

International Hydrological Programme

43rd session of the IHP Bureau
(Paris, 3 – 5 June 2009)

PROPOSED CATEGORY 2 WATER-RELATED CENTRES

Item 5.2 of the provisional agenda

SUMMARY

This document briefly reports on the proposal of the Government of the Republic of Sudan to establish a Regional Centre for Capacity Building and Research in Water Harvesting in Sudan as a category 2 centre under the auspices of UNESCO.

The Bureau may wish to endorse this proposal towards the establishment of the proposed centre and make the appropriate recommendations for its consideration at the 19th session of the Intergovernmental Council of the IHP in accordance with the IHP strategy for UNESCO's category 1 and category 2 water-related centres (document IHP/Bur-XL/8 rev. (Consolidated)).

Regional Centre for Capacity Building and Research in Water Harvesting (Sudan)

1. This document describes a proposal by the Government of the Republic of Sudan to establish a Regional Centre for Capacity Building and Research in Water Harvesting in Sudan.
2. On 11 March 2009, the Minister for Irrigation and Water Resources, Government of the Republic of Sudan, presented to the Director-General a proposal for the establishment of a Regional Centre for Capacity Building and Research in Water Harvesting in Sudan as a category 2 centre under the auspices of UNESCO (see Annex).
3. The proposed centre intends to act as a centre of excellence in rainwater harvesting through research, capacity building and information networking at the national, regional and international level. The proposed centre will enhance the attainment of the Millennium Development Goals by securing agriculture water supplies through rainwater harvesting in sub-Saharan Africa and South Asia and will therefore greatly help towards food security, poverty alleviation and minimisation of conflicts over limited resources. The proposed Centre envisages strong cooperation with UNESCO chairs and centres and with the UNESCO-IHE Institute for Water Education. The proposed centre has very strong political support from the Government of Sudan. The proposal refers to strong financial guarantees, up-to-date infrastructures with technical laboratories, computer rooms, teaching facilities and accommodation for students through the existing facilities of the Hydraulic Research Station and future custom built facilities for the operations of the proposed centre.
4. The initial proposal submitted by the Government of Sudan needs to be further aligned with document 33 C/19 related to the principles and guidelines for the establishment and functioning of UNESCO institutes and centres (category 1) and institutes and centres under the auspices of UNESCO (category 2), as approved by the General Conference in 33 C/Resolution 90 especially in terms of legal identity, governance structure and distinct financial and administrative autonomy from the existing Hydraulic Research Station.

ANNEX

Letter and proposal from the Ministry of Irrigation and Water Resources of the Republic of Sudan for the establishment of a Regional Centre for Capacity Building and Research in Water Harvesting in Sudan as a category 2 centre under the auspices of UNESCO



النمرة : ١٩ / ١ / ٦٥ / ٢٢

Date 11/3/2009 : التاريخ

Form: Minister of irrigation and Water Resources
To: Mr. K. Matsuura, Director General, UNESCO

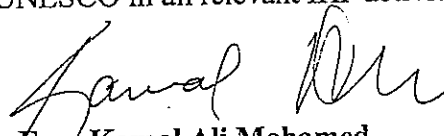
C/C: President of the Intergovernmental Council of IHP
C /C: UNESCO IHP Secretary

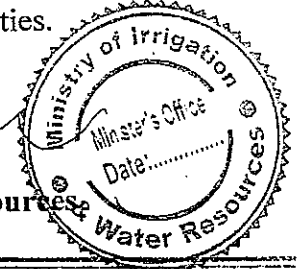
Subject: Regional Centre of Water Harvesting

We were pleased to be informed that the Director General of UNESCO in a meeting with the Sudanese ambassador and the president of the Intergovernmental Council of IHP has welcomed the idea of establishing a Regional Water Center under Category 11 of the UNESCO system. Following nonfiction we arranged a meeting where all national universities, reach centers, the high council of environmental resources, UNESCO chair in water resources, UNESCO Chair Desertification and organs of the ministry of irritation and water resources were present. The meeting was chaired by the first under secretary of the ministry of irrigation and water resources and addressed by the president of the intergovernmental council of IHP and the chairman of the Sudanese IHP committee. The out come of the meeting can be summarized as below:

