

# **EMS-CDC meeting Oslo, friday april 10, 2015**

## **Program**

*The programme of the afternoon is followed by the contribution of Wandera Ogana (page 2) and the report on the roundtable discussions (page 7).*

### **Mathematics pure and applied, actions of development**

Chair Michel Waldschmidt

NORAD and NOMA programs: Masters/PhD in Mathematical Modelling  
Bernt Øksdendal

NIMS National Institute of Mathematical Sciences in Ghana, PGS involvement in the development of higher education in mathematics Antonella Zanna Munthe-Kaas

Developing mathematical education, research, and academic staff: various aspects Francesco Pappalardi

Developing mathematical education and research: dynamical systems, Stefano Luzatto

Committee for Developing Country of the International Mathematical Union, AMMSI program Wandera Ogana (in VIDEO CONNECTION)

Centre International de Mathématiques Pures et Appliquées - CIMPA, Tsou Sheung Tsun

Round table: "Strategies for developing mathematical research in less developed countries"  
Chair Marie-Francoise Roy

**Committee for Developing Country of the International Mathematical Union, AMMSI program (in VIDEO CONNECTION)**  
**by Wandera Ogana President IMU-CDC and Programme Director, AMMSI**

**1. INTERNATIONAL MATHEMATICAL UNION – COMMISSION FOR DEVELOPING COUNTRIES (IMU-CDC)**

**1.1 MANDATE**

- Manage, strengthen and promote the programmes of the IMU in developing and economically disadvantaged countries.
- Establish institutional partnerships with scientific organizations with common goals.
- Acquire adequate funding to support the corresponding activities.

**1.2 BRIEF HISTORY**

- At the IMU GA 2010, The Commission on Development and Exchanges (CDE) and the Developing Countries Strategy Group (DCSG) were merged into the CDC.
- CDC has been operational since January 2011.

**1.3 MEMBERS (2015-2018)**

- Wandera Ogana (Kenya) – CDC President
- C. Herbert Clemens (USA) – CDC Secretary for policy
- Srinivasan Kesavan (India) – CDC Secretary for Grant Selection
- Alf Onhaus (Columbia) – Latin American Member
- Mama Foupouagnigni (Cameroon) – African Member
- Polly W. Sy (Philippines) – Asian Member
- Budi Nurani Ruchjana (Indonesia) – Member appointed by IMU Executive Committee
- Angel Pineda (USA/Honduras) – Member appointed by IMU Executive Committee
- Angel Ruiz (Costa Rica) – Member appointed by ICMI Executive Committee
- Shigefumi Mori (Japan) – IMU President and Ex-officio Member

**1.4 TRAVEL GRANTS TO ICMs**

- Predecessor bodies awarded travel grants to mathematicians from developing countries to attend ICMs.
- For ICM2014, the Korean ICM organizers provided 654 awards, through NANUM, to mathematicians from developing countries to attend ICM and ICWM.
- CDC worked closely with the Korean organizers in logistics and implementation.
- Regional Networking meetings organized during ICM2014.

**1.5 MENAO**

- IMU2010 GA passed a resolution to examine feasibility of holding a “donors conference” at ICM2014.
- In March 2013, IMU and CDC decided to hold the “Mathematics in Emerging Nations:

Achievements and Opportunities (MENAO)” Symposium on 12th August 2014.

- Aims and goals are in the CDC website.
- Event was attended by more than 250 participants from embassies, scientific institutions, private business and foundations.
- CDC facilitated reports on the current state of mathematics in Africa, Southeast Asia and Latin America. The reports were published on the CDC website and were made available at the MENAO symposium.

### **1.6 GRANTS FOR CONFERENCES**

- Partial support to conferences in developing and economically disadvantaged countries.
- Support to few major international conferences in developed countries in order to invite mathematicians from developing countries.
- 120 conferences supported during 2011-2014

### **1.7 GRANTS FOR INDIVIDUAL RESEARCH TRAVEL (IRT)**

- Travel costs for research visits of at least 4 weeks
- For mathematicians based in developing and economically disadvantaged countries
- 16 grants given during 2011-2014

### **1.8 IMU-SIMONS TRAVEL FELLOWSHIP PROGRAM**

For mathematicians working in developing or economically disadvantaged countries.

