ABSTRACT: As a result of a joint project between the Hydraulic Research Institute (HRI) and UNESCO-IHE in Delft, the Netherlands on developing a regional training centre for the Nile basin countries, the idea was born to develop a Nile Basin Capacity Building Network (NBCBN) for professionals to sustain the professional and social relations that were built up during the various training courses. Such a network can be a powerful mechanism to address the need of building professional capacity in the field of water in the Nile region and an instrument in promoting regional cooperation among the Nile basin countries.

A first start with the establishment of the NBCBN-RE was made in 2000 with the installation of a network secretariat. A kick off workshop held in Cairo in January 2002 marked the actual beginning of the NBCBN. The main output of the workshop was summarized in Cairo Declaration in which representatives of all ten Nile basin countries and different international organizations expressed their commitment to actively participate in the development of the network.

Networks are made for and by people. Therefore, human aspects such as confidence, trust and commitment are vital for the success of any network. However, for the development of knowledge networks, some additional conceptual elements are regarded as essential building blocks. These are, for instance, the concept of “Communities of practice” or Communities of professionals as elementary units of a network and the creation of an appropriate ICT support environment like Internet based interactive platform. Communities of Practice are consider as places where a real add values could be produced through sharing the ideas, insight, information, knowledge, experience and tools.

The above concepts have been used and integrated in the design of the NBCBN-RE over the last two years and many lessons have been learned in the network development process. By the end of 2003, each Nile basin country will have its own in-country capacity building network in river engineering to take care the challenges and needs on the country level and to actively interact with the networks in the other Nile basin countries. Moreover, five, out of six, regional research
clusters have been established in some areas of river engineering such as hydropower development, river morphology, river structures, environmental aspects, flood management and GIS and modelling. Each cluster is composed of 2-3 research groups. Each cluster, or research group, is a community of practice or a community of professionals who have the same background and interest. To enhance the interaction among the members of each community of professionals (cluster), the project has provided them with a powerful ICT platform (NBCBN-RE web-site). Each community of professionals has its own folder to share and exchange their ideas knowledge and experience.

This paper focuses on the application of the main concepts of the knowledge network development and lessons learned so far through the experience gained during building NBCBN-RE.

THE NEED FOR CAPACITY BUILDING IN THE NILE REGION

The Nile River and its challenges

![Figure 1. Nile River Basin](image)
The Nile River, the longest river in the world, traverses more than 6,700 kilometres from its farthest source at the headwaters of the Kagera River Basin in Rwanda and Burundi to its delta in Egypt on the Mediterranean Sea. Ten countries share the Nile: Burundi, Democratic Republic of Congo (DRC), Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, and Uganda. The Nile River Basin covers 3 million km² - one tenth of Africa's total land mass.

It serves as home to world-class environmental assets, such as Lake Victoria (the second largest fresh water body by area in the world) and the vast wetlands of the Sudd. It also serves as home to an estimated 140 million people within the boundaries of the Basin; while more than twice that number - roughly 300 million - live within the ten countries that share the Nile waters.

Today, the Basin is characterized by poverty, instability, rapid population growth, and environmental degradation. Half of the 10 Nile riparian countries are among the world's ten poorest. Population is expected to double within the next 25 years, placing additional strain on the scarce water and other natural resources. Yet the Nile holds significant opportunities for 'win-win' development that could enhance energy availability, food production, transportation, industrial development, environmental conservation and other related development activities in the region. Cooperative water resources management ought also serve as a catalyst for greater regional integration, both economic and political, with benefits far exceeding those derived from the river itself.