- 1- Rain Water Harvesting is a main area of interest to Sudan "with more than 1000 milliard meter cube per annum" and fits very well in our future strategy of agricultural, industrial development and water supply strategy.
- 2- The objective of the centre will be confined to apply research and capacity buildings in the field of water harvesting where only 0.4% of the total rain is utilized so far in our region.
- 3- All universities and research centers showed high interest on the subject and promised to support by finance, personnel and logistics and agreed that the center will be hosted by the ministry of irrigation and water resources; considering the ministry resources and support anticipated to be given for the success this center while all interested universities and research centers could be affiliated to this center on partnership arrangement.
- 4- A detailed proposal for the establishment of the center will be prepared according to UNESCO procedures for Category II entities. This will be submitted before the Intergovernmental Council of IHP in June 2009 to be approved hopefully at the UNESCO General Conference in October/June 2009.
- 5- Your eminent support to this subject will be highly appreciated since we are strengthening our cooperation with UNESCO in all relevant IHP activities.

Please accept our best regards.


Eng. Kamal Ali Mohamed
Minister of Irrigation and Water Resources



**ESTABLISHMENT OF A REGIONAL CENTER FOR
CAPACITY BUILDING AND RESEARCH IN WATER
HARVESTING IN SUDAN,
UNDER THE AUSPICES OF UNESCO**

A proposal Submitted

By

**The Ministry of Irrigation & Water Resources
Government of the Republic of Sudan**

ESTABLISHMENT OF A REGIONAL CENTER FOR CAPACITY BUILDING AND RESEARCH IN WATER HARVESTING IN SUDAN, UNDER THE AUSPICES OF UNESCO

INTRODUCTION

General: The recent high world's population increase, especially in rural areas, and the future outlook, requires accompanied increase in domestic water and food supply in order to keep pace. However, such increase needs more water to produce food, which ought to be produced within sustainable development frames; moreover, the food should be produced faster and the production increase has to be occurred in poor farming communities, which are often dependent on unreliable crop water supply; i.e. rainfall. For instance, in sub-Saharan Africa (SSA) and south Asia, where 60% of food insecure people lives, the food gap has been estimated at 400 million tons by the year 2020; thus, a flip in the policies is required from blue water management towards green water management (Green-Green Revolution).

Recently, to enhance realization of the MDGs, the mighty role of the green water (rainwater), on scientific pillars, has been revived. Water harvesting is the future promising technique, especially, in arid and semi arid lands. Adopting water harvesting techniques will provide good water in terms of quantity and quality for both irrigation and domestic use, reduce crop yield fluctuation, reduce risk of investment in rain-fed agriculture, improve pastures, reduce use of groundwater in agriculture, save soil fertility, and increase groundwater recharge. Moreover, the low input of water harvesting techniques makes it economically available for everyone, especially the poor traditional farmers. Water harvesting is easier to develop than any other water resources as well as water harvesting can be easily integrated with indigenous knowledge.

National Justification: Sudan is the largest country in Africa; with 40.2 millions of people; of which 60% is living in rural areas. Sudan embraces about 7% of Africa continent's crop lands as 12% of its land is arable land. Sudan is endowed with multi climatic zones and ecosystems. Both encourage broad scale of economic activities; however, agriculture (including animal production) is dominant.

The total arable land in Sudan is estimated at 84 million hectare, with reasonable soils fertility. Two types of farming systems are practiced: Irrigated farming system (1.89 m ha), which consumes 90% of Sudan available water; rain-fed farming system (15 m ha); which produces around 80% of cereals, 100% of Sesame and 90% of Groundnut of Sudan agricultural production. Two main types of rain-fed agriculture are practiced in Sudan, mechanized rain-fed agriculture, which is estimated at 23% out of the total cultivated land in Sudan; and traditional rain-fed agriculture, which occupies 61% of the total cultivated land in Sudan with steadily annual increase and produces 81% of the rain-fed total production; moreover, rain-fed agriculture is the main measure of agricultural growth rate and performance in Sudan. Furthermore, Gum Arabic production (*Acacia Senegal* and *Acacia seyal* are the main producer trees) is an important land use, especially at Kurdofan and Darfur regions; where, sandy soil (Qoz's) is found. Livestock husbandry is also widely spread in Sudan; actually, 13%

and 10% of Africa continent's pasture lands and livestock population are embraced in Sudan; respectively.

