IFS in particular should put (more) effort into helping grantees finding wider funding opportunities.

In Dec 2006, 77% of the grantees said they have "easy" access to internet, as compared with the 50% of the MESIA study seven years earlier, but even the current capacity may not be enough for using literature databases efficiently. Access to bibliographic databases was reported by 46% of the respondents, equalling the 45% of the MESIA study.

Grantees had attended 247 conferences in total outside their home country. Almost half of these were held within Africa. However, nearly half of the respondents had been abroad for a conference only up to twice, if at all, during the eight-year period 1999-2006. The grantees were exposed to regional and international conferences far too seldom.

When asked about main factors holding back research work, lack of funding and lack of access to equipment were the main problems. This is followed by a lack of consumables and supplies. Equipment repair was one of the main recurring difficulties. Inferior infrastructure, poor access to documentation, and lack of good technicians and students, were also high on the list.

The grantees had published around 500 articles during the period 1999-2006. A third of these articles were published in ISI-listed journals. They had published in 232 journals; in 142 of them only once. Only 29 journals were in common for those who got their degree abroad and those who got the degree at home. Moreover, half of all articles were published in these 29 journals, of which 17

were in the ISI list. Each grantee had published on average 1 article per year in international journals. Corresponding numbers were 0.2 in both national and regional journals. The highest publication rate was four to five years after receiving the grant. Only 12 articles (2.5%) had single authors. The grantees were the first names in almost half of the co-authored articles, and slightly more often when international scientists were among the co-authors. Extended visits outside the home country promote publications, as can be expected from research visits away from daily duties. There also appears to be a positive correlation between the number of publications and per capita GNI.

During the period 2005-2006, 159 MSc and 74 PhD students had an IFS/OPCW grantee as their main supervisor or co-supervisor. It can be assumed that many of these students benefited to some extent from the facilities made available through the IFS/OPCW grant. The grantees also played a role in a number of various national, regional and international events and outreach activities, both in their own societies and in the scientific community.

What role has the IFS/OPCW grant played? Most grantees would have tried to pursue research even without the grant, but on a reduced scale or in a substantially different form. However, one third of those from countries with a per capita GNI of less than 600 USD said they would not have continued with research. It is possible that some researchers would have continued their research abroad, with the risk of brain drain, or at least diminishing the critical mass of researchers at home. For many respondents, IFS/OPCW grant had changed their possibilities to do research, and half of the grantees had changed their research orientation. The equipment and chemicals obtained through the grants provided the opportunity for grantees to engage in research of their choice. The grants also made it possible to pursue a sandwich programme, on a relevant subject, staying with the family, instead of going abroad full time.

Both IFS and OPCW offer additional types of support. Most appreciated support by IFS was participation at scientific conferences or IFS thematic workshops. Only a few respondents had taken up OPCW opportunities, but those who did benefited greatly from programmes ranging from equipment and internship support to the analytical skills development course. The most notable beneficial overspill of being a grant recipient, affirmed by 90% of respondents, was found to be the opportunities for collaboration with new partners, and increased scientific and technical assistance from their institutions especially from those located in poorer countries.

Three main themes could be discerned in the IFS/OPCW-supported research – the use of local plants, crop or other material; to improve the economy, either for the poor, or for the national economy by reducing the need for import of goods and creating a basis for export products; and to establish a sound basis for sustainable management of land and water resources.

The grantees' main contribution to the advancement of science was new knowledge in the field of chemical composition of plants including new molecules, knowledge on efficacy and safety of traditional medicine and of nutritional or industrial values of local crops, and knowledge about environmental pollution. Chemical synthesis or modification of natural compounds was performed in a few cases. Chemical analysis was predominant, but biochemistry, molecular biology and pharmacology/toxicology were also represented. Most grantees had their local or national communities in mind when choosing research subjects. A total of 30 researchers (including most of the pre-2005 grant recipients) had up to 2006 published based on IFS/OPCW-supported research representing over 70 publications.

A majority of the grantees found the administration of the grant excellent and the selection process good to excellent, but they were less satisfied with aspects involving scientific counselling and support with maintenance of research equipment. Highest in demand for support from the IFS and OPCW, in a given list of 22 items, was a grant for expensive equipment, wanted by 72% of the respondents. This priority was confirmed by workshop participants. Grants to attend scientific workshops, conferences and summer schools, along with funding for expendable supplies were requested by 53% of respondents. A visit to a centre of excellence for a couple of months came next on the wish list. There was little interest among respondents on support-

ing regional visits, but greater interest was shown toward participation in regional networks. Workshop participants wished to see increased the regional collaboration. According to the respondents, the least important items were assistance with patenting and intellectual property protection, with internet connection, and with transfer of second hand donated equipment.

In conclusion, the IFS/OPCW grant, although comparatively small (10-12000 USD) has indeed served as a project initiator as well as a catalyst for the pursuit of research. The majority of grant recipients have undertaken research of great relevance to their home country, and they publish both locally and in international journals. Nevertheless, there is scope for improvement to the support offered by IFS/OPCW.

In view of the findings of the assessment exercise, it would be advisable for the IFS and OPCW to give serious consideration to the following aspects:

- Assisting and encouraging grantees to find funding opportunities
- Increased funding for the second grant
- Grants for equipment
- Funds for material to run and repair equipment
- Repeated hands-on training on spot of technicians - and grantees - on maintenance, repair and optimal use of equipment
- Support to attend scientific to attend scientific conferences of high calibre and to pay for research visits to good research institutions
- Encourage regional collaboration.

Résumé

La Fondation Internationale pour la Science (IFS) et l'Organisation pour l'Interdiction des Armes Chimiques (OIAC) ont en commun pour objectif de promouvoir la recherche de qualité dans les pays en développement. L'IFS se concentre sur la gestion durable des ressources biologiques et des ressources en eau. La Division pour la Coopération et l'Assistance Internationales de l'OIAC a pour tâche de renforcer les capacités de recherche pour une utilisation pacifique de la chimie, comme stipulé sous l'article XI de la Convention sur les Armes Chimiques. Depuis 1998 et conformément à leurs mandats respectifs, l'IFS et l'OIAC ont conjointement accordé des bourses à un grand nombre de chercheurs de pays en développement. L'IFS et l'OIAC ont décidé d'entreprendre une évaluation des bourses communes IFS/OIAC dans le cadre d'un processus d'évaluation continu, afin d'estimer leur impact et les manières d'améliorer les capacités de recherche en Afrique. A cette fin, un questionnaire détaillé a été envoyé aux 71 boursiers africains soutenus par ce programme, et un atelier a été organisé rassemblant 28 boursiers africains à Nairobi en décembre 2006.

Un questionnaire a été préparé, basé sur celui développé pour les études IFS MESIA[4] par J. Gaillard et col., et modifié en collaboration avec l'IFS, l'OIAC et l'évaluateur. Le questionnaire a été préparé en deux versions, une française et une anglaise. Ces questionnaires ont été envoyés en octobre 2006 aux 71 chercheurs ayant reçu la bourse commune entre 1998 et 2005. En février 2007, 77% des boursiers avaient répondu. Treize de ces 54 scientifiques avaient reçu deux ou trois bourses IFS ou IFS/OIAC; et cinq se sont vus accorder leur première bourse au cours de la période 1993-1996. L'enquête questionnaire couvre une vaste zone géographique du continent africain et porte sur des chercheurs originaires de toutes les sous-régions. La bourse IFS/OIAC a été accordée à 38 boursiers originaires de pays avec un RNB par habitant[5] de 160-560 USD en 2005, à 33 boursiers originaires de pays avec un RNB par habitant de 1.010-5.260 USD; et aucune dans les rares pays aux revenus intermédiaires. 27 boursiers de chaque catégorie ont répondu au questionnaire.

L'âge auquel les 71 boursiers ont reçu leur première bourse est compris entre 24 et 44 ans, avec une médiane de 36 ans, ce qui rappelle les chiffres des rapports MESIA précédents; le nombre de jeunes boursiers a cependant augmenté ces dernières années. Cinq boursiers étaient plus âgés que l'âge limite "classique" de l'IFS de 40 ans, et tous étaient des hommes. 27% des boursiers sont des femmes. Dans l'évaluation MESIA réalisée en 2001[6], couvrant la période 1974-99, cela ne représentait que 15%. L'augmentation de ce taux peut en partie être attribué aux plus grands efforts fournis par l'IFS/OIAC, mais reflète aussi les efforts soutenus de la part des universités africaines de recruter un plus grand nombre d'étudiantes vers l'éducation supérieure. Les boursières mariées avaient jusqu'à quatre enfants, mais poursuivaient leurs études au même rythme que les hommes.

Au total, 76% des 54 réponses détenaient au moins un doctorat de 3ème cycle ou un PhD. La moitié de ceux-ci avait effectué des études post-doctorales ou reçu un doctorat d'Etat. Onze boursiers avaient obtenu un diplôme plus élevé après réception de

[4] Système d'Analyse et de Mesure d'Impact (MESIA) de l'IFS

[5] Revenu National Brut par habitant, statistiques de la Banque Mondiale

[6] Questionnaire Survey of African Scientists

leur première bourse IFS/OIAC, et d'autres étaient en train de faire de même. Dans la plupart des cas, le diplôme de premier cycle a été acquis dans le pays d'origine, alors que 30% des diplômes de maîtrise et 33% des doctorats avaient été obtenus à l'étranger, en premier lieu en Europe. Les chiffres correspondants dans le rapport MESIA de 2001 étaient 49% des diplômes de maîtrise et 65% des doctorats, indiquant la capacité grandissante des pays africains de décerner des diplômes de troisième cycle.

Dans de nombreux cas, les diplômes étaient de modèle "sandwich" ou "split site" (en co-tutelle), indépendemment du lieu où le diplôme avait été décerné, avec des séjours partiels dans des institutions étrangères. Ce type d'études permet un transfert continu de connaissances, et la recherche a tendance à être plus basée sur des sujets pertinents pour le pays d'origine. Dans ces cas, la bourse IFS/OIAC peut constituer un facteur décisif en permettant à une partie de la recherche d'être basée dans l'institut d'origine. Ainsi, 45 boursiers ont passé au moins deux mois dans une institution étrangère. Les expériences et les possibilités d'apprentissage durant ces périodes créent des chercheurs pluriqualifiés avec des expériences gagnées et à l'institut d'origine, et à l'étranger. De ce point de vue, la bourse de stage de l'OIAC est de grand valeur.

La majorité des boursiers détenait un emploi stable avant de recevoir les bourses IFS/OIAC, et ils sont souvent chargés d'enseignement à l'université ou chercheurs dans un institut de recherche. Huit étaient professeur associé ou professeur. Le critère de promotion de loin reconnu le plus important est, quel que soit le pays, de publier dans les revues internationale, et 91% des réponses accordaient à ce critère la plus grande priorité avec un mximum de 5 points. Sept chercheurs ont reçu une offre d'emploi de l'étranger et deux l'ont acceptée, respectivement en Afrique et en Europe.

La plupart des scientifiques ayant répondu travaillaient dans des universités publiques (72%) ou dans des instituts de recherche publics (28%). Une minorité travaillait aussi dans des universités ou instituts de recherche privés en plus de leur travail public. Quatre cinquièmes enseignent régulièrement, avec une médiane de 10 heures, mais avec une fourchette de 1 à 40 heures par semaine. La valeur médiane de temps consacré à la recherche était de 22 heures par semaine, avec une fourchette de 4 à 70 heures; tous les boursiers ayant répondu faisaient aussi de la recherche. Vingt-et-un boursiers s'adonnaient à des activités complémentaires en plus de leur travail ordinaire, le plus fréquemment de l'enseignement ou un travail de consultant. Les boursiers envisageaient plusieurs développements dans leur carrière à venir. 72% prévoyaient une carrière scientifique nationale, 35% considéraient une carrière scientifique à l'étranger et 41% espéraient travailler pour une organisation internationale. Une entreprise privée ou une carrière politique n'étant pas considéré comme des choix attirants.

Presque tous les boursiers travaillaient avec d'autres scientifiques. Les contacts avaient augmenté sensiblement après la réception de la bourse; 32% des boursiers ayant des contacts quotidiens ou mensuels avec des chercheurs d'autres instituts dans leur pays avant la bourse, en avaient 77% après. Les chiffres pour des contacts scientifiques avec des autres pays en Afrique avaient augmenté de 10% à 31%, avec l'Europe de 31% à 53%, et avec les Etats-Unis ou le Canada de 18% à 32%.

Seuls 17 chercheurs ont déclaré d'autres financements de recherche depuis réception de leur première bourse IFS/OIAC. Les financements de source nationale sont compris entre 500-6.000 USD par année; les montants plus élevés étaient accordés dans les pays avec le RNB par habitant le plus élevé. Les financements fournis par des organismes internationaux variaient en ce qui les concerne entre 3.000 et 44.000 USD par année. 37 boursiers dépendent actuellement en premier lieu de la bourse IFS/OIAC. Depuis le début de leur carrière de recherche, 32 boursiers ont reçu des financements d'environ 50 autres donateurs, mais 22 n'avaient reçu que des financements IFS/OIAC. L'IFS, en particulier, devrait aider les boursiers à trouver des possibilités plus larges de financement.

En décembre 2006, 77% des boursiers ont dit pouvoir accéder "facilement" à l'Internet, comparé à 50% dans l'étude MESIA sept années auparavant, mais il se peut que la capacité actuelle, ou vitesse de connexion, ne soit pas suffisante pour une utilisation efficace des bases de données bibliographiques. 46% des répondants ont déclaré avoir accès à des bases de données bibliographiques, équivalant les 45% de l'étude MESIA.

Les boursiers avaient participé à un total de 247 conférences à l'extérieur de leur pays d'origine. Presque la moitié de celles-ci ont été organisées en Afrique. Presque la moitié des chercheurs n'ont cependant été à l'étranger pour participer à une conférence que deux fois, ou pas du tout, durant la période de huit ans 1999-2006. Les boursiers sont encore beaucoup trop rarement exposés à des conférences régionales et internationales.

Interrogés sur les principaux facteurs limitant l'avancement de leurs travaux de recherche, les boursiers ont déclaré que les principaux problèmes étaient le manque de financements et le manque d'accès aux équipements. Suit le manque de consommables et de fournitures. La réparation d'équipements est une des principales difficultés récurrentes. Une infrastructure de mauvaise qualité, l'accès difficile à la documentation et un manque de bons techniciens et étudiants constituaient aussi d'importantes difficultés.

Les boursiers ont publié environ 500 articles durant la période 1999-2006. Un tiers de ces articles a été publié dans des revues scientifiques figurant sur la liste ISI. Les boursiers ont publié dans 232 revues; 142 de celles-ci ont été éditeur seulement une fois. Seules 29 revues sont communes pour les boursiers qui ont reçu leur diplômes dans leur pays d'origine et pour ceux qui l'ont obtenu a l'étranger. De plus, la moitié de tous les articles publiés l'ont été dans ces 29 revues, parmi lesquelles 17 figurent sur la liste ISI. Chaque boursier a publié en moyenne un article par an dans une revue internationale. Le nombre moyen de publication n'est que de 0,2 dans les revues nationales et régionales. Le taux de publication le plus élevé a lieu de quatre à cinq ans après l'obtention de la bourse. Seuls 12 articles (2,5%) étaient rédigés par des auteurs uniques. Les noms des boursiers figuraient en tête dans presque la moitié des articles avec plusieurs co-auteurs, et un peu plus fréquemment lorsque des scientifiques internationaux étaient parmi les co-auteurs. Des séjours prolongés à l'extérieur du pays d'origine favorisent les publications, ce qui peut être prévu pour des séjours de recherche loin des devoirs quotidiens. Il semble aussi y avoir une corrélation positive entre le nombre de publications et le RNB par habitant.

Durant la période 2005-2006, 159 étudiants de maîtrise et 74 de doctorat avaient un boursier IFS/OIAC comme superviseur ou co-superviseur. Il peut être supposé que nombre de ces étudiants bénéficiaient aussi pour une certaine mesure des équipements acquis dans le cadre de la bourse IFS/OIAC. Les boursiers ont joué aussi des rôles important dans un nombre d'événements variés sur les plans national, régional et international, ainsi que dans des activités de vulgarisation, aussi bien au sein de leurs propres sociétés que dans la communauté scientifique.

Quel a été le rôle joué par la bourse IFS/OIAC? La plupart des boursiers auraient tenté de poursuivre leurs recherches même sans obtenir une bourse, mais à une moindre échelle ou sous une forme complètement différente. Par contre, un tiers des boursiers provenant de pays avec un RNB par habitant inférieur à 600 USD a déclaré qu'ils n'auraient pas continué dans la recherche. Il est possible que certains chercheurs auraient poursuivi leurs travaux de recherche à l'étranger, avec le risque de fuite des cervaux, ou au moins celui de diminuer la masse critique des chercheurs dans leur pays d'origine. La bourse IFS/OIAC a changé les possibilités de pratiquer la recherche pour de nombreux chercheurs, et la moitié des boursiers a changé de sujet de recherche. Les équipements et produits chimiques obtenus grâce aux bourses ont permis aux boursiers d'effectuer les recherches de leur choix. Les bourses ont aussi rendu possible la poursuite d'un programme "sandwich", sur un sujet pertinent, permettant aux boursiers de demeurer au sein de leur famille plutôt que de partir à l'étranger à temps plein.

L'IFS et l'OIAC proposent aussi des types de soutien additionnels. Le soutien additionnel IFS le plus apprécié était la participation à des conférences scientifiques, ou à des ateliers thématiques IFS. Seuls quelques réponses mentionnent les opportunités OIAC, mais ceux qui l'ont fait en ont grandement bénéficié, du soutien en équipement et de stage aux cours de développement des capacités analytiques. Les avantages les plus notables du fait d'être boursier, affirmées dans 90% des réponses, sont les possibilités de collaboration avec des partenaires nouveaux, et une augmentation du soutien scientifique et technique de la part de leurs instituts, surtout pour ceux originaires des pays plus pauvres.

Trois thèmes principaux peuvent être discernés dans le recherche soutenu par IFS/OIAC: l'utilisation de plantes, cultures ou autre matériel locaux;

l'amélioration de l'économie, soit pour les pauvres, soit pour l'économie nationale, en réduisant le besoin d'importer des biens et en créant une base pour des produits d'exportation; et l'établissement d'une base solide pour la gestion durable des ressources de la terre et de l'eau.

Le principale contribution des boursiers à l'avancement de la science était constituée par un nouveau savoir dans le domaine de la composition chimique des plantes, y inclus de nouvelles molécules ; un savoir sur l'efficacité et la sécurité de la médecine traditionnelle et sur les valeurs nutritionnelles ou industrielles des cultures locales ; et un savoir sur la pollution de l'environnement. La synthèse chimique ou la modification de composés naturels a été exécutée dans quelques cas. L'analyse chimique est prédominante, mais la biochimie, la biologie moléculaire et la pharmacologie/toxicologie étaient aussi représentés. La plupart des boursiers ont considéré leurs communautés locales ou nationales lors du choix de leurs sujets de recherche. Au total 30 chercheurs (y inclus la plupart des boursiers pré-2005) ont publié des articles basés sur leurs recherches soutenues par IFS/OIAC, représentant plus de 70 publications.

Une majorité des boursiers a trouvé l'administration de la bourse excellente et la procédure de sélection de bonne à excellente, mais ils étaient moins satisfaits des aspects impliquant les conseils scientifiques et le soutien pour l'entretien des équipements de recherche. Le soutien par l'IFS ou l'OIAC le plus demandée, choisie à partir d'une liste de 22 éléments, concernait une bourse pour des équipements coûteux, réclamée dans 72% des cas. Cette priorité a été confirmée par les participants à l'atelier. 53% des chercheurs souhaitaient des bourses pour participer à des ateliers scientifiques, conférences ou écoles d'été, ainsi que des bourses pour des articles consommables. Suivait une visite de quelques mois dans un centre d'excellence. Les jeunes scientifiques ont manifesté peu d'intérêt pour un soutien à des visites régionales, mais ils ont montré un intérêt plus élevé pour la participation à des réseaux régionaux. Les participants à l'atelier désiraient une collaboration régionale accrue. Selon les réponses, les éléments les moins importants étaient le soutien pour les brevets et pour la protection de la propriété intellectuelle, le raccordement Internet et le transfert d'équipements d'occasion à titre de don.

En conclusion, la bourse IFS/OIAC, même si elle est relativement modeste (10-12.000 USD), a bien servi à initier des projets, de même que catalyser la poursuite de la recherche. La majorité des boursiers a entrepris des recherches de grande pertinence pour leur pays d'origine, et ils publient aussi bien localement que dans des revues internationales. Le soutien fourni par IFS/OIAC contient néanmoins une marge d'amélioration.

Vu les conclusions de l'exercice d'évaluation, il serait opportun que l'IFS et l'OIAC considèrent sérieusement les aspects suivants:

- Soutenir et encourager les boursiers à trouver des possibilités de financement
- Financement accru pour la deuxième bourse
- Bourses pour équipements plus onéreux
- Financements pour le fonctionnement et la réparation des équipements
- Formation pratique in situ répétée des techniciens – et des boursiers – sur le maintien, la réparation et l'usage optimal des équipements.
- Soutien pour participer à des conférences scientifiques renomméeset financement de visites de recherche à des instituts de recherche de qualité
- Encouragement de la collaboration régionale.

1 Introduction

The International Foundation for Science (IFS) is a not-for-profit, non-governmental organisation founded in 1972. The mission of IFS is to contribute towards strengthening the capacity of developing countries to conduct relevant and high quality research on the sustainable management of biological and water resources. IFS has awarded more than 6,500 research grants, and additional support, to some 4,500 young scientists in over 100 developing countries.

The Chemical Weapons Convention is an international treaty which bans the development, production, stockpiling, transfer and use of chemical weapons, and also stipulates their timely destruction. The Convention entered into force in 1997 and mandated the **Organisation for the Prohibition of Chemical Weapons (OPCW)** to eliminate the scourge of chemical weapons forever and to verify the destruction of the declared chemical weapons stockpiles within stipulated deadlines. The goal is a world in which cooperation in the peaceful uses of chemistry is fostered. The Organisation's division for International Cooperation focuses on capacity building for the peaceful applications of chemistry in areas which are relevant to the Chemical Weapons Convention. A number of programmes are being implemented by the Organisation which are primarily designed for Member States whose economies are either developing or in transition.

IFS and OPCW have given joint grants since 1998 to a number of researchers from developing countries, doing research in their home countries. The grants are up to 12000 USD, and are administered by IFS. Grants can be sought for basic research items, such as equipment and consumables, literature, and field work, and can be given up to three times. The general age limit is 40 years, but may be extended for African scientists. The grants are competitive; about one fourth of the applicants are awarded a grant. Both organisations have additional possibilities for support.

IFS and OPCW decided to undertake an evaluation of the IFS/OPCW joint funding, in order to see its effect and how it could be improved. The evaluation is mainly based on answers to a questionnaire, but also on contributions at a workshop with grantees, and on a few interviews.

The questionnaire, based on the one developed for IFS MESIA[7] studies, was prepared in one English and one French version and was sent in October 2006 to the 71 African scientists who received the joint grant in 1998 to 2005. By February 2007, 77% of the grantees had responded. All grantees, who have so patiently filled in yet another questionnaire, are greatly acknowledged. The English version of the questionnaire is given in Appendix 1.

The workshop was held in Nairobi in December 2006 to discuss the IFS/OPCW support, and for participants to present their research to each other, and to IFS and OPCW representatives. About half of the IFS/OPCW-supported researchers, and some other speakers including six presenting African networks, were invited. The grantees were chosen to represent all parts of Africa, different age groups, both genders, and different areas of research. The results of the discussions are interwoven mainly into Section 9, on assessment and priorities of assistance from IFS and OPCW. Summaries of the presentations are given in the Book of abstracts, available from IFS.

Data from the present study are sometimes compared with the MESIA 2[8] and MESIA 5[9] studies. These are studies of the situation for researchers and the impact of the IFS grant, covering the period up to 1999 and 2002, respectively.

[7] IFS Monitoring and Evaluation System for Impact Assessment
[8] J Gaillard, A Furó Tullberg: Questionnaire survey of African scientists. MESIA Impact Studies, Report No 2, IFS 2001
[9] J Gaillard, E Zink: Scientific research capacity in Cameroon. MESIA Impact Studies, Report No 5, IFS 2001

2 Responses to questionnaire

The questionnaire sent to the grantees was jointly developed by the evaluator, IFS and OPCW. An earlier questionnaire developed by Gaillard et al (2001)[4] formed the basis of this modified version prepared in both English and French. The English version is presented in Appendix 1.

In total, 71 African scientists were recipients of joint IFS/OPCW grants from 1998 to 2005 (no joint grants were offered in 2000), cf Figure 2.1. One of the grantees passed away during this period. Thirteen of the grantees had received an IFS grant some years prior to the IFS/OPCW grant, as shown in Figure 2.2 and reflected in the lower number of first grants in 2005, compared to Figure 2.1. Sixteen of the grantees received a total of two or three grants from IFS, of which three received the IFS/OPCW joint grant twice. It is inevitable that some responses relate to both the IFS and the joint IFS/OPCW grant. Several of the questions focus on the period from 1998 or 1999 in an attempt to catch the situation during the joint grant.

The questionnaire was sent out both by e-mail and ordinary post to the African scientists who had received joint IFS/OPCW grants. It was first sent out in October 2006, and 39% of the 70 grantees alive responded. After an electronic reminder in November, another 31% responded, and responses to a second reminder, in January 2007, gave a total of 77% responses. A somewhat higher response rate was observed from the 51 male than from the 19 female grantees (82% responses vs 63%), but no significant difference in response from the 54 grantees who had received one grant vs the 12 ones who had received two grants (76% responses vs 83%). Three of the four who had received three grants (including earlier IFS grant), and five of the eight whose support was completed had responded. Among the 16 not responding were both newcomers and early grantees, as seen when comparing Figures 2.2 and 2.3.

