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Norwegian involvement in developing countries for what concerns mathematics

DRAFT

This is a summary of the engagement of Norway in developing countries for what concerns mathematics.

This report is based on information collected among colleagues that have been or are engaged in different ways and levels in the promotion of mathematics worldwide. At the present stage the information may still not be fully complete.

The engagement of Norway in developing countries starts at personal level with the involvement of mathematicians affiliated to Norwegian institutions in various projects (see below) or ad-hoc committees within the International Mathematical Union and European mathematical society. Besides, Norway takes active participation to national and international projects.

Norwegian participation to international projects

CIMPA. Norwegian interest in CIMPA starts at personal level with the involvement of mathematicians both in the Scientific Council and the direct participation to CIMPA researcher schools or affiliated activities as lecturers:

- Ragni Piene (UiO) member of the Scientific Council
- Alexander Vasiliev and Irina Markina (UiB) participation in REALMA, Chile, Bolivia, Argentina
- Dag.O. Madsen (UiN) participation to CIMPA schools
- ...

Finally, Minister of Research and Higher Education, Mme Tora Aasland has signed a letter as agreement of cooperation with Minister of Research and Higher Education, Mr Laurent Vauquier in which Norway will join CIMPA as a member from 2012.

Since then, Giulia Di Nunno and Snorre Christiansen (UiO) are part of the Steering Committee representing the Norwegian Mathematical Society. Giulia Di Nunno is also working in the Africa regional team with a specific view in the sub-Saharan area, in this joining Marie-Françoise Roy as scientific officer.

Norwegian fully funded projects

SIU - Norwegian Centre for International Cooperation in Higher Education

This is a Norwegian public sector agency under the Ministry of Education and Research. SIU's main focus is the management of all international cooperation on all educational levels and it cooperates with the Research Council of Norway (RCN) for what concern the development of research.

RCN is a public agency that provides input to the government authorities on issues related to research policy. RCN is responsible for the administration and allocation of public funds in research, that is a bridge-builder between Norwegian and international research knots.

SIU funding sources are:

- The Norwegian Ministry of Education and Research (KD)
- The Norwegian Ministry of Foreign Affairs (UD)
- The Norwegian Agency for Development Cooperation (Norad) Norad is a directorate under the Norwegian Ministry of Foreign Affairs
- The Nordic Council of Ministers
- The Commission of the European Community
- Norwegian Directorate for Education and Training

NUFU – Norwegian program for development, research and education

NUFU supports partnership-based academic cooperation between researchers and institutions in developing countries and in Norway.

The goal is to support the development of sustainable capacity and competence for research and research-based higher education in developing countries and to enhance academic collaboration between South and North.

Norad is the funding agency for NUFU and its management is carried out by SIU.

NUFU projects in mathematics

Title: **Mathematical Modeling**

- Base: Mathematics Department, University of Zimbabwe, Harare, Zimbabwe
- Coordinators: Prof. M. Petrov (UZ), Prof. B. Øksendal (UiO)
- Steering committee: 14 members (1 Austria, 2 Botswana, 1 Malawi, 2 Norway, 2 South Africa, 1 Swaziland, 1 UK, 1 Zambia, 3 Zimbabwe)
- Activity: 1996-2007
- Funding: circa EUR 1.1 mill, total
- 56 MCs graduates
- 11 PhD graduates in the program, more outside

Objectives:

- To provide training for those who intend to apply mathematics in industry, economic development and research activities
- To build capacity in mathematics staff in higher education institutions
- To address gender imbalance by actively increasing the enrolment of female students in mathematics at postgraduate level
- To consolidate capable postgraduates in mathematics with knowledge needed to pursue a PhD and other advance research activities/training
- To train PhDs

Two steps program:

Master program – The master student is not leaving the region, supervision local and by remote contact (email, fax, skype, conferences in the region, visits of experts in the region, etc.)

PhD program – Depending on the location of the supervisors, the student carries out long and short research visit for direct contact with the supervisors at need.

Notes: Links and partnership with SAMSA – Southern African Mathematical Sciences Association since the start of the program, which is active since 1981.

Title: Competence building in research, teaching and application of mathematics and informatics in Mozambique

- Base: Department of Mathematics and Informatics, University Eduardo Mondlane, Maputo, Mozambique
- Coordinators: Prof. A. Ponosov (UMB)
- Activity: 1998-2010
- Funding: circa EUR 1.1 mill, total
- Among the alumni one is now rector of the new University of Beira, one is scientific director at UEM and one is the vice-president of the largest bank in Mozambique, others are faculty members at UEM
- Recorded female percentage of graduates 30%

Objectives

- Raise the competence level of the Mozambican members of the staff with special emphasis on PhD projects and research in mathematical modeling in biology and informatics
- Develop mathematics and informatics towards engaging in problems of vital importance for Mozambique (in particular management of natural resources, the transfer and use of IT and its impact on socio-economic development, educational and didactic problems in mathematics in schools and universities)
- Improve the teaching of mathematics at UEM towards more integration with the other natural sciences, agricultural sciences and economics, develop and optimize curricula, work out computer-aided solutions to be used in the teaching process.

Three steps program

- Education at Master's level with the "sandwich model" (Mozambican participants were sent to South African Universities for Master studies, while Norway covered fees and fellowships)
- Education at the PhD level, where we educated MSc recipients in both South Africa and Norway.
- PostDoc level, when the PhD recipients conducted joint research at the home university.

