Earth science education initiative in Africa.

IUGS UNESCO 40 IGCP

Earth Science education events

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REPORT

United Nations Educational, Scientific and Cultural Organization

IUGS

USGS science for a changing world

In a continent rich in Earth resources, like Africa, Earth science education is an important element for sustainable development, opening opportunities for Africans to the careful management and prosperous use of their natural wealth. The morning session provided an update on the work underway at UNESCO to fill this need through UNESCO's Earth Science Education Initiative in Africa.

The ADG/SC, Gretchen Kalonji, welcomed participants and highlighted the strategic importance of this work in the context of the UNESCO Natural Science activities on Ecology and Earth Sciences, Science Education, Water, Disasters and Engineering. Mohamed Sheya, from the Tanzanian delegation and moderator of the morning session, introduced the day by stressing the importance of African countries to master the use and application of science and technology so the human capital can take advantage of the rich Earth resources for sustainable development across the continent. He indicated that it's time for UNESCO's Earth Science Education Initiative to move from its scoping stage to its implementation.

Sarah Gaines and Felix Toteu, UNESCO Earth science programme specialists in Paris and Nairobi, respectively, presented an update on the progress of UNESCO's Earth Science Education Initiative in Africa from its declaration at the regional launch of the International Year of Planet Earth in Arusha, Tanzania in May 2008 through it's regional scoping workshops across the continent in 2009 and 2010 to the adaptation of the scoped findings and the identification of a number of main activities and partners. A number of relevant ongoing activities were mentioned, including the emerging network of Geoparks in Africa, and the increased focus of IGCP funding for African-led projects. The three activities to be implemented during the 2012-2013 biennium are the development of an African Network of Earth Science Institutions, the development of a mobile geological field mapping school, and a focus on introducing geosciences in primary and secondary level curriculum, starting with the case of Djibouti.

CIFEG, a partner in this initiative was presented by their president Joel Rolet who indicated their interest in collaborating with UNESCO on the development of a network of African Earth Scientists.

Major Earth science challenges and collaboration in Central Africa in the past, present and future was presented by Luc André from the Royal Museum of Central Africa, Tervuren, Belgium, another partner institution. He highlighted problems of artisanal mining, urban erosion, volcanic hazards and the increase in regional scientific monitoring networks such as AfricaArray (http://www.africaarray.psu.edu/). Regarding artisanal mining, he stated that 10% of the population is dependant on artisanal mining and showed maps clearly indicating that mining permits granted overlap with protected areas. The cooperation between the EU and the AU in Earth sciences was also presented.

ERAIFT (L'École régionale post-universitaire d'Aménagement et de Gestion intégrés des Forêts et Territoires tropicaux) in Kinshasa, DRC was presented by Samy Mankoto as an important school for the UNESCO Man and the Biosphere Programme, although integrated forest management should certainly include an Earth science perspective as demonstrated in the presentations of Luc André. The opportunities for this collaboration between ecology and Earth sciences were enthusiastically endorsed by other UNESCO programme specialists present in such networks as AfriMAB.

A member of the IGCP Scientific Board, and director of the Monash Science Center in Australia, Patricia Vickers-Rich, indicated that the situation described in Earth science education in Africa is similar to the situation in Australia 20 years ago. She explained that the solution there was to get the curriculum change incorporated at the state level and to ensure

that scientists worked directly with teachers. She also highlighted the importance of museums in engaging young people. Her own center is one example: http://sciencecentre.monash.edu/

Hamish Campbell from New Zealand who also is the coordinator for the International Geological Congress Theme on Geoscience for Society commented that the Earth Science community of New Zealand lobbied the education ministry some 15 years ago to get Earth science into the curriculum. He also highlighted the fellowships established for teachers whereby every year two teachers have a year long sabbatical at GNS, the Geological Survey of New Zealand, which keeps a trained teacher on staff. As Earth Sciences are applied sciences, they can also be taught well in physics, chemistry, math and biology, or vice versa.