Applicants must hold valid PhD and be employed as a faculty member of a university or equivalent institution.

For collaborative visit to an institution in any part of the world.

This program replaces the Individual Research Travel program during 2014-2016.

Eleven mathematicians received the grant during January 2014 to February 2015.

### **1.9 PROJECT SUPPORT FOR MATHEMATICIANS**

- CDC mainly supports higher education, capacity building projects and local initiatives.
- AMMSI partial postgraduate scholarships (Over 250 awards so far but 75 awarded entirely from CDC support during 2010 – 2014).
- Mentoring African Research in Mathematics (MARM), in collaboration with London Mathematical Society and AMMSI (17 partnerships established during 2005 – 2014).
- Cambodia: Scholarships to pursue postgraduate studies outside Cambodia.
- RUPP, Cambodia - Purchase of 25 computers for computer laboratory (2014).
- Contribution to Ibni Oumar Mahamar Saleh Prize (2014).
- CDC supported Workshop “Finding Online Information in Mathematics” by Anders Wandahl (Addis Ababa, Ethiopia, 2010; Bamako, Mali, 2010; RUPP, Cambodia, 2011).

### **1.10 ACTIVITIES FOCUSED ON WOMEN MATHEMATICIANS**

- African Women in Mathematics workshop series (Ouagadougou, Burkina Faso, October 2012 and AIMS, South Africa, July 2013), in collaboration with AMU and CIMPA.

- The European Women in Mathematics (EMW) Network meeting (Bonn, Germany, September 2013).

### **1.11 VOLUNTEER LECTURER PROGRAM (VLP)**

- The goal is to offer universities in the developing world lecturers for intensive 3-4 week courses.
- Advanced undergraduate or masters.
- Courses given since 2007 in Africa, Central America, South East Asia and Middle east
- Support covers travel and living expense for lecturer.
- In collaboration with CIMPA (through Michel Jambu), the program has provided intensive courses at RUPP, Cambodia.

### **1.12 SUPPORT FOR MATHEMATICS EDUCATION**

- Capacity and Network Project (CANP) is a program of the International Commission on Mathematical Instruction (ICMI).
- IMU and CDC have supported CANP 1 (Mali, 2011), CANP 2 (Costa Rica, 2013), CANP 3 (Cambodia, 2013), CANP 4 (Tanzania, 2014), CANP 5 (Peru, 2016).
- Ibero-American Mathematics Competition (IMMC), October 2011, Quito, Ecuador.
- Ibero-American Mathematical Olympiad, November 2014, Puerto Rico

### **1.13 LIBRARY ASSISTANCE SCHEME**

- CDC matches donors of mathematical materials with libraries in developing countries.
- CDC offers limited financial support for shipment costs.
- University of Tibet in Lhasa (2011).
- National University of Laos (2011).
- Pan African Centre of Mathematics, Dar es Salaam, Tanzania (2011).
- KCA University, Kenya (2013).

### **1.14 ABEL VISITING SCHOLAR PROGRAM**

- Funded by The Niels Henrik Abel Board.
- For mathematicians in developing countries to visit international collaborators for one month.
- For postdoctoral mathematicians in early stages of their professional careers.
- CDC administers the program.

*(For more details please visit the IMU-CDC website - <http://www.mathunion.org/cdc>)*

## 2. AFRICAN MATHEMATICS MILLENNIUM SCIENCE INITIATIVE (AMMSI)

### 2.1 WHAT IS AMMSI?

- **The African Mathematics Millennium Science Initiative (AMMSI)**, established in 2004, is a distributed network of mathematics research, training and promotion in Africa.
- AMMSI was established with the support of the Millennium Science Initiative (MSI), a programme administered by the Science Initiative Group (SIG).
- AMMSI is divided into six regions with Regional Offices located in Botswana, Cameroon, Morocco, Nigeria, Senegal and Tanzania.
- Countries constituting different AMMSI regions are listed in the AMMSI website.
- In July 2014, AMMSI became an affiliate network of the **Regional Initiative in Science Education (RISE)**, which was also established by SIG.
- AMMSI currently operates in collaboration with the African Academy of Sciences (AAS), which provides office space and financial services.

