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Tracing ISP Graduates

2014-2017





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INTERNATIONAL SCIENCE PROGRAMME ISP

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Front page picture: ISP graduate Dr Charles Opiyo from University of Nairobi, Kenya (to the left) together with research group technician Mr Boniface Muthoka.

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Executive Summary

The International Science Programme (ISP) at Uppsala University, Sweden, provides long-term financial and collegial support to institutionally based research groups and scientific networks in chemistry, mathematics and physics in Africa, Asia and Latin America.

During 2014-2017, totally 259 PhD students have graduated from 29 of the research groups and 14 of the networks supported by ISP. This is 100 more PhD graduates than in the previous, longer granting period, lasting 2008-2013. Increasing the number of PhD holders are in line with ISP's objective to build research capacity. But where do graduates go after graduation? Are they contributing to increased competence at their academic institutions or are they making use of their skills in other sectors or other countries? This report aims to find out.

In all, 250 out of the 259 PhD graduates were traced with their present whereabouts. In line with previous ISP tracer studies, this study shows that 95% of the PhD graduates are employed in their home countries (89%) and regions (6%). A large majority (94%) is working at universities or research institutes, many holding positions as lecturers or assistant professors. Twelve graduates (5%) are currently working outside their home country and regions, most (83%) at academic institutions in these countries.

Only twelve of the 250 graduates are working outside the academic sector, all but one in their



95% ARE WORKING IN THEIR
HOME COUNTRIES OR REGIONS IN
2018

home countries. Workplaces include research councils, ministries and national authorities.

An equal share of both female and male graduates is currently working in their home countries and regions (95%).

A comparison of ISP's three scientific programs (chemistry, mathematics and physics) shows that most of the graduates working outside their home countries and regions (9/12) graduated in physics. This might be related to the type of PhD training. Five of the nine physics students now employed outside their home countries and regions did their PhD to a full extent abroad. Percentage-wise, the full time abroad students have the lowest return rate. Half of the students that did their PhD studies full time abroad have not returned home, compared to 3% of sandwich and locally trained students.

Introduction

The ISP model

The International Science Programme (ISP) at Uppsala University, Sweden, provides long-term financial and collegial support to research groups and scientific networks in chemistry, mathematics and physics at universities and research institutes in Africa, Asia and Latin America.

The ISP model is designed to build capacity by improving local conditions for conducting research. The groups and networks use ISP funding to build and strengthen their research capacity, by equipping and maintaining laboratories, training and exchange of staff and postgraduate students with institutions abroad, attending conferences and organizing workshops, etc.

Most groups and networks collaborate with at least one more resourceful research group at an academic institution in the region or in the north. When local postgraduate training is not possible, groups and networks use the sandwich model, where students spend part of their doctoral training at their home university and part at a host institution abroad. Through the sandwich model students keep the important connections to their home and the focus on local research problems, while getting exposure to advanced training facilities, cultures and collaborations abroad (Andersson, 2017). It also facilitates the continuation of research when students return home – which always has been one of ISP's goals (Andersson & Zdravkovic, 2017). Ultimately, the objective is to establish local PhD programs, if not available from the start.

Objective

Together, ISP supported groups and networks graduate many PhD's every year (on average 65). Increasing numbers of PhD's are in line with ISP's objective to build research capacity, but where do they go after graduation? Are they contributing to increased competence at their academic institutions or are they making use of their skills in other sectors or other countries? This report aims to find out.

Why train students?



Meet Professor Collen Masimirembwa, a former ISP-student and now group leader of the ISP supported research group at the African Institute of Biomedical Science and Technology (AiBST) in Zimbabwe. An institute he also founded in 2002.

- We focus on training young people with the hope that they will participate and drive innovation forward and find the solution to healthcare problems. Quite a number of students have graduated from ISP support. ISP is great in capacity building terms.

Method

In all, the present affiliations of 250 (97%) of the 259 PhD's graduated from ISP supported groups and networks between 2014 and 2017 were traced.

All graduates with known email addresses (179) were invited to join the ISP's and Uppsala University's joint alumni network via an online registration form – where they also were asked to fill out their home country and present affiliation. In total, 61 of the graduates registered with their current whereabouts.