Participants from the Portuguese IGCP National Committee highlighted their education and outreach activities which can be found on their website: www.anoplanetaterra.org

The importance of policy relevant tools and information was stressed by a number of African Member States. The connection between science questions and government needs to be improved. The delegate from Kenya agreed with the idea of starting at primary and secondary education levels in order to ensure sustainability. The delegate from Nigeria explained that in his country there are Industry Enterprise Institutions, privately funding Earth science institutions that show youth clearly the careers possible in the Earth sciences. It was highlighted by the president of the African Association of Women Geoscientists (AAWG) that a Pan-African University Center of Excellence in Mineral Resources will be established in Nigeria. Further, the AAWG will have a roundtable on education in their upcoming meeting in Cameroon (http://www.aawg.org/).

The relationship between education and research is a critical question during the 40th anniversary of the IGCP when we are focused on the importance of international scientific cooperation for the future of Earth science research and its relevance to society. This point came out strongly during the celebratory event on 22 February. All IGCP projects contain an important degree of capacity building for the project team and, at times, the public. The afternoon session provided an opportunity to discuss concrete ways to expand this role through strategic partnerships, specifically as relate to Africa. The president of the International Union of Geological Sciences (IUGS) and moderator of the session, Alberto Riccardi opened the afternoon session with a statement about the central importances of Earth science education for the IUGS. As co-organizers of the event, the US Geological Survey and the IUGS's Commission on Geoscience Education make opening presentations. The USGS pointed out that education and research, by nature, are always in the public service. IUGS-COGE indicated that geoscience education must take place at many levels: for students, teachers, and policy makers. This commission is focusing on partnerships, capacity building, interdisciplinary approach, and geo-ethical approach.

Sylke Hlawatsch, the president of the International Geoscience Organization (www.geoscied.org) stressed that like Earth system science, education is a system and we must not forget to train geoscience educators also.

Success stories of a number of ongoing activities were presented. Earth Science teaching tools were presented by Carl Laj, the chair for geoscience education for the European Geoscience Union and Chris King, from IUGS-COGE and IGEO. Carl Laj highlighted the Geosciences Information for Teachers (GIFT) workshops and lectures and the potential to work with UNESCO to plan a GIFT workshop in Africa. Chris King shared tools from the website www.earthlearningidea.com. Teaching tools on geologic maps were presented by Philippe Rossi from the Commission of the Geological Map of the World. The success story session closed with two presentations from UNESCO programme specialists working on related activities. The role of the Global Geoparks Network in supporting Earth science education and outreach, a core role for each Geopark, was presented by Margarete Patzak.

Examples of education in Geoparks can be found online: http://www.unesco.org/new/en/natural-sciences/environment/earth-sciences/geoparks/geopark-and/education/.
Rovani Sigamoney from the UNESCO Engineering Initiative talked about the World Water Experiment, the largest global chemistry experiment which was at the same time a teaching exercise, launched last year during the International Year of Chemistry.

Participants from the Chinese Geological Survey highlighted the planned training in geological and geochemical mapping that the Chinese will host in Africa for some 200 participants.

Participants requested that the IGCP secretariat clearly post brief explanations of each project. In fact, there are short descriptions currently available online: http://www.unesco.org/new/en/natural-sciences/environment/earth-sciences/international-geoscience-programme/igcp-projects/. The secretariat will also develop a website highlighting education activities related to IGCP projects.

The day closed with a roundtable discussion amongst participants that highlighted the strength of the partners present in the room and the potential to build extensive collaboration from here. Specific suggestions were that UNESCO could help identify high quality teaching tools and that specific tools coming out of IGCP projects should be highlighted, as well as a clear teachable description of each project. The observation was made that Geoparks tend to be most successful in countries where geologic protection legislation already exists, perhaps indicating an underlying national priority. It was also observed that funding from US-based foundations tends to go to issues related to health – connecting educated people to healthy land and water to healthy people could be an important argument. The importance of working closely with the media was also highlighted. Final statements related to the importance of communication, role of teachers, sense of place, and geologists as story tellers. In closing, it was suggested that the strength of partners, networks and tools represented at this meeting alone were enough to make the Earth Science Education Initiative in Africa a successful collaboration.