### 2.2 MISSION:

To nurture the next generation of African mathematicians and mathematical leadership

### 2.3 GOALS

- To support research in mathematics and its applications (**Research**).
- To strengthen the teaching and learning of mathematics and its applications (**Training and Education**).
- To enhance capacity in mathematics through linkages and networks (**Linkages and Networking**).
- To raise general awareness in mathematics (**Outreach and Public Education**).
- To enhance the use of ICT in the teaching and learning of mathematics (**ICT**).

### 2.4 PROGRAMME COMMITTEE

This committee plans and implements activities of AMMSI. Current members are:

- Wandera Ogana - School of Mathematics, University of Nairobi, Nairobi, Kenya (Programme Director).
- Basile G. R. Bossoto, Marien Ngouabi University, Faculty of Science, Department of Mathematics, Brazzaville, Congo (Regional Coordinator, Central Africa).
- Eunice Mureithi, University of Dar es Salaam, Department of Mathematics, Dar es Salaam, Tanzania (Regional Coordinator, Eastern Africa).
- Nouzha El Yacoubi, University Mohammed V-Agdal, Faculty of Science, Department of Mathematics, Rabat, Morocco (Regional Coordinator, North Africa).
- Edward Lungu, Department of Mathematics, University of Botswana, Gaborone, Botswana (Regional Coordinator, Southern Africa).

- Samuel Ilori, Department of Mathematics, University of Ibadan, Ibadan, Nigeria (Regional Coordinator, Western Africa Zone 1).
- Hamidou Toure, LAME, University of Ouagadougou, Ouagadougou, Burkina Faso (Regional Coordinator, Western Africa, Zone 2).

## **2.5 POSTGRADUATE SCHOLARSHIPS**

- The scholarships are awarded to students who are African nationals to enable them pursue postgraduate studies in mathematics and its applications, at any university in Africa.
- The awards provide only partial support of approximately EUR 1,000 annually.
- Were supported by The Mellon Foundation during 2005 to 2009.
- Have been supported by IMU-CDC since 2010.
- To date over 250 postgraduate students have benefited from this scheme.

## **2.6 LMS-AMMSI CONFERENCE GRANTS**

- The London Mathematical Society (LMS) awards grants not exceeding GBP 2,000 per conference, in Africa, which is organized, or supported, by AMMSI.
- These grants cover only the travel costs of postgraduate students with mathematics degrees.
- To date over 30 conferences have been supported and 150 postgraduate students have benefited.

## **2.7 MENTORING AFRICAN RESEARCH IN MATHEMATICS (MARM)**

- This programme is designed to promote mentoring relationships between mathematicians in other continents and postgraduate students in African universities.
- It also creates joint research partnerships involving the visiting mathematicians and researchers in the host universities in Africa.
- MARM is jointly run by AMMSI, the London Mathematical Society (LMS) and the International Mathematical Union (IMU).
- Partnerships are supported for 2 years and are encouraged to explore longer sustainable links.
- To date 17 partnerships have been supported.
- One partnership was instrumental in the establishment of the NIMS/DVNA/PGS program at the Kwame Nkrumah University of Science and Technology (KNUST).
- For more details see the website  
<http://www.lms.ac.uk/grants/mentoring-african-research-mathematics>.

## **2.8 PAST ACTIVITIES**

In the past AMMSI organized the following activities.

- Research/Visiting scientist fellowships, during 2005 to 2008, awarded to 23 academics and researchers to enable them travel to other institutions in sub-Saharan Africa for postgraduate teaching and training.
- Regional scientific meetings: Porto-Novo, Benin (2005), Nairobi, Kenya (2006), Windhoek, Namibia (2007), and Yaounde, Cameroon (2009).
- International Mathematical Biology Workshop (Nairobi, Kenya, 2006).
- Symposium on the African Woman and Mathematics (Maputo, Mozambique, 2008).