A request was simultaneously sent to group leaders and network coordinators asking them to fill out the

present affiliation of PhD's graduated from their groups and networks, as far as known. Some data were already existing since it had been collected from group leaders and networks coordinators for the 2018 evaluation of ISP (Pain *et al*, 2018). Most (137) of the affiliations were collected through group leaders and network coordinators. Internet search was carried out as a third and final option in the cases where the present affiliation was still unknown (52). LinkedIn, Research Gate and Web of Science served as sources.

Information about the type of PhD training and the time to complete PhD degrees was collected from ISP's monitoring data, provided by groups and networks in their annual activity reports. To trace the movements of graduates, their original home countries where compared to their whereabouts in 2018.

Previous ISP tracer studies

The 2011 external evaluation of ISP (GHD, 2011) concluded that there is only anecdotal evidence that ISP graduates are contributing in their home countries after graduation. Such evidence included an early (1976) study of 263 ISP fellows where only 4% had relocated to an "industrialized country". The "brain drain" became even lower when the program evolved into supporting research groups instead of individual fellows, and with the

introduction of sandwich PhD training in the 1980s (Liminga, 1996; Lindqvist, 2011). The 2011 evaluation recommended ISP to follow up graduates in a more systematic way, which would "serve as a good basis for assessing the higher level development impacts of the ISP program".

Here, a second tracer study of such a kind is presented. The first one covered the previous granting period 2008-2013, and comprised 154 PhD graduates from ISP supported groups and networks (Andersson & Sundin, 2016). In addition, an in-depth tracer study was published in 2017 including 70 traced PhD graduates that were part of ISP's former collaboration with Sri Lanka and Thailand (Andersson & Zdravkovic, 2017). In 2012, a MSc student from Linköping University included a brief tracer study in her Master thesis on ISP's collaboration with research groups in Bangladesh (Kuhn, 2012), and an external evaluation of the ISP-supported mathematical networks EAUMP also included a mini tracer of the 11 PhD sandwich graduates in the network (Singull *et al*, 2016).

All results confirm ISP's earlier claims based on limited studies, namely that the large majority (72-100%) of the PhD graduates of ISP supported research groups and scientific networks are employed in their home countries and regions, in most cases at academic institutions.

Where are graduates today?

Graduate data

In total, the 250 traced PhD's graduated from 29 research groups and 14 networks supported by ISP 2014-2017. Most (31) of the groups and networks are located in Africa, ten are in Asia and two are in Latin America. The majority of the PhD graduates (203; 81%) are therefore from Africa, 38 (15%) are from Asia and the remaining nine (4%) are from Latin America (Figure 1).

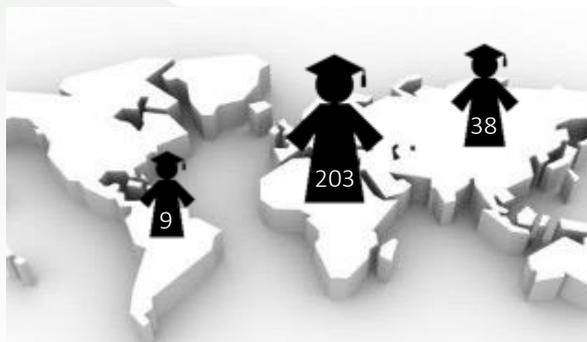


Figure 1. Regional origin of traced PhD graduates.

In all, 102 (41%) of the traced PhD's graduated in chemistry, 89 (35%) in mathematics, and 59 (24%) in physics.

Out of the 250 traced students, 70 (28%) were sandwich students, while 170 (68%) have spent their research training to the full extent in their home countries and 10 (4%) to the full extent at a host university abroad.

On average, the traced PhD graduates completed their studies in 4.9 years. The sandwich students took slightly longer time to graduate (5.0 years) compared to the full time local students who graduated within 4.8 years. The 10 graduates that did their PhD training to a full extent abroad, all at a university in Sweden, finished on average in 5.9 years.