Rainfall fluctuations, dry spells and drought are the main constraints for rain-fed agriculture development in Sudan. Based on the Sudan water demand projection up to the year 2027, the total demand of Sudan would be 46.2 BCM, while the current total available water is 30 BCM. Currently Sudan population growth (2.9%), and accordingly the Sudan population would be 56 millions by the year 2030. The irrigated area is expected increase to 2.44 million hectare, which is only 4% of total arable land (84 million ha). The conclusion is that there is a wide gap ought to be bridged while the limiting factor for agricultural expansion in Sudan is water and not the land. However, the average annual amount of rainfall in Sudan is more than 10 times the average annual discharge of the Nile River. Enhancing water use efficiency as well as water management techniques, especially water, would mitigate such shortages, and would maximize the socio-economic and environmental benefits for Sudan. Consequently, without doubt, water harvesting is a key element for Sudan future development projects and peace; for instance, the current conflict in Darfur region was initially a conflict over water resources. Moreover, rain-fed agriculture is practiced in most of the rural areas; hence water harvesting is expected to play a significant role in terms of socio-economic development. Promoting sustainable water management through research in water harvesting is a necessity.

Regional Justification: Water harvesting has a vital role to play in responding to the socio-economic crises facing the region and it is one of the priorities for the region to mitigate climate change impacts. Although several economic instruments are being deployed to address these crises, the success of these efforts will depend heavily on the availability of sustainable water resources. Despite the extraordinary natural endowments and rich cultural history of the region, its people face considerable challenges. To day the region is characterized by economies dependent on rain-fed agriculture, subsistence farming, low internalization, poor development of infrastructures, poverty, instability, rapid population growth, and environmental degradation. Four countries in the region are amongst the world's ten poorest, with per capita incomes in the range of USD 100-200 per year. Population is expected to double within the next 25 years, placing additional strain on scarce water and other natural resources.

In the region, agricultural yields in rain-fed agriculture are generally low and highly variable. This is to a large extent related to the high variability of rainfall, making private investments in increasing productivity a hazardous activity. There is a clear need for low cost infrastructure designed to increase the reliability of water supply through an increase of the productivity of rainfall. An increase in water harvesting facilities is a pre-condition to reducing rainfall variability. Technologies suitable for large and small scale intensification of rain-fed agriculture include water harvesting and soil and water conservation measures. These technologies are generally low cost. Experiences in Burkina Faso, the Sudan and Kenya show that the rain harvested from one hectare for supplementary irrigation of another can triple or even quadruple agricultural production. Good water harvesting and watershed management are effective in conservation of rain water and its domestic and agriculture uses. Restoring the vegetative soil cover decreases peak surface runoff by promoting infiltration of rainwater into the soil. Physical technologies for good watershed

management, such as terraces and storage bonds, also help to conserve rainwater and play an important role in making rain-fed agriculture less dependent on erratic rainfall. The benefits which justify water harvesting in agriculture and domestic water use are therefore not only improved and stabilized yields of crops, animal products, peace and stability, but also the wider environmental and socioeconomic benefits such as improved soil conservation, attenuated flood peaks, increased groundwater recharge, and retention of dry season base flows in streams, thus enhancing aquatic and region habitat for diverse natural biota. In addition, there will be indirect benefits in the form of trade, business activities and greater availability of raw materials for industry. This will have the effect of increasing the tax base for governments and the GNP of the region.

GOALS

To attain food security, poverty alleviation and peace and minimize conflict over resources through research, capacity building and information networking activities in the field of rain water harvesting at the local, national and regional levels.