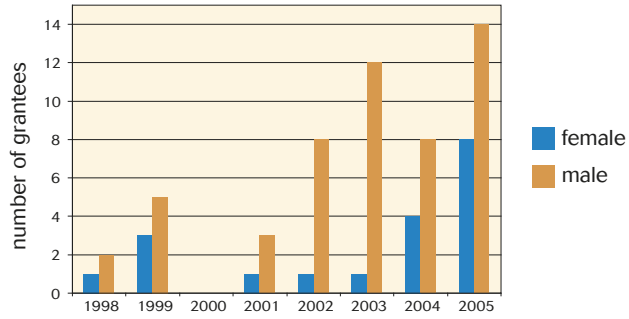


Figure 2.1. Year for first IFS/OPCW grant (n=71)

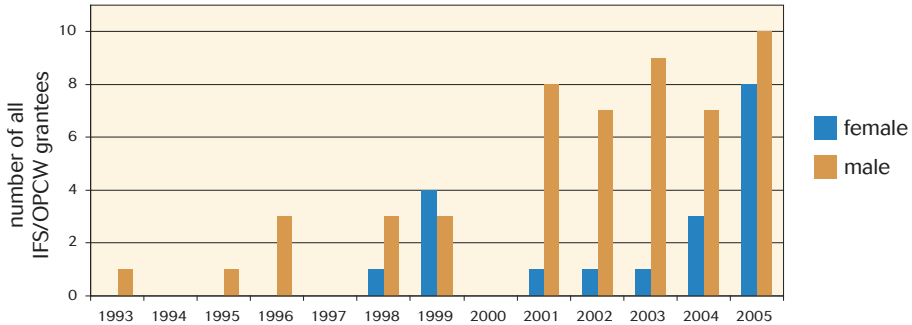


Figure 2.2. Year for first IFS or IFS/OPCW grant (n=71)

Figure 2.4. Number of responding grantees from respective countries

In conclusion, the response rate was satisfactory, and the sample as presented in Figure 2.3 gives a fair overview of the IFS/OPCW grantees. The coverage of the African continent was also reasonably good, see Figure 2.4.

The responses suggest that while all grantees are continuing with their research, some scientists are more actively engaged in research than others. Among the non-respondents, IFS contacts have confirmed that several grantees are still engaged in research in their home countries.

Table 2.1. Responses to the questionnaire

Sex	Sent	Received	Response rate
Female	19	12	63%
Male	51	42	82%
Total	**70**	**54**	**77%**

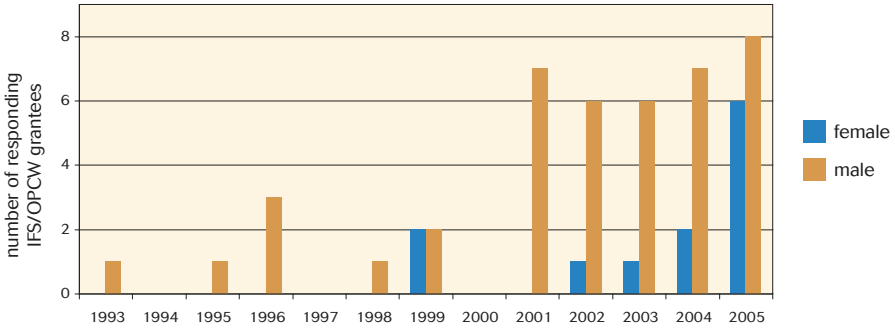


Figure 2.3. Year when *responding* grantees got their first grant (n=54)

3 Who are the grantees?

3.1 Geographical distribution

The IFS/OPCW grantees in Africa come from 17 countries, 7 Francophone and 10 Anglophone, see Table 3.1. None of the grantees came from the former Portuguese colonies, an observation that conforms to an earlier MESIA survey. Table 1 indicates the country of residence of the grantees at the time of grant application. Two of the grantees had moved within Africa before applying (to Botswana and South Africa, respectively).

The IFS aims to increase its support towards poorer countries. Table 3.1 gives the Gross National Income per capita (GNIpc) for 2005[10]. Although a rough and debated measurement that does not reflect income distribution, it provides a general overview of the economic conditions in the country. Just over half of the grantees (38) come from countries with a GNIpc of <600 USD, and the rest (33) from countries with a GNIpc of 1000. Among the 36 receiving their joint grant up to 2003, 50% were from countries with less than 600 USD per capita, while the figure for those receiving the grant in 2004-2005 had increased to 57%. (For comparison can be mentioned that the GNIpc for Sweden was 41060 USD).

3.2 Gender (Q 5)

Overall, 27% of the grantees were female (n=19), which can be regarded a comparatively good figure in Africa. In the MESIA report of 2001, covering the period 1974-99, this proportion was just 15%. In recent years, there has been an increased number of IFS/OPCW grants, and an increasing share of

Table 3.1. Grantees' residence country at time of application

Country	GNI per capita, USD 2005	Number of all IFS/OPCW grantees			Number of responding grantees
		female	male	total	total
Algeria	2730		2	2	1
Benin	510		1	1	1
Botswana	5180		2	2	2
Burkina Faso	400	1	5	6	6
Cameroon	1010	1	12	13	11
Ethiopia	160		2	2	2
Ghana	450		1	1	1
Kenya	530	4	8	12	6
Madagascar	290	1	1	2	2
Mauritius	5260	1		1	1
Morocco	1730	3	4	7	5
Nigeria	560	3	3	6	4
South Africa	4960	2	3	5	4
Tanzania	340		1	1	1
Tunisia	2890	1	2	3	3
Uganda	280	2	1	3	3
Zimbabwe	340		4	4	1
Total		**19**	**52**	**71**	**54**

[10] World Bank statistics

grants given to females, see Figure 2.2. This may be an indication of IFS's increased efforts to attract more female applicants, but also reflects the achievement of African universities in facilitating female access to higher education.

The proportion of females was similar in countries with a GNIpc of <600 and 1000 USD, 29% and 25%, respectively.

As mentioned below, the women were 24-40 years old when they received their first grant, with a median of 33 years. These figures correspond well with those of the Cameroonian study (MESIA 5). While this was an even smaller sample, it does nonetheless strengthen our present findings. Married female researchers with up to four children were still able to pursue their studies at the same pace as the men. However, nearly half of the responding women were single, with no children.

3.3 Age (Q 6)

The age at which the grantees got their first grant varied between 24 and 44 years, with a median of 36 years (see the distribution in Figure 3.1.) Nine were at or above the "classical" IFS age limit of 40; all but one were men. The principal argument in favour of increasing the age limit for Africans is to give women a chance to apply after raising children. In this investigation the women were between 24 and 40 years, with a median of 33 years (median for men was 36 years). It seems to be the case that not many women are aware of the fact they are still eligible to apply for grants after the age of 40.

Do researchers tend to be younger nowadays than they were previously? As reflected by the year of the

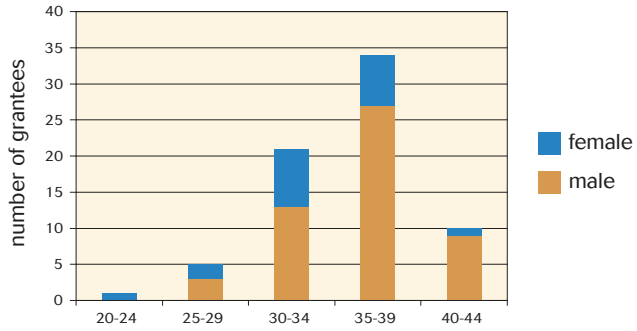


Figure 3.1. Age when receiving first grant (n=71)

first grant, the median of 34-36.5 years of age was astonishingly constant from 1993-2005, but the youngest first-year grantees received their grant in the last years (Table 3.2). Is there a difference in age between the poorest and the somewhat richer countries? Again the span between the ages were similar, with medians of 36 years in both categories (GNIpc <600 and 1000 USD, respectively).

Table 3.2. Age upon receipt of first IFS or IFS/OPCW grant (n=71)

year for first grant	median age	age span	n
1993-96	36	33-38	5
1998	36	36-41	4
1999	34	32-39	7
2000	-		0
2001	35	31-39	9
2002	36	30-41	8
2003	35.5	28-40	10
2004	36.5	31-44	10
2005	34.5	24-42	18

The present age (December 2006) of those responding to the questionnaire was 25-49 with a median of 39 years and a distribution as shown in Figure 3.2. The females were 25-41 years old, median 36 years.

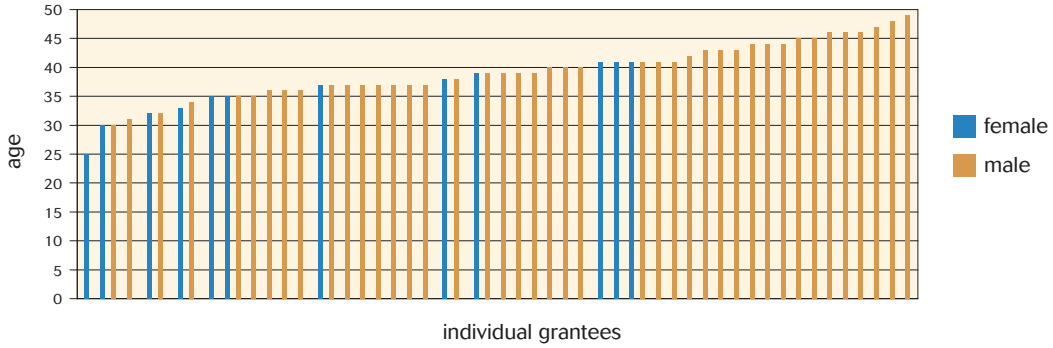


Figure 3.2. Present age (2006) of responding grantees (n=54)

3.4 Family Situation (Q7, 8, 9)

Among the total number of respondents, the majority (44) of respondents were married and ten were single. Close to half of the females responding (42%) were singles, equally spread over the ages, whereas the figure for men was 12%. All married women had two to four children.

Most grantees with families had two or three children (cf Figure 3.3). This low number is in contrast to the great number of children usual in traditional agricultural societies. There may be several reasons for the reduced number. With access to health care the risk of losing a child is minimized, although malaria still takes its toll. The costs of providing a child a good education is high in view of the low salaries. When both parents are also working out of home (see below) there is less time to take care of many children.

Most spouses were working outside their homes. Only 19% of female spouses were housewives (there were no housemen). Among all the spouses, 16% were housewives, comparable with 17% as reported in the MESIA 2 report. In most cases the wives working out of home did not hold positions demanding as high level of education as the IFS grantees enjoyed. Their main occupations included school teachers but professors and PhD students were also among the female spouses.

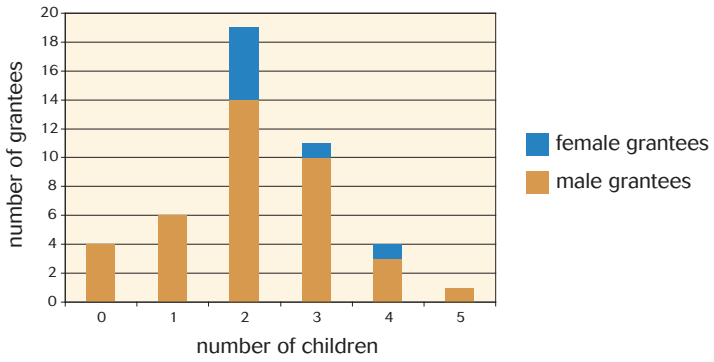


Figure 3.3. Number of children per grantee (n=45)

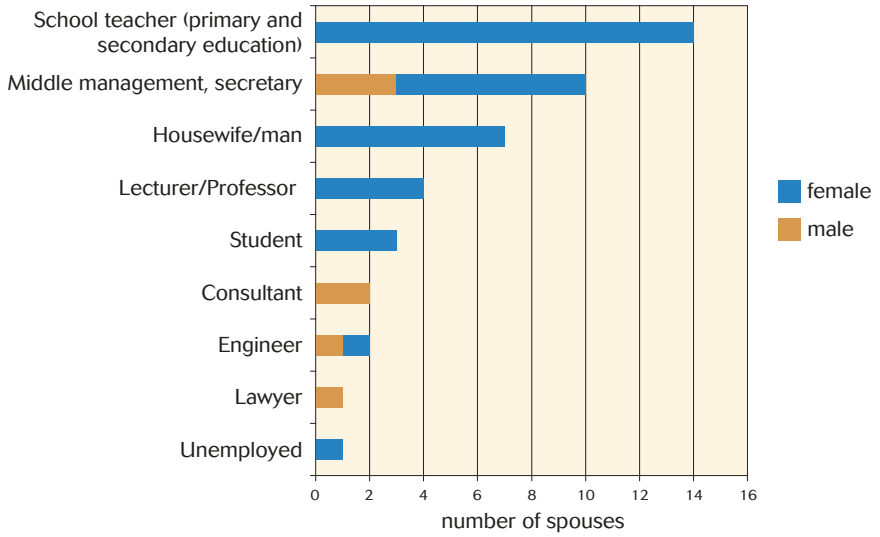


Figure 3.4. Principal occupation of the spouse (n=44)

4 Academic and job career

4.1 Research areas

IFS supports research on biological and water resources. For administrative purposes the applications are handled within eight research areas, cf Table 4.1, but there are no distinct boundaries between the programmes. The OPCW supports the peaceful uses of chemistry. Therefore, the joint IFS/OPCW grants cover most of the IFS research areas with a chemical component. The distribution among research areas was as given in Table 4.1 and Figure 4.1. The majority of grantees fall within the area of 'Natural products', where research is primarily focussed on the characterisation of molecules from local plants, mushrooms and marine organisms. While no grants were given in the field of social sciences, applications regarding social studies of sustainable use of chemistry for development should be encouraged in the future. The recently launched programme on Water resources and environment, where chemistry plays a large role, explains the relatively low number of joint grants given in this area up to 2005.

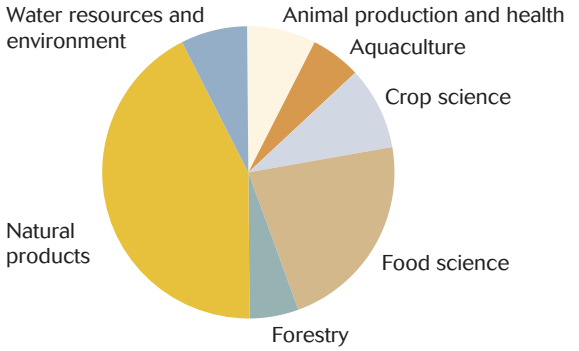


Figure 4.1. Responding grantees' main research area (n=54)

Table 4.1. Grantees' main research areas by gender (n=71)

IFS Research area	Number of IFS/OPCW grantees		
	female	male	total
Animal production and health	1	4	5
Aquaculture	1	2	3
Crop science	2	7	9
Food science	3	9	12
Forestry	2	2	4
Natural products	8	24	32
Social sciences	0	0	0
Water resources and environment	2	4	6
Total	19	52	71

4.2 Degrees obtained (Q 10)

In total, 41 (76%) of 54 respondents held at least a PhD or a Doctorat de 3ème cycle. Among the 13 who held an MSc as their highest degree, 7 were studying for a PhD. Twenty-one of the PhDs had done a postdoc or had received a Doctorat d'Etat, and at least four others were on their way.

The majority of grantees had a PhD or had done a postdoc when receiving the first grant, but several applicants had started off with an MSc, cf Table 4.2. Eleven of the grantees had reached a higher degree after receiving their first IFS/OPCW grant, and more are on their way. There is no doubt that the

Table 4.2 Degree held at the time of first IFS/OPCW grant and at time of this study (December 2006) (n=54)

Degree	No of Grantees		% of Total	
	When receiving first grant	Dec 2006	When receiving first grant	Dec 2006
MSc/Maitrise/ Ingénieur	16	13	30 %	24 %
PhD/Thèse de 3ème cyle/ Docteur Ingénieur	25	20	46 %	37 %
Postdoc/ Doctorat d'Etat	13	21	24 %	39 %

IFS/OPCW grants are contributing to their achievements in most cases.

The earliest PhD among the grantees was obtained in 1987. The bachelor's degree in most cases was obtained in the home country, whereas 30% of the MSc degrees and 33% of the PhD degrees were obtained abroad. Corresponding figures in the MESIA 2 report from 2001 were 49% of the MSc and 65% of the PhD degrees, showing the increasing capability in Africa of offering higher degrees. At the same time, there is also increasing mobility. This may be reflected in the diagrams below (Figures 4.2-4.4) which show that several students are still studying abroad. The countries where the degrees were or will be obtained are given in Table 4.3. As can be seen, most degrees were given at home (124) or in a European country (25), while ten degrees were taken each in another African country or in North America.

In recent years the Western world has seen a diminishing number of students pursuing studies in science. Research groups therefore tend to attract people from other parts of the world to keep their research momentum. In fact it is often mainly the PhD students and the postdocs who do the practical research. The same talented scientists are greatly needed for the same reason at home.

In many cases, the studies are on "sandwich" or "split site" bases, just as for many students getting their degrees at home. If this is the case, knowledge is continuously transferred, and the studies are usually still on subjects relevant for the home country; if studies are pursued full time abroad the research subject is that of the group, which most often has little immediate relevance for Africa. Here the IFS/OPCW grants can be decisive to make it possible to pursue some of the research at home, as witnessed in an interview.

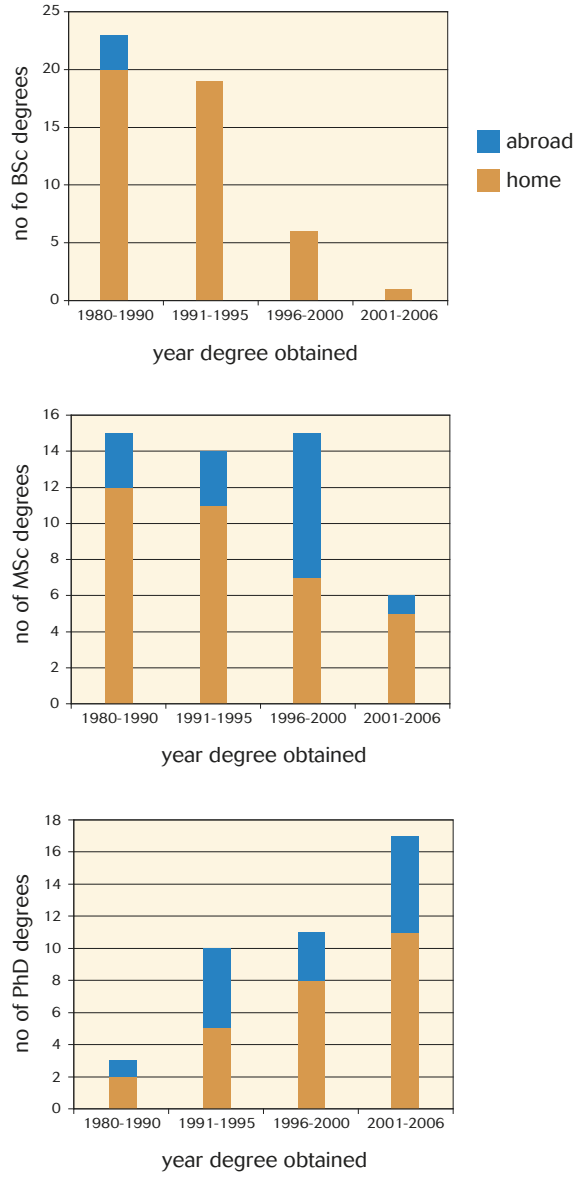
The time elapsed between the first and higher degrees varied, just as in any society, but a closer analysis the differences between Francophone and Anglophone education systems can be sensed. The mean time to get a Maîtrise or a DEA from a Licence in a francophone country is only 1.4 years while the mean time to receive an MSc from a BSc in an Anglophone country was 4.1 years. The mean times taken to obtain a PhD/Doctorat de 3ème

Table 4.3 Countries where grantees have been or will be awarded degrees

Country	BSc	MSc	PhD/ Doctorat de 3ème cycle	Postdoc/ Doctorat d'Etat	Total
home country	46	36	29	13	124
Botswana			1		1
Kenya		1			1
Nigeria	2	2	1		5
South Africa			2		2
Tanzania		1			1
Belgium		1	2		3
France		2	4	4	10
Germany			2	1	3
Netherlands		2	1	1	4
Sweden				1	1
UK		1		3	4
Canada		1	2	1	4
USA		2	3	1	6
India	1	1			2
Japan		1	1		2
Australia				1	1

Table 4.4. Extended visits to foreign countries and length of stay by indicated number of grantees (n=45)

Country	2-6 months	7-12 months	more than one year	Total no of grantees per country	Total no of visits
Botswana	2		1	3	4
Kenya		1		1	1
Nigeria			1	1	1
South Africa	1		2	3	3
Tanzania	1		1	2	2
Uganda	1			1	1
Austria		1		1	1
Belgium	1		4	5	7
France	7	1	9	17	41
Germany	6		3	9	14
Italy	1	1		2	3
Netherlands	5		3	8	12
Portugal		1		1	1
Spain	1	1		2	4
Sweden	3		2	5	8
UK	1	2	2	5	7
Canada			2	2	2
USA	1		3	4	5
Bangladesh		1		1	2
India		1		1	1
Israel	1			1	1
Japan	1	1		2	2
Australia		1		1	1
Total	**33**	**12**	**33**	**78**	**124**



Figures 4.2-4.4. Degrees obtained at home or abroad?
BSc (n=49) MSc (n=50) PhD (n=41)

cycle in the two education systems from a BSc/Licence were 6.3 and 11 years, respectively (see distribution in Figure 4.5). Here, as in the MESIA 2 report, a Doctorat de 3ème cycle has been regarded as equivalent to a PhD even if this may not be always the case. The mean time taken from a Licence to the Doctorat d'Etat was 12 years.

4.3 Extended visits abroad (Q11)

Only nine (17%) of the 54 grantees had not undertaken an extended visit abroad of two months or more. In total, the 45 grantees who had gone abroad, had been cumulatively abroad on 124 occasions, and had spent a total of approximately 1500 months abroad, cf Table 4.4. Thirty-one (69 %) of them had spent at least one year abroad; 22 grantees (41%) had spent two years or more. This contrasts with the MESIA 2 study, which reported 60% of the IFS grantees as having received main part of their education abroad. The students staying abroad for at least two years stayed on average 5-6 years. The present study comprises a majority of younger scientists, who are pursuing university studies at home or on a sandwich basis to a greater extent than before. The expansion of degree opportunities in African universities and better internet communications have most likely contributed to this trend.

It is common for African students to undertake extended visits in a laboratory abroad. This provides the student with a broad experience and makes her/him multi-skilled. The student gets experience of various techniques, research methods and research cultures, while being familiar with research

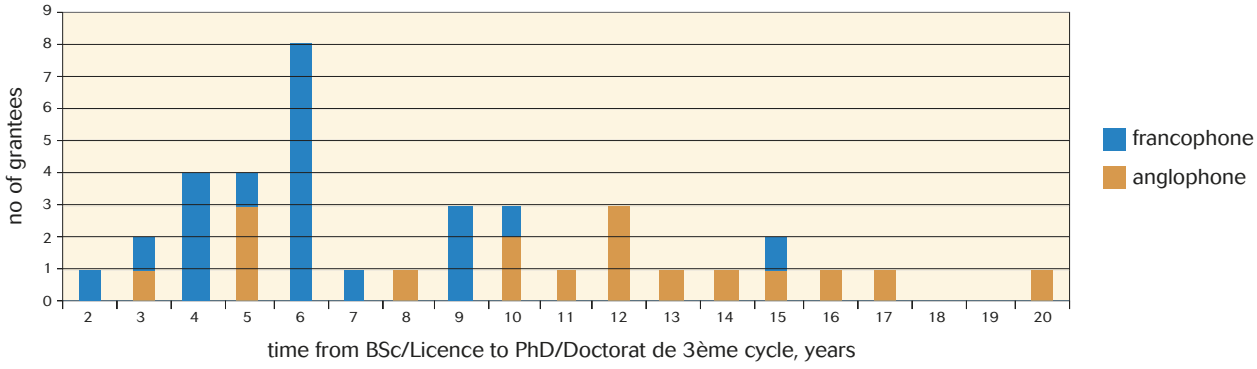


Figure 4.5. Time elapsed from basic to higher degree (n=38)

questions in low-income countries and able to cope with difficult situations. In this respect, the OPCW internship grant offers a very valuable opportunity.

For students taking their degree abroad it has proven beneficial to shift between periods abroad and at home. Not only does this provide continuous transfer of experience and knowledge, but the students are able to keep abreast with the latest scientific and social situation and development in their home countries. Cases of sandwich degrees are reflected in Table 4.4 where the number of visits is greater than the total number of grantees.

4.4 Positions held (Q12)

Most grantees held successful careers when becoming IFS/OPCW grantees. Many were lecturers or senior lecturers at university, or research officers in a research institute, when receiving their first IFS/OPCW grant. Eight were associate professors or professors, cf Table 4.5. Seven grantees were still students.

The majority of the grantees had received their grant during the period 2002-2005, thus only four years within this study. Still eight of the grantees had advanced in their careers since receiving their first IFS/OPCW grant. One grantee had been promoted to senior lecturer, three to associate professor, three to professor, and one to a higher position at the research institute. Four of these had earlier got an IFS grant, and they had all a postdoc/Doctorat d'Etat at the time of filling the questionnaire. One grantee had become head of department, and two others assistant vice dean and vice dean, respectively. While the precise contribution of the grant to these career advancements is difficult to judge, but as seen in Section 4.6, international publications constitutes an important criterion for career advancement and such publications are greatly facilitate by IFS/OPCW grants.

Table 4.5. Positions held by grantees (n=47)

Position	Place of work	Number of grantees with	
		position when receiving first IFS/OPCW grant	present position
Assistant lecturer	University	4	2
Lecturer	University	13	12
Senior lecturer	University	12	10
Associate professor	University	5	7
Professor	University	3	6
Research officer	Research Institute	8	10

4.5 Positions offered abroad (Q21)

Seven (13%) of the respondents had been offered a job abroad, three of them twice (cf Table 4.6). Several offers had been made from other African countries, but the only offer to be accepted was in Botswana. Otherwise it can be fairly attractive to work for a while in another African country, since universities may be able to pay higher salaries to expatriate teachers. Two positions had been offered in France to North African researchers but these were not taken up. The lower acceptance rate among North African scientists for positions abroad may be due to the better research environment they enjoy in their home countries compared with their Southern African colleagues. For one grantee, the choice of positions was between South Africa and Germany, but the grantee chose Germany, where the PhD degree had been obtained.

