



# Nile Basin Initiative



E. Nile Technical Regional Office (ENTRO)  
Nile Basin Initiative Trust Fund / IDA

## Eastern Nile Watershed Management Project Cooperative Regional Assessment (CRA) for Watershed Management

### COOPERATIVE MECHANISMS DRAFT FINAL



May 2007

The Consortium:



In association with



Addis Ababa, Ethiopia



Cairo, Egypt

COMATEX NILOTICA

Khartoum, Sudan

This report was prepared by a consortium comprising Hydrosult Inc (Canada) the lead company, Tecsuit (Canada), DHV (The Netherlands) and their Associates Nile Consultants (Egypt), Comatex Nilotica (Sudan) and T & A Consultants (Ethiopia).

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## ABBREVIATIONS AND ACRONYMS

CRA	Cooperative Regional Assessment
DSS	Decision Support System
DNP	Dinder National Park
DPSIR	Driving Forces-Pressures-State-Impact-Responses
EEA	European Environmental Agency
EECCA	Eastern Europe, Caucasus and Central Asia
EIA	Environmental Impact Assessment
ENPM	Eastern Nile Planning Model
ENSAP	Eastern Nile Subsidiary Action Programme
ENTRO	Eastern Nile Technical Regional Office
ENWMP	Eastern Nile Watershed Management Project
ETB	Ethiopian Birr
E£	Egyptian Pound
FAO	Food and Agricultural Organization
Fed	Feddan
GIS	Geographic Information System
ha	Hectare
HRS	Hydraulic Research Station
ISLSCP	International Satellite Land Surface and Climatology Project
ISP	Institutional Strengthening Proposal
IWAC	International Water Assessment centre
IWRM	Integrated Water Resources Management
JMP	Joint Multi-Purpose programme
km	Kilometre
km <sup>2</sup>	Square kilometer
KwH	Kilowatt Hour
m	metre
m <sup>3</sup>	cubic metre
masl	meters above sea level
MCM	Million Cubic Meters
MIWR	Ministry of Irrigation and Water Resources
MODIS	Moderate Resolution Imaging Spectro-radiometer
MW	Mega Watt
N	Nitrogen
NBI	Nile Basin Initiative
NP	National Park
NTEAP	Nile Transboundary Environmental Assessment Programme
SD	Sudanese Drachma
SVP	Shared Vision Programme
SWC	Soil and Water Conservation
S£	Sudanese Pound
t	ton
TBPA	Trans Boundary protected Area
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
USAID	United States Agency for International Development
USLE	Universal Soil Loss Equation
US\$	United States Dollar
WB	World Bank
WRPMP	Water Resources Planning and Management Project
WSM	Watershed Management

## EXECUTIVE SUMMARY

An outline is given of a continuum of possible cooperative mechanisms using as a model that proposed by Sadoff and Grey (2005), which posits a cooperative continuum from uni-lateral actions (no cooperation) through increasing levels of intensity of cooperation from coordination, collaboration and finally joint actions. This continuum is examined in the context of potential cooperative mechanisms required to achieve successful implementation of the proposed watershed management interventions. An outline is presented of the institutional framework for cooperation and some institutional capacity support initiatives.

Chapter 3 examines a first level of cooperative mechanisms - that of coordination. It sees that data and information sharing will be a key to successful Basin-wide development. The chapter examines the current status of information and data, potential thematic areas and synergies that can be realized through linkages among the CRA's and the Joint Multi-purpose programme.

The institutional implications of data and information sharing are then outlined. In particular, the processes involved of data and information sharing are examined: (i) data acquisition and harmonization, (ii) processing of data into information and (iii) the role of research.

The next section looks at the organizational implications of data and information sharing and its role in project planning, monitoring and evaluation, strategic planning and policy review within the context of ENCOM, ENSAPT and ENTRO. The current Project Coordination Unit would require expansion to encompass a wider range of functions. Three basic sets of functions are identified: (i) Project identification, preparation, implementation and supervision (current functions), (ii) programme monitoring and evaluation, Strategic Social and Environmental Impact Assessment (SSEIA) and policy review, and (iii) Information and Data Base, Geographic Information System (GIS) and Decision Support System (DSS). Finally the issues of technical and financial support are raised.

Chapter 4 examines the cooperative mechanisms required for an increased level of cooperation: that for Collaborative Activities. Two levels of collaborative activities are identified: (i) time and space bound "project-like" activities such as joint planning, research, studies and surveys, and (ii) collaboration between countries in terms sharing and adapting national level plans within a basin-wide perspective. The cooperative mechanisms for the first type of activity are seen to be similar to the current round of CRA's and fast track projects, with ENSAPT and ENTRO playing their current enabling, support and coordination roles.

To date there have been no precedents for this level of collaboration. The process is seen to develop incrementally with the first step involving prior information to other riparians regarding national developments in the Basin and then moving to more active collaboration, information sharing, negotiation and adaptation of national plans.

The mechanisms for the second type of activity will be more complex and will require an enabling role for ENCOM with technical support from ENSAPT and ENTRO.

Chapter 5 examines the cooperative mechanisms required for joint long term activities that would require permanent institutional and organizational arrangements. These would require a period of preparation and negotiation in which ENCOM would have enabling and ENSAPT and ENTRO would have supporting roles. Each long term joint activity would have its own unique set of cooperative mechanisms. The example of the establishment of a Trans-boundary Park with the Dinder and Alatish Parks was taken as an example as to how these mechanisms would work out in practice. Whilst the establishment of a Trans-boundary Park within the auspices a river basin organization is unusual, it could provide an opportunity to address linking issues such as watershed management in the Dinder-Rahad catchment, the degradation of the Rahad-Dinder wetlands and the increasing incidence of flooding.

## **1. INTRODUCTION**

### **1.1 Objectives**

The objectives of this Cooperative Mechanisms component are to examine various types, levels and modes of cooperation needed to achieve the watershed management interventions and opportunities outlined in the Transboundary and Distributive Analyses carried out previously.

### **1.2 Linkages to Transboundary Analysis and Distributive Analysis**

The Watershed Management CRA comprises six components:

- i. Transboundary Analysis
- ii. Distributive Analysis
- iii. Cooperative Mechanisms Analysis
- iv. Design Long term Watershed Management CRA
- v. Develop Project profiles
- vi. Executive Summary of the whole CRA

The Transboundary Analysis identified a range of watershed management problems and issues at the country level that were elaborated upon in the three Country Reports. The subsequent analysis then consolidated the three Country Reports into four Sub-basin Reports. These reports provided a "without borders" analysis of each of the four Sub-basins of the Eastern Nile Basin and identified opportunities to increase net benefits of watershed management interventions in the basin.

The Distributive Analysis was a logical sequence to the Transboundary Analysis. This component re-inserted borders and analyzed the distribution of the costs, benefits and impacts that accrue and result from the implementation of the interventions proposed in the Transboundary Analysis across the three countries.

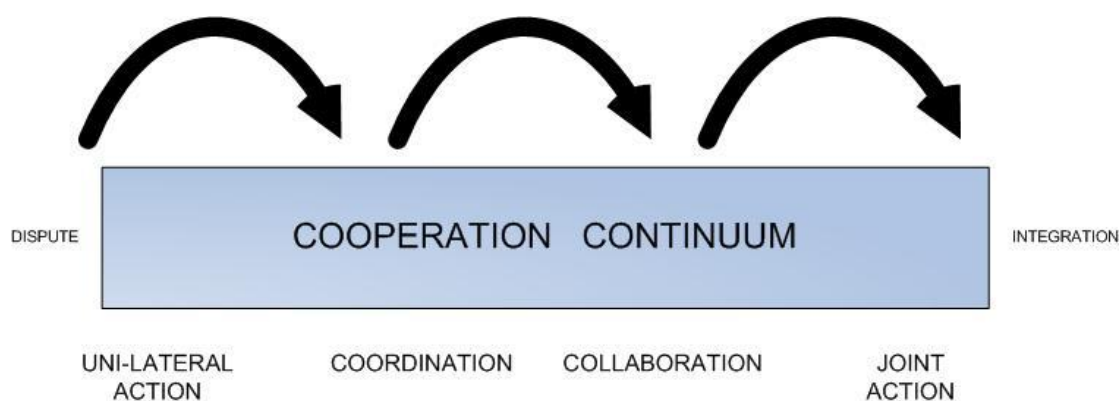
The Cooperative Mechanisms Analysis determines the levels and the processes of cooperation that will be required to effectively implement the proposed watershed management interventions.

## 2. MECHANISMS OF COOPERATION

### 2.1 A Continuum of Mechanisms

In theory there are a wide range of potential mechanisms for cooperation in trans-boundary watershed management. Sadoff and Grey (2005) have provided a framework in which they describe a continuum of cooperative mechanisms requiring increasing cooperative effort.

They describe four main degrees of cooperation (figure 1). At the one end there is no cooperation, which they term as "unilateral action". With increasing intensity of cooperation there is coordination, through to collaboration and finally to joint action. The continuum is seen to progress from "dispute" to "integration".



**Figure 1. The Cooperative Continuum (Sadoff and Grey, 2005)**

With uni-lateral action there is not even communication or information exchange over the management and development of a shared river. The cumulative impact of uncoordinated developments may degrade water quality to the point where all activities may be compromised.

A first move along the continuum to increasing cooperation is exemplified by the coordination or exchange of information. This could include the exchange of flow and meteorological data and sharing of watershed development plans. Cooperative Regional Assessments (CRA's) are another example of trans-boundary coordination.

Collaboration can result for example when national plans are adapted to generate benefits or mitigate negative impacts on other riparian countries (upstream or down-stream).

Finally, joint actions occur when riparian countries act as partners in the design, investment and implementation of trans-boundary river development.



Benefit sharing mechanisms come under this category of cooperative mechanisms. These sharing mechanisms may include joint ownership and management of assets.

They stress that "more cooperation" is not necessarily better. The continuum is seen as dynamic because there will be varying points along the continuum that will be more appropriate for different cooperative activities at different times and that nations may choose to increase or decrease the intensity of their cooperation in response to new opportunities or developments within or outside the cooperative process. Finally they see the continuum as iterative in that they will be repeated opportunities for cooperation, with the success of earlier cooperation (particularly in realized benefits) promoting increasing cooperation.

## **2.2 Potential levels of Cooperation in the Context of Watershed Management Interventions of the Eastern Nile Basin**

At the first level of cooperative intensity is the exchange or cooperative gathering of information on the Eastern Nile Basin. In the context of this Watershed Management CRA that process has already begun. The reports of the Transboundary and Distributive Analyses are tangible evidence of the first steps in such process of cooperation. Moving to a deeper level of cooperation will require a more formal system of coordinated data gathering and information sharing. These are explored in Chapter 3 with respect to the specific requirements for the establishment of uniform and conformable baseline data and the establishment of a trans-boundary system of monitoring key indicator variables. An important component of such coordination mechanisms will be the dissemination of the information collected to the various stakeholder levels.

The outputs from this coordinated data collection, monitoring and information sharing will provide an important element of confidence-building that is a prerequisite to potential benefit sharing (or cost compensation) arrangements that might form part of joint actions, such as those currently being considered by the Joint Multi-purpose Programme (JMP).

Moving to a higher intensity level of cooperative mechanisms is the area of collaborative activities. These will require a higher level of cooperation and more elaborate mechanisms. At the highest level of cooperation are joint activities. These will require extreme complex cooperative institutional mechanisms that include joint planning, financing and implementation.

The institutional framework for integrated land and water management in the Eastern Nile Basin has been established under the auspices of the Nile Basin Initiative (NBI). Any consideration of cooperative mechanisms must therefore

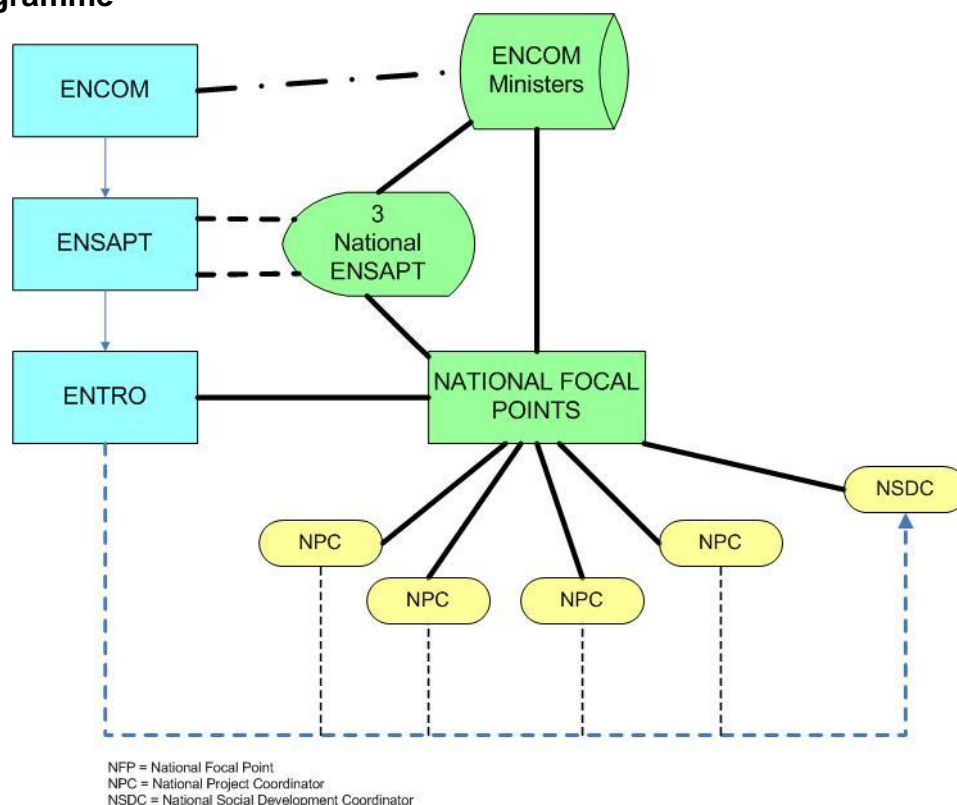
start with the existing institutional arrangements for cooperation. This is examined below.

## 2.3 Institutional Framework for Cooperation

### 2.3.1 Eastern Nile Subsidiary Action Programme (ENSAP)

The Eastern Nile Subsidiary Action Programme (ENSAP) is an investment programme by the Governments of Egypt, Ethiopia and the Sudan under the umbrella of the Nile Basin Initiative (NBI). It is led by the Eastern Nile Council of Ministers (ENCOM). ENCOM comprises the Ministers representing key stakeholder ministries and the ENSAP Teams (ENSAPT) comprise three technical country teams. The primary objective of ENSAP is to achieve joint action of the ground to promote poverty alleviation, economic growth and arresting environmental degradation. The Eastern Nile Technical Regional Office (ENTRO), which is a legal entity established by an ENCOM decision in 2002, manages and coordinates the preparation of ENSAP Projects. (Figure 2)

**Figure 2. Institutional Structure of the Eastern Nile Subsidiary Action Programme**

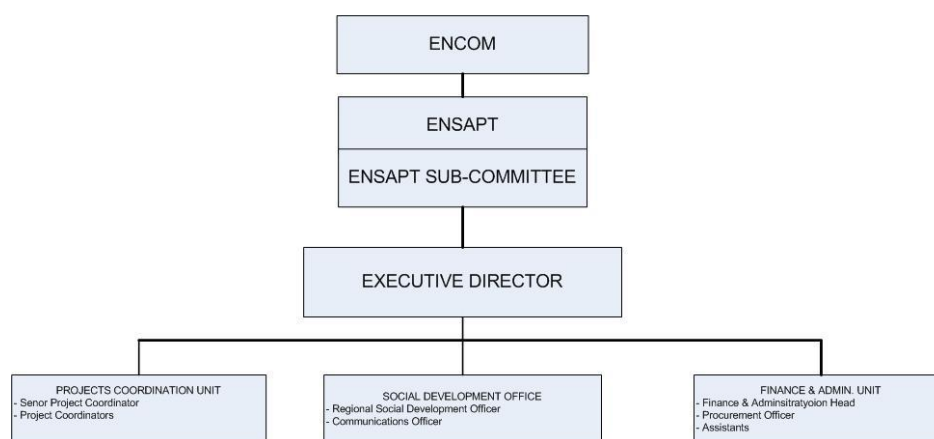


### 2.3.2 Eastern Nile Technical Regional Office

The Eastern Nile Technical Regional office (ENTRO) currently prepares, manages and coordinates projects within the Eastern Nile basin. As well as coordinating the implementation of ENSAP, ENTRO, strengthens institutions and provides secretariat support to ENCOM/ENSAPT. ENTRO has a Social Development Office (SDO) that supports all ENSAP Projects through capacity building in social development, input into project design, formulation of guidelines and the initiation of studies and analysis.

At the Country level ENSAP has National Focal Points (NFP) that undertakes overall coordination and liaison of National Coordinators and Working Groups (of specific projects) and the National Social Development Coordinators (NSDC's). Restructured in 2003. ENTRO itself is led by the Executive Director and has three Units: (i) Projects Coordination Unit, (ii) Social Development Office and (iii) the Finance and Administration Unit. The Projects Coordination Unit has a Senior Project Coordinator and Project Coordinators for each of the ENSAP Projects (Figure 3)

**Figure 3. Organizational Structure of ENTRO**



The current ENSAP programme is a set of sub-projects comprising the Integrated Development of the Eastern Nile (IDEN). IDEN comprises seven components:

- Eastern Nile Planning Model,
- Baro-Akobo Multi-purpose Water Resources Development,
- Flood Preparedness and Early Warning,
- Ethiopia-Sudan Transmission Interconnection,
- Eastern Nile Power Trade Investment
- Irrigation and Drainage
- Watershed Management

The general elements of a CRA are (i) institutional strengthening, (ii) a participatory process for building trust and confidence, and (iii) to gain a transboundary understanding the watershed system from a basin wide perspective.

The results of the analyses of the sectoral CRA's and Fast Track Projects will be brought together in the design and decisions in a joint multi purpose programme (JMP) of interventions. The JMP will encompass a comprehensive set of components including investments in infrastructure linked to the River and Power Systems; Watershed and Environmental Management; Enhanced Agricultural production; Leveraged growth and economic integration and supported by an Information base and Institutional regimes.

### **2.3.3 National Institutions**

In all three countries the two primary institutions that have responsibilities for Watershed Management activities are the Ministries of Water Resources and Ministries of Agriculture (each with slightly different names in each country). The Ministry of Agriculture in Egypt also includes responsibilities for land reclamation, whilst that in Ethiopia is within a broader ministry of Rural development. However, in matters of "river basin" planning the Ministries of Water Resources in each country take the lead. In Ethiopia draft legislation is already drafted to establish River Basin Authorities (RBA's) which will have a clear mandate in matters of basin planning and watershed management.

Although the three countries have a federal structure of government, decentralization of development responsibilities is further advanced in Ethiopia. However, in Egypt the Aswan High Dam Authority (AHDA) has wide ranging responsibilities for developments in and around Lake Nasser, although the institution works closely with the Ministries of Water Resources and Irrigation and Agriculture and land Reclamation.

### **2.4.2 Other Cooperative Institutions**

#### **(i) Nile Basin Capacity Building Network for River Engineering**

The Nile Basin Capacity Building Network for River Engineering (NBCBN-RE) is a network linking professionals from all the Nile Basin Countries and is located in the Nile Research Institute, Cairo, Egypt. It is supported by UNESCO-IHE Institute for Water Education. The main object of the NBCBN-RE is to create an environment within which professionals from the water sector can exchange ideas and experiences. The network fosters education, training, research and exchange of information. There are six Research Clusters:

- River morphology
- Hydropower
- GIS and modeling
- River structures
- Environmental Aspects
- Flood Management

### **(ii) Improving Livestock Water Productivity in the Nile Basin**

This is a project of the CGIAR Challenge programme on water and Food. It is a partnership of national and international research organizations, NGO and river basin communities. The project objects are:

- To identify areas where opportunities exist to improve food security and reduce poverty through policies which promote equitable, productive and sustainable use of water, land and livestock.
- To promote household and community innovations which improve booth livelihoods of poor farmers and pastoralists and the productivity of their water resources.
- To encourage researchers, development professionals and policy makers to include livestock production practices in strategies to improve water, productivity.

It is anticipated that by applying new knowledge about livestock-water productivity through integrated livestock and water management this will ensure more effective and equitable use of water resources in the Nile Basin. The project is located in the International Livestock research Institute, Addis Ababa, Ethiopia.

### **3. COOPERATIVE MECHANISMS FOR COORDINATION**

"Coordination" is the first move along the continuum of cooperation. Exchange and sharing of information is probably the key mechanism of cooperation in this regard. The undertaking of Cooperative Regional Assessments is another, which can even pre-date formal protocols of information sharing.

#### **3.1 Data and Information Sharing for Watershed Management**

##### **3.1.1 Current Status**

The issue of data and information sharing is central to assessing development needs of the countries of the Eastern Nile Basin as well as to developing effective and effective processes of cooperation (Nicol, 2003). Information in terms of Basin development includes data on hydrology (including sediment loads), meteorology, agriculture, socio-economic (e.g. poverty), macro economy and trade. Such data will be essential in developing cooperative development projects and programmes. Any mechanism for cost and/or benefit sharing must have as its basis good quality information on the physical and economic basis for such sharing.

The Watershed Management CRA has developed a substantial Geographic Information System on the natural resource base of the Eastern Nile Sub-basin. The data-base is currently structured (figure 3) initially at the national level, then by sub-basin by country and finally by Sub-basin. The database also includes Africa-wide and global datasets of relevance. The database has been handed over to ENTRO and now forms part of the ENTRO database.

The GIS Data-base contains the results of some secondary geographic data analysis such soil erosion rate estimation using the universal soil loss equation, population support capacity analysis and livestock carrying capacity analysis.

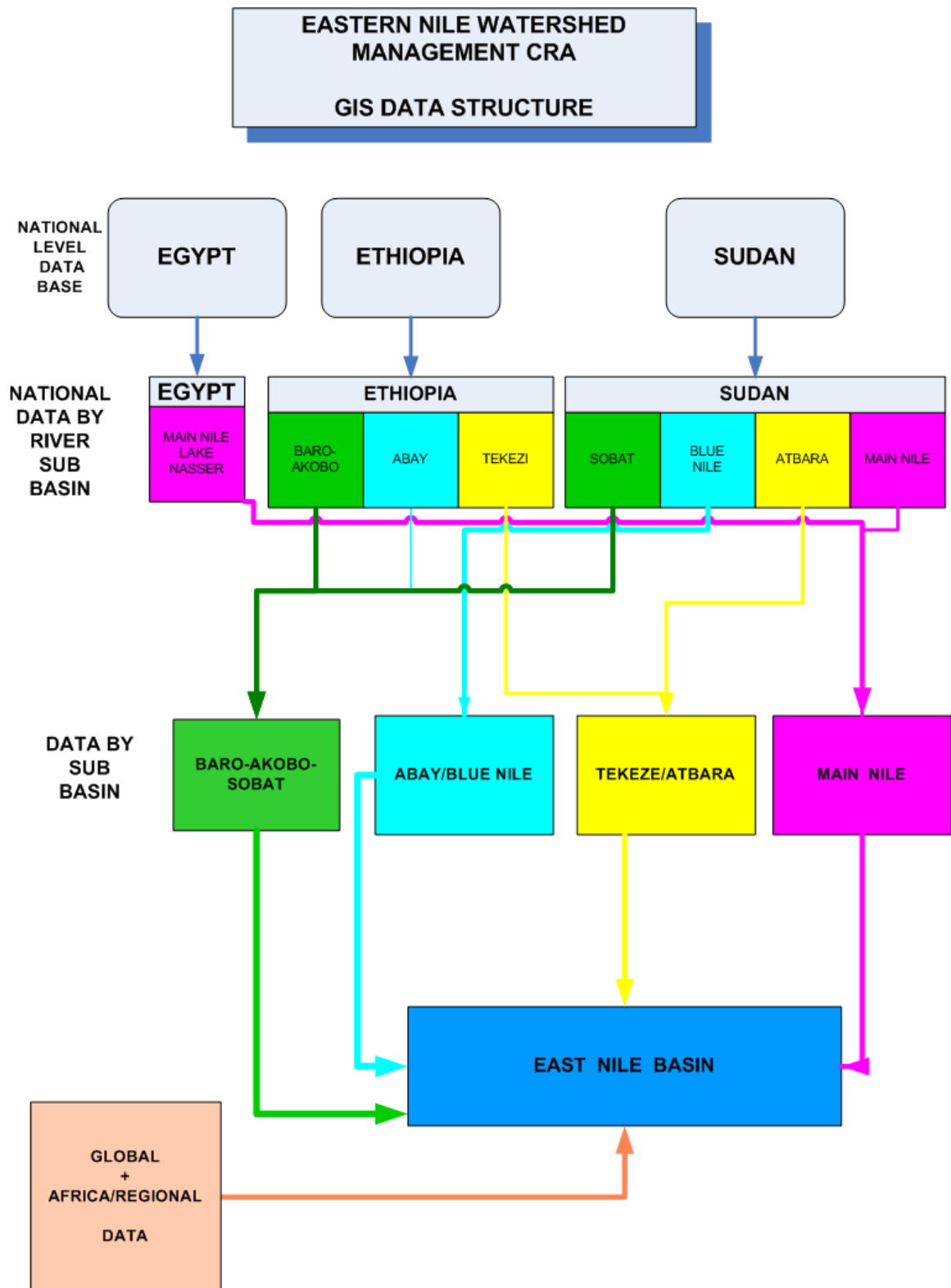


Figure 3. Watershed Management CRA: GIS Database Structure

### **3.1.2 Poverty reduction and Sustainable Livelihoods**

As indicated above the Watershed Management CRA Transboundary Country and Sub-basin reports contain information on livelihood strategies. In the three riparian countries poverty reduction strategies have or are being developed and baseline data is being collected to monitor progress in achieving objectives. Whilst the formal definitions of the "poverty line" are assessed differently in each of the three countries and results are thus not directly comparable, they do provide essential information for monitoring poverty levels and trends.

These data will help to provide of more holistic assessment of progress in the implementation of watershed management interventions are thus of considerable value in informing decision makers of progress in achieving the overall goals of the ENSAP programme.

### **3.1.3 Potential Linkages and Synergies**

Additionally, synergy could be achieved in the collaborative development by the CRA Teams of the Cooperative Mechanisms. Some of these mechanisms could cater for activities in more than one CRA area. Some Cooperative Mechanisms that serve Watershed Management activities can also serve those for Irrigation and for Flood Preparedness. This is particularly so in the case of coordination of information sharing and possibly less so in cases of joint actions (e.g. joint planning exercises).

Outcomes from the Watershed Management CRA of information on constraints to and potentials of agricultural production; on livelihood strategies; and levels and distribution of poverty will be of use in the development of the Joint Multi-purpose programme (JMP) and the Power Trade Investment interventions. This information would be useful in developing potential demand scenarios for likely patterns of domestic power demand. These clearly encompass the "driving forces" and "pressures" elements of the DPSIR Framework.

The outputs of the Watershed Management CRA touch on all the NBI Shared Vision Programme (SVP) Projects and provide valuable information on the core areas of each of the programmes. The Watershed Management CRA GIS database will provide useful data for Water Resources Planning and Management Project. Some of the analysis that is being undertaken in the Distributive Analysis of the Watershed Management CRA will be of practical use to the Socio-economic Development and Benefit Sharing Project. Similarly, outputs from the NTEAP activities in the Dinder National Park have informed this CRA on lessons learnt in developing a community-based approach to biodiversity and natural resource conservation.



### 3.1.4 Institutional Implications for Information Sharing

#### (i) Current Situation

Monitoring of river flow and sediment is being carried out by the Hydrological Survey Department (HSD, Ministry of Water Resources) in Ethiopia, the Ministry of Irrigation and Water Resources (MIWR) in Egypt, and the Hydraulic Research Station (HRS, Ministry of Irrigation and Water Resources) in Sudan.

The hydrological station networks are operational in all three countries, however with common shortcomings (lack of continuity of data, shortage of long term records, low density of gauging stations that can provide long term reliable records). More specifically, the following data collection problems were summarized for Sudan (Abdallah Abdelsalam Ahmed, 2006):

- deterioration of network,
- poor data archiving,
- different record length for each station, and
- missing data.

Similar remarks apply to Ethiopia (Mulder, 2002). Data are stored in national databases. An important data gap identified in both Sudan and Egypt is up-to-date bathymetric information for larger reservoirs.

More in-depth analysis of data and modelling of river flow and sedimentation