OBJECTIVES

- Develop the human and technical research capacity in water harvesting in Sudan and the region.
- Promote scientific research on water harvesting and its implementation at national and regional levels and create synergy mechanism with relevant national and regional water harvesting institutions.
- Establish and reinforce regional network in water harvesting by taking the necessary cooperative arrangements, strengthening local capabilities and foster increased bilateral cooperation between regional institutions through joint research and training programs among scientists of the region to ensure mobility of researchers and greater accessibility to information and new technologies; and organize, facilitate and disseminate the water harvesting database.
- Tap the vast water resources and human potential in Sudan and the region as a whole and take advantage of these resources for the well being of the people and for the economic development of the region.
- Generate and provide scientific and technical information on training in water harvesting in the region that would allow the formulation of sound policies and legislations leading to sustainable and integrated water resources management at the local, national and regional level.
- Contribute to the efficient and sustainable use of the water through comprehensive studies and proper design and implementation of water harvesting projects.
- Develop and enhance simple water harvesting techniques based on sound basic and applied research.

FUNCTIONS

The functions of the Center shall be:

- To conduct specialized training programs and other capacity building activities and raise the awareness and knowledge on water harvesting through conducting training sessions for stakeholders.
- To promote scientific research and to undertake effective capacity-building activities at the institutional and professional levels.
- To create and reinforce networks for the exchange of scientific, technical and policy information among institutions and individuals.
- To develop and coordinate cooperative research activities, taking advantage particularly of the scientific and professional capacity of the IHP networks and the relevant programs of non-organizational organizations, international institutions and networks.
- To conduct regional training courses for practitioners and researchers on a regional level.
- To organize knowledge and information transfer activities including local, regional and international symposia or workshops, and to engage in appropriate awareness-raising activities targeted at various audiences including the general public.
- To develop a strong program of information and communication technology.
- To provide technical consulting services.
- To produce technical publications and other media items related to the activities of the Center.

EXISTING AND FUTURE LEGAL STATUS

The Regional Centre shall be established as an autonomous body, initially as part of the Hydraulics Research Station (HRS) (Annex 1) and operated under the responsibility of the Ministry of Irrigation and Water Resources (MIWR). It is envisaged that the initial phase of development (i.e. first five years) the Regional Center will operate from the HRS and be based largely upon the existing facilities and expertise of the institution (Annex 2). Other academic institutions contributing to this initiative, and visiting/guest faculty from national, regional and international related institutions will conduct training programs offered during the developmental period. The Director of HRS would serve as interim Director of the Regional Center until the appointment of a permanent Director within a period of six month to one year following approval of the proposal.

After the developmental period, the Regional Center is to be re-located in a separate purpose-built facility located either in Wadmedani or Khartoum. Ultimately, at the end of the five-year developmental period, the Regional Center would have its own full complement of regular faculty, technical and support staff. Recruitment would commence shortly after approval of the proposal. The staff would be located at the HRS until such time as the core facility becomes operational. It is recommended that selection should be based primarily on those areas of water resources and water harvesting depending on the interest of the region, and that a regular review of programs be introduced in order to accommodate emerging priorities.

GOVERNANCE

The Regional Center will be established as a hub for research, capacity building and information networking activities on water harvesting at local, national and regional levels and will cooperate with universities, research centers and other governmental and non-governmental organizations in order to implement its activities. Its structure would involve:

The Board of Governors: will have the function of guiding the activities of the Regional Center; will comprise a Chairperson (the Minister of MIWR from Sudan), representatives of countries in the region, and UNESCO representative.

The Technical Advisory Committee: comprising scientific, technical and other experts nominated by the Government of Sudan, countries in the region, UNESCO representatives and experts from outside the region, will provide technical advice for planning, execution, review and monitoring of the program of the Regional Center.

The Center Executive Committee: will be constituted from the heads of the departments of the Center and will be responsible for the management of the day-to-day activities of the center, headed by the Director of the Regional Center and appointed by the Board of Governors in agreement with the Director-General. The Director shall be appointed by the Board of Governors with consultation with the Director General of UNESCO and shall direct the work of the Center.