*(For more details please visit the AMMSI website -- <http://www.ammsi.org>)*

## **Report on the round table "Strategies for developing mathematical research in less developed countries"**

The round table was chaired by Marie-Francoise Roy.

She first reminded the few introductory words that had been sent out before the meeting to prepare the discussion. Then the round table continued with three presentations and featured a discussion between the attendees.

### *Introduction to the discussion (sent before the meeting)*

There are many international institutions playing a role for developing mathematical research in less developed countries.

It seems that all these institutions would agree on the following statement

- it is needed to train mathematicians originating from less developed countries at the best international level
- it is very difficult for a local university in a less developed country to reach this international level by itself and so some kind of networking , south south cooperation and north south cooperation is necessary
- it is crucial to find a strategy to encourage mathematicians to get a job in their home country or continent at the end of their training
- during their career they should have opportunities and structures helping them to go on with a high quality research activity.

Several mechanisms are proposed and developed

- local mathematical school at the master level
- master degrees in network
- international master degrees organized locally or at centers in developed countries
- local research schools
- support for doctoral studies in developed countries
- support for doctoral studies taking place part time in developed countries
- support for doctoral studies taking place essentially locally with a coadvisor from developed countries
- regional centers for doctoral studies
- local research structures
- research projects with international support

etc etc ...

What are the positive aspects and the drawbacks of these various mechanisms ? How is it possible to combine them efficiently?

Are there currently missing links in what is existing and alternative ideas that could be proposed ?

### *Three presentations*

*Claude Cibils (CIMPA):*

- \* It is important to take into account less developed regions, not just less developed countries;
- \* The situation is changing for countries like Brazil & China, they are taking into account their less developed regions.
- \* Why focus on deprived areas? Some might say you should go to places that are already established, in order to consolidate them and to go further from there. Both aspects are important, enabling creating networks between deprived areas and places already established .
- \* It is bad to work in a desert and to do everything ourselves. Even with pragmatic and good purposes. We should encourage involvement and avoid doing ourselves work that should be done by people in site.
- \* Some mathematicians have the idea of acting nobly, but they shouldn't just run a mathematical successful party without a real local previous activity in order to rely on it. We need to anticipate the consequences for the day after and to think about what will happen once we leave.
- \* It is important to collaborate and not act as chiefs. Local people react badly to the latter even if they accept momentarily.
- \* Sometimes returning PhD's are not well received. E.g. Coclé, Panama - small place far from Panama City. Two mathematicians were trained as PhD's in Spain but when they returned there was a bad reaction from local people.
- \* Sometimes returning PhD's can think they know best.
- \* Sometimes returning PhD's cannot get the jobs that they deserve - they need salaries, offices, research facilities. Some countries are considering this very seriously, fortunately. CIMPA can try and organise activities to fix these problems.
- \* We need to manage the connections between great centres (like IMPA) and the less developed regions. E.g. Salto , Uruguay - a recent regional centre connected to the central university.

*Stefano Luzzato (ICTP):*



Five issues:

(1) Good high school students don't go into mathematics.

(2) How to create contacts between young mathematicians ? An ICTP school in Senegal included students from Europe / USA. Had very positive feedback - the first world students were stronger and drove the others on. Students who came were very open-minded and there was very good interaction.

(3) Brain drain - researchers not coming back. Sometimes going back is not compatible with research. It might be better to stay abroad but have contact (facilitated by ICTP or others) in order to encourage / inspire. Long-term involvement can be from afar.

(4) Our goal when we organize activities? Are we trying to raise the general standard or to find the 1 or 2 excellent students who can make it internationally.

(5) Continuity - lot of activity like a short school in an area might inspire students but we might leave them hanging.

Leif Abrahamson (ISP)

\* The overall objective of ISP is to strengthen scientific research for the fight against poverty.

\* Support is institutional not individual.

\* Ownership of the project is with the receiver.

\* Working in region with weak infrastructure, it is better to have networks strong so that strong nodes can help the weak ones.

### *Discussion*

*Marie-Francoise Roy*

\* Continuity is important, since no institution is dealing with the development of the whole mathematical community.