Earth science education initiative in Africa.

Participants:

name		organisation	country
Artur	Abreu Sá	President, Portugal IGCP National Committee	Portugal
Luc	André	Earth Sciences Department, Musee Royal de l'Afrique Centrale, Tervuren	Belgium
Jean-Paul	Cadet	UNESCO SC/EES/GEO	UNESCO
Hamish	Campbell	GNS Science	New Zealand
Tom	Casadevall	USGS	US
William	Cavazza	Department of Earth Sciences, University of Bologna; IUGS Treasurer	Italy
Lian	Changyun	Deputy Director, Department of Science and Technology and International Cooperation, China Geological Survey, Beijing	China
Ed	de Mulder	former President, IYPE	Netherlands
Edward	Derbyshire	former IGCP Scientific Chair	UK
Shuwen	Dong	Chinese Academy of Geological Sciences	China
Wolfgang	Eder	University of Munich; Earth Science Matters	Germany
Ezzoura	Errami	African Association of Women Geoscientists; African Geopark Network	Morocco
Sarah	Gaines	UNESCO SC/EES/GEO	UNESCO
Yann	Gavillot	UNESCO SC/EES/GEO	UNESCO
Mike	Gunzburger	Science Advisor to the US Permanent Delegation to UNESCO	US
Shigeki	Hada	Kobe Women's University; Japan National Committee for IGCP	Japan
Sylke	Hlawatsch	President, International Geoscience Education Organisation	Germany
Xiaochi	Jin	Institute of Geology, CAS, Beijing	China
Gretchen	Kalonji	UNESCO ADG/SC	UNESCO
Chris	King	IUGS COGE; IGEO	UK
Carlo	Laj	Chairman, Committee on Education, European Geosciences Union (EGU)	France
Bessem	Manga	Cameroon Permanent Delegation to UNESCO	Cameroon
Samy	Mankoto	retired SC/EES; ERAIFT	DRC
Louis	Marechal	Chargé de missions "Ressources minérales", Direction générale de la mondialisation, du développement et des partenariats; Ministère des Affaires Etrangères et Européennes	France
Jesus	Martinez-Frias	IUGS Commission on Geoscience Education	Spain
Robert	Moritz	University of Geneva, Earth and Environmental Sciences; IGCP Scientific Board member	Switzerland
Feng-Jun	Nie	Chinese Academy of Geological Sciences	China
Patrick	Okafor	Deputy Permanent Delegate, Permanent Delegation of Nigeria to UNESCO	Nigeria
Margarete	Patzak	UNESCO SC/EES/GEO	UNESCO
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Bob	Ridky	Geoscience Education Director, USGS	US
Solene	Roi	National French Commission for UNESCO	France
Joel	Rolet	Chairman, CIFEG	France
Philippe	Rossi	Commission for the Geological Map of the World	France
Abdin	Salih	UNESCO SC/IHP	UNESCO
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Rovani	Sigamoney	UNESCO Engineering Initiative	UNESCO

Elizabeth	Silva	Portuguese National Commission for UNESCO - Science Officer; Portugal IGCP National Committee	Portugal
Felix	Toteu	UNESCO Nairobi	UNESCO
Joanne	Venus	President, YES network	UK
Patricia	Vickers Rich	Monash Science Centre and School of Geosciences, Monash University, Melbourne, Victoria; IGCP Scientific Board member	Australia
Max	Vidal	Observatoire des Sciences de l'Univers, Universite d'Orleans; CIFEG	France
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