Table 4.6. Positions offered abroad (n=53)

In country	offered	accepted
Botswana	1	1
Niger	1	
Nigeria	1	
South Africa	1	
Togo	1	
France	2	
Germany	1	1
Oman	1	
Australia	1	
Total offers	**10**	**2**
none	46	

4.6 Criteria for promotion (Q34)

The material was analysed on whether there were any pronounced differences in the criteria for promotion between sub-regions or between Anglophone and Francophone countries, but no, cf Figure 4.6. The collected data suggests that the most important factor for promotion remains the

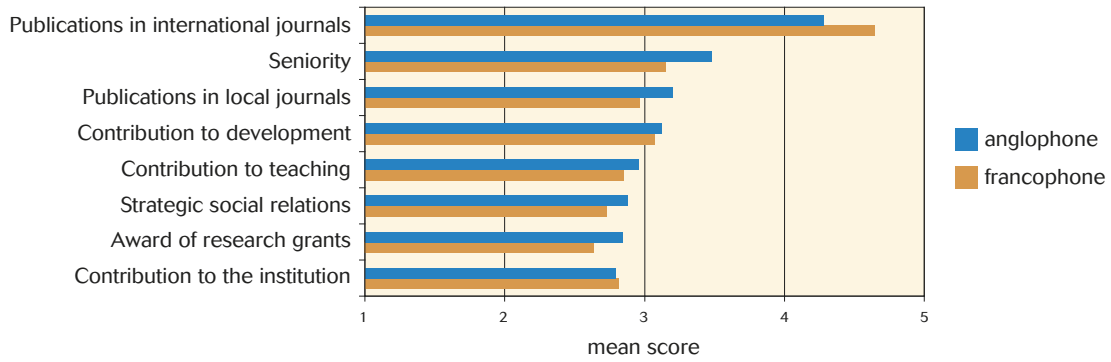


Figure 4.6. Importance of criteria for the promotion of scientists, *mean values* scores from 1=not important to 5 =very important (n=50-53)

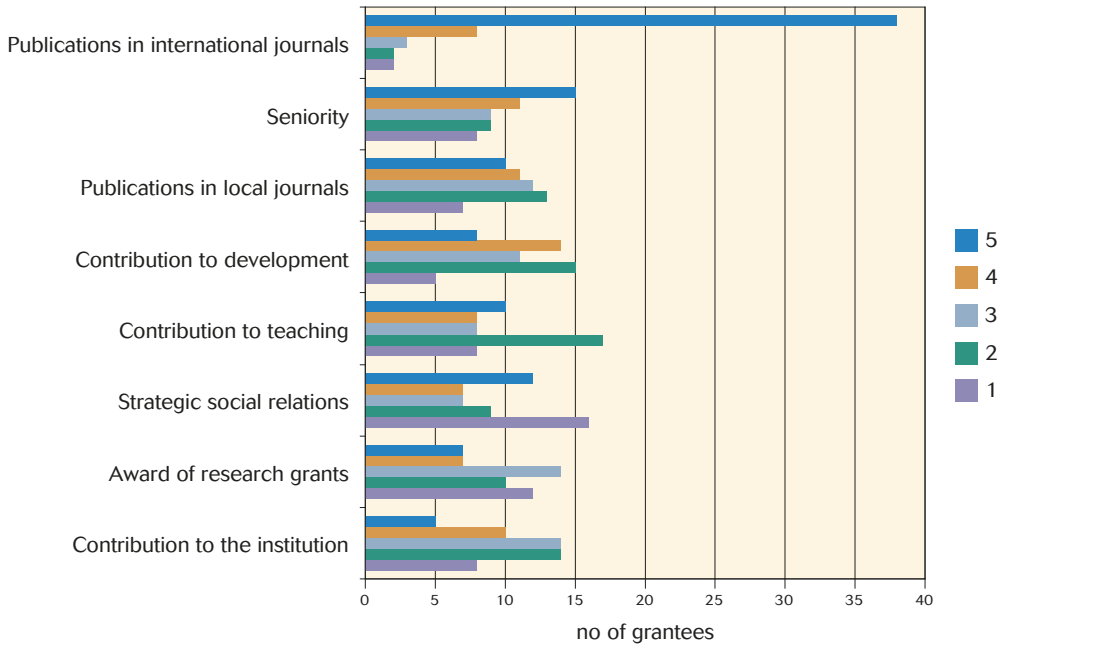


Figure 4.7. Importance of criteria for the promotion of scientists, *distribution of scores* scores from 1=not important to 5 =very important (n=50-53)

number of publications in international journals, cf Figure 4.6. The importance of international publications is even more visible in Figure 4.7, which shows that 91% of all respondents gave it the maximum score of 5. As shown in Table 7.7 it is easier to publish internationally with a degree or extended visits abroad. Whether the publication then is on a subject relevant to the country was not analysed.

Seniority was the second most important factor for promotion, but not very distant from the other factors mentioned in the questionnaire. Six of the seven respondents who gave a low score (≤3) for international publications gave the highest scores for seniority and strategic relations. No correlations among the countries were found. Nonetheless, it is noteworthy that strategic social relations appear to be rated as either very important or not at all important (Figure 4.7).

These results are quite similar to that of the MESIA 2 report, which showed mean scores for international publications of 4.2, and for all others between 2.7 and 3.3.

Table 4.7. Where do grantees work? (n=53)

Institution	Number of grantees
Public university	39
Private university	1
Public institute	15
Private institute	2
National/local govt'l organization/dept	1
International govt'l organization	1
Local NGO	1
International NGO	0
None, I am a housewife/man	0
None, I am unemployed/job seeking	0

4.7 Institutional framework (Q17)

The majority of respondents work at public universities (72%), while a lower proportion of respondents (28%) worked at a public institute (see Table 4.7.) These figures compare well with those of the MESIA 2 report of 68% and 29% respectively. Very few respondents worked at private universities or institutes. Private universities are proliferating across Africa, but most of them remain focussed on subjects that do not need laboratory practices thereby falling beyond the scope of IFS (except social sciences) and OPCW. Two of those working in a public university also worked in a public institute, and one reported to work both in public and private universities as well as in three other places.

Whereas half of those with an MSc as highest degree were working in a public institute or NGO only one fifth of those with a PhD were working in public institutes, the proportion being even less for those holding a Doctorat d'Etat.

4.8 Time allocation of work activities (Q 18)

41 of the 53 responding grantees were regularly teaching a median of 10 hours with a span of 1 to 40 hours per week. The median time devoted to research was 22 hours per week and all 53 respondents actively undertaking research. (See Table 4.8)

Half of the respondents (25 of 48, 52%) wished if possible to reduce the teaching load by up to one third. Most of them (21) wanted a simultaneous increase of their research time by 20-200% that included. time gained from less administration even while increasing the total number of hours worked. Thirteen respondents (27%) wanted to keep or increase their teaching hours while four, who were not teaching wanted to do so. Seven wanted to reduce the research time, mainly to reduce their total working load, but also to give time for extension and consultancy. One third of the respondents were satisfied with their current research situation.

Compared to the MESIA 2 report, the mean time for research increased from 47% to 58% of the working time in the present study, while the mean time for teaching has kept constant at 28% of working time. Time taken up by administrative tasks has gone down from 14 to 8%. These differences may in part be explained by the younger profile of the grantees in the present study.

The females worked in total 22-45 hours per week, except one who worked 70 hours per week on research. The ideal amount of time devoted to research among female grantees was found to be between 26-42 hours per week. Eleven of 40

Table 4.8. Allocation of time between different work tasks

Task	Present workload (n=53)			Ideal workload (n=48)		
	Number of grantees	Median hours per week	Span, hours per week	Number of grantees	Median hours per week	Span, hours per week
Teaching	41	10	1-40	39	9	2-18
Research	53	22	4-70	48	25	6-63
Administration	34	8	1-20	33	5	1-20
Extension	21	4	1-15	22	3.5	2-10
Consultancy	23	2	1-6	27	5	2-10
Other	7	5	2-20	7	5	1-15
total	**53**	**40**	**22-84**	**48**	**40**	**24-84**

responding men worked more than 50 hours per week. Astonishingly, ten of the responding 38 men wanted actually to work more than 50 hours per week, and another five wanted to work more than 40 hours per week.

4.9 Working extra (Q19, 20)

Among the responding grantees, 21 respondents often with a PhD or higher, took on extra work outside their ordinary job. Teaching or offering consultancy services figured among the most common jobs (see Table 4.9). Those undertaking additional work included 40% of both men and women, married and singles alike. The figure in the MESIA 2 report was slightly higher at 48%. The main difference among these two reports was that MESIA 2 gave a mean of 12 hours per week, while in the present evaluation with a large proportion of fresh grantees, the grantees worked extra on average 8 hours per week. The MESIA 2 report, which included many senior scientists, noted that there was a clear tendency for established scientists to spend more time on extra work, while the younger scientists tended to concentrate of their research careers. The present lower figures for outside work therefore does not necessarily reflect better economic situations for the scientists.

The above figures account for the paid extra jobs. But as can be seen from answers to question 40, several grantees are engaged in other activities, much of which constitutes volunteer work. See further sections 7.3 and 7.4.

The proportion of grantees engaged in supplementary work in teaching and consultancy were 29% and 32% respectively. 14% of the grantees worked in their own private business. The corresponding figures for IFS grantees in the MESIA 2 report were 26%, 12% and 11%. Farming was high, 14%, in the MESIA 2 report, but that study included many agronomists and was not inclined towards chemistry. Although the cohort is small in the present study, one could see a tendency towards more consultancy work.

4.10 Future career goals (Q22)

All the respondents answered the question on career goals. 9 grantees gave three or four goals, while 22 and 23 respondents gave one and two goals, respectively. Six intended to leave research in the future, some of whom were senior scientists seemingly nearing the end of their research careers. Thirty-nine grantees (72%) were aiming at a national scientific career, while for 14 grantees, such a career was the only alternative.

In total, 21 respondents had the wish to work internationally. Ten had both a national and an international scientific career in mind, and another eight wanted to combine national research with work in an international organization. Five of those with the goal of a scientific career abroad had no alternative or only the alternative to work with international or foreign organizations, while four of them could also work within national development programs. Another three only aimed at working with international organizations. Thus eight grantees were focused on an international career, but international organizations can be situated in one's home country, so the brain drain may not be that pronounced.

Table 4.9. Type of extra work (n=21)

Type of work	no of grantees	hours per week	median hours per week
Teaching	8	1-12	5
Farming	1	not given	
Own local consultancy	6	1-12	10
Somebody else's local consultancy	4	2-10	4.5
Own international consultancy	3	1-8	1
Somebody else's international consultancy	0		
Own private business	4	2-7	5.5
Somebody else's business	1	18	18

Table 4.10. Future career goals indicated by respondents in this study, and the MESIA 2 and 5 studies on African and Cameroonian scientists, respectively
(percentage of respondents giving a specific answer)

Career choice	this study, % (n=54)	MESIA 2 study, % (n=approx 480)	MESIA 5 study, % (n=47)
National scientific career	72	61	66
Career with foreign or international organizations*	41	-	-
Scientific career abroad*	35	-	-
Career with foreign or international organizations *and/or* Scientific career abroad	72	4	51
Career within national development programs	20	41	6
Own consultancy (incl medical practice)	6	2	11
Private business	4	17	4
Career in administration	2	9	13
Career in politics	0	4	4

* in the MESIA 2 and 5 questionnaires these two questions were combined

At many African universities as well as in the international donor community there is an increasing focus on the practical applications of research in the local community. In this respect, there were too few researchers who aimed at private business (2 respondents). None had a desire to enter politics.

The results of this study were compared with the MESIA 2 study, on African scientists, and the study no 5, on Cameroonian scientists, all approached in 2000, cf Table 4.10. The two MESIA studies did not contain questions concerning international scientific careers, so for comparative purposes, questions about international scientific career and work in international organizations have been combined in Table 4.10. It is quite apparent that the general trends of the present study are quite similar to the Cameroonian study.

5 Research practice, communication and perception of research

5.1 Perceptions of research (Q28)

The grantees were asked to give their view on the role of science and research, as well as how free they felt when selecting a research topic. The result was very similar to those of the MESIA 2 and 5 reports, cf Table 5.1. The grantees were highly convinced that science contributes to development, with a mean score close to the maximal 5, with a lowest score of 3. Scientific knowledge is universal, and should preferably be of practical value. Researchers are to some extent free to choose their research question, more often than not. Compared to the MESIA 2 and 5 studies, the feeling that scientific knowledge is universal has slightly decreased, but still gets a high score.

The material was analysed to see whether there were differences in perception depending on work place, language of research environment, or GNIpc, cf the complex Figure 5.1. Generally there were no big differences, except for the view on whether science is public knowledge, where those from universities were more positive than those from public institutes. Furthermore, those from francophone or from 'richer' countries were slightly more positive to the production of goods for competitive markets, and felt to a higher degree that research topics were set by the sponsors.

5.2 Mono/multidisciplinary research (Q 26)

Most grantees (85%) responded that their work was of a multi-disciplinary nature even among those who worked alone or only with the students. This question is not straightforward as the meaning of multidisciplinary itself is contested. It may mean different branches of chemistry, or it may mean chemistry together with other disciplines. The best multidisciplinary research would be in a team of people, each with profound knowledge in her or his own discipline.

Table 5.1. Responses to value statements given by respondents in this study, and the MESIA studies 2 and 5, respectively 1=disagree completely to 5=agree completely (mean values)

Value statements	this study (n=51-54)	MESIA 2 study (n≈480)	MESIA 5 study (n=41-47)
Science contributes to development	4.8	4.9	4.8
Scientific knowledge is universal	4.3	4.6	4.7
Science should mainly lead to useful innovations	4.1	4.1	4.1
Science should firstly produce knowledge	4.1	4.2	4.1
Researchers should have entrepreneurial and managerial skills	3.7	3.8	3.9
Science is public knowledge	3.7	3.7	3.6
Researchers are free to choose their own research topics	3.5	3.7	3.5
Researchers should produce goods for a competitive market	3.5	3.6	3.8
Research problems are set by clients	3.3	3.5	3.4
Research topics are set by sponsors	3.3	2.7	3.1
Research topics are set by employers	2.9	2.6	2.9

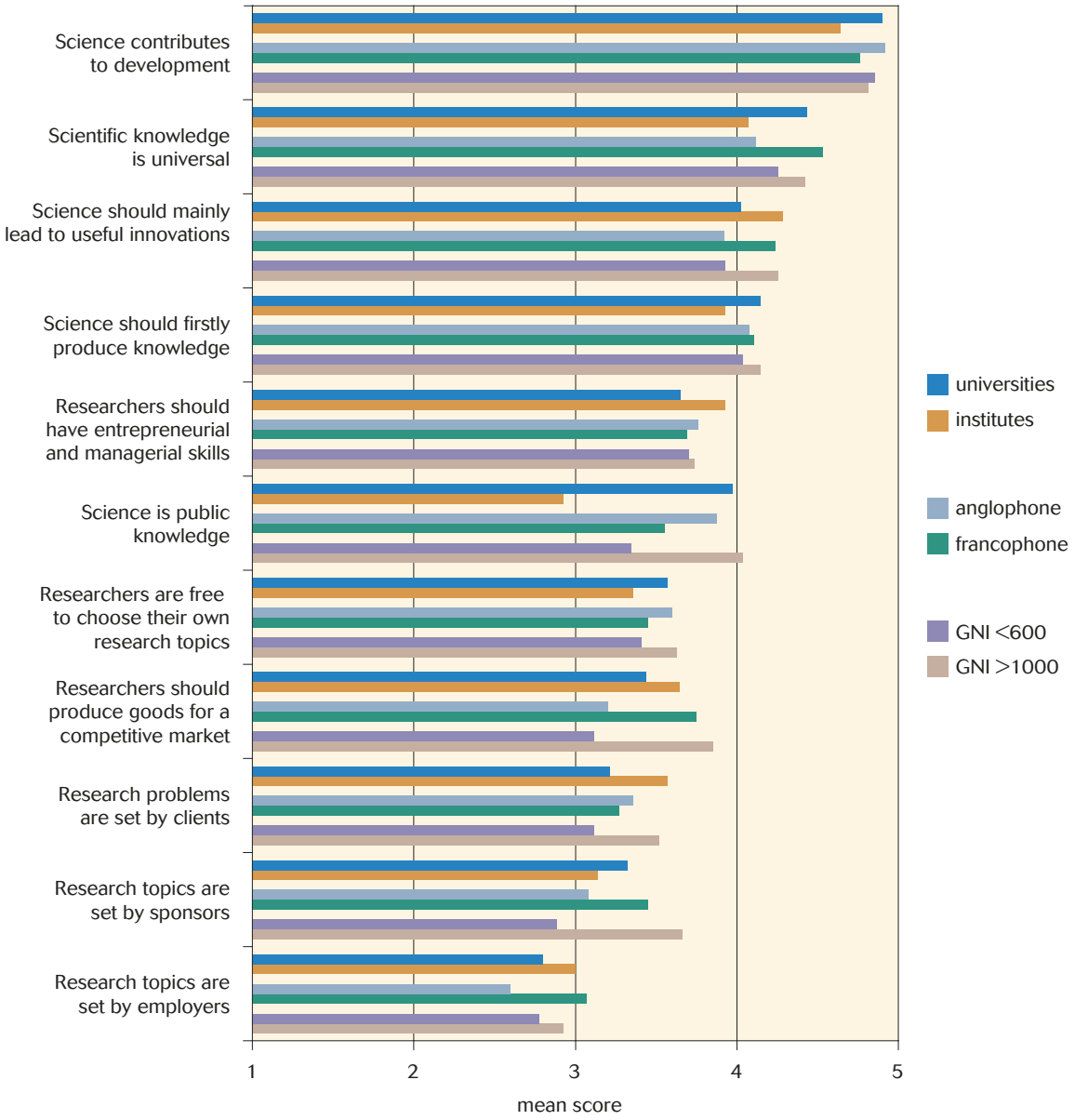


Figure 5.1. Responses to value statements, according to institutional framework, according to anglophone vs francophone research environment, and according to countries' GNIpc.
1=disagree completely to 5=agree completely (mean values; n_51-54)

5.3 Interaction with others (Q 25, 27)

Among the 54 respondents, only one grantee reported to work alone and one to work only with his students. Thus 96% were working with other scientists, which corresponds to the 90% of the MESIA 2 and 5 reports. It is not known whether the aim of working together was to share resources, discuss scientific problems, or merely to discuss teaching methods. However, it is known that while the grants are disbursed on an individual basis, the equipment and chemicals purchased with the IFS/OPCW grant often has collective benefit for other researchers of the same institution.

Communication among scientists is essential in order to test ideas and to discuss problems. Figure 5.2 gives the frequency in communication with various communities. A fair number of the grantees also tried to estimate contact frequency before getting the IFS/OPCW grant, and their change in communication pattern is given in Figure 5.3. There was

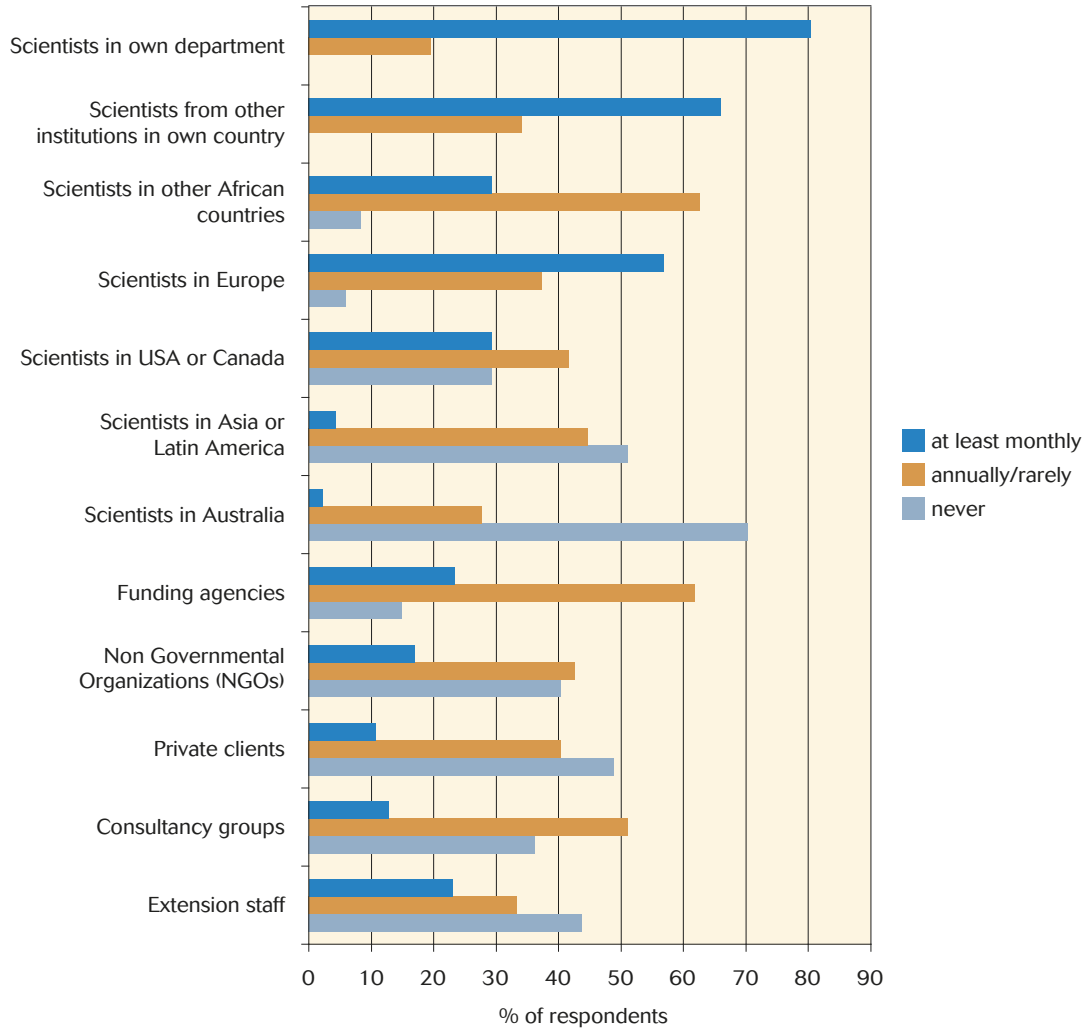


Figure 5.2. Scientific and professional communication (% of respondents; n=47-51)

an overall increase in contacts upon receipt of the grant, among both colleagues within the grantee's department as well as with other institutions in the country.

In most cases it was the intensity of contacts that increased, but increases in the number of contacts within a category should not be discounted. Communications opened up with a few new categories as reflected in the decrease in the "never" columns. This was especially true for intra-African contacts, which is encouraging for the continent.

Intercontinental contacts were mainly with Europe. With increasing access to the internet, global communications has never before been so accessible. Most contacts by mail or e-mail correspondence are preceded by personal contacts, though. The flow of scientists between Europe and Africa is presumably higher than that between other continents, see Tables 4.3 and 4.4 on country for degree and study visits, respectively, which may explain the higher figures for contacts with Europe compared to other continents. There seems to be an increase in global contacts (Table 5.2) where scores from the present study are compared with those from the MESIA 2 study from 2001.

5.4 Evaluation of research (Q35, 36)

In total, 43 (80%) of the respondents said their research was evaluated regularly, which constitutes a significant improvement from the 57% of the MESIA 2 study. Many grantees were under scrutiny

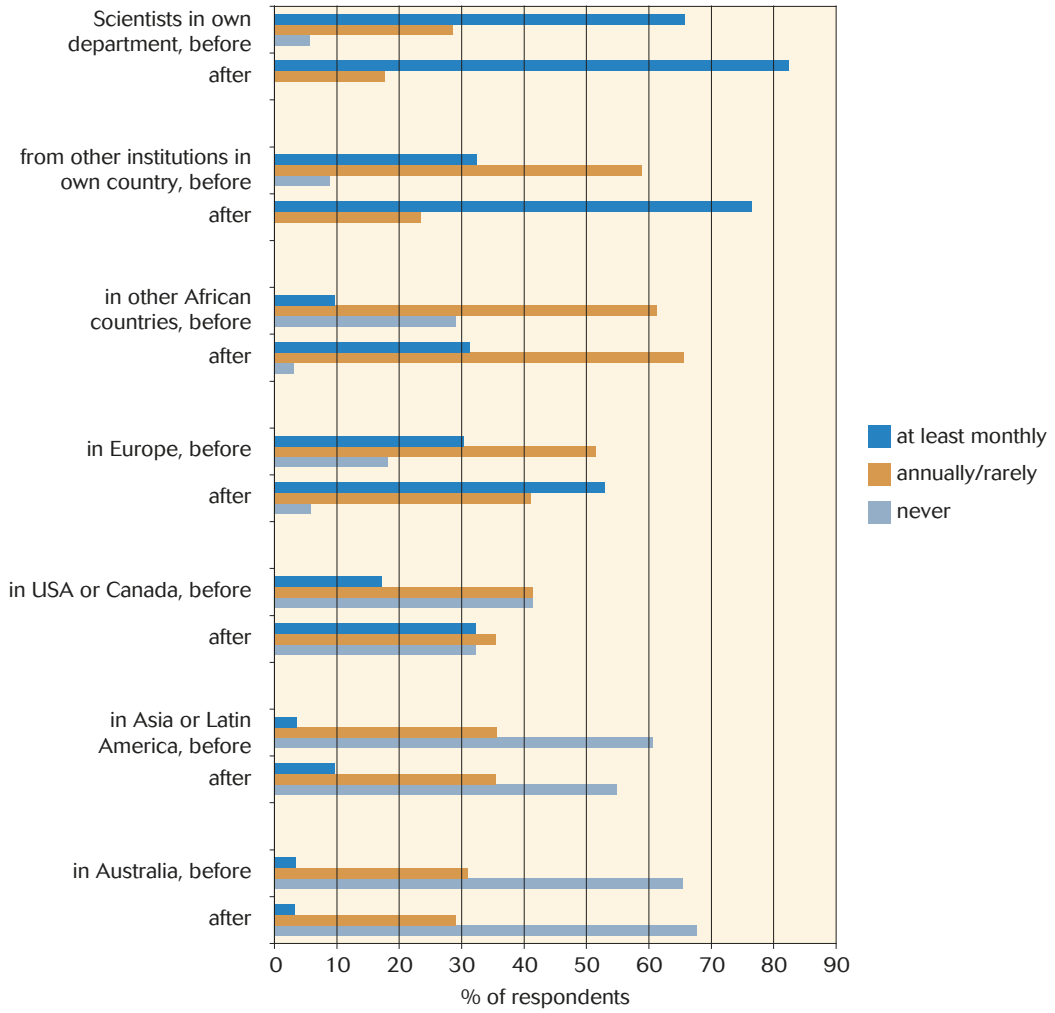


Figure 5.3. Change in communication pattern with the IFS/OPCW grant
(% of respondents; n=31-35)

Table 5.2. Communication patterns in the present study and the MESIA 2 study
1 = never, 2 = rarely, 3 = annually, 4 = monthly, 5 = more often (mean scores)

	This study (n=47-51)		MESIA 2 study (n≈480)
Contact	before grant	after grant	
Scientists in own department	3.7	4.5	4.4
Scientists from other institutions in own country	3.1	3.8	3.5
Scientists in other African countries	2.2	2.9	2.5
Scientists in Europe	2.8	3.6	3.1
Scientists in USA or Canada	2.1	2.6	2.2
Scientists in Asia or Latin America	1.6	1.9	1.6
Scientists in Australia	1.5	1.4	-
Funding agencies	2.5	2.9	3.0
Non Governmental Organizations (NGOs)	1.8	2.3	2.3
Private clients	1.7	2.0	2.2
Consultancy groups	2.1	2.2	2.1
Extension staff	2.2	2.6	2.9

from several evaluators, (Table 5.3), with a total of 124 evaluators for 43 grantees.