The need for capacity building

There is no doubt that there is any other continent than Africa that suffers more from the lack of capacity to carry out research, studies and to establish policies for the region's development in general and for the water sector in particular. The lack of critical capacity in science and technology is one of the major obstacles to sustainable development. Many factors explain this:

- Disparities in salaries
- Dependence on outside donors
- Lack of access to post graduate education. Lack of access to scientific literature
- Lack of access to Internet
- Poor participation on international conferences. Lack of scientific equipment
- Decreasing public funding and budgets
- Globalisation and Privatisation affected science development reducing universities' activities
- Very low participation of women
- Aging of academic staff without new recruitments
The resulting Brain Drain process arising from these factors

The above situation also holds for the water sector in most of the Nile basin countries. Co-operation at technical level has proved instrumental to improve the joint management of shared water resources and to mitigate and even prevent international conflicts. Informal and formal contacts at professional level often formed the basis for agreements and effective international co-operation. It is in the interest of both powerful and less powerful riparian countries to "level the playing field" and so share the same data, information and knowledge making it possible to analyses and interpret the consequences of certain measures on both national and river basin scale. Information and knowledge sharing is a critical issue in the development of transboundary rivers since it will build confidence and partnership among riparian states. Therefore, the issue of capacity building has to be addressed in a way that it also encourages and facilitates Basin interchange. A long-term capacity building program is required to address the many gaps and variation among countries and should address in particular the following three sectoral issues:

- **The lack of capacity to manage water in an integrated manner.**

  Most of the Basin countries are burdened by weak human and institutional capacity to manage water resources in an integrated manner. This situation applies not only to the management of international waters, but also to the management of national waters. Existing regional centres in the Nile Basin would be strengthened in selected specialties of IWRM to provide training within the region.

- **Uneven distribution of capacity within the basin.**

  A central issue is that the water sector in the Basin is characterized by widely diverse institutional capacities in the countries. The availability of water professionals, for instance, varies from 100 in one country to over 3,000 in another. Senior managers, trainers, and researchers are even fewer. There is a great need for some of the countries in the Basin to develop a large cadre of trained professionals, while other countries already have such a group. Thus, it is important to have as many countries as possible represented in any training event. The more privileged countries will be invited to host and offer training to others. In addition capacity building should encourage participation of women professionals.

- **Little interaction among water professionals in the Nile Basin**

  By its very nature, management of transboundary waters is a complex matter. In the case of the Nile, collective or joint development of the Nile waters is made even more difficult by the fact that there is limited trade and exchange among the riparian countries. Political, economic, social, and cultural (including language) differences among the countries pose a major challenge to such exchange.

As a special example of one of the capacity building models for developing water sector training capability, the HRI-Regional Training Project can be considered. The Hydraulics Research Institute (HRI) is one of the 12 institutions under the National Water Research Centre (NWRC) of the Ministry of Water Resources and Irrigation, Egypt. Since 1996, FHU, has been organising a three-month course and various short courses on Hydraulic Engineering in River Basins for especially professionals from the Nilotic States. The project activities are supported professionally, by the International Institute for Infrastructure, Hydraulic and Environmental Engineering (IRE), Delft and the International Institute for Aerospace Survey and Earth Sciences (ITC), Enschede, The Netherlands, with financial support of the Dutch Government.

The main objective of the HRI project was to

"Strengthen the capacity of the Nilotic states to develop their research infrastructure required for a sound and proper management of the Nile and other river basins ".

The first phase of the project (1995-1999) focused on the practical training of professionals active in the various (semi-) governmental authorities, institutes and projects dealing with water resources development in the region. Activities were tuned both to support BRI to become a regional training institution and to support the region to train professionals from the region and to provide a number of fellowships to enable participants to attend the regular courses at HRI.

The training centre established at the HRI premises became in a short time a regional training centre well known not only within African Nilotic countries but also further in the African Continent and the Arab world. Training groups of young professionals coming from countries with different political background and culture fostered friendly relationships between them and actually turned out to be an excellent long-term investment. They not only learned how to design hydraulic works but also how to solve practical problems in a technical and environmentally sustainable manner.

The above experiences are worth elaborating further the concept and approach of the first phase through facilitating an even more intensive co-operation between professionals from the Nile region. The main concept on which the second phase of the project (2000-2004) will be based is to create an environment in which professionals from the water sector sharing the same river basin would have the possibility to exchange ideas, their best practices and lessons learned. Such an environment can best be established by fostering a network through which education, training, research and exchange of information for and by professionals can take place.