Staff: the Center's staff will include the members employed by the Director General as well as researchers and professionals appointed and/or invited by the Director General to contribute to the Center's activities.

Consultations with countries in the region and others will be organized by the Sudan Government authorities with a view to establishing terms of cooperation with the Regional Center.

METHOD OF FINANCING AND RESPECTIVE RESPONSIBILITIES OF SUDAN

The Government of Sudan will take appropriate measures to finance the Center. This will include but not limited to: the land on which the Regional Center will be built, the costs of its construction and equipment, recurring cost for staffing, consumables and other contingencies. During the developmental phase, the Sudan Government, represented by HRS, will provide the Center with the appropriate office space, equipment and facilities and cover the communication, utilities and maintenance costs of the Center, plus the expenses of holding the sessions of the Technical Advisory Committee. In Addition, the Sudan Government will also make sure that the Regional Center will receive adequate financial contributions, in accordance with relevant and applicable laws and regulations.

Following the developmental phase, the Government of Sudan will continue to provide funding to meet the recurring costs in accordance with national laws governing autonomous centers. It is also envisaged that financing would be sought

from international funding agencies, from the private sector through joint technology transfer arrangements, and through a "core fund" to which participating countries could make contributions. If the Regional Center is to be truly collaborative, and a sense of genuine participation is to prevail, some contribution is essential from participating countries in the region. Financial contributions from such countries should provide support towards their participation in the administrative structures of the Regional Center and for trainees. In addition, it is anticipated that UNESCO could provide some support for training activities, fellowships, etc., in keeping with available resources and program priorities in this field.

TYPE AND NATURE OF COOPERATION WITH UNESCO

UNESCO could participate in cooperative activities as appropriate such as:

- i. Technical assistance and administrative advice for the establishment and cooperation of the Center, including assistance in the formulation of the short-term, mid-term and long-term programs of the Center.
- ii. Encourage international governmental and non-governmental financial entities, as well as member states of the Organization to provide financial and technical assistance and to propose appropriate projects to the Center. UNESCO is also expected to facilitate contacts with other international organizations relevant to the functions of the Center.
- iii. To provide the Center with IHP publications and other pertinent materials and shall disseminate information on the activities of the Center via the IHP website and other mechanisms at its disposal.
- iv. In conformity with the relevant policies of the Intergovernmental Council of the IHP, UNESCO may contract out to the Center the execution of water harvesting activities and may provide support within the framework of each regular program and budget, in particular to reinforce its start-up period. UNESCO may contribute financially to concrete activities/projects if those are deemed in line with UNESCO's program priorities, although it should not provide financial support for administrative or institutional purposes.
- v. Provision of support to visiting students by means of UNESCO Fellowships in water resources through the usual competitive process.

EXPECTED REGIONAL IMPACT OF THE CENTER

The Center plans to carry out regional joint research projects on water harvesting in collaboration with universities, organizations and research institutes outside Sudan. The Center also plans to organize training courses for practitioners and researchers from the region and to invite visiting lecturers from outside of Sudan for these training courses. The Center is ready to welcome involvement from all countries sharing enthusiasm on water harvesting issues and willing to contribute to and benefit from the Center. Its activities will range from local, national to regional scale.

The research results from the Center will be applied to capacity building for researchers and professionals, mainly from the region. The human network formed through the training activities at the Center will become a permanent hub of the future worldwide information network. Thus the impact of the Center on regional scientific and technical cooperation is expected to be great.

Cooperation in terms of research, capacity building and information networking will be required at different scales between different communities. Cooperation especially with other IHP centers/chairs/courses, UNESCO-IHE, and other United Nations entities is envisaged.

The Center is expected to upgrade national and regional capacities in terms of water harvesting and ensure effective transfer of appropriate technologies as an important means of securing long-term self reliance and sustainable development; these remain a priority for the region states. Scientific exchange will reinforce existing collaboration in the region and promote new partnerships through the development of mutually beneficial research and development programs. The focus of activities of the Regional Center will be demand-driven and directed towards problems related to food security, poverty alleviation, peace and conflict mitigation, indigenous to the region. This will address priority issues for the region and also promote sustainable development of water resources.