This granting period, 100 more PhD students graduated compared to the previous period (2008-2013), and the share of sandwich PhD graduates has decreased from 45% to 28% compared to the earlier period.

Why full time abroad?



Meet Sorya Proum, PhD graduate and ISP chemistry group leader at Royal University of Phnom Penh (RUPP) in Cambodia.

Dr Proum did her PhD full time abroad at University Brunei Darussalam, in Brunei. She finished her PhD in 2016 and returned to her employment as research group leader at RUPP.

- The overall goal of the group is to increase the research capacity at the Chemistry Department since most of the staff members only hold MSc degrees and have limited experience in research.

At the moment, a BSc program is available, and the plan is to develop a quality MSc program in the near future.

While capacity is built up, all PhD students in the group are trained full time abroad. The return of the students to Cambodia is thus crucial for the capacity building process.

Geographical movement

A large majority of the traced graduates (238; 95%) are currently working in their home countries or regions. In total, 72 of these graduates are female.

While almost all graduates (223; 89%) still are in their home countries, 15 (6%) have relocated within their regions (Figure 2). In all but one case it is movements within Africa, whereas one has moved from Nicaragua to Brazil. All 15 are working at universities or research institutes.

Only 12 graduates (5%) are currently working outside their home country and regions, namely in Canada, China, Czech Republic, Denmark, France, Germany, New Zealand, Switzerland, and Sweden. Most of them (10) are working at universities, five of them as postdocs.

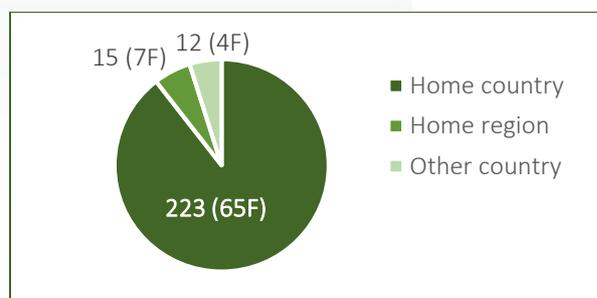


Figure 2. Whereabouts of traced PhD graduates.

Present work place

A majority of the 250 traced graduates (235; 94%) is currently working at universities (219) or research institutes (16) (Table 1).

In total, 209 of the university employees are working in their home countries and regions. Most (197) are employed at public universities in these countries, and a few (10) are employed at private higher education institutions, and two at institutions with both publicly and privately funded. Many graduates are employed at their university of graduation, but several have also relocated to another university.

The current position was provided by 126 graduates, most are lecturers or assistant professors. Among graduates are also a few full professors, assistant and senior lecturers, researchers, postdocs, Heads of Department, Department Chairs, a Vice Dean, and a Campus Director.

Table 1. Sector of employment of graduates.

Employment	Number of graduates
Universities	219
Research Institutes	16
Outside Academia	12
Unemployed/retired	3
Total	250

15 out of the 16 graduates working at research institutes are in their home countries and regions. Three are at the Botswana Institute for Technology Research and Innovation (BITRI), six are working at research institutes under the Burkina Faso National Centre for Scientific and Technological Research (CNRST), three are at the Kenya Medical Research Institute (KEMRI), one at the Kenya Industrial Research and Development Institute (KIRDI), one at the International Livestock Research Institute (ILRI) in Nairobi, Kenya and one at the Regional Center for Agricultural Research, under the Institute of Rural Economy in Mali. One graduate is working at the Swedish Meteorological and Hydrological Institute (SMHI).

Twelve of the graduates are currently working outside the university sector, eleven of them in their home countries. They are employed at the Agricultural Research Council of Nigeria, at the Pediatric Hospital Charles de Gaulle, at the Ministry of Health, and the National Authority of Radioprotection and Nuclear Security, all in Burkina Faso, at the Ministry of Agriculture in Central African Republic, at The Ministry of Higher Education and at Hôpital Général de Référence Nationale de N'Djamena in Chad, and at an Ophthalmologist's practice in Zimbabwe. Two graduates are employed by the Kenyan Police Service, and one is working for a real estate agent in Czech Republic. One is a high school physics teacher, applying for university jobs in Burkina Faso.