To this end, the **NILE BASIN CAPACITY BUILDING NETWORK for RIVER ENGINEERING (NBCBN-RE)** is to be established as a regional programme to build and strengthen capacity in the Nile riparian countries for an environmentally sound development and management of the Nile River Basin. The network is to be an open network of national and regional capacity building institutions and professional organisations active in education, training and research. The ownership of the NBCBN-RE Network is an essential issue to be seriously addressed. It is envisaged that the network will be owned by a group of information and knowledge suppliers,
capacity builders and end-users, all under the umbrella of a regional organisation. Such an organisation could best be the **NILE BASIN INITIATIVE (NBI)**.

**HOW TO BUILD A CAPACITY BUILDING NETWORK FOR THE NILE BASIN?**

In the previous section, all kinds of building blocks were brought up as essential components for building networks. In one way or another, they all contribute to the concept and approach of building an internet-based network. Communities of practice form one of the main building blocks for such a network. These are seen as the "foundation" for every network, since the communities are the places where real value is produced through sharing ideas, insight information experience and tools.

The main concept behind the proposed establishment of a regional Nile Basin Capacity Building Network is to support and strengthen the already existing communities, to promote and initiate an environment that stimulates the creation of new communities, and to generate added value through making cross-links. The leading thought behind the regional network is that, in order to leverage knowledge, we should not focus on the knowledge itself, but on the communities that own the knowledge and the people that create and use it. In building the network and in supporting communities of practice it is therefore vital to identify, already existing forms of communities and networks.

If communities of practice are such important building blocks for the development of capacity building networks, the question arises: "How to build and/or develop communities of practice?" Communities of practice are living things and go through all kind of stages of development. Communities of practice typically start as loose networks that hold the potential of becoming more connected. In order to develop them one has to understand the structure. All communities of practice share a basic (social) knowledge structure, consisting of three fundamental elements for developing and sharing knowledge:

- A domain that creates the common ground and identity
- The community that creates the social fabric of learning
- The practice defined as the set of frameworks, ideas, tools, information, styles, language, stories and documents that community members share.

It is important for communities of practice to develop all three elements in parallel and in a balanced way.

The following guidelines are seen as crucial for a community of practice to become alive:

1. Define the scope of the domain
2. Build on pre-existing personal networks
3. Identify common knowledge needs
4. Legitimise participation by the member's organization
5. Identify potential community coordinators. Effective coordinators:
   a. are well respected;
   b. are knowledgeable about the domain;
   c. are well connected to other members;
   d. are good communicators;
   e. make time available;
   f. go deep inside the community;
   g. have network skills.
6. Organise community launch events
7. Develop relationships and sufficient trust
8. Initiate regular community events
9. Initiate community spaces
10. Provide support (time, ICT, encouragement, rewarding)

In the development of the NBCBN-RE maximum use has been made of the instruments and elements as described in the previous sections. In building the capacity of the water sector of Nile basin, the approach was to focus first on the professionals working in the various institutions and the communities in which they participate. From the other side, institutions could provide the enabling environment for those professionals and communities by entering into partnerships with related organizations. This will create an initiating enabling environment for networks and communities to develop and will promote interactions among people from different organizations. Networks are used more for exchanging and sharing information among individuals and organizations. Networks have in principle no identity and practice. However, networks are important in developing relationships. A community of practice is different from networks in the sense that it is "about" something. Something that is personal and informal. In communities of practice people find value in their interactions, they help each other to solve problems, they accumulate knowledge, and they become informally bound by the value in learning together. And this is what capacity building is really about.

The following framework for capacity building has been adopted (figure 2):

**Partnerships:**

- HRI-IHE
- NBCBN-RE partnership of River Engineering institutions in the Nile basin (Cairo Declaration)
- NBCBN-RE - NBI partnership
Figure 2. Capacity Building Process

Networks:
- UNESCO-IHE Global Knowledge Network
- NBCBN-RE

Communities of Practice:
- In-country networks in all 10 Nile Basin countries
- Research clusters and sub-clusters (research groups)
The Concept of a NBCBN-RE Node

- The node is the core of in-country network: node’s activities are required in order to develop and sustain a local capacity for river engineering within a country.