The Regional Center will aim towards the establishment of a functional infrastructure within the region for collaborative research, rain harvesting technology transfer and information dissemination. Furthermore, it will foster the development of water resources in the region.

Annex 1. The Hydraulics Research Station

The establishment of a Hydraulics Research Station (HRS) in Sudan was proposed as far back as 1930. The Government requested UNDP assistance to undertake a feasibility study to establish HRS in Wadmedani. The study was followed by a preparatory assistance in 1974 and 1975. Implementation of HRS as a UNDP/UNESCO assisted project undertook place from August 1976 until the end of 1986. The government implementing agency was the Ministry of Irrigation, through its Irrigation Department at that time.

As a joint project, the UN grant included technical expatriates in HRS and supply of necessary equipment together with in-house and abroad training of engineers and technicians. The Government of Sudan prepared all necessary buildings and structures and hired the national staff.

Its mission is to give support to MIWR for developing and improving water resources and management activities related to the main spheres of the national economy through basic and applied research. HRS is managed directly under the supervision of the Undersecretary of MIWR. Its policies and research programs are reviewed and approved by the Council of Research headed by the Undersecretary MOIWR.

Annex 2. Existing Facilities and Expertise of HRS

Existing Facilities:

1. **Offices with all necessary facilities** including electricity; furniture; computers; Internet connections, etc.
2. **Database** for water resources and electronic library;

3. **Specialized library** (books, journals, periodicals ...etc)
4. **Conference hall** with visual and audio facilities;
5. **Training facilities**, computer room, blackboards, projectors; ...etc.
6. **Equipment and instruments** including land and bathymetric surveying equipment, velocity and discharge measurement, positioning systems, etc.
7. **Qualified research and training staff.** HRS and other national institutes will provide the Centre with qualified research and training staff who has an excellent experience in water harvesting both in the field work and office.

Moreover, there are about ten universities, already having their own water harvesting research and training programs, and research institutes which will participate in the Center as partners.

Experience: Sudan has an accumulated developing experience in the area of water harvesting towards the development of forestry, rangelands, rain-fed agriculture and rural water supply. Also, the Sudan UNFCCC National Adaptation Program of Action (NAPA) is approved by GEF in five different States. The project is mainly water harvesting activities in these five States. Implementation is expected to start in Sep. 2009. The cost is 7 million US\$ (50% is from UNFCCC Adaptation Fund and 50% by the Government of Sudan).

HRS has a good experience in water harvesting as it carried out and participated in many water harvesting projects such:

- Khor Arbaat, Red Sea, 1990
- Assessment of Khors and Wadis and small earth dams within Sudan, 1998
- Assessment of El Ban Gadieed small earth dam, Northern Kordofan 1999
- Chairmanship of the committees for assessment of small earth dams and Hafirs in Greater Darfur and Kordofan States (two committees) 2003
- Studies and hydraulic design of AlKoma Dam; North Kordofan State; 2003
- Study and Hydraulic Design of Abu Elikri Dam; West Kordofan State; 2003
- Study and Hydraulic Design of Angolo Dam; South Kordofan State; 2003
- Assessment of small earth dam within the Eastern States of Sudan, 2006
- Assessment of the impacts earth dams across Khor Abu Habil, Northern Kordofan, 2007
- River Gash and Delta ElGash water studies 1998,2000
- Tokar water studies 2007
- Water Harvesting studies of:
 - Khor Tashalal, Hamashkoreeb area
 - Khor Shalaloub, North East Kassala
 - Khor Musran, Butana area, Eastern Gezira
 - Khor Abu Alaga, East Kassal, Kassala State 2007
- River Dinder Earth dams study 2005
- Elkhor El Mayit study, River Rahad
- Water Harvesting studies at Sam Turk, Um Khaboub and Um Abiad areas, South Gedaref, 2007