Two of the remaining three graduates are unemployed, looking for a job in their respective home country and one is retired.

Comparing numbers

Considering ISP's three programs, 99% of the mathematical graduates, 98% of the chemistry graduates, and 85% of the physics graduates have remained in their home countries or regions after graduation (Table 2). Hence, most (75%) of the graduates working outside their home regions, are physics graduates.

Table 2. Graduates current whereabouts by program, gender and type of training.

Program	Home country	Home region	Other country	Total
IPICS	90	10	2	102
IPMS	85	3	1	89
IPPS	48	2	9	59
Total	223	15	12	250
Gender				
Female	65	7	4	76
Male	158	8	8	174
Total	223	15	12	250
Type of training				
Sandwich	63	5	2	70
Local	156	9	5	170
Full time	4	1	5	10
Total	223	15	12	250

Notably, however, among these nine physics graduates, five were part of a program where they spent their training to a full extent in Sweden. Percentage-wise, the full time abroad students are the ones with the lowest return rate to their home countries and regions (50%), compared to 3% of sandwich and local students. Comparing gender, an equal share (5%) of both female and male graduates are currently working outside their home countries and regions. A slightly larger share of the females (9%) compared to 5% of male graduates have been mobile within their home region.

Physicist in the Kenyan Police



Meet Dr Charles Opyia, a materials science PhD graduate from University of Nairobi working for the Kenyan Police.

During his PhD studies, Charles was employed by the Kenyan Police Service, studying during the day and working during the night. After graduating, he continued his service as Chief Inspector of the Police.

Charles PhD research focused on solar thermal solutions, in other words using solar radiation for heating water using different materials.

How is material science relevant to the police?

- Working for the police, I found that most of the operations are in remote rural areas, off the power grid. Therefore, I found it interesting to study alternatives, such as solar thermal solutions, so that I at some point could provide help to the police with my research.

In the future he wants to do full time research on renewable energy and solar energy.

- I want to start a forum between research teams, the industry and costumers, which will help to improve the solar thermal provision in Kenya.

Conclusions

In total, 259 PhD students have graduated from 29 research groups and 14 networks in Africa, Asia and Latin America supported by ISP 2014-2017. This is 100 more PhD graduates than the previously studied, longer period 2008-2013.

Increasing the number of PhD holders are in line with ISP's objective to build research capacity at supported institutions. The reported study aimed to find out if graduates are contributing to increased capacity at their academic institutions by returning to or staying at their home institutions after graduation, or if they are making use of their skills in other sectors or other countries.

In all, 250 out of the 259 PhD graduates were traced with their present affiliations. The share of sandwich PhD graduates has decreased from the previous granting period from 45% to 28%, indicating that supported groups and networks has increased their capacity to graduate local PhD's.

In line with previous ISP tracer studies, it turned out that 95% (238) of the PhD grads are employed in their home countries and regions.¹ A large majority (94%) of these are working at universities or research institutes, many as lecturers or assistant professors. Two graduates are unemployed and one retired. The remaining twelve graduates are currently working outside their home country and regions, mostly (10/12) at academic institutions in these countries. Half of these are however holding postdoc positions, which are usually temporarily positions abroad.

Only twelve of the 250 graduates are working outside the academic sector, all but one in their home countries. Workplaces include research councils, ministries and national authorities.

There is no gender difference regarding where in the world the traced graduates are working. Comparing ISP's programs, physics graduates have been most prone to work outside their home countries and regions (15% compared to 1-2% within the

mathematics and chemistry program). However, 60% of the physics graduates that are working outside their home countries and regions did their PhD to a full time abroad, which might be one explaining factor. Only 3% of local and sandwich graduates are working outside their home countries and regions, compared to 50% of the full time abroad PhD graduates.

The reason for doing a full time PhD abroad is often that the home department is not licensed to run a PhD program, and circumstances preventing sandwich training. Some students have an employment at their home university, while other have no employment to return home to. In the latter case, having spent 4-5 years abroad, it might be easier to consider a continued career there.

¹ 89% in their home countries and 6% are currently working in other countries in their home region.

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