- The node as part of the research cluster network: the node’s activities are required to develop and sustain the regional research capacity with respect to one research domain in the field of river engineering.

- The node as part of the regional network: node’s activities are required to participate in the overall network development.
**Table 1. List of the host institutions and focal persons in each Nile basin country**

<table>
<thead>
<tr>
<th>Country</th>
<th>Hosting Institution</th>
<th>Focal Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burundi</td>
<td>Geographical Institute of Burundi</td>
<td>Mr. Nduwayo Manasse</td>
</tr>
<tr>
<td>Congo</td>
<td>Ministry of Environment</td>
<td>Mr. Delphin Tshiemenena</td>
</tr>
<tr>
<td>Egypt</td>
<td>Hydraulics Research Institute</td>
<td>Mr. Ibrahim El-Desouky</td>
</tr>
<tr>
<td>Eritrea</td>
<td>Water Resources Department</td>
<td>Mr. Michael Nagash</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>Addis Ababa University</td>
<td>Dr. Bayou Chane</td>
</tr>
<tr>
<td>Kenya</td>
<td>Nairobi University</td>
<td>Dr. Patt Odira</td>
</tr>
<tr>
<td>Rwanda</td>
<td>Kigali Institute for Science, Technology and Management</td>
<td>Dr. Museruka Casimir</td>
</tr>
<tr>
<td>Sudan</td>
<td>UNESCO Chair in Water Resources</td>
<td>Prof. Abdalla Abdel-Salaam</td>
</tr>
<tr>
<td>Tanzania</td>
<td>Dar es Salaam University</td>
<td>Prof. F. Mtalo</td>
</tr>
<tr>
<td>Uganda</td>
<td>Makerere University</td>
<td>Dr. Gaddi Nigrane</td>
</tr>
</tbody>
</table>

**THE LESSONS LEARNED**

1. **Strategic partnerships as a basis for co-operation**

The engagement of partners in a strategic partnership legitimizes the co-operative framework and shows the commitment and ownership of the top management and decision-making levels. It accelerates the process of co-operation and creates the enabling environment for institutions and professionals to start joint capacity building activities. The NBCBN-RE has largely benefited from the partnership that was forged during the Cairo Kick-off meeting (Cairo Declaration).

2. **A participation, approach creates ownership and commitment**

In building partnerships, networks and communities of practice, a participatory approach, through which all the participants have maximum involvement in the building process, contributes largely to the success of it and creates ownership and commitment of the participants. Organisers and third parties should restrict themselves to optimal information provision and facilitation. In all its network and community building activities NBCBN has applied this kind of METAYLAN process approach successfully and has proved to be a very effective methodology to maximize the outputs.

3. **Joint research has a high potential in building capacity**

In a region where the lack of capacity is greater than other parts of the world and where relations among member countries, institutions and people are tense, the choice to concentrate initially on organizing joint research has proven to make sense. The main idea is that the research will lead to new, relevant and practical knowledge that can then be disseminated through special training courses and used for improvement of education curricula. NBCBN has indeed adopted the joint research as main driver for its capacity building activities. It also has helped in identifying regional centers of excellence that has the capacity and willingness to take the hosting role for a
specific research topic. It is also felt that this concept is the fastest way of leveling the playing field among the countries.

4. Capacity building networks should involve all water sector institutions

To make capacity building networks effective and to guarantee demand-responsiveness it should accommodate all main stakeholders in the field: the water professionals active in both public and private water sector institutions (ministries, research institutions, water utilities, consultants and contractors) and local capacity builders (universities, poly-techniques, professional organisations, research and study teams). The NBCBN-RE activities involve all the main players in the field of River Engineering in the Nile region.

5. Networks should be open and easy to access

Networks should be open networks and should stimulate relevant institutions and individuals to join the network. However, in order to secure the identity and value of the network, new incomers should express their commitment and willingness to actively participate. Networks should avoid discrimination and hierarchy among its members. The NBCBN-RE is an open network and can easily accessed through its platform.