When taken together, 37 of the grantees were evaluated within the university/institution, whether by a supervisor, department, faculty or at higher level. Nineteen of these were also evaluated externally; three were evaluated by their supervisor only. Fifteen were evaluated outside their working place but within the country, by a national scientific committee or a ministry/governmental agency, while 24 were evaluated by a donor and/or an external evaluator. The character of the evaluations is not known, but is hoped that they give constructive feed back, like the feedback grantees receive for their IFS/OPCW applications.

Table 5.3. Evaluators of research (n=43)

Category of evaluator	No of grantees evaluated in each category*
University/Institution	24
Donor	21
Supervisor	20
Department	19
National Scientific Committee	11
Ministry/Governmental Agency	10
Faculty	9
External evaluator	6
Employer	3
Supra-national Scientific Committee	1

* each grantee could be evaluated by several categories of evaluators

6 Research conditions

6.1 Research funding (Q41, 43)

Funding is still the most problematic issue for the grantees (cf Figure 6.2), as it is in fact for most researchers world-wide. Lack of funding is especially severe in poor countries. In richer countries there is always funding for the very best researchers, which is seldom the case in poorer countries. It is costly, not only to set up and equip a laboratory but further costs are incurred in the maintenance of equipment and purchase of consumables.

Only 17 of the respondents reported other sources of funding since they received their first IFS/OPCW grant. 37 grantees therefore presently rely mainly on the IFS/OPCW grant. Of these 37 grantees, 8 were MScs and 6 had received their PhD in 2004-2006, but 23 had received their PhD degree from the early 1990's to 2003. Thirteen of them had got other funding earlier. Still, ten with a PhD from 1991 to 2001 had had no funding but from IFS/OPCW. Sixteen of the 37 were awarded their IFS/OPCW grant in the period 1999-2003, and should in principle have been able to find new funding. African scientists would no doubt be greatly facilitated if the IFS could invest more effort into helping grantees find alternative funding opportunities, possibly through partnerships with other scientific funding institutions.

The in kind contribution from the scientist's own department is not mentioned and would vary. Of the 34 grantees discussed above, 19 were from countries with a GNIpc 1000, and might have enough basic facilities around them to pursue research, given the IFS/OPCW grant.

Funding from national sources was generally 500-6000 USD per year; the higher amounts in countries with the highest GNIpc. One grantee had around 20 000 USD per year from national public funds. Funds from international donors were anything from 3000 to 44000 USD per year. The total amount given to grantees after receiving the first IFS/OPCW grant is given in Table 6.1. Note that grants for studying abroad may be included in the figures given.

The grantees were also asked to mention all funding they had received since they began their research careers. Twenty-one of the 54 respondents had received 1-2 grants, 11 had received 3-6 grants while 22 had only received the IFS/OPCW grant. The grants had come from institutions or organisations in 9 African and 14 non-African countries and a few international organisations. In total approximately 50 different donors outside the home country had offered funding to these respondents. As these figures illustrate, there are indeed many funding pos-

Table 6.1. Sources of other funding since obtaining first IFS/OPCW grant (n=54)

Source of funding	No of grantees	Approx amount, 1000 USD
Home institution	8	93
National public funds	7	230
Industry or private foundation (national)	1	6
Industry or private foundation (international)	1	11
International organisation	12	890
Total	**17**	**1230**

sibilities, but an informative and continuously updated database would be of great help to grantees.

6.2 Access to internet and databases (Q29, 30)

Access to the internet has been increasingly made easier across the African continent. In December 2006, 77% of the grantees said they have "easy" access to internet, as compared with the 50% of the MESIA 2 study, seven years earlier. This trend will no doubt continue into the foreseeable future.

Nevertheless, the ease of access does not necessary reflect the capacity of the internet which remains relatively low in many countries. Basic internet connection may be sufficient for e-mail contact but inadequate for effective use of larger literature databases. Access to bibliographic databases was reported by 46% of the respondents, similar to the 45% of the MESIA 2 study.

6.3 Attendance at conferences (Q31)

Participation in conferences is a very important part of a scientist's agenda, whether it is a national, regional or international conference. They all have their merits – the international conferences challenge scientists with new scientific ideas and knowledge at the forefront of their field, the national conferences enable presentation of one's findings and receive feedback from the local society. Active participation in regional conferences facilitates the build up of a critical mass of scientists working on common problems in the region. Unfortunately, the attendance figure for regional conferences remains discouragingly low as seen below.

The grantees visited a large number of conferences in the period 1999 to 2006. Nearly 60% of these conferences were held in the home countries, cf Table 6.2. The second most frequent host locations were other countries within Africa, followed by Europe. African scientists attended very few international conferences outside of Europe and Africa. Again the picture is very similar to that obtained in the MESIA 2 study, cf Table 6.2.

The number of grantees having visited different parts of the world is shown in Figure 6.1. All grantees had visited conferences in their home country during the period 1999-2006. The attendance of the 247 conferences outside the home country is scattered among grantees, cf Table 6.3. Eight had not been abroad for conferences during this period, although four of them had had extended visits abroad. In total, 43% had been abroad for a conference a maximum of two times, which is discouragingly low attendance rate.

Participation at international conferences of high calibre is especially important for scientists away from active research centres, who can not benefit from such centres' high concentration of researchers and frequent visits by prominent scientists. The conferences of the highest calibre are still held primarily outside Africa (although an increasing number is finding its way to Africa). Eighteen grantees had never visited a conference outside Africa, and another 20 had visited such a conference only once or twice in the eight-year period. As a detailed look at the figures show, even if the total attendance rate at conferences seems large, the international exposure of scientists remains very low. During this period the grantees had authored or co-authored

Table 6.2. Number and place of conferences attended 1999-2006 (n=53)

Place of conference	National support	IFS support	OPCW support	Other foreign support	Without support	Total	% of all	% of all, MESIA 2 report
Own country	176	16	0	57	111	**360**	59	58
Africa (excl own country)	45	16	3	49	7	**120**	20	20
Europe	33	3	1	45	7	**89**	15	13
USA or Canada	9	1	1	14	0	**25**	4	5
Latin America or Caribbean	0	0	3	0	0	**3**	0.5	0.5
Asia or Australia	1	1	0	8	0	**10**	1.6	2.6
Total	**264**	**37**	**8**	**173**	**125**	**607**		
% of all	43	6	1.3	29	21			
% of all, MESIA 2 report	36	8	-	30	27			

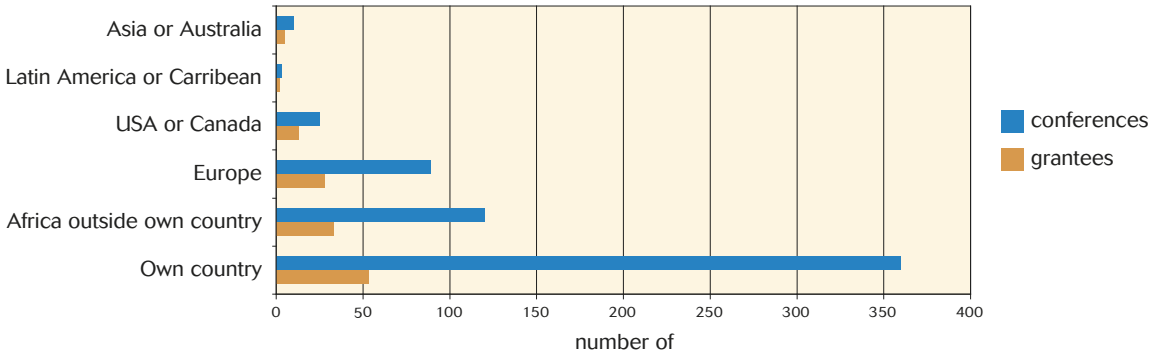


Figure 6.1. Number of grantees having attended conferences in different parts of the world 1999-2006 (n=53)

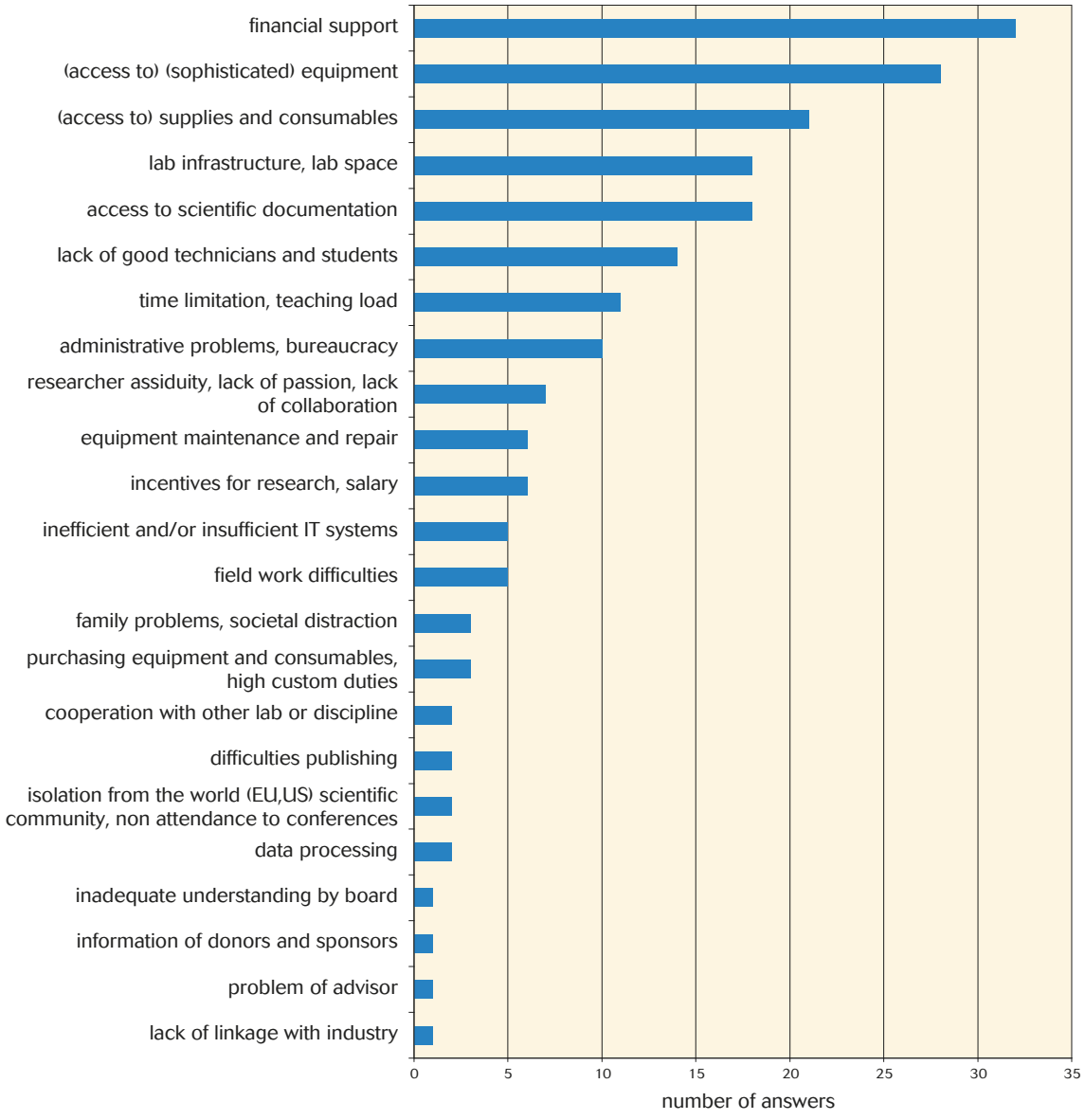


Figure 6.2. Main hindrance for research, mentioned by indicated number of grantees (n=54)

at least 369 conference reports, cf Section 7.1, but this aggregate number hides significant differences among individual scientists. It can be assumed that there were a fair number of additional presentations not resulting in full reports.

Table 6.3. Number of conferences attended outside the home country 1999-2006 (n=53)

No of conferences	No of grantees
0	8
1-2	15
3-5	15
6-10	9
11-15	5
15	1

6.4 Factors holding back research work (Q32, 33)

There is most often a tremendous difference between laboratory facilities in industrialised countries and the poorest African countries. Not only is there a lack of equipment and consumables, but the infrastructure to keep the laboratories going is also of a lower standard. Power cuts, heat and humidity, shortage of water, poor access to maintenance and repair services, contribute to the low quality of research environment. Despite these conditions, good research work can be performed, if oriented towards what is feasible. The isolation of scientists is also often felt, since a critical mass of good researchers within the same research field is seldom reached.

In order for IFS and OPCW to give the most effective support, the grantees were asked to mention four main obstacles for research in their own words and to rank them (Q 32). The number of grantees mentioning a certain obstacle is given in Fig 6.2. When taking their ranking into account, the order is almost the same, see Fig 6.3.

They were also asked to indicate recurring difficulties from a given list, see Figs 6.4 and 6.5 (Q 33). In addition they were asked to indicate from a list the five most and the five least important issues related to support (Q 52), cf section 9.2.

Overall, besides the lack of funding, a lack of access to sophisticated equipment was the main problem. Since the need for equipment is taking a prominent position in answers to all the questions 32,

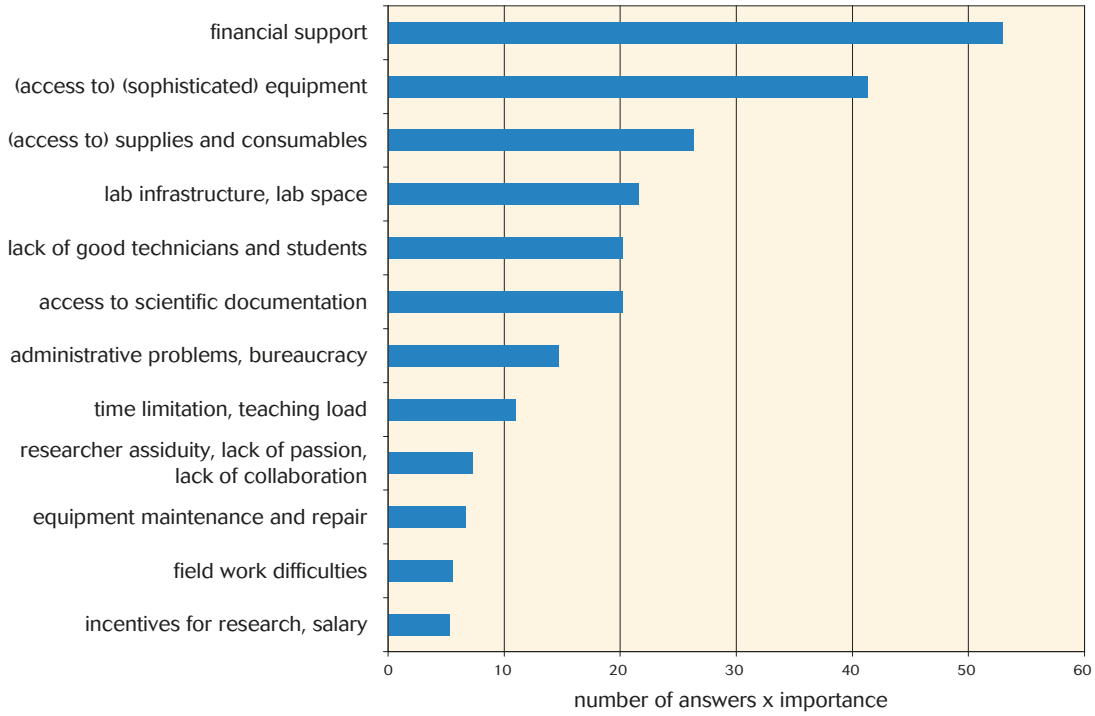


Figure 6.3. Weighted importance of the 12 foremost difficulties number of answers x degree of importance, 1-4 where 4 has the heaviest impact (n=54)

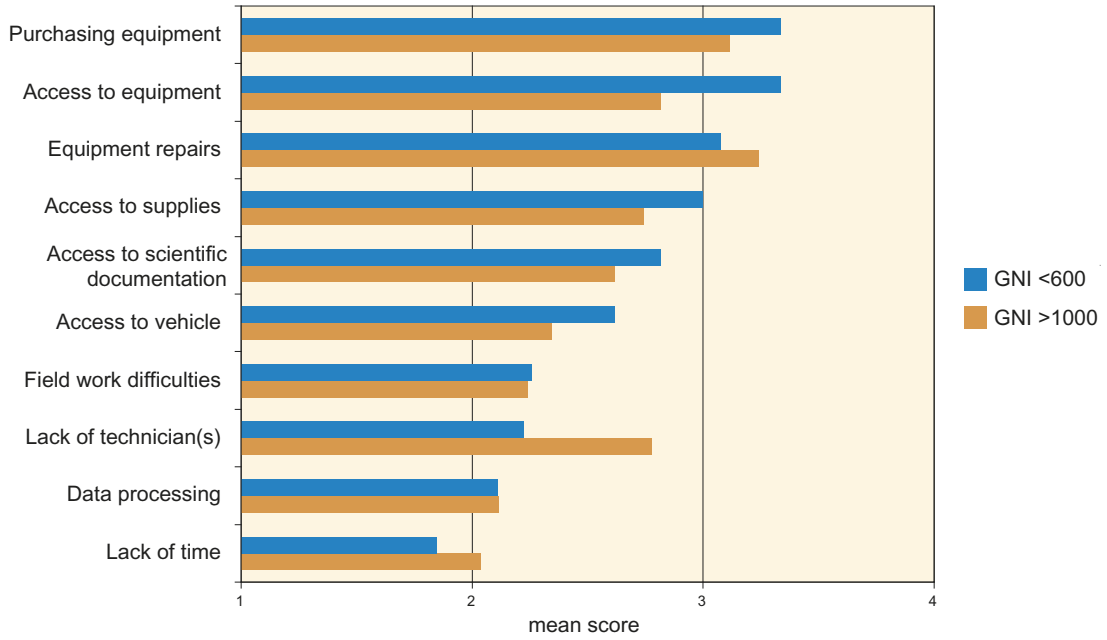


Figure 6.4. Recurring difficulties, ranked by answers from countries with a GNI of less than 600 USD per capita. 1 = insignificant, 2 = tolerable, 3 = serious, and 4 = obstructive (n=25-27 in both categories of GNIpc)

33 and 52, it can be assumed that any financial support would to a large extent be to pay for new equipment. Equipment is also highest on the list of demands from the IFS and OPCW, as discussed in section 9.2.

Closely behind the lack of equipment is the lack of consumables, see also section 9.2. Many respondents also pointed out the lack of interest for research among colleagues or personnel, a matter which could be coupled to the lack of incentives for research. The items in the list of Fig 6.4 would all be well-known to most of the grantees, although they did not mention them among the four most prominent ones. While certain factors are beyond the scope of IFS and OPCW assistance, in other cases IFS mentors may contribute towards a solution.

Equipment maintenance and repair was mentioned surprisingly rarely, but received high ranking among "recurring difficulties", cf Table 6.2 and Fig 6.4. See further section 9.2. Two problems not directly for IFS and OPCW to solve are poor laboratory infrastructure and lack of good technicians. However, some of these issues could be addressed fairly easily. For instance, an air conditioner would improve the laboratory environment, and technicians could get incentives in the form of taking part in, e.g., a maintenance workshop abroad.

When the grantees were asked to score well-known recurring difficulties, the mean scores with regard to GNIpc level were as given in Figure 6.4. Researchers in countries with the higher GNIpc were slightly better off, but the lack of functioning equipment was still a major difficulty for their research. Lack of technicians and time was more pronounced in the "richer" countries. "Purchasing equipment" got a high ranking in question 33, but a low ranking in question 52. In question 33 it has probably been interpreted by many as grant for equipment, not the purchasing procedure as such (cf the low scores in section 9.2).

Recurring difficulties were also broken down by the level of academic degree, cf Figure 6.5. Access to documentation and data processing was more desired by postdocs and MScs than by PhDs, while MScs were more satisfied with the access to supplies and vehicles.

What support from IFS and OPCW would the grantees value? This is further discussed in section 9.2.

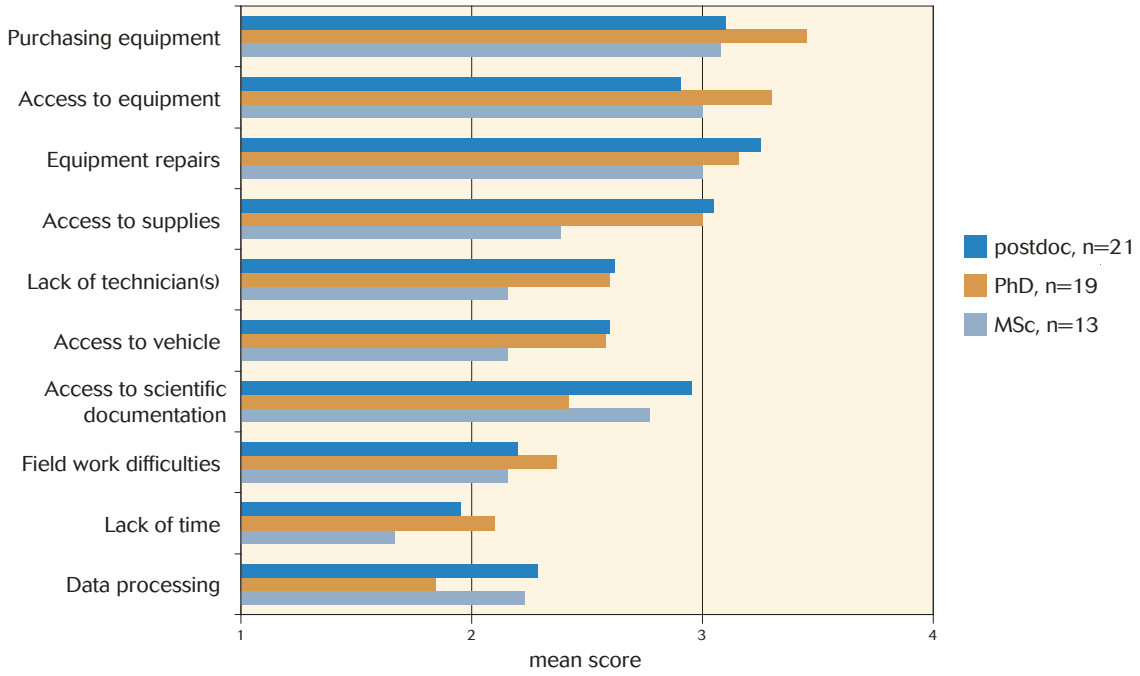


Figure 6.5. Recurring difficulties according to academic degree obtained
1 = insignificant, 2 = tolerable, 3 = serious, and 4 = obstructive

7 Scientific output of African researchers

7.1 Publications (Q37)

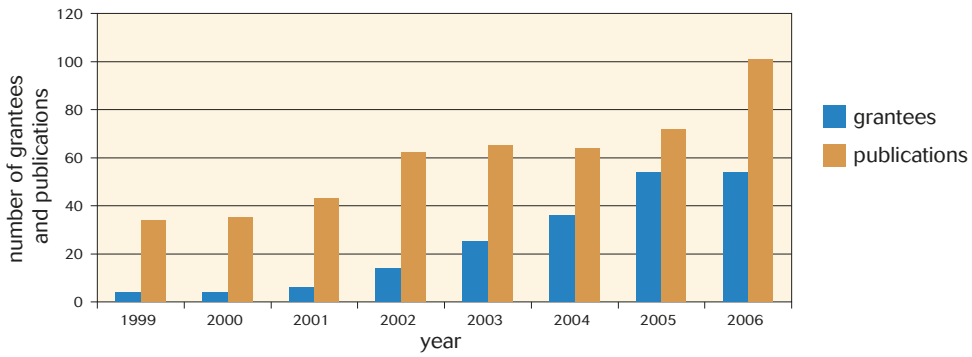
"Publish or perish" is a saying among scientists, and publication in international journals is by far the most important factor for promotion, according to the grantees, as can be seen in section 4.6. And the grantees do publish. In all over 500 articles were published by the 54 responding grantees during the period 1999 to 2006.

The grantees had been asked to give the number of publications and conference reports for the period, regardless of when they received their IFS/OPCW grant. They were also asked to send in their publication lists. In a few cases the list was not attached, or was not up to date. Then a search was done with Google Scholar, which includes several African journals, and goes beyond ISI indexed journals. As can be seen in Table 7.1 the numbers do not agree completely. Nevertheless, the figures correspond well enough to treat the information received as reliable data.