*Tsou Sheung-Tsun*

\* It is very difficult to deal with brain drain - it needs lots of money!

*Andreas Griewank*

\* It is important that developing countries have some mathematical capacity. E.g. Quito group doing meteorological models

\* The stress on competence / excellence is OK but students also need some academic freedom.

*Begoña Vitoriano*

\* The brain drain is a big problem even if contact is maintained. Postdoctoral stays might be

necessary to maintain first world relationship.

\* CIMPA schools are for research, they are not for the least-developed countries. Support for training in research (masters etc) is more appropriate there. These are two very different strategies.

*Tsou Sheung-Tsun*

\* Regional schools like AMS or CIMPA schools at lower levels are partly to address that.

*Michel Waldschmidt*

\* In France the best students go to ENS and get a salary. In Kurdistan they are trying to emulate this to make math study more attractive.

\* Brain drain: in Iran many good mathematicians don't return because of military service. In India this does not happen - this is a better model to study.

\* In Cambodia the aim is to improve the general level (see Luzzato's point (4)). At the same time there was a very bright student who went to New York and now Paris for a PhD. So even though the goal was not to find international-standard students it is still compatible.

\* For continuity several different programmes are necessary and should be combined.

*Francesco Pappalardi*

\* Another aspect like brain-drain: sometimes graduate programmes in USA are designed to keep people coming from developing countries in lower-level academic careers. This is dangerous.

\* From experience in Nepal - one should always see things in a long-term framework. It is all part of a longer plan.

\* Most people getting a PhD in Italy will not become academics whereas students from developing countries DO have academic places they can go for.

*Michel Théra*

\* If you have a PhD student from overseas it is a responsibility to make sure that every couple of years they have opportunity to return to do some research.

*Michel Waldschmidt*

\* The associate programme of ICTP is very good.

*Marie-Francoise Roy*

\* Having heard from all these programmes, are there gaps, missing programmes?

*Michel Waldschmidt*

\* Students from developing countries with a PhD need more opportunity for a postdoc.

*Leif Abrahamsson*

\* We need to connect them into research groups. (And this is long-term - 20 years or more.)

*Tsou Sheung-Tsun*

\* This is missing in Cambodia.

*Paul Vaderlind*

\* One problem in Rwanda is that we don't have two students doing the same subject. If we can get some in the same area, then they can build a school.

\* A postdoc for 1/2 year and then another some years later if research is continuing might be a good method.

*Begoña Vitoriano*

\* There is no math organisation supporting very long-term programmes.

*Gert-Martin Greuel*

\* We need to give the chance to do research and to get NEW IDEAS. To get them invitations to conferences etc.

*Leif Abrahamsson*

\* Not enough PhD's in one area shows the importance of regional cooperations.

\* Some programmes in chemistry are 30 years long.

\* Postdocs should be connected to the local situation.

*Stefano Luzzato*

\* The problem of expense for the person to return is the responsibility of government.

\* Critical mass is an important factor.

\* Two students from Senegal are now trained in dynamical systems. It is not possible to organise schools in Senegal and get them back (even if they don't return themselves). This is a very positive impact over a very long term.

*Paul Vaderlind*

\* Different policies - Sweden supports networks as opposed to individuals.

*Giulia di Nunno*

\* Continuity is a big topic for masters programmes. Experience suggests that success occurs if there is local interest in maintaining the programme. Raising local interest is a problem for each specific case.

*Marie-Francoise Roy*

\* Once people finish their PhD they need to maintain support for participation. We need to coordinate participation in programmes (e.g. Newton Institute, IHP Oberwolfach, CIRM...)

*Gert-Martin Greuel*

\* We need a QUOTA to ensure the participation of people from developing countries. Oberwolfach now has such an agreement with AIMS South Africa

*Marie-Francoise Roy*

\* There are problems at PhD funding level. We can identify people at CIMPA schools but can't always get them into PhD programmes.

*Nick Gill*

\* The money for PhD's might not be the problem. It might be a connection problem, specifically that first world universities are unable to evaluate the worth of transcripts from developing countries. This committee's knowledge could be important here.

*Report written by Nick Gill and Marie-Françoise Roy*