6. Networks require co-ordination

A network requires an active and good functioning co-coordinating body. It should stimulate the flow of information and knowledge between the nodes, coordinate the overall activities of the network, disseminate pro-actively relevant information to its members, maintain the knowledge base, develop, maintain and continuously improve the interactive network platform, and initiate new activities. The NBCBN-R_E Network Secretariat fulfils a crucial role in the development of the network.

7. CoP's form the main building block of a knowledge network

Communities of practice are seen as one of the most important drivers for building capacity of both individuals and organizations. They are seen as the "foundation" for every network, since the communities are the places where real value is produced through sharing ideas, insight, information, experience and tools. For this reason, NBCBN has used this concept for building the network.

8. Networks should focus on already existing communities

The leading thought behind a regional network is that, in order to leverage knowledge, it should not focus on the knowledge itself, but on the communities that own the knowledge and the people that create and use it. In building the network and in supporting communities of practice, it is therefore vital to identify already existing forms of communities and networks. The network is to support and strengthen the already existing communities and to promote and initiate an environment that stimulates the creation of new communities, and to generate additional value
through making cross-links. NBCBN-RE is making maximum use of already existing contacts and local networks and professional communities.

9. Network and communities should clearly define its domain

A well-defined domain will inspire members to contribute and to participate. It provides the network and community members their common ground and identity. It should describe the key issues and problems that members jointly experience and really care about. It also triggers members to take leadership in promoting and developing that domain. NBCBN-RE has deliberately restricted itself to a specific area of Water Resources: River and Hydraulic Engineering. For the purpose of developing communities of practice the domain is even defined more confined to research activities in the fields of River Morphology (Reservoir sedimentation, River bed erosion & protection, Watershed erosion & sediment transport), Hydropower Development (Small hydropower for rural development, Large hydropower), GIS & Modelling (Flood propagation, GIS for Watershed Management), River Structures (Diversion works and Micro-Dams).

10. Effective network and community coordinators are key

The identification of effective network and community coordinators is a key factor for the successful development of any community. Effective coordinators are people who are well respected, knowledgeable about the domain, well connected to other members and good communicators. The most important factor is maybe the time that they can make available for their community members. NBCBN has found these persons through the involvement of both Scientific Advisors from UNESCO-IHE and ITC and through the proper selection of the local key players during the Kick-off meeting (Country Coordinators) and research cluster launch events (Research cluster coordinators).

11. Building distributed communities require extra attention

Distributed communities of practice cannot rely on face-to-face meetings and interactions since they link people across time zones, countries, organizational units, languages and cultures. They rely heavily on technology. Since members have less contact, it is more difficult to build trust and personal relationships. As the majority of the communities in the NBCBN are distributed, extra attention has been given to organize intensive participatory launch events and regular biannual or annual meetings. Moreover a great effort has been put in developing a user's friendly, dynamic and interactive web-site that can easily be accessed by all the members of the communities.

12. Critical success factors for network and community development

Being involved in the process of network and community development, it is essential to understand the main thoughts and feelings of the participating people. NBCBN has been asking the participants of all its kick-off and launch events to reveal anonymously their views on what they saw as the main critical success factors. Participants involved so far in those events have
listed the following items as major success factors: commitment, transparency, trust, funding, coordination and co-operation.

13. Support to network development should lead to sustainability

In network development, the leading thought behind all the externally supported activities should be on how they contribute to sustainability. Therefore, NBCBN has focused its support on creating an environment through which individuals and institutions are attracted and facilitated to co-operation and sharing information and knowledge. The main support components are: providing fellowships, organizing and facilitating launch events at nodes, supporting the establishment of an in-country network in all the 10 Nile Basin countries, including the development of a proper ICT infrastructure, supporting staff development and exchange, supporting the applied research (no salaries, only small incentives), development of an Information Centre and a user's friendly interactive NBCBN web-site and establishing a network secretariat. NBCBN is actively creating awareness among the local and regional institutions to support its participating staff through making time available and financial support of their research.

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