In Figure 7.1 all articles according to publication lists are given, also those published before obtaining the first IFS/OPCW grant. In general, grantees published regularly even prior to getting their grant. Publications are considered favourably when applying for an IFS/OPCW grant. The younger scientists published mainly during their period of study which may be one cause of the high number of publications vs the number of grantees in the early years. The increase in publications from 2005 to 2006 would be partly an effect of the grant but also an effect of more students maturing to reach the scientific level for publishing. See further Figures 7.2 and 7.3.

Table 7.1. Number of publications and conference reports in 1999-2006

	Number of publications			Number of conference reports		
According to	1999-2004	2005-2006	Total	1999-2004	2005-2006	Total
Answers to question 37	360	197	557	260	109	369
Publication lists	303	173	476	-	-	-



Figures 7. 1. Number of publications vs number of grantees in 1999-2006

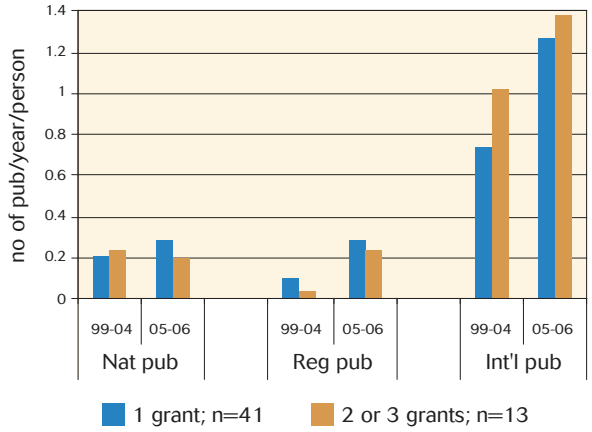


Figure 7.2. Publications

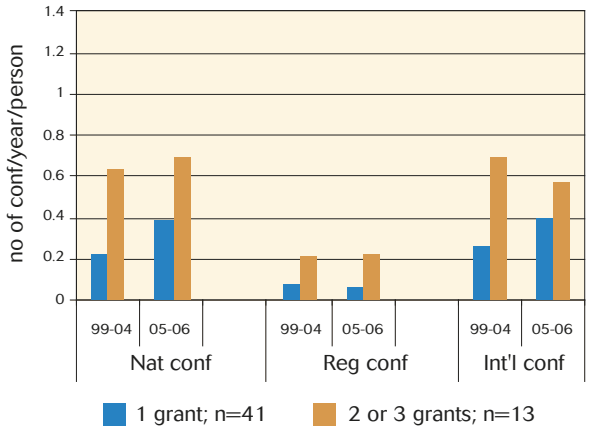


Figure 7.3. Conference reports

Figures 7.2-3. Average number of publications and conference reports per grantee and year (n=54)

The material was not analysed against impact factors according to ISI index, but journals on the ISI list are marked in Table 7.3 and Appendix 2. Publication in a highly ranked journal needs good science and good publication skills, and should be encouraged. However, these journals publish mainly results of mainstream science of global interest or the interest of the advanced industrialised countries. Here the African scientist has a dilemma. Good science tackling local or regional problems may not find its way to such journals – although it does increasingly and should - whereas science in a field à la mode is more easily published in an ISI-indexed journal. In an ideal situation, research tackling local or regional problems should be published in both local and international journals of the highest quality.

The numbers of publications and conference reports per grantee are given in Figures 7.2 and 7.3, respectively. The grantees had been asked in the questionnaire to classify their publications as national, regional and international. The data were split into the years 1999-2004 and 2005-2006 in an attempt to capture the impact of the IFS/OPCW grant. The results show that senior researchers with two or three IFS or IFS/OPCW grants not only publish more regularly but also present or are co-authors of presentations at both national and international conferences more frequently.

The number of national conference reports equals roughly the number of international reports but both remain low. The number of conference reports for regional journals is even lower. Still the figures indicate presentations at a national or an international conference every 2-3 years. However, as mentioned in section 6.3, nearly half of the respondents had been abroad for a conference only up to twice, if at all, during the period 1999-2006. This means that grantees appear as co-authors on many conference reports, without being able to participate in the conferences.

A sample of journals where grantees have published is shown in Table 7.3, which lists journals in which grantees have published the most frequently. The whole list of publications is given in Appendix 2.

Table 7.2. Total numbers of journals and articles

	Grantees with a PhD (or MSc if not yet a PhD) from home (n=32)	abroad (n=22)	Total
Number of journals used	137	124	232
Total number of articles	275	201	476
Number of articles in ISI-listed journals	99	60	159

Table 7.3. Journals where grantees have published most frequently in 1999-2006

Journal	Total number of articles	Number of authors with degree obtained			ISI listed
		abroad	at home	total	
Phytochemistry	22	2	4	6	x
Journal of Ethnopharmacology	13	2	7	9	x
Journal of Agricultural and Food Chemistry	11		2	2	x
African Journal of Traditional, Complementary & Alternative Medicines, CAM	10	2	3	5	
South African Journal of Botany	10		2	2	
Journal of Natural Products	8	1	5	6	x
Bulletin of the Chemical Society of Ethiopia	8	2	3	5	
Planta Medica	8	2	2	4	x
Polyphenol Communications	8	1	1	2	
Journal of Membrane Science	8		1	1	x
African Journal of Biotechnology	7		4	4	
Pharmazie	7	1	1	2	x
Bulletin of Environmental Contamination and Toxicology	6		1	1	x
Zeitschrift für Naturforschung	5	1	3	4	x
Applied Biochemistry and Biotechnology	5	1	1	2	x
Biotechnology Letters	5	1	1	2	x
Bioresource Technology	4	1	2	3	x
Phytomedicine	4	1	2	3	
Food Chemistry	4	1	1	2	x
International Journal of Pure and Applied Chemistry	4	2		2	x
Journal of Applied Phycology	4		1	1	x
Macromolecular Symposia	4		1	1	
Plant Growth Regulation	4		1	1	x
Reproduction Nutrition Development	4	1		1	
Sciences et Techniques	4	1		1	
Theriogenology	4	1		1	x
Fitoterapia	3	2	1	3	
Journal of the Cameroon Academy of Science	3	1	2	3	
Journal of Toxicological and Environmental Chemistry	3		3	3	x
Phytotherapy Research	3		3	3	x
Thérapie	3	2	1	3	
African Crop Science Journal	3	1	1	2	
African J Food, Agriculture, Nutrition and Development	3		2	2	
Annals of Tropical Medicine and Parasitology	3		2	2	x
Bioorganic & Medicinal Chemistry Letters	3	1	1	2	x
Chemical and Pharmaceutical Bulletin	3		2	2	x
Desalination	3		2	2	x
International Journal of Food Science and Technology	3		2	2	x
Journal of Animal and Veterinary Advances	3	1	1	2	
Journal of Biotechnology	3	1	1	2	x
Journal of the Science of Food and Agriculture	3		2	2	x
Central African Journal of Medicine	3	1		1	
Ethnopharmacologia	3	1		1	
Journal of Biological Chemistry	3	1		1	x
Journal of Plant Pathology	3	1		1	
Online Journal of Veterinary Research	3	1		1	
Pharmacopée et médecine traditionnelles africaines	3	1		1	

Of the 232 journals only 29 journals, of which 21 are in the list of Table 7.3, were common to both those who got their degree abroad and those who got the degree at home. Altogether 236 articles were published in 29 journals, of which 17 were ISI listed. The grantees with their degree from abroad had chosen 124 journals for their 201 articles, and those with the degree from home had chosen 137 journals for their 275 articles (Table 7.2.). Table 7.4 shows that grantees published only once in an overwhelming majority of journals.

Table 7.4. How often have articles from IFS/OPCW grantees been published in a given journal in 1999-2006?

Number of articles in a given journal	Number of journals
1	142
2	42
3	23
4	9
5	2
6	2
7	2
8	5
9	1
10	1
11	1
13	1
22	1
	Total 232

The number of publications per grantee varied substantially. Many had 6-15 publications during the period (Table 7.5) Four had no publications but had a manuscript, had submitted a paper, or had presented at a conference; none of these four had yet a PhD. Fifteen had not produced any conference report, but may very well still have presented at a conference where proceedings were not recorded.

As mentioned earlier, grantees have published significant numbers of articles even before receiving the IFS/OPCW grant. Only four MScs had got their grant without prior publication. The publications could be connected with grantees' study period, especially where a PhD thesis was a composite thesis, needing several publications, and not a monograph. But they could also be connected with other grants, pure IFS grants included. Figures 7.4 and 7.5 illustrate this possibility as well as the possible effect of the IFS/OPCW grant. These figures are based on the number of grantees who may have published a certain number of years prior to and after the joint grant. Since only four grantees received their grant in 1999, the first year of the joint grants (cf Figure 2.3), only these four could possibly publish 6 and 7 years later, etc. The frequency of publishing remains regular if not increased after receiving the grant due to greater opportunities for research. The peak in publication comes four years after receiving the grant, both in the percentage of grantees publishing and the number of publications per grantee. Although based on a small pool of grantees, this may be a representative of a general feature of grants – from purchasing goods to getting the article in print.

Table 7.5. Publication productivity of individual grantees 1999-2006 (n=54)

Number of publications	Number of grantees who have published articles in 1999-2006			Number of grantees who have written conference reports		
	Grantees with 1 grant	Grantees with 2-3 grants	Total	Grantees with 1 grant	Grantees with 2-3 grants	Total
0	4	0	4	11	4	15
1-2	5	1	6	9	1	10
3-5	7	1	8	7	1	8
6-10	8	5	13	9	2	11
11-15	7	3	10	2	1	3
16-20	5	1	6	1	1	2
21-30	3	2	5	2	2	4
31-40	2	0	2	0	0	0
61-70	0	0	0	0	1	1
Total no of grantees	**41**	**13**	**54**	**41**	**13**	**54**

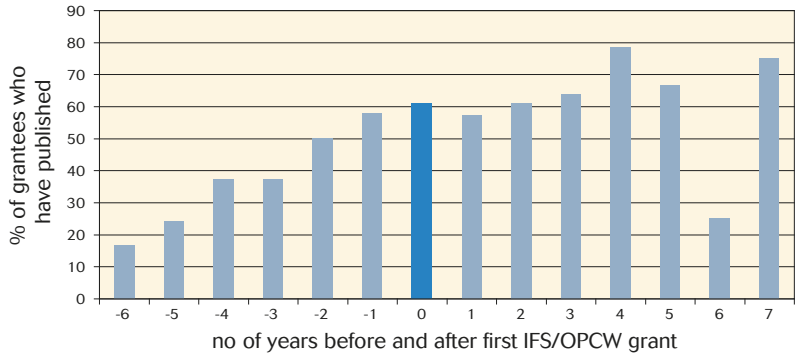


Figure 7.4. Percentage of publishing grantees in relation to the time of the award of the first IFS/OPCW grant

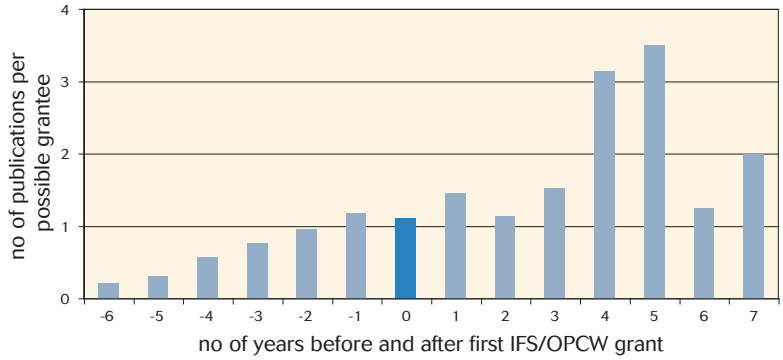
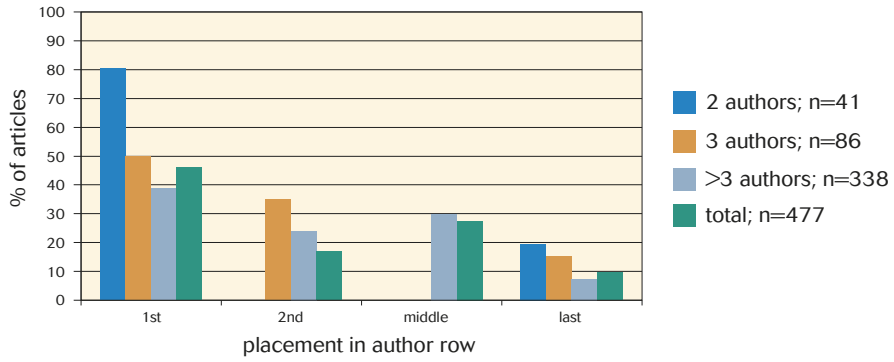


Figure 7.5. Average yearly publication output in relation to the time of the award of the first IFS/OPCW grant

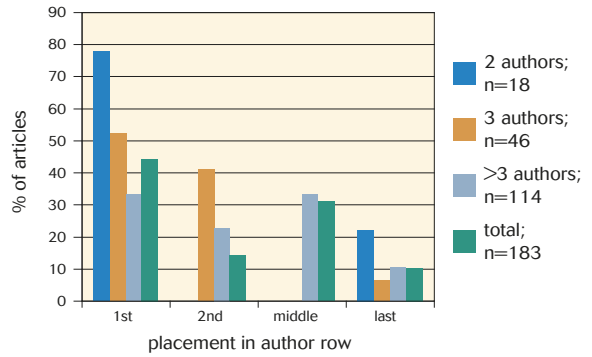


Figures 7.6. Grantees placement in order of authorship

While the quantity of publications is insufficient as a benchmark to judge research performance; the position in the row of authors matters considerably. Most publications were co-authored; in fact only 12 articles had single authors. Figure 7.6 shows the percentage of co-authored articles, where the grantees were the first, second or last authors, or in the middle. IFS/OPCW grantees were first authors in almost half of all articles. Often, although not always, the last author is supervisor or the leader of a research group. Second authors may also have a prominent role.

Would there be any difference whether the grantee publishes together with local or international scientists? As can be seen in Figures 7.7-10, it is more common that the grantee is the first author when people from abroad are among the co-authors, especially where there are two or three authors, and less likely to be last authors.

… with *local* people



… with people from *abroad*

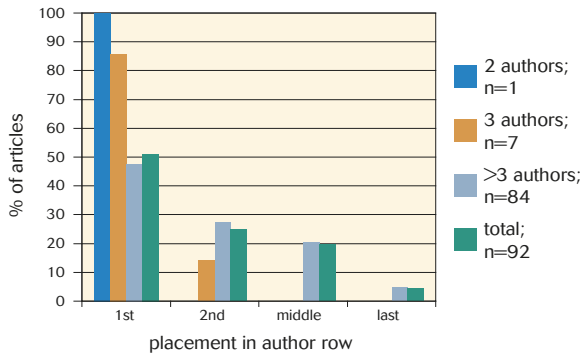
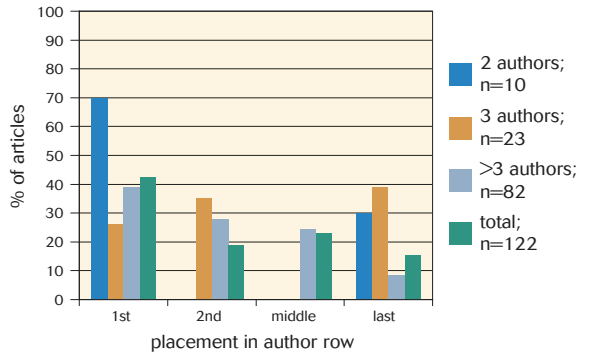


Figure 7.7-8. Grantees with a PhD degree at home, co-publishing

… with *local* people



… with people from *abroad*

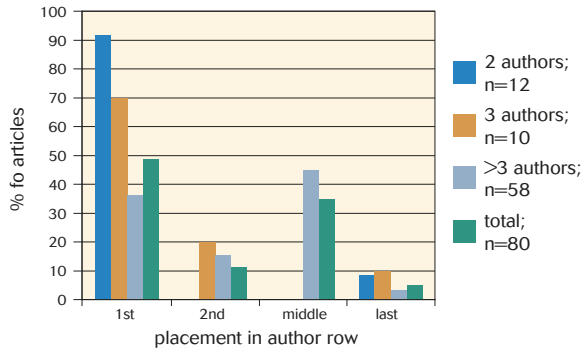


Figure 7.9-10. Grantees with a PhD degree abroad, co-publishing

Figures 7.7-10. Grantees placement in order of authorship, in relation to where the PhD degree was obtained and who the co-authors were (n denotes number of articles)

A number of factors influence research activities and publications. Tables 7.6 and 7.7 present some factors connected with publication per se, and publication in international journals, respectively. There is no doubt that extended visits outside the home country promote publications. There is nothing unique in this trend for African scientists as everywhere across the world, the trend can be witnessed. The opportunity to take leave from daily duties provides scientists the chance to concentrate on research both in the lab and at home. For African scientists, better access to equipment and literature also counts greatly. The number of publications is also related to the GNIpc. Many reasons for this have been discussed including better infrastructure and research facilities in wealthier countries, and the need for extra income sources in poorer countries that diverts important time away from research.

7.2 Student supervision (Q39)

An important output connected to research activities is the supervision of research students. Most grantees have at some point been involved in student supervision that contributes to fostering the future generation of well trained people for their country. Even the honours, or last year basic degree students, get trained in analytical and critical thinking when doing a research project, and the grantees had supervised in total over 260 undergraduates since 1999.

Table 7.6. Various factors influencing *total* publication productivity
Figures denote number of grantees (n=54)

Influencing factor		Number of grantees for a given number of publications Number of publications					Total number of grantees
		0	1-5	6-10	11-20	20	
MSc, year	-1990	0	6	7	11	7	31
	1991-2000	4	3	6	5	0	18
	2001-	1	4	0	0	0	5
Highest degree obtained	MSc	5	3	2	1	0	11
	PhD	0	5	6	7	2	20
	postdoc	0	5	5	8	5	23
Country where degree was obtained*	home	2	11	6	5	4	28
	abroad	3	2	7	11	3	26
Extended visits	none	1	3	1	3	1	9
	<6 months	0	2	3	1	1	7
	6 months	4	8	9	12	5	38
GNIpc, USD	<600	4	6	10	7	0	27
	1000	1	7	3	9	7	27

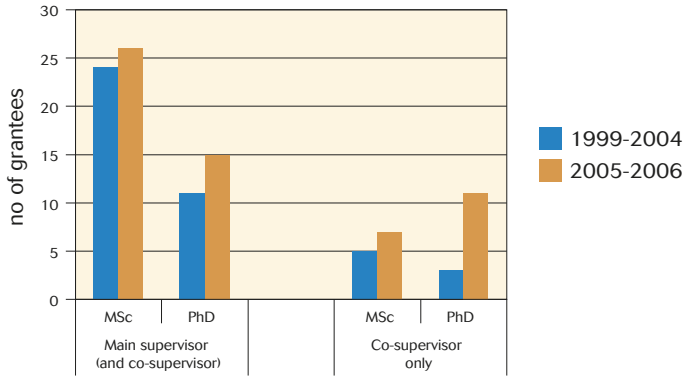
* if at least one degree was obtained abroad, it is classified as "abroad"

Table 7.7. Various factors influencing productivity of *international* publications
Figures denote number of grantees (n=54)

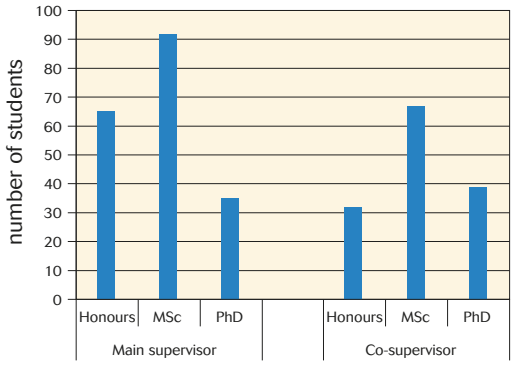
Influencing factor		Number of grantees for a given number of publications Number of international publications					Total number of grantees
		0	1-5	6-10	11-20	20	
MSc, year	-1990	-	9	2	3	3	31
	1991-2000	5	10	9	5	2	18
	2001-	2	4	-	-	-	5
Highest degree obtained	MSc	6	5	-	-	-	11
	PhD	1	8	7	2	2	20
	postdoc	-	10	4	6	3	23
Country where degree was obtained*	home	2	13	5	2	3	28
	abroad	5	10	6	6	2	26
Extended visits	none	2	5	1	1	-	9
	<6 months	-	4	2	-	1	7
	6 months	5	14	8	7	4	38
GNIpc, USD	<600	5	14	7	1	-	27
	1000	2	9	4	7	5	27

* if at least one degree was obtained abroad, it is classified as "abroad"

The grantees were asked to give the number of research students supervised in the two periods 1999-2004 and 2005-2006, cf Figure 7.11. The exact numbers of MSc and PhD students is unclear due to a certain degree of overlap between the two degrees. There was a clear increase in the number of co-supervisors of PhD students, probably due to the maturing of the youngest scientists. In 2005-2006 159 MSc and 74 PhD students had an IFS/OPCW grantee as main supervisor or co-supervisor, cf Figure 7.12. It can be assumed that many of these students benefited to some extent of the facilities made available through the IFS/OPCW grant.



7.11. Number of grantees supervising



7.12. Number of students supervised, 2005-2006

Figures 7.11-12 Supervision of MSc and PhD students (n=54)

Table 7.13. Number of events where grantees have had an important role (n= 36)

Type of event	Number of participants				
	1-10	11-50	51-100	101-500	Total
National	5	30	12	16	63
Regional	1	13	4	8	26
International	0	6	2	8	16
Total	**6**	**49**	**18**	**32**	**105**

Grantees were found to be supervising 1 to 16 MSc and/or 1 to 6 PhD students, with a median of 3 and 2, respectively. Only 7 grantees had no supervision at all, 4 of these working outside universities.

7.3 Events arranged (Q 38)

In addition to interaction with other researchers, scientists today are encouraged to interact with their own local communities. The grantees were asked to mention courses, workshops and conferences in which they had played a leading role, and which were outside their daily teaching. In total, 105 such events outside ordinary work were reported by 36 grantees, see Table 13. There were neither positive nor negative correlations between the number of events and the number of publications, so the time spent engaging the local community appears not to have negatively affected research output.

Regional and international events were mainly scientific conferences, where the grantees had been part of the organizing committee. The national events were more varied with many courses open to laymen of different backgrounds. A few examples of events are given in Box 7.1.

Box 7.1. Some examples of courses, workshops and conferences where grantees played a major role

National events

Basics in statistical analysis, courses

Ecotourism excursions for colleagues

Launching of national chemical society

Mass media popularization

National workshop on laboratory management, with NUSESA

Nutritional training workshops for health workers

Student visits to food industries

Sweet potato processing training

Water and its pollution, workshop

Regional events

Benefits and health risks in urban agriculture, conferences

Launching of Federation of African chemical societies

NAPRECA summer school

Proteomics and Bioinformatics course

International conferences in Africa

MIM malarial conference

Pesticide use in developing countries

Problems of fluorosis

7.4 Other outputs (Q 40)

Being an active researcher gives skills and experiences which could be beneficial also outside the research laboratory. Outreach activities besides conferences and workshops were reported by seventeen grantees, but more could have mentioned such activities. The type of activities varies with the age of the scientist, but all contribute to bring science or scientific thinking forward within broader society.

Common activities for mature and responsible scientists include working as a referee to journals or sitting as a member of an editorial board – there are examples of both among the respondents. Some grantees are also active participants of learned societies where they have quite prominent roles in both national and regional as well as in international scientific societies. (Box 7.2.) Some grantees serve as experts in their own country in fields such as biotechnology and biosafety.

There is an increased emphasis among both Southern universities and Northern donors on getting research into use (RIU) and on using already existing knowledge. This involves scaling up methods developed, adjusting knowledge to suit local conditions, and to make these methods find their way to the users. It is also important to apply research methods and to develop critical and analytical thinking for local initiatives. Some grantees are involved in activities that facilitate this transfer of scientific knowledge for the benefit of society as a whole. (Box 7.2.)

Box 7.2. Some examples of outreaching activities given by grantees

- Referee to journals
- Member of editorial board
- Board member of WAYS (World Academy of Young Scientists), regional and international
- Board member of SETAC (Society for Environmental Contamination and Toxicology), regional and international
- Chairman of National Committee of Standards & norms
- Involved in developing policy guidelines on urban agriculture and education messages for urban farmers and consumers
- Provide statistical assistance to other researchers in plan and design, data management and analysis, and report writing
- Pioneered the ethnobotanical and traditional medicine survey in an area of my country
- Initiated and established the analytical service laboratory at the university
- Initiated the formation of a young scientist group in my university
- Working to establish a centre for research on grain quality, processing and technology transfer
- Member of a fish research farm where fry and fingerlings are sold in thousands to local fish farmers in my locality/community
- While working with traditional herbalists on an IFS-funded project, l was challenged by the herbalists to start a rural herbal and research centre

8 Contribution of IFS/OPCW grant to research and career

8.1 The role of IFS/OPCW funding for pursuing research and for the research orientation (Q 44, 23, 24)

The IFS/OPCW grant is not substantial compared to other sources of funding (USD 10000-12000) but for a young scientist it can have a decisive impact. When asked whether they would have pursued research without the grant, answers were as given in Figure 8.1. None would have done research without any support (unlike the case in the social sciences and humanities), but many would have tried to do it in one way or other without the IFS/OPCW grant. Nearly one third of those from the poorer countries said that they would not have continued with research. It is quite probable that some of these would have tried to get a fellowship abroad for further studies, which often leads to a brain drain, or at least a diminishing of the critical mass in the research team, as discussed in section 4.2.

The figures obtained are quite similar to those obtained in the MESIA 2 report. The percentages obtained in the present study set against those in the MESIA 2 study were, for the answers given in Figure 8.1, 21 vs 23%; 0% vs 3%; 55 vs 51%; 23 vs 16%; and 2 vs 8%, respectively. There were slightly more who would pursue their research now in one form or other than in the earlier study, perhaps indicating that the basic resources in the department were somewhat better than at the time of the MESIA 2 report.

The grantees were also asked to indicate whether they had changed the scientific orientation of their research grant either when the IFS/OPCW grant was given or after it was terminated (Q23, 24). Half of the grantees (28 of 54) had a changed orientation in mind when applying for the grant, whereas most grantees (35 of 41) stuck to the same research orientation in the post-grant period. As seen below, in some cases the grant made it possible to initiate new areas of research in a country.

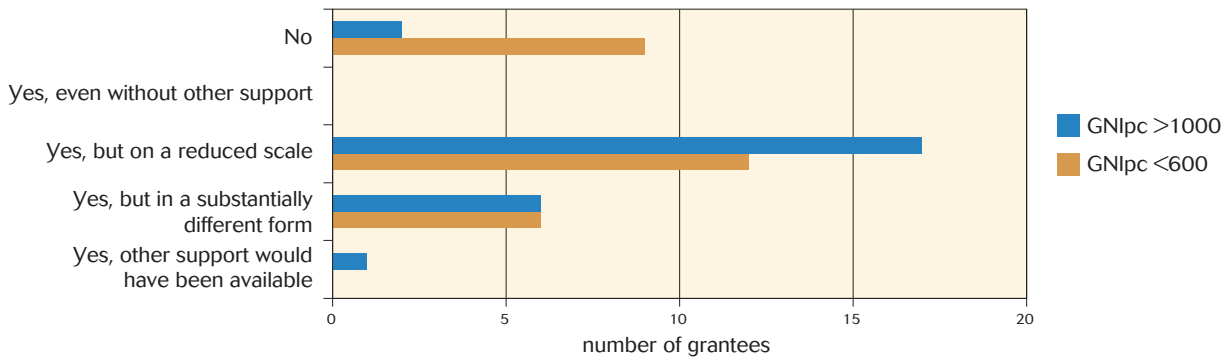


Figure 8.1 Would the grantees have pursued their research if this IFS/OPCW funding had not been made available? (n=53; 27 for GNIpc <600 and 26 for GNIpc 1000)

For those with a PhD, there was no great difference whether the grantee had received the PhD at home or abroad – 56% of those with a degree at home and 50 % of those with degree from abroad had changed the orientation when receiving the grant. Neither was there any difference for grantees from countries with a GNIpc <600 USD and those with a GNIpc 1000; exactly 50% changed their orientation in both cases.

For many the grant had changed both their possibilities to do research and their research orientation. Some commented that equipment and chemicals obtained by the grantees allowed them to work on research that was of genuine interest to them. One grantee mentioned that the grant had made it possible for her to pursue a sandwich programme instead of staying abroad which would have meant being away from small children and her husband for the whole duration of the PhD study. It also allowed her to take up a subject of greater relevance to her own country. Another grantee reported to have been able to be more self-dependent and to change the research subject from the main activity at the laboratory to another and new area of relevance to the country. A series of quotes from the respondents are given below:

"Opportunities have opened for me to work on my research problems and contacts have been established with other colleagues in other parts of the world."

"It was granted to me at the moment no funding came from the government. This grant really saved my life as far as my scientific activities and research career are concerned."

"The grant has permitted me to open new perspectives on our research subject."

"The comments of the IFS scientific advisers helped significantly."

The MESIA 2 study tells that the main reason that scientists change orientation when returning to their country of origin from a degree abroad is to do research on a subject relevant for the country. This has been mentioned in the current study as well.

8.2 Importance of other IFS and OPCW support (Q 42)

Both IFS and OPCW offer a number of possibilities in addition to research grants, as given in Figures 8.2 and 8.3. In total 41 of the 54 respondent grantees took advantage of either IFS or OPCW opportunities on offer. A greater proportion of grantees benefitting from IFS programmes may be due to the fact IFS is a long established and well connected institution compared to the relatively new OPCW.

The grantees were asked to rate the importance of the additional support for their research career. Research grants were dominant, and judged very important by most, cf Figures 8.2 and 8.3. External visits, to conferences or other laboratories, were rated high, whereas grants and workshops for publication were of less importance. The opportunities offered by OPCW are well received, and should be made better known to the African scientists.

8.3 Catalytic effects of being an IFS/ OPCW grantee (Q 45, 46, 47)

When receiving a grant, it is not only the very equipment and consumables that enhance the research conditions. Once judged to be a researcher worthy of support, their status as a researcher may rise considerably.

In general, researchers from poorer countries have tended to benefit the most from the IFS/OPCW grant (cf Figure 8.4.) Nearly all of those respondents reported that they started scientific collaboration with new partners following receipt of the grant. This figure was also high in the wealthier countries. However, the researchers from poorer countries received much more assistance and support from their home institutions than their counterparts from wealthier countries. Although funding opportunities did not increase markedly, more than one third of the responding grantees had received additional funding from international sources, and those from the poorer countries in particular received extra funding from their own institutions.

Some grantees may have received the additional funding in any case along with maturing, but for the majority of respondents, the IFS/OPCW grant seems to have been instrumental.

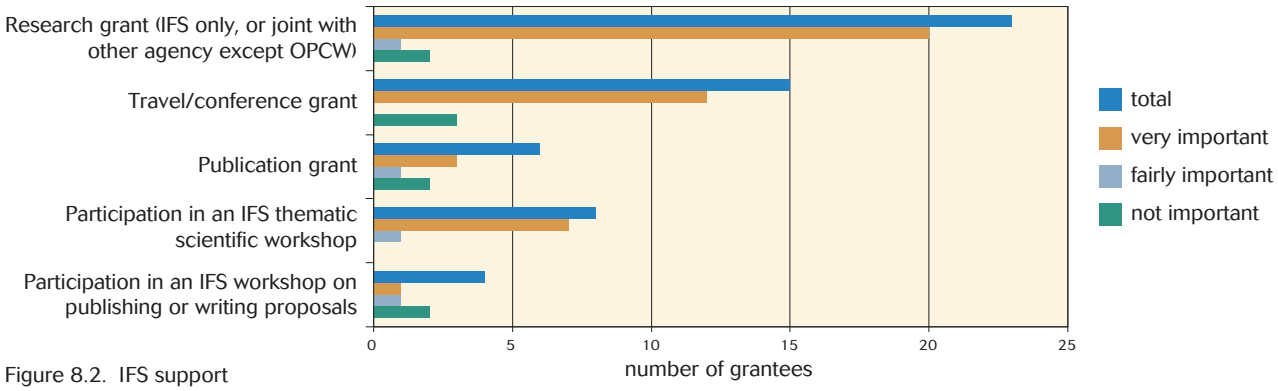


Figure 8.2. IFS support

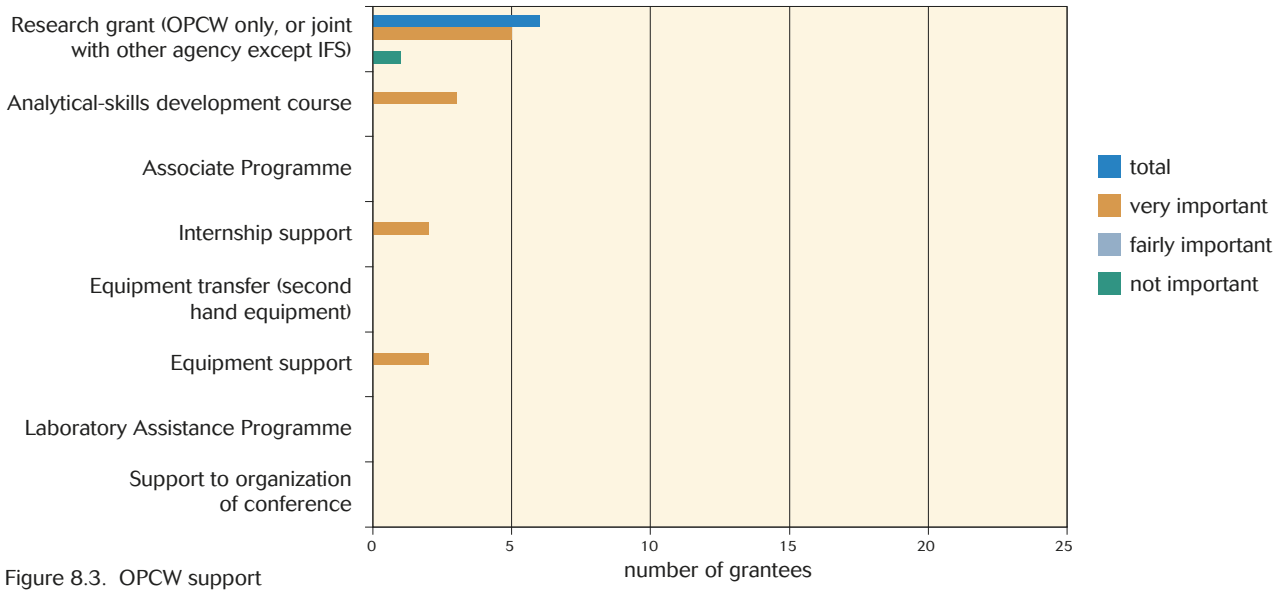


Figure 8.3. OPCW support

Figure 8.2 and 8.3. Importance of other IFS and OPCW support for research
The bars denote the number of grantees having received the support indicated, and the distribution of their judgments on the importance of that support

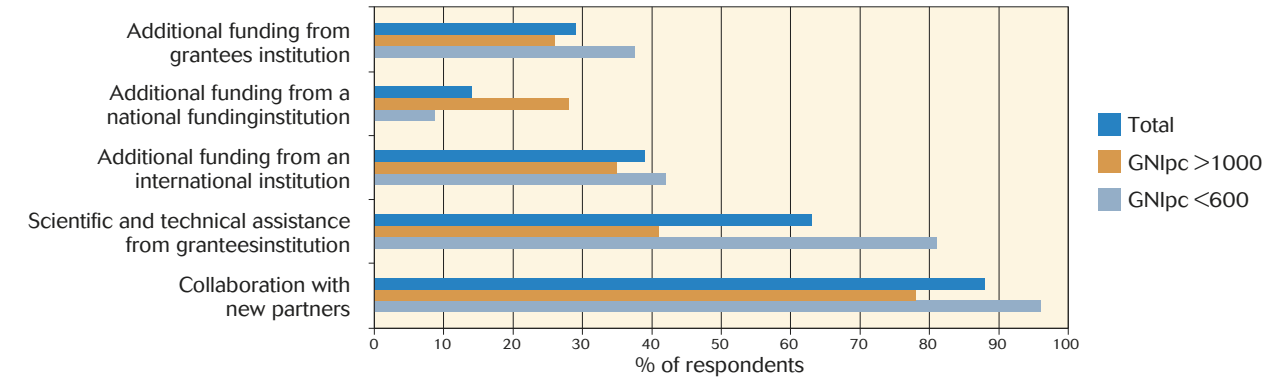


Figure 8.4. Additional benefits of being a grantee (n=41-51)

8.4 Publications based on IFS/OPCW-supported research (Q 50)

Well over half of the respondents (30 of 50) had published on research performed with the IFS/OPCW support. (cf Table 8.4.) Four of the respondents to date had no publications to their names at all but two of the four had submitted articles based on the IFS/OPCW-supported research. The work had also been presented at numerous conferences. As indicated in Figure 8.5 it is mainly those who recently received their IFS/OPCW grant that reported "no publication".

Table 8.4. Grantees with publications based on research with IFS/OPCW support (n=50)

Grantees' total number of publications	Are any of your publications based on work with IFS/OPCW support?	
	yes	no
0	-	4
1-2	0	5
3-5	4	1
6-10	10	4
11-15	8	1
16-20	2	4
21-30	4	1
31-40	2	0
Total no of grantees	**30**	**20**

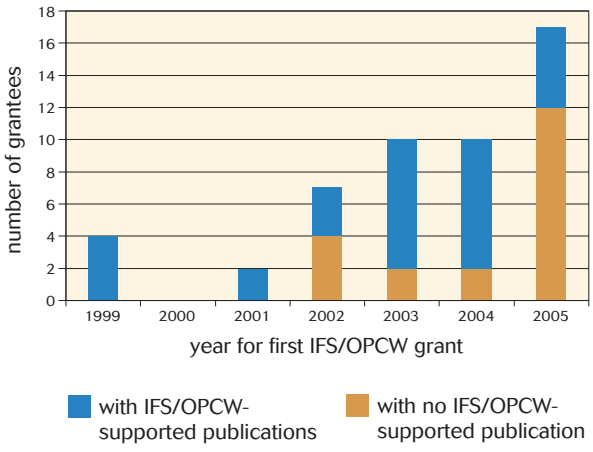


Figure 8.5. Number of grantees who have published based on research done with or without IFS/OPCW support, in relation to when receiving the grant (n=50)

In many cases the research was based on support from other sources in addition to the IFS/OPCW grant, while certain publications were based on research carried out under non-IFS/OPCW related grants. Fifty publications, of which 29 articles written by 18 grantees based on IFS/OPCW support were published in ISI-listed journals. However, 12 of the grantees did not indicate whether their publications were based on IFS/OPCW support. Among these were the most productive researchers, and therefore it can be estimated that the IFS/OPCW played a role in at least seventy publications by African scientists, so far (up to 2006).

8.5 Contribution to the advancement of science (Q 48)

In response to the question of whether the IFS/OPCW-supported research had led to the advancement of science, 9 of the 49 respondents answered 'no' or 'not yet'. One said 'yes, of course' and this seems to be the feeling among most grantees according to comments in the questionnaire. Not all research reported was yet finished, so the summary below contains both achieved results and work in progress.

The main contribution to science is new knowledge. Chemical analytical techniques, biochemical methods, and molecular biology tools are used for this purpose. Many grantees were working on purification and identification of active ingredients of plants used in traditional medicine or pest control, thereby contributing to the knowledge of indigenous plants of Africa. New or confirmative knowledge about efficacy and safety of traditional medicine was obtained with biochemical and pharmacological methods. New nutritional or industrial values were identified and characterized in various crops. Chemical environmental monitoring gave new data on pollution.

The grantees also worked on adjusting existing techniques for use in new fields. Biochemical methods were introduced in ecotoxicological studies with snails, and molecular biology tools were adjusted for use in sheep breeding. Grantees' research has contributed to the understanding of the mode of action of certain plant poisons and pesticidal microbes as well as chemical changes in foodstuffs on storage and processing.

Rational drug design, improved methods for synthesis of generic drugs, biocatalysis for obtaining optically pure enantiomers, and chemical modification of biopolymers are examples of production of new molecules, all performed in countries with a GNIpc 1000 USD.

One measure of the contribution to science is whether it has been possible to publish results. As shown in section 8.4, it is estimated that at least over 70 articles based on IFS/OPCW supported research has been published, and that 80 % of those receiving the grant up to 2004 had done so by December 2006.

8.6 Contribution towards meeting development needs (Q 49)

The grantees were also asked to indicate whether their IFS/OPCW-supported research had an impact of, or opened up the prospect of solving a local developmental problem or need. Most grantees had their local community in mind when choosing the research subject. Only four of the 49 grantees responding to the question said 'no', dedicating themselves to more fundamental research, and 3 others were uncertain.

Three main themes can be discerned - to make use of local plants, crop or other material; to improve the economy, either for the poor, or for the national economy by reducing the need for import of goods and giving a basis for export products; and to give a basis for sound management of land and water resources. The two first themes are often coupled. Box 8.1 gives a smorgasbord of matters where grantees feel they contribute to the development needs. In some cases they have started implementing, in others they need more research first. Examples of this are given in the Book of abstracts from the Nairobi workshop.

Box 8.1. Examples of the focus of the research

Use of local food crops

Biochemically based selection of sorghum varieties for nutritional value and for industrial purposes

Effect of post-harvest treatment and processing on nutritional values and toxic compounds (*)

Biochemical studies on local crops for increased value as functional foods (*)

Contribution to local or national economy

Evaluation of locally prepared gum arabic for use in local production of drugs

Chemical studies for use of local material to remove fluoride from ground water

Use of thermostable enzymes from locally sourced bacteria for national detergent industry Characterization of starch in tef for possible industrial use

Characterization and modification of biopolymers from seaweed for industrial purposes

Traditional medicine knowledge

Pharmacological and biochemical studies for safer and more evidence supported use of affordable traditionally used plants and drugs to treat many common diseases, such as cardiovascular and protozoal diseases, and diabetes (*)

Phytochemical studies of traditionally used plants with a long-term perspective to find new drugs against major diseases in Africa (*)

Biological methods for pest treatment

Biochemical studies on biocontrol agents against pathogens and infesting weeds (*)

Animal health for increased production

Identification and action mechanism of toxicants in poisonous plants

Evaluation and strategy for use of ethnobotanicals in tick control

Ecosystems and environmental pollution

Agroforestry and soil carbon sequestration

Heavy metals in vegetables from urban agriculture on contaminated sites

Mercury in meat from cattle grazing near goldmines

Pesticide behaviour in soil

Misuse, abuse and fate of pesticides

Biochemical parameters in snails for monitoring of pollutants in water

(*) indicates researched by several grantees

9 Grantees' assessment and priorities of support from IFS and OPCW, as expressed in the questionnaire and Nairobi workshop

This report is based mainly on the answers to the questionnaire sent out. This section also includes views as expressed in the report from the workshop that was held in Nairobi in December 2006 with approximately half the grantees who had responded to the questionnaire[11]. One day of the workshop was devoted to discussions on the IFS/OPCW support. The grantees mentioned a number of positive results from IFS/OPCW funding including. Some key findings include:

- IFS/OPCW funding provided a springboard for further research enabling scientists to apply and obtain further funds from other sources and to expand the network of collaborators. It has also enabled teams to form and expand their research agenda.

- Empowerment of the grantees has enabled them to get access on board of important committees within their government, which can influence policy positively.

- Managerial and leadership skills have been developed by the grantees in terms of academic rewards (promotion) and international exposure from the IFS/OPCW grants.

9.1 Assessment of IFS assistance (Q 51)

IFS is handling the joint IFS/OPCW grants. How do grantees experience the assistance they get from the IFS? The workshop participants discussed the content of support (section 9.2) rather than the delivery of IFS support, but the comments made regarding the IFS corresponded to the answers provided to the questionnaire. There the grantees were asked to classify the assistance with items in a given list, with anything from unacceptable to excellent, cf Figure 9.1.

The grantees found the administration of the grant excellent, which was not always the case with other funding institutions. The contacts with IFS and the selection process were also highly regarded. The selection actually starts before the application. To fill the application is a small research project in itself as anecdotal evidence shows - one grantee mentioned that some of their colleagues found the application form too demanding to complete. The monitoring and follow-up of the projects was regarded as important by the workshop participants, and received a good assessment in questionnaire responses.

In contrast, grantees did not hold a favourable opinion of the assistance given to equipment maintenance. This is seen even more clearly in Figure 9.2, where the distribution of scores is shown. Half of the respondents found the assistance either poor or unacceptable. This reflects the difficulties in maintaining equipment and the diminished capacity of IFS when it comes to providing spare parts.

The IFS was also rated lowly on scientific counselling and assistance for publications. The IFS recently began a mentor programme but it appears that its impact has not yet been fully felt. The organisation of thematic workshops also received low rankings while attending scientific conferences and workshops was listed as items high on demand, cf Figure 9.3.

[11] Report from the IFS and OPCW workshop Chemistry in Nature, Nairobi, Kenya, 10-14 December 2006; available at IFS

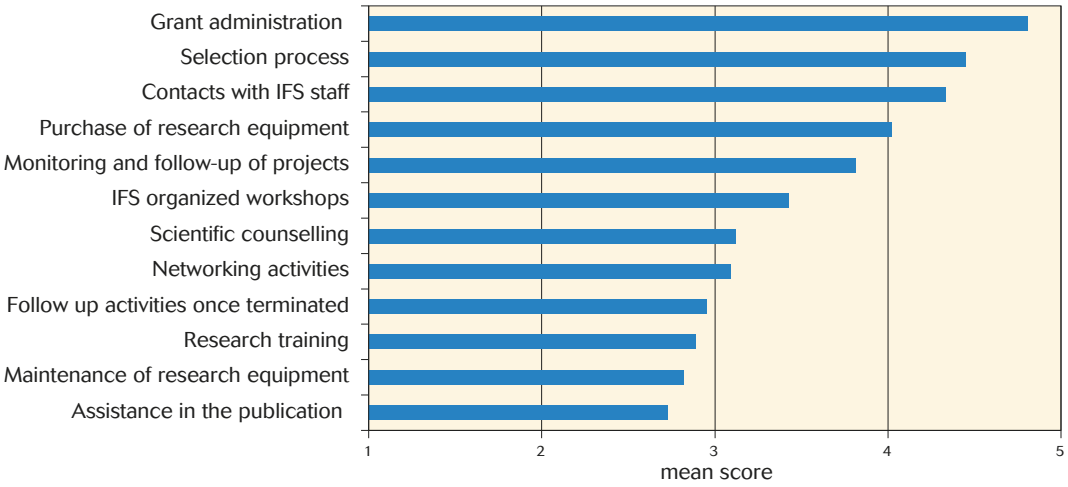


Figure 9.1. Assessment of IFS assistance, mean scores
1 = unacceptable, 2 = poor, 3 = satisfactory, 4 = good and 5 = excellent (n=23-52)

Figure 9.2. Assessment of IFS assistance, distribution of scores

9.2 Most and least needed type of support (Q 52 and workshop suggestions)

In the questionnaire the grantees received an extensive list of possibilities for potential IFS and OPCW support. They were asked to choose five of the most and five of the least important areas for support. The results are given in Figures 9.3 and 9.4. There was common consensus on the five most important areas for support than over the five least important areas. These lists correspond fairly well, but not always, with the main factors holding back research work, as discussed in section 6.4. In summary, support for high quality scientific research came top of the desired areas for IFS/OPCW support.

Lack of financial support was given by respondents as the main obstacle to research, (cf Figure 6.2). Funding was also discussed among workshop participants. The ceiling of the IFS (and IFS/OPCW) grant of 12000 USD has been kept since the inception of IFS in 1972. It was suggested to increase this ceiling to 25000 USD. Alternatively, a competetive medium grant should be added as a follow up to the first grant. This would introduce a tiered funding that enables successful awardees to move from the small grant to a medium-sized grant. They would subsequently be able to compete for a larger grant from the big international funding agencies. Requests to the IFS/OPCW for information on other funding agencies was also often made.

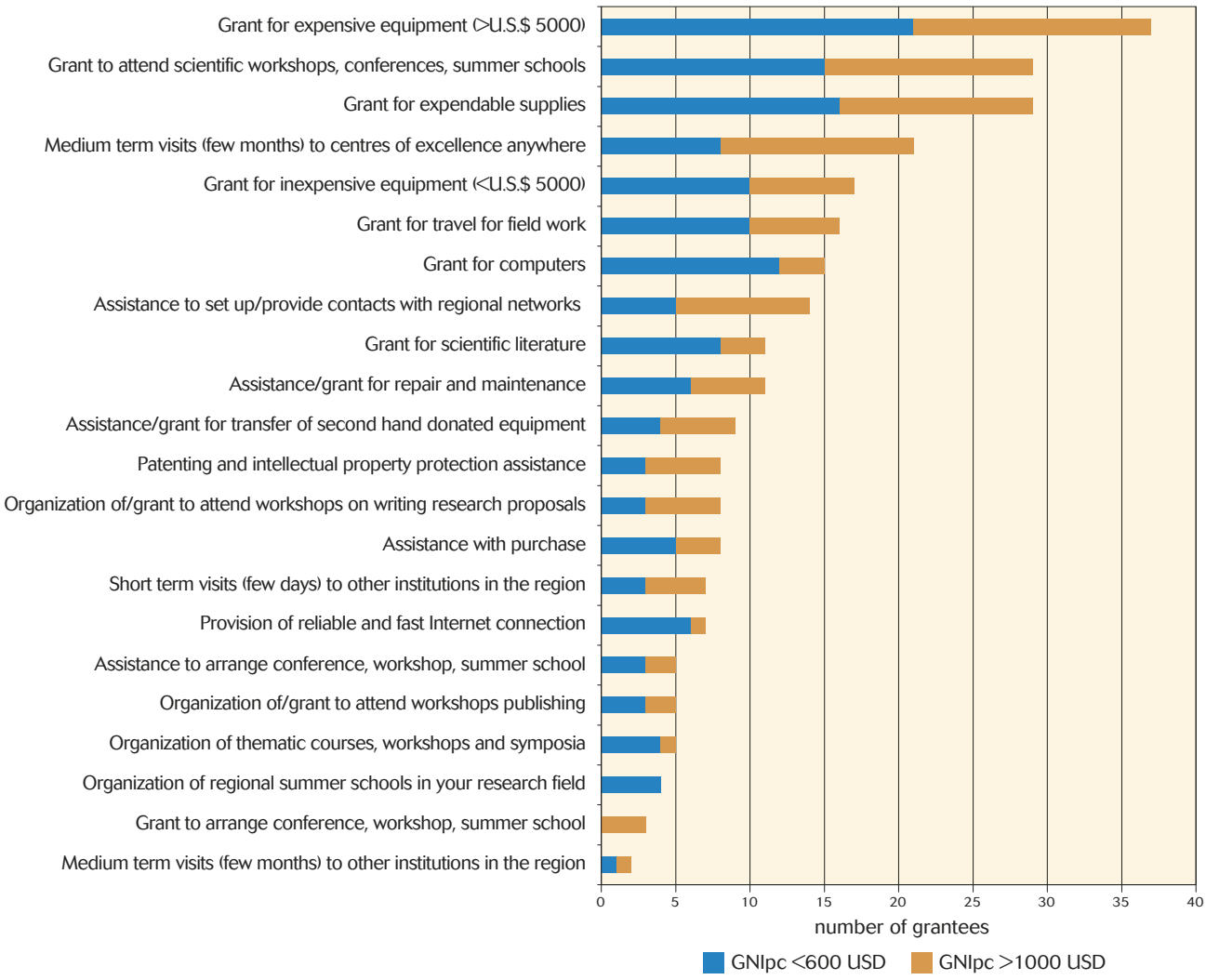


Figure 9.3. Number of grantees finding items the MOST important to support (n for GNIpc <600 USD = 27; n for GNIpc 1000 USD = 24)

Another issue raised was the need for scientists to develop arguments that are capable of convincing national policy makers on the importance of investing in science. They may involve the policy makers in the ongoing research projects or invite them to the laboratory as a means of lobbying. Grantees should engage the local media for exposure of research projects.

Figure 9.3 shows that an overwhelming majority of grantees was in need of equipment, as was shown also in Section 6.4. Visits to centres of excellence, which was high on the wish list, would cater for the need to access very advanced equipment, but this would not solve the requirement of medium sized equipment in the local laboratories. It was emphasized also by workshop participants that scientific equipment is central to a research project. It was suggested that requests should be for the type of equipment rather than the amount of money required. At the very least, it was suggested that grants be adjusted for inflation.

The maintenance of equipment can be especially difficult in Africa due to difficult climatic conditions, poor infrastructure and lack of experience in equipment maintenance within poorer countries. The great difficulty in purchasing spare parts also hinders efforts at regular maintenance. In addition it is costly and often difficult to get a serviceman, who usually has to come from abroad. The maintenance problem was emphasized in section 6.4 regarding the main obstacles to research and was also mentioned as one of the four main obsta-

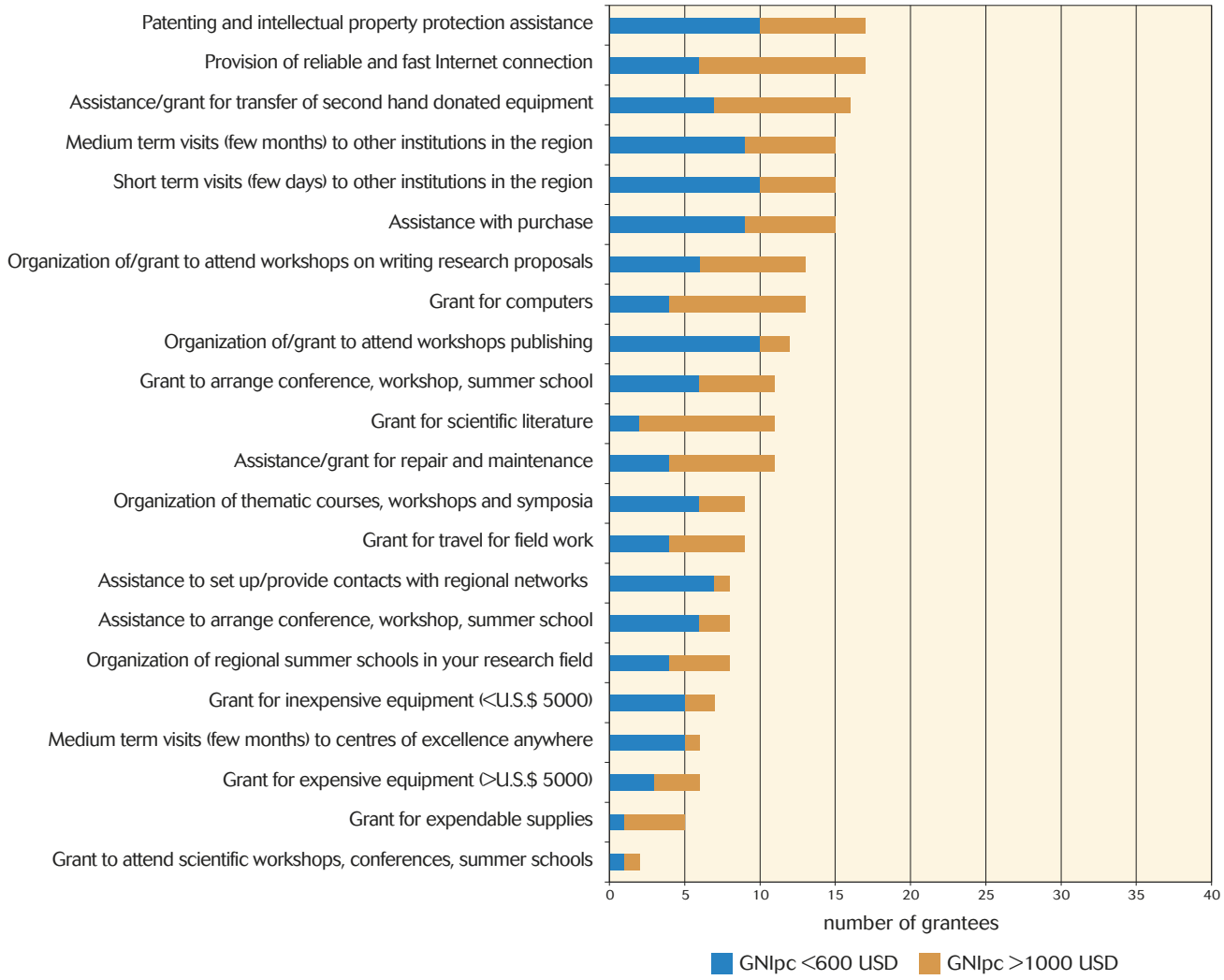


Figure 9.4. Number of grantees finding items the LEAST important to support (n for GNIpc <600 USD = 26; n for GNIpc 1000 USD = 23)

cles by several grantees, cf Figure 6.2. In Figure 6.4 showing recurring difficulties, equipment repairs even got the highest ranking of all difficulties by researchers from countries with GNIpc 1000 USD. The difficulties in repair and maintenance can also be seen in Figure 9.3.

Workshop participants suggested that technical training should be a part of the options in a grant application. Both technicians and scientists would need hands-on training for maintenance and optimal use of even small equipment, and should also be encouraged to train handling and maintenance on obsolete equipment, just like medical students train on corpses before cutting in living humans. It is suggested that IFS enhance its capacity to purchasing spare parts, and that both IFS and OPCW set aside funds for repair. In fact, when donating an instrument, one ought to set aside an equal amount of money to keep the equipment running for at least five years, since it costs annually roughly 20% of the purchase price to run (e.g. gases), maintain and repair any instrument.

The interest for second hand equipment is low (Q52). Although a way out where there are no other possibilities, there could be problems with quicker rate of breakdown and difficulties with spare parts being out of stock. In some countries it is not allowed to import second hand equipment following bad experience. According to the author's experience, a shipment of second hand glassware and minor equipment, such as stirrers, conductometer, are most welcome and less risky, whereas

more sophisticated second hand equipment can be difficult to get to function properly. However, if a researcher is offered equipment she/he has worked with and knows how to maintain, then there is a reasonable prospect of getting it to work again.

Access to supplies is high up the lists, in accordance with section 6.4. In some types of research large quantities are used of both chemicals and glassware as well as expendable material for equipment. Transport may also be expensive. Consumables may not always be expensive, but there may be problems accessing suppliers. Some chemicals may be sensitive and therefore pass its expiry date if customs process delays the delivery to the laboratory. Certain chemical compounds may also be prohibited from air-transport and may need to be shipped which further incurs delays.

While access to scientific documentation is noted as a pronounced obstacle to research, (cf Figure 6.2,) it is not considered particularly important for IFS or OPCW to support the access to scientific literature. Increased internet access and organisations like INASP[12] are bringing considerable progress to these areas. Grants for computers are certainly of interest to many researchers in poorer countries, but access to internet is beyond the scope of concern for the IFS and OPCW, according to the respondents.

Among the most important areas of support is the participation in scientific conferences and other meetings. These provide important exchange of ideas and the intellectual stimulus needed when the number of researchers nearby is at a sub-critical level.

According to the respondents to the questionnaire, regional contacts besides regional networks were of lesser interest. Nevertheless, the workshop participants found it important to strengthen South-South cooperation and build up relationships. Laboratory links should be enhanced and encouraged among South-South partners. Inter-laboratory comparisons are needed to ensure the accuracy of results generated. Internship for young scientists should be emphasized. Tuition fees could be included in such grants.

[12] International Network for the Availability of Scientific Publications

Regional networks are of interest for questionnaire respondents, especially for respondents from countries with a GNIpc 1000 USD. The same interest was expressed by the workshop participants, who thought that regional networks should be strengthened and be created in areas where there were none. The participants interacted with representatives of six networks present at the workshop[13], and with participants at a workshop[14] next-door. Africa Links can also be enhanced through thematic meetings, visits to regional centres/laboratories of excellence. Strong Alumni Associations of former grantees were also suggested. The underlying opinion was that it is only through collective action that resources can be harnessed.

[13] ANCAP; The African Network for the Chemical Analysis of Pesticides
FOSNNA; Food Science and Nutrition Network of Africa
NABSA; The Network for Analytical and Bioassay Services in Africa
NAPRECA; Natural Products Research Network for Eastern and Central Africa
SARBIO; Southern African Regional Co-operation in Biochemistry, Molecular Biology and Biotechnology
SEANAC; Southern and Eastern Africa Network of Analytical Chemists

[14] World Academy of Young Scientists

10 Are objectives met? Concluding remarks

The objective of the OPCW is 'to build *national capacity* in peaceful uses of chemistry, for economic and technological development'. The mission of IFS is to 'contribute towards strengthening the capacity of developing countries to conduct *relevant* and *high quality research* on the sustainable management of biological and water resources'. The strategy is to identify promising young scientists '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*.

To what extent has the support given contributed towards achieving these goals?

10.1 Research in developing countries

The support offered by the OCPW and IFS is intended to foster a cadre of skilled scientists working in their home countries. Among the 54 responding grantees only one had moved outside Africa, and one within Africa. It is known that most of the non-responding grantees are also still active in their home countries. This is a significant achievement in a continent where the most talented scientists have traditionally moved onto greener pastures. When grantees were asked whether they would have continued with research in the absence of an IFS/OPCW grant, 23 said they would not have continued with research or would have undertaken the research in a different form (section 8.1) Many of these respondents may have moved abroad. Applicants for the IFS or OPCW grants may already have some inclination to remain in the home country, but the grant gives a further incentive to stay and allows the researcher to fully exploit her/his research potential.

Several of the grantees have pursued their studies abroad, and as much as 41% of the grantees had spent 2-8 years abroad (on average 5 years; section 4.3). The IFS/OPCW grant is certainly a factor taken into account when making the decision to start up research in the home country. However, when research students are abroad, the critical mass of good researchers at home is reduced, since it is mainly the PhD and MSc students who do the practical research. Fortunately, in recent years, an increasing number of PhD students have been opting for the sandwich or split site scheme. These schemes have proven to be highly successful in producing young researchers receptive to knowledge and influences from abroad while remaining in touch with their own societies and research environment. Most grants for studies abroad do not provide for costs at home, and here the IFS/OPCW grant can be decisive in making a sandwich program possible, by providing support to small equipment, consumables, and field work. (Section 4.2) In future, calls for applications should highlight this unique feature of the IFS/OPCW grant.

In terms of future ambitions, only 39% of the grantees held solely national aspirations as opposed to an international career. However, a national scientific career was the path of choice for 72% (section 4.10). One third of the grantees considered a scientific career abroad; the lack of good research facilities being one major contributing factor in the decision to move (section 6.4). IFS and OPCW could counteract this trend by a tiered funding scheme, and collaboration to find other supporting agencies. IFS and OPCW could also liaise with donors who prefer one-time donation of equipment, and offer consumables and other complementary support, if not provided directly by the donor. The donor could then be reassured that any such equipment will be put to good use by known researchers.

Active regional networks of various kinds among scientists from developing countries tend both to raise their visibility and strengthen ties within the region. Members of such networks are able to exchange views on regional scientific problems, may often act as external examiners or give courses in specialized areas, and can share research facilities. Participation in such networks should be encouraged as such links enhance regional recognition and facilitates the mutual exchange of research students.

10.2 Relevance

Research supported by IFS should aim primarily at the sustainable management of biological resources[15] relevant to the needs of the country or region[16]. However, as the demarcations between the scientific disciplines become increasingly blurred, support may be given to enhancing the use of science beyond strictly biological and chemical resources.

To what extent is the research actually relevant for the region? The majority of grantees undertake research relevant to local or regional issues, related either to making use of local resources, or caring for human or animal health, or giving a basis for sustainable use of land and water (section 8.6). Many of the projects lead to the resolution of serious problems even if it takes several years to get high quality supporting data. In other cases, solutions to pressing issues may be a distant reality but worthwhile scientific research published in reputed journals raises the international recognition of researchers, and constitutes a small but important first step towards capacity building within the scientific community.

The grantees, when asked to share their views on the role of science and research, were convinced that science contributes to development (section 5.1), and most grantees had their local or African society in mind when choosing research topics (section 8.6). In addition to their research, many grantees were engaged in a number of outreach activities (sections 7.3, 7.4).

It would therefore be worthwhile to encourage applications focussing on the sustainable use of chemistry for development within its social and economic context.

[14] Mission statement
[15] Guidelines for application

10.3 Quality research

The number of publications, in particular in ISI-indexed journals, serves as the most commonly accepted indicator of research quality. The average publication rate among the grantees was found to be 1-2 articles per year after receiving the IFS/OPCW grant (section 7.1). A third of the approximately 500 articles published by the grantees during the period 1999-2006 were in ISI-indexed journals. Much good research is published in local or regional journals, partly because it is centred on local interests deemed by international journals to be of limited interest to their readers. Furthermore, articles published in local and regional journals play an important role in the dissemination of important local scientific knowledge.

As discussed in section 7.1, it can easily take 4 years from the time of grant receipt until the publication is in print, and the majority of the responding grantees (30 of 54) had received their grant in 2003 or later. So far approximately 70 of the articles were derived from IFS/OPCW supported research. Of the articles noted by the respondents to be based on the IFS/OPCW supported research, nearly two thirds were in ISI-indexed journals. This increase in the proportion of ISI-listed journals may be partly due to the grant, and partly attributable to maturing scientists, who presumably published more in local journals during their study period.

The average number of articles in ISI-indexed journals was actually slightly higher for those who received their degrees at home compared to those who obtained them abroad. (3.1 vs 2.7) This should be regarded as a good sign when the difficulties of research in home countries are taken into account. However, those who undertook extended visits abroad published a substantially greater number of articles in both ISI-indexed and non-indexed journals.

A further indicator of research quality is the number and amount of grants obtained. This measurement can be difficult to use in developing countries. Domestic grants are virtually non-existent in the poorest countries. When available, they are usually too small to make any significant difference. The research subjects to be supported are often demand driven, both for domestic and international sup-

port, and the research, whatever the quality, may not fall into the area at hand. Still it is worrying that the number of respondents who had received other funding after receiving the first IFS/OPCW grant (section 6.1) remains at less than one third. Given the difficulties in securing funding for all the equipment required, (section 6.4) grantees should be encouraged, and offered assistance to searching for alternative sources of funding.

The majority of grantees are producing high quality research in their home countries. However, some of the grantees struggling to produce high quality research could benefit from greater IFS/OPCW assistance. To this end, the provision of functioning equipment is essential (sections 6.4, 9.2), as discussed under 10.1. Hands-on training workshops for grantees and technicians on maintenance and repair could also be arranged, possibly in collaboration with other organisations. Second hand equipment received low priority from grantees due to its fragility and lack of instructions, but provided grantees receive adequate training on the use and maintenance of older models, they could be more highly valued and put to good use (section 9.2). The IFS and OPCW should lobby among other donors to ensure that donations of second hand equipment are accompanied by adequate training and resources for maintenance.

Highly valued on the wish list were the visits to "centres of excellence" (section 9.2). Such visits enhance research quality, providing not only access to equipment but also contacts and exposure to research culture, training and access to literature of the highest quality. IFS and OPCW should support such visits, especially to well equipped institutions in the region (see 10.1) that may serve as "resource centres". Mutual benefit could be derived from such visits as the visiting scientist would bring fresh ideas, research questions and knowledge.

IFS/OPCW spends considerable time and resources in organising general workshops and regional thematic meetings aimed at IFS and IFS/OPCW grantees, but mature researchers should rather be encouraged to attend high quality conferences beyond the IFS/OPCW sphere. Stimulation and exposure to the wider scientific community is important in raising scientific quality of IFS/OPCW sponsored researchers. Meetings with IFS and IFS/OPCW grantees together with such conferences are already practised and should continue.

The current standard grant of 12000 USD is relatively low, but can act as a stepping stone. If this sum could be doubled for the second grant, as suggested by workshop participants, it would be a considerable incentive for researchers to produce good quality research in the first instance.

10.4 Science leaders

A scientist working in a developing country struggles to devote her/himself to full-time research. Besides research her/his general knowledge and advice is in great demand within society. The fewer highly educated people in a country, the greater the expectations placed on the scientist. This is an important social contribution by the IFS/OPCW grantee, and for roughly half of the grantees the workload included 2-4 hours of consultation or extension services per week (section 4.8). A quarter of the grantees had extra job as consultants outside the university or research institute (section 4.9). Some contributed in governmental advisory committees; others were involved in local research centres and activities (section 7.4).

The science leader also devotes considerable time to teaching. Passing down acquired research skills to the next generation of scientists is an investment with potentially high returns in the future. During 2005-2006 there were 74 PhD students, 159 MSc students and at least 96 honours/final year BSc students, who received insights into research under the supervision of an IFS/OPCW grantee. This gives a satisfactory average number of 6 research students per grantee (section 7.2). While it is assumed that equipment and resources obtained through IFS/OPCW grants were also used by the research students, the quality of the supervision cannot be taken as given. To reduce possible disparities in the quality of supervision, IFS and OPCW could consider offering workshops on supervision of research students.

It is also important for high quality researchers to teach undergraduate students. An active researcher capable of inspiring undergraduate students by conveying his latest research ideas creatively can make a considerable difference to the career aspi-

rations of undergraduate students. This is another positive indirect outcome of the IFS/OPCW support. Seventy-seven per cent of the grantees were teaching a median of 10 hours, which they found acceptable (section 4.8).

Many grantees are recognized as scientists and have good positions at universities or research institutes. Among the grantees were six professors, seven associate professors, and ten senior lecturers. Several of these researchers had advanced to the present positions with the assistance of IFS/OPCW grants (section 4.4). Since the main criterion for promotion is the number of publications in international journals (section 4.6), IFS/OPCW support can be considered to be highly significant.

Several of the more senior grantees had commitments in recognition of their scientific capabilities. In addition to sitting on governmental advisory boards, some were sitting on boards of regional scientific societies, or acting as referees to national, regional and international journals (section 7.4). Publication in a reputable journal instantly raises the international profile of a researcher, especially if she/he is the first author. Encouragingly, nearly half of the articles had an IFS/OPCW grantee as the first author (section 7.1).

In view of the aim to support future leaders in science, there may be room for adjusting the prerequisites for grant applications. Today in Africa, it would be difficult to become a leader in science without a PhD degree. Only 7 of the 13 grantees with an MSc were studying for a PhD. In future PhD level research could be demanded of all applicants.

The importance of the female role model in science has long been recognised as an important factor that encourages young females to enter a career in science. It is therefore important not only to encourage female applications but also to support female grantees once they have received their first grant. The percentage of females increasing to 39% by the time of this study is fairly high in view of the ongoing gender disparities in many African societies (section 2). Even so, efforts should continue to raise this figure further.

10.5 What more could be done?

To a great extent, the IFS and OPCW have succeeded in finding and selecting promising grantees. Despite struggling in a demanding environment, many grantees have produced sound research results. They are also actively contributing to their surrounding society. There is still room for improvement in the research situation, and changes or amendments to the support given by IFS and OPCW could include:

* increased funding for the second grant
* assistance in finding funding opportunities beyond the IFS and OPCW
* fewer general workshops and greater number of conference support in specific (targeted) areas of high quality and need
* more support for visits to regional resource centres
* further encouragement and support of female applicants and grantees
* hands-on workshops on optimal use and maintenance of equipment
* encouraging participation in regional, possibly virtual, networks
* support to the local component of sandwich PhD studies

Appendix 1

Questionnaire to Grantees of the Joint IFS/OPCW Research Fund

The questionnaire used for this report is reproduced on the following pages. It was prepared in both English and French and is based on the one developed for IFS MESIA[17] studies and was sent in October 2006 to the 71 African scientists who received the joint IFS/OPCW grant between 1998 and 2005.

Reference to the discussion of the questions in the report:	
Question no.	**Chapter no.**
4	3.1
5	3.2
6	3.3
7, 8, 9	3.4
10	4.2
11	4.3
12	4.4
13-16	2
17	4.7
18	4.8
19, 20	4.9
21	4.5
22	4.10
23, 24	8.1
25	5.3
26	5.2
27	5.3
28	5.1
29, 30	6.2
31	6.3
32, 33	6.4
34	4.6
35, 36	5.4
37	7.1
38	7.3
39	7.2
40	7.4
41	6.1
42	8.2
43	6.1
44	8.1
45, 46, 47	8.3
48	8.5
49	8.6
50	8.4
51	9.1
52	9.2

[17] IFS Monitoring and Evaluation System for Impact Assessment

Questionnaire to Grantees of the Joint Ifs/OPCW Research Fund

Introduction

The International Foundation for Science (IFS) is a not-for-profit, non-governmental organisation founded in 1972. The mission of IFS is to contribute towards strengthening the capacity of developing countries to conduct relevant and high quality research on the sustainable management of biological and water resources. IFS has awarded over 5,800 research grants, and additional support, to some 4,000 young scientists in over 100 developing countries.
See more on www.ifs.se

The Chemical Weapons Convention is an international treaty which bans the development, production, stockpiling, transfer and use of chemical weapons, and also stipulates their timely destruction. The Convention entered into force in 1997 and mandated the *Organisation for the Prohibition of Chemical Weapons (OPCW)* to eliminate the scourge of chemical weapons forever and to verify the destruction of the declared chemical weapons stockpiles within stipulated deadlines. The goal is a world in which cooperation in the peaceful uses of chemistry is fostered.

The Organisation's division for International Cooperation focuses on capacity building for the peaceful applications of chemistry in areas which are relevant to the Chemical Weapons Convention. A number of programmes are being implemented by the Organisation which are primarily designed for Member States whose economies are either developing or in transition. See more on www.opcw.org.

IFS and OPCW have given joint grants, handled by IFS, to a number of researchers in developing countries, and you are one of them. IFS and OPCW have now decided to undertake an evaluation of the IFS/OPCW joint funding, in order to see its effect and how it could be improved. The evaluation will be conducted by Malin Åkerblom of Uppsala University, Sweden.

It would be very much appreciated indeed if you could spend some time to fill in and return this questionnaire (address given on last page). The results of the questionnaire will be the major input into the evaluation and help shape the future of our support for scientists from developing countries.

You may find it difficult to answer some of the questions. If so, leave them. If something is unclear, please send an e-mail to malin.akerblom@isp.uu.se for clarification.

Additional comments are welcome.

Information and comments from the participants in the questionnaire will be treated discreetly and confidentially.

Stockholm October 5, 2006

Michael Ståhl
Director, IFS

QUESTIONNAIRE

The questionnaire could be filled in by hand and faxed, or scanned and e-mailed, or could be filled in on computer by underlining alternatives, when applicable
Please return latest by October 23, 2006

I Civil status, education and mobility

1. First name:

   Family name:
   (underline the name under which you publish)

2. E-mail address(es):

   Telephone number (work):

   Fax number:

3. Postal address (work):

4. Citizenship:

5. Sex: □ Male □ Female

6. Year of birth:

7. Civil status: □ Single □ Married □ Widowed

8. How many children do you have?

9. If you are married, what is your spouse's principal occupation?

10. Academic degrees obtained

Degree equivalent to	Discipline/Area of specialisation	Year degree awarded	Educational establishment	Fellowship/study grant obtained from
BSc/Licence				
MSc/Maîtrise/ Ingénieur				
PhD/Thèse de 3ème cycle/Docteur Ingénieur				
Post-Doc/Doctorat d'Etat				

11. List your academic visits abroad (stay of at least 2 months) since you were awarded your basic degree (BSc/Licence)

Year	Institution	Country	Duration (x months)	Purpose

add more rows if needed

II Career

12. List all major positions you have held since you received your first IFS/OPCW grant, including your current position(s)

Position	Employing institution	Country	Dates (from-to; month, year)	Research time, average hours per week

add more rows if needed

13. Are you still working as a researcher?
    - □ Yes Please continue from question **17**
    - □ No Please answer the following 3 questions. It would also be much appreciated if you answer all the following questions, as you would have done when still working as a scientist

14. Why did you leave research?
    - □ Interesting new job
    - □ Better salary and other living conditions
    - □ Lack of job opportunities
    - □ Lack of adequate research funding
    - □ Inferior working conditions at old institution
    - □ Other (please specify):

15. To what extent was your academic title important to receive your new position?
    Circle one number from 1 = not important at all to 5 = very important

    1 2 3 4 5

16. To what extent was your research experience per se important to receive your new position?
Circle one number from 1 = not important at all to 5 = very important

1 2 3 4 5

Comments:

17. In what type of institutional framework are you currently working?

□ Public University
□ Private University
□ Public Institute
□ Private Institute
□ National/local governmental organization/dept
□ International governmental organization
□ Local Non Governmental Organization (NGO)
□ International NGO
□ None, I am a housewife/man
□ None, I am unemployed, job seeking
□ Others (please specify):

18. In your daily work, give the approximate amount of time devoted to the different activities listed below and indicate in the second column what, according to you, it should ideally be.

Activities	Present average hours per week	Ideal average hours per week
Teaching		
Research		
Administration		
Extension		
Consultancy		
Other (please specify)		

19. If you have extra jobs to supplement your income, indicate how many additional hours you spend working per week. …… hours

20. Specify the nature of your extra jobs

□ Teaching
□ Farming
□ Own local consultancy
□ Somebody else's local consultancy
□ Own international consultancy
□ Somebody else's international consultancy
□ Own private business
□ Somebody else's business
□ Other (please specify):

21. Have you been offered employment abroad since you got your first IFS/OPCW grant?

If yes, in which country?	Did you accept the offer?	
……	□ Yes	□ No
……	□ Yes	□ No
……	□ Yes	□ No

22. What are your future career goals?

□ National scientific career
□ Scientific career abroad
□ Career in administration
□ Private business
□ Own consultancy
□ Career in politics
□ Career within national development programs
□ Career within foreign or international organizations
□ Other (please specify)

III Research choice and perception of research

23. Did the IFS/OPCW grant substantially change your scientific orientation/research subjects?
□ Yes □ No

24. If the grant is terminated, have you since substantially changed your scientific orientation/research subjects? □ Yes □ No

If 'Yes' to question 23 or 24, please give a comment:

25. To carry out your research activities, do you usually work alone or with other scientists?
□ Alone □ Only with my students □ With other scientists

26. Whenever you work with other scientists do you usually work in monodisciplinary or multidisciplinary research teams ? □ monodisciplinary □ multidisciplinary

27. How often do you communicate with the following people regarding your research (in addition to your students)?
(1 = never, 2 = rarely, 3 = annually, 4 = monthly, 5 = more often)

Nowadays		Before the IFS/OPCW grant *(leave, if difficult to estimate)*
1 2 3 4 5	Scientists in your department	1 2 3 4 5
1 2 3 4 5	Scientists from other institutions in your country	1 2 3 4 5
1 2 3 4 5	Scientists in other African countries	1 2 3 4 5
1 2 3 4 5	Scientists in Europe	1 2 3 4 5
1 2 3 4 5	Scientists in USA or Canada	1 2 3 4 5
1 2 3 4 5	Scientists in Asia or Latin America	1 2 3 4 5
1 2 3 4 5	Scientists in Australia	1 2 3 4 5
1 2 3 4 5	Funding agencies	1 2 3 4 5
1 2 3 4 5	Non Governmental Organizations (NGOs)	1 2 3 4 5
1 2 3 4 5	Private clients	1 2 3 4 5
1 2 3 4 5	Consultancy groups	1 2 3 4 5
1 2 3 4 5	Extension staff	1 2 3 4 5
1 2 3 4 5	Others (please specify):	1 2 3 4 5

28. Indicate whether you agree with the following assertions by circling a number from 1 = "disagree completely" to 5 = "agree completely".

1 2 3 4 5	Science is public knowledge
1 2 3 4 5	Scientific knowledge is universal
1 2 3 4 5	Science contributes to development
1 2 3 4 5	Science should firstly produce knowledge
1 2 3 4 5	Science should mainly lead to useful innovations
1 2 3 4 5	Researchers are free to choose their own research topics
1 2 3 4 5	Research topics are set by sponsors
1 2 3 4 5	Research topics are set by employers
1 2 3 4 5	Research problems are set by clients
1 2 3 4 5	Researchers should produce goods for a competitive market
1 2 3 4 5	Researchers should have entrepreneurial and managerial skills

IV Access to scientific literature and attendance of conferences

29. Do you have easy access to the Internet? □ Yes □ No

30. Do you have access to bibliographic databases? □ Yes □ No

31. How many scientific conferences have you attended since 1999?

Conferences	With national support	With IFS support	With OPCW support	With foreign support**	Without support
Within your country					
In Africa*					
In Europe					
In USA or Canada					
In Latin America & Caribbean					
In Asia or Australia					

*Except your own country **Except IFS or OPCW

V Main factors influencing your research work

32. What are, according to you, the four main factors holding back your research work, in order of importance? (1 = most important)

1. ……

2. ……

3. ……

4. ……

33. Certain recurring difficulties have been listed below. Indicate by circling the relevant number (1, 2, 3, 4) whether they are 1 = insignificant, 2 = tolerable, 3 = serious, or 4 = obstructive, according to you, in your research work.

1 2 3 4 Access to equipment	Lack of technician(s)	1 2 3 4
1 2 3 4 Purchasing equipment	Field work difficulties	1 2 3 4
1 2 3 4 Equipment repairs	Access to vehicle	1 2 3 4
1 2 3 4 Access to supplies	Access to scientific documentation	1 2 3 4
1 2 3 4 Lack of time	Data processing	1 2 3 4
1 2 3 4 Others (please specify):		

34. Which criteria are the most important for the promotion of scientists in your country?
Circle one number from 1 = not important at all to 5 = very important

1 2 3 4 5 Seniority	Contribution to teaching	1 2 3 4 5
1 2 3 4 5 Contribution to development	Contribution to the institution	1 2 3 4 5
1 2 3 4 5 Publications in local journals	Publications in international journals	1 2 3 4 5
1 2 3 4 5 Award of research grants	Strategic social relations	1 2 3 4 5
1 2 3 4 5 Others (please specify):		

35. Is your research work evaluated regularly? □ Yes □ No

36. If yes, by whom (you can tick several)?

□ Institution/University
□ Faculty
□ Department
□ Supervisor
□ Ministry/Government Agency
□ Others (please specify):
□ Supra-national Scientific Committee
□ National Scientific Committee
□ Donor
□ External evaluator
□ Employer

VI Outputs related to your role as a scientist

37. Number of publications where you have been author or co-author.

Number of publications/reports	National		Regional		International	
	1999-2004	2005-2006	1999-2004	2005-2006	1999-2004	2005-2006
published						
accepted for publication*	----------		----------		----------	
submitted for publication*	----------		----------		----------	
conference reports						

* if not yet published

*Please provide your publication list (with name of authors, title of article, the journal/conference proceedings/book/report, year, volume, issue, pages**, indicating publications which are a result of the research carried out with the IFS/OPCW grant.**) If yet unpublished, indicate "accepted for publication", "submitted" or "in manuscript", where applicable.*

38. Events arranged (outside your daily teaching) where you have played a leading role

Courses, workshops, conferences; abbreviated title	Year	National	Regional	Interna-tional	No of parti-cipants

Other outreach events. Give a short description	Year	National	Regional	Interna-tional	No of parti-cipants

39. Number of students supervised/co-supervised by you, from 1999

	Main supervisor		Co-supervisor	
	1999-2004	2005-2006	1999-2004	2005-2006
Honours graduates				
Masters graduates				
Doctoral graduates				

40. Any other outputs related to your role as a scientist that you would like to mention:

VII Research Funding

41. You have received one or two IFS/OPCW joint research grants. During this period, what other research funds have you received, if any (expressed in USD)?

Sources	**year(s)**	**total, in USD**
Home institution		
National public funds		
Industry or private foundation (national)		
Industry or private foundation (foreign)		
International organization		
Other (please specify)		

42. You have received one or two IFS/OPCW joint research grants. Have you received other support of any kind from IFS or OPCW? If so, how do you rate the importance of them for your research career?

Circle one number from 1 = not important at all to 3 = very important

From IFS:

□ Research grant (IFS only, or joint with other agency) 1 2 3
□ Travel/conference grant 1 2 3
□ Publication grant 1 2 3
□ Participation in an IFS thematic scientific workshop 1 2 3
□ Participation in an IFS workshop on publishing or writing proposals 1 2 3
□ Other (please specify): 1 2 3

From OPCW:

□ Research grant (OPCW only, or joint with other agency) 1 2 3
□ Analytical-skills development course 1 2 3
□ Associate Programme 1 2 3
□ Internship support 1 2 3
□ Equipment transfer (second hand equipment) 1 2 3
□ Equipment support 1 2 3
□ Laboratory Assistance Programme 1 2 3
□ Support to organization of conference 1 2 3
□ Other (please specify): 1 2 3

43. List the different funding institutions from which you have received financial support for your research activities since the beginning of your research career, excluding IFS, OPCW and your own institution.
Indicate your degree of satisfaction (1 = very bad, 2 = bad, 3 = average, 4 = good and 5 = excellent)

Years	Name of funding institution	Country	Amount in USD	Degree of satisfaction
				1 2 3 4 5
				1 2 3 4 5
				1 2 3 4 5
				1 2 3 4 5
				1 2 3 4 5
				1 2 3 4 5

VIII Relative importance of the IFS/OPCW support

44. Would you have pursued your research if this IFS/OPCW funding had not been made available?

□ Yes, other support would have been available
□ Yes, but in a substantially different form
□ No
□ Yes, but on a reduced scale
□ Yes, even without other support
□ Other (please specify):

45. Since becoming an IFS/OPCW grantee, has it become easier for you to obtain:

	Yes	No
1. Additional funding from your institution	□	□
2. Additional funding from a national funding institution	□	□
3. Additional funding from an international institution	□	□

If yes to item 3, give name:

46. After receiving support from IFS/OPCW, did it become easier for you to obtain scientific and technical assistance from your institution? □ Yes □ No

47. Has the IFS/OPCW support provided opportunities to collaborate with new partners ?
□ Yes □ No

48. Has your research (which was funded by IFS/OPCW) led to advancement of science? If so, how and in which area?

49. Has your research (as referred to above) had an impact on, or have a prospect of solving a local developmental problem or need? Please give specific details.

50. Have you published any paper on the basis of the research referred to above?
□ Yes □ No

If yes, please indicate them in your publication list, see question 37. A copy of the paper may be provided, if possible.

51. IFS has handled your IFS/OPCW grant. How would you assess the IFS mode of work and support to your research work?
(1 = unacceptable, 2 = poor, 3 = satisfactory, 4 = good and 5 = excellent)

1 2 3 4 5 Selection process
1 2 3 4 5 Grant administration (including transfer of funds)
1 2 3 4 5 Monitoring and follow-up of projects
1 2 3 4 5 Contacts with IFS staff
1 2 3 4 5 Purchase of research equipment
1 2 3 4 5 Maintenance of research equipment
1 2 3 4 5 Research training
1 2 3 4 5 Scientific counseling
1 2 3 4 5 IFS organized workshops
1 2 3 4 5 Networking activities
1 2 3 4 5 Assistance in the publication of your research results
1 2 3 4 5 Follow up activities once the supported project is terminated
1 2 3 4 5 Other (please specify):

52. How would you rate the following type of support with/activities by IFS or OPCW as important for your research
Select the **5** issues you consider as ***most*** important and the **5** issues you consider as ***least*** important for IFS or OPCW to support:

	Most important	**Least** important
Grant for expensive equipment (U.S.$ 5000)	□	□
Grant for inexpensive equipment (<U.S.$ 5000)	□	□
Assistance/grant for transfer of second hand donated equipment	□	□
Assistance/grant for repair and maintenance	□	□
Grant for expendable supplies	□	□
Grant for scientific literature	□	□
Assistance with purchase	□	□
Grant for computers	□	□
Provision of reliable and fast Internet connection	□	□
Grant for travel for field work	□	□
Grant to attend scientific workshops, conferences, summer schools	□	□
Organization of thematic courses, workshops and symposia	□	□
Organization of regional summer schools in your research field	□	□
Organization of/grant to attend workshops on writing research proposals	□	□
Organization of/grant to attend workshops publishing	□	□
Grant to arrange conference, workshop, summer school	□	□
Assistance to arrange conference, workshop, summer school	□	□
Short term visits (few days) to other institutions in the region	□	□
Medium term visits (few months) to other institutions in the region	□	□
Medium term visits (few months) to centres of excellence anywhere	□	□
Assistance to set up/provide contacts with regional networks	□	□
Patenting and intellectual property protection assistance	□	□
Other suggestions ……	□	□
……	□	□
……	□	□
……		

Any other comments are welcome!

Thank you for your co-operation!

Appendix 2

Journals in which grantees have published 1999-2006

Journal	Total no. of articles	Number of authors with degree			ISI listed
		abroad	at home	total	
African Crop Science Journal	**3**	1	1	**2**	
African Journal of Biotechnology	**7**		4	**4**	
African Journal of Ecology	**1**	1		**1**	x
African Journal of Food, Agriculture, Nutrition and Development	**3**		2	**2**	
African Journal of Health Sciences	**1**	1		**1**	
African Journal of Range and Forage Science	**1**		1	**1**	
African Journal of Reproductive Health	**1**	1		**1**	
African Journal of Traditional, Complementary & Alternative Medicines, CAM	**10**	2	3	**5**	
American Journal of Tropical Medicine and Hygiene	**1**	1		**1**	x
Analytical Biochemistry	**1**		1	**1**	x
Animal Science	**1**		1	**1**	
Animalis	**1**	1		**1**	
Annales de Médecine Vétérinaire	**2**	1		**1**	
Annals of Microbiology	**1**	1		**1**	
Annals of nutrition and metabolism	**1**		1	**1**	x
Annals of Tropical Medicine and Parasitology	**3**		2	**2**	x
Applied Biochemistry and Biotechnology	**5**	1	1	**2**	x
Applied Microbiology and Biotechnology	**1**		1	**1**	x
Applied Tropical Agriculture	**1**		1	**1**	
Aquatic Ecosystem Health & Management, 2005 - Taylor & Francis	**1**		1	**1**	
Arab Agric. Res. J	**1**	1		**1**	
Archives of Environmental Contamination and Toxicology	**2**	1		**1**	x
Asian Journal of Andrology	**1**		1	**1**	
Behavioural Pharmacolog	**1**		1	**1**	x
Biochemistry	**1**	1		**1**	x
Biochemistry and Biotechnology	**1**	1		**1**	
Biocontrol Science and Technology	**1**		1	**1**	x
Biologia Tunisie	**2**	1		**1**	
Biological and Environmental Sciences. Journal of the Tropics (BEST)	**1**		1	**1**	
Biomarkers	**1**		1	**1**	x
Bioorganic & Medicinal Chemistry Letters	**3**	1	1	**2**	x
Bioresource Technology	**4**	1	2	**3**	x
Biosciences Res Com	**1**		1	**1**	
Biotechnol. Mol. Biol. Rev	**1**		1	**1**	
Biotechnology Letters	**5**	1	1	**2**	x
Botanica Marina	**2**		1	**1**	x
Botswana Notes and Records	**1**	1		**1**	

Journal	Total no. of articles	Number of authors with degree			ISI listed
		abroad	at home	total	
Bulletin of Environmental Contamination and Toxicology	6		1	1	x
Bulletin of the Chemical Society of Ethiopia	8	2	3	5	
Burkina Médical.	1	1		1	
Cahiers Agricultures	1		1	1	
Canadian Journal of Microbiology	1	1		1	x
Central African Journal of Medicine	3	1		1	
Chem. Commun	1	1		1	
ChemBioChem	1	1		1	x
Chemical and Pharmaceutical Bulletin	3		2	2	x
Chemoecology	1	1		1	
CIAT Africa occasional publications series no. 42	1		1	1	
Compte Rendu Académie des Sciences Paris	1		1	1	
Compte Rendu de Chimie	2	1	1	2	x
Current Genetics	1	1		1	x
Current Organic Chemistry	2	1	1	2	x
Current Topics in Plant Biology	1		1	1	
Desalination	3		2	2	x
Diabetes Research	1		1	1	
Diabetologia	1		1	1	x
Discovery and Innovation.	1		1	1	
Drug Development and Industrial Pharmacy	2	1	1	2	x
East African Journal of Science	1	1		1	
East African Medical Journal	2	1		1	
Electroanalysis	2		1	1	x
Electrochimica Acta	1		1	1	x
Environ. Eng. Res	1	1		1	
Environmental and Experimental Botany	1		1	1	x
Environmental Research Uganda	1		1	1	
Environmental Technology	1		1	1	x
Enzyme & Microbial Technology	2		2	2	x
Espace Vétérinaire	2	1		1	
Ethiopian Pharmaceutical Journal	1	1		1	
Ethnopharmacologia	3	1		1	
European Journal of Pharmacology	1		1	1	x
European Journal of Plant Pathology	1		1	1	x
FEBS Journal (ex European Journal of Biochemistry)	1		1	1	x
Fertility and Sterility	1	1		1	x
Fitoterapia	3	2	1	3	
Flavour and Fragrance Journal	1		1	1	
Food and Nutrition Bulletin	1		1	1	
Food Chemistry	4	1	1	2	x
Food Hydrocolloids	1	1		1	x
Food Research International	2	1		1	x
Free Radical Research	1		1	1	x
Fresenius Environmental Bulletin	1	1		1	
Fruits	2		2	2	
Global Journal of Pure and Applied Sciences	2		1	1	
HYDR Dispatch	1	1		1	
Hydrobiologia	2	1	1	2	x
In series :Recent progress in medicinal plants	1		1	1	
In: Liquid Interfaces in Chemical, Biological and Pharmaceutical Applications, A. Volkov (Ed.),	1	1		1	
In: Livestock Research for Rural Development	1	1		1	

Journal	Total no. of articles	Number of authors with degree			ISI listed
		abroad	at home	total	
In: Recent Research Development in Oil Chemistry, S.G. Pandalai (Ed.),	1	1		1	
In: Vitamins and Hormones	1	1		1	
In: World Seaweed Resources, UK	1		1	1	
In: Wrigley, C., Corker, H. and Walker, C. E. (Eds.). Encyclopedia of Grain Science.	1	1		1	
Indian Journal of Pharmacology	2		1	1	
Industrial Crops and Products	1		1	1	
Inflammopharmacology	1		1	1	
International Journal of Cancer	1		1	1	x
International Journal of Ecol. Environ. Sci	1		1	1	
International Journal of Environmental Research and Public Health	1		1	1	
International Journal of Food Science and Technology	3		2	2	x
International Journal of Mass Spectrometry	1		1	1	x
International Journal of Pharmaceutics	2	1		1	x
International Journal of Pure and Applied Chemistry	4	2		2	x
Investigacion Agraria: Sistemas y Recursos Forestales	2	1		1	
Journal de Pharmacie de Belgique	1	1		1	
Journal of African Health Sciences	1	1		1	
Journal of Agricultural and Food Chemistry	11		2	2	x
Journal of Am. Chem. Soc	2	1		1	x
Journal of Animal and Veterinary Advances	3	1	1	2	
Journal of Applied Phycology	4		1	1	x
Journal of Arid Environments	1	1		1	x
Journal of Bacteriology	1	1		1	x
Journal of Biological and Biochemical Sciences	1		1	1	
Journal of Biological Chemistry	3	1		1	x
Journal of Biotechnology	3	1	1	2	x
Journal of Chemical Ecology	2		1	1	x
Journal of Clinical Microbiology	1	1		1	x
Journal of Ethnopharmacology	13	2	7	9	x
Journal of Food Composition and Analysis	1		1	1	
Journal of Food Engineering	1		1	1	x
Journal of Food Processing and Preservation	2	1	1	2	
Journal of Food Technology	1		1	1	
Journal of Herbs, Spices & Medicinal Plants	1		1	1	
Journal of Medical and Applied Malacology	2		1	1	
Journal of Medical Entomology	1	1		1	x
Journal of Medical Laboratory Sciences	1	1		1	
Journal of Membrane Science	8		1	1	x
Journal of Molecular Catalysis B	1		1	1	x
Journal of Natural Medicines	1		1	1	
Journal of Natural Products	8	1	5	6	x
Journal of Organic Chemistry	2	2		2	x
Journal of Pediatric Gastroenterology and Nutrition	1	1		1	x
Journal of Phycology	1		1	1	x
Journal of Phytopathology	1	1		1	x
Journal of Plant Pathology	3	1		1	
Journal of Plant Physiology	1		1	1	x
Journal of the Cameroon Academy of Science	4	1	3	4	
Journal of the Ghana Science Association	1	1		1	
Journal of the Institute of Brewing	2		1	1	x
Journal of the Science of Food and Agriculture	3		2	2	x

Journal	Total no. of articles	Number of authors with degree			ISI listed
		abroad	at home	total	
Journal of the South African Veterinary Association	1	1		1	
Journal of Toxicological and Environmental Chemistry	3		3	3	x
Lakes & Reservoirs: Research and Management	1	1		1	
Le Pharmacien d'Afrique	1	1		1	
Letters in Organic Chemistry	1		1	1	
Livestock Production Science	1		1	1	
LWT-Food Science and Technology	1		1	1	x
Macromolecular Symposia	4		1	1	
Macromolecules	2		1	1	x
Magnetic Resonance in Chemistry	1		1	1	x
Medicina clínica (Barcelona)	2		1	1	x
Microbiologie et Hygiène Alimentaire	2	1	1	2	
Microporous & Mesoporous Materials	1		1	1	x
Molecular Reproduction and Development	1	1		1	x
MUARIK Bulletin	1	1		1	
Nahrung/Food	1		1	1	x
Natural Product Research	2	1	1	2	
Nigerian Journal of Microbiolgy	1	1		1	
Nutrition Research	1		1	1	x
Online Journal of Veterinary Research	3	1		1	
Pakistan Journal of Nutrition	2		1	1	
Parasitology Research	1	1		1	x
Pest Management Science	1	1		1	x
Pharm Pharmacol Lett	1		1	1	
Pharmaceutical Biology	1		1	1	
Pharmazie	7	1	1	2	x
Physical Chemistry Chemical Physics	1		1	1	x
Phytochemistry	22	2	4	6	x
Phytomedecine	4	1	2	3	
Phytopathologia Mediterranea	3	1		1	
Phytoprotection	2	1		1	x
Phytotherapy Research	3		3	3	x
Plant and Soil	2	1		1	x
Plant Growth Regulation	4		1	1	x
Plant Product Research Journal (Nig)	2		1	1	
Planta Medica	8	2	2	4	x
Polymer	1		1	1	x
Polymer Bulletin	1		1	1	x
Polyphenol Communications	8	1	1	2	
Preventive Veterinary Medicine	1		1	1	x
Proceedings of the National Academy of Sciences, USA	1	1		1	x
Process Biochemistry	1		1	1	x
Rapid Communications in Mass Spectrometry	1		1	1	
References	1	1		1	
Reproduction in Domestic Animals	2	1		1	x
Reproduction Nutrition Development	4	1		1	
Revue CAMES (Conseil Africain et Malgache pour l'Enseignement Supérieur)	1		1	1	
Revue de Médecine Vétérinaire	1	1		1	x
Revue des Régions Arides	1	1		1	
RIVISTA ITALIANA EPPOS	1		1	1	
Science des aliment	1		1	1	
Science Research Annuals	1		1	1	
Sciences et Techniques	4	1		1	

Journal	Total no. of articles	Number of authors with degree			ISI listed
		abroad	at home	total	
Sciences et Techniques, Sciences de la Santé, Burkina Faso	**2**	1		**1**	
Sensors & Actuators	**1**		1	**1**	x
Separation and Purification Technology	**1**		1	**1**	
Short Communication. Chemické listy - The official journal of Czech Chemical Society	**2**	1		**1**	
Sight and life newsletter	**1**		1	**1**	
SINET, Ethiopian Journal of Science	**1**	1		**1**	
Soil & Tillage Research	**1**		1	**1**	x
Solution: A biannual Newsletter of the Chemical Society of Ethiopia	**1**	1		**1**	
South African Journal of Botany	**10**		2	**2**	
Starch/Stärke	**3**	1		**1**	x
STP pharma sciences	**2**	1		**1**	
Structure	**1**	1		**1**	x
Tetrahedron	**2**	1	1	**2**	x
Tetrahedron Letters	**2**		1	**1**	x
The Veterinary Journal	**1**	1		**1**	x
Thérapie	**3**	2	1	**3**	
Theriogenology	**4**	1		**1**	x
Transaction of the Royal Society of Tropical Medicine and Hygiene	**2**	1		**1**	x
Tree Physiology	**1**	1		**1**	x
Tropical Ecology	**1**	1		**1**	
Tropical Medicine and International Health	**2**	1		**1**	x
Tunisian Journal of Plant Pathology	**1**	1		**1**	
Vecteur Environnement	**1**	1		**1**	
Veterinary and Human Toxicology	**1**	1		**1**	
Veterinary Microbiology	**1**	1		**1**	x
Vlaams Diergen Tijdschr	**1**	1		**1**	
Water Research	**1**	1		**1**	x
Water Science and Technology	**2**	1		**1**	
Weed Res	**1**		1	**1**	x
Weed Science	**1**		1	**1**	x
World Aquaculture	**1**		1	**1**	
World J. of Microbiol. Biotech.	**2**		1	**1**	
Zeitschrift für Naturforschung	**5**	1	3	4	x
Number of journals	**232**	**124**	**137**	**232**	
Number of articles/authors	**476**	**134**	**177**	**311**	

Appendix 3

Acronyms

ANCAP	The African Network for the Chemical Analysis of Pesticides
DEA	Diplôme d'études approfondies (Diploma of Advanced Studies)
FOSNNA	Food Science and Nutrition Network of Africa
GNIpc	Gross National Income per capita
IFS	International Foundation for Science
INASP	International Network for the Availability of Scientific Publications
ISI	Institute for Scientific Information
MESIA	Monitoring and Evaluation System for Impact Assessment
MIM	Multilateral Initiative on Malaria
NABSA	The Network for Analytical and Bioassay Services in Africa
NAPRECA	Natural Products Research Network for Eastern and Central Africa
NGO	Non-Governmental Organisation
NUSESA	Network of Users of Scientific Equipment in Eastern and Southern Africa
OPCW	Organisation for the Prohibition of Chemical Weapons
SARBIO	Southern African Regional Co-operation in Biochemistry, Molecular Biology and Biotechnology
SEANAC	Southern and Eastern Africa Network of Analytical Chemists
SETAC	Society for Environmental Contamination and Toxicology
WAYS	World Academy of Young Scientists

IFS MESIA Impact Studies

Report No. 1	*Monitoring and Evaluation System for Impact Assessment (MESIA), Conceptual Framework and Guidelines* Gaillard J. Stockholm: IFS, 2000. 38 pages.
Report No. 2	*Questionnaire Survey of African Scientists* Gaillard J. and A. Furó Tullberg Stockholm: IFS, 2001. 92 pages.
Report No. 3	*IFS Impact in Mexico: 25 years of support to scientists* Gaillard J., J.M. Russell, A. Furó Tullberg, N. Narvaez-Berthelemot and E. Zink Stockholm: IFS, 2001. 152 pages.
Report No. 4	*Strengthening Science Capacity in Tanzania: An Impact Analysis of IFS Support* Gaillard J., E. Zink and A. Furó Tullberg Stockholm: IFS, 2002. 104 pages.
Report No. 5	*Science Research Capacity in Cameroon: An Assessment of IFS Support* Gaillard J. and E. Zink Stockholm: IFS, 2003. 72 pages.
Report No. 6	*Summary of IFS Impact Studies Nos. 1-5* Zink E. and Gaillard J (ed.) S. Major Stockholm: IFS, 2006. 28 pages.
Report No. 7	*Evaluation of IFS Food Science Area* J R N Taylor Stockholm: IFS, 2006. 64 pages.
Report No. 8	*IFS and OPCW Joint Support to African Scientists* Malin Åkerblom Stockholm: IFS, 2008. 80 pages. (this document)
Report No. 9	*Science in Vietnam: An assessment of IFS grants, young scientists and the research environment* Zink E. Stockholm: IFS, 2008. 92 pages

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