NOMA – Norad’s program for Master studies

Noma provides financial support for developing and running Master’s degree programs in developing countries through equal partnerships between local and Norwegian higher education institutions. The funding is provided by Norad and the management is carried through by SIU.

NOMA – projects in mathematics

Title: Mathematical Modeling (MM)

- Base: Mathematics Department, University of Dar-es-Salaam, Tanzania
- Coordinators: Dr. C. Wilson (UDS), Prof. B. Øksendal (UiO), Prof. Giulia Di Nunno (UiO)
- Steering committee: 8 members (1 Malawi, 1 Mozambique, 2 Norway, 2 Tanzania, 1 Uganda, 1 Zambia)
- Activity: 2008-2013
- Funding: circa EUR 1 mill, total
- Since its inception, the Msc mathematical Modelling program at UDSM has enrolled 158(44 females, 114 Males) students (42 NOMA sponsored, 116 other sources of scholarship mainly private) . Up to December 2012 a total of 71 students had graduated and were awarded a Master of Science degree in mathematical modeling. More than 20 Journal papers have been published by researchers involved directly or indirectly in the program. The program is among the Postgraduate programs of the University of Dar-Es-Salaam. In this way, the sustainability of the program is guaranteed. The program has been using both local and visiting professors from Countries such as United Kingdom, Finland, Norway, Uganda, South Africa, Zimbabwe, Botswana. Through IMU the program received two volunteered professors for one month from France and Spain.
- <http://www.noma.udsm.ac.tz/>

Objectives:

- To provide training for those who intend to apply mathematics in industry, economic development and research activities
- To build capacity in mathematics staff in higher education institutions
- To address gender imbalance by actively increasing the enrolment of female students in mathematics at postgraduate level
- To consolidate capable postgraduates in mathematics with knowledge needed to pursue a PhD and other advanced research activities/training
- Links and partnership with SAMSA – Southern African Mathematical Sciences Association since the beginning

Title: Mathematical and Statistical Modelling (MASTMO)

- Base: Department of Applied Mathematics and Statistics. Hawassa University, Ethiopia
- Coordinators: Dr. Ayele Taye Goshu (HU), Prof. H. Omre (NTNU Trondheim)
- Activity: 2007-2012

- Funding: circa EUR 1 mill, total
- Web-page: <http://wiki.math.ntnu.no/mastmo>
- MASTMO project has been granted a PhD student from NTNU's quota programme. The PhD project is planned to focus on applied mathematics and numerical modelling, with applications to Awassa Lake hydrology.

Objective:

- To establish a MSc programme in mathematical and statistical modeling at Hawassa University based on and linked to the existing Industrial Mathematics programme at NTNU.

Two steps programme:

- Qualification of HU faculty at NTNU (2008 - 2010)
- Implementation of the MSc programme at HU (2009 - 2012)

NUCOOP – Norwegian University Cooperation Programme for Capacity Development in Sudan

This is a cooperation program between higher education institutions in Sudan/South Sudan and Norway. The focus is on capacity building, research and infrastructure. The projects should provide workforce with adequate qualifications, The funding comes from Norad, the management through SIU.

NUCOOP projects involving mathematics

Title: **Teaching basic science**

- Collaboration: University of Juba (Southern Sudan) and University of Bergen (Norway)
- Activity: 2008-2012
- Situation: Although the University of Juba was established in 1988 everything is in chaos in this war-ridden country which is just about to be established as an independent country.
- Objective: The project focus on establishing the most basic needs like setting up lecture hall, labs and some offices.
- In mathematics there is at present the establishment of curriculum with introductory courses. This will include possibilities for student exchange. Moreover, the discussion is about the qualifications of the faculty members and their development.

Abel Foundation

- IMU – CDC: The Abel Fund is supporting the IMU with EUR 45 K per for activities in developing countries
- Ramanujan Prize.
 - The Prize is awarded annually to a researcher from a developing country less than 45 years of age, who has conducted outstanding research in a developing country.

- The prize is awarded jointly by: ICTP (Trieste), IMU, and the Abel Fund. The Ramanujan Prize carries a USD 15 K cash award.
- Researchers working in any branch of the mathematical sciences are eligible.

PGS – Petroleum Geo-Services

- Petroleum Geo-Services (PGS) offers a wide range of seismic and electromagnetic services, including data collection and processing, reservoir analysis and interpretation, as well as multi-client library data. PGS helps oil companies to find oil and gas reserves offshore worldwide.
- Petroleum Geo-Services (PGS) and the Norwegian Academy of Science and Letters have signed a cooperation agreement regarding support for measures to increase interest in mathematics in general and to improve competence in mathematics both in Norway and in developing countries. The agreement has an annual budget of NOK 3 million over a period of 5 years, starting in 2012.
- The agreement is twofold. The national section consists of contributions to the Niels Henrik Abel's mathematics competition, Abel Scholarships and the educational website matematikk.org.
- Internationally, the intention is to support the development and teaching of mathematics in developing countries. There are concrete plans to support the establishment of a regional "Center of Excellence in Mathematics" in Africa.
- The agreement was signed by CEO Jon Erik Reinhardsen in PGS and Øivind Andersen General Secretary of the Norwegian Academy of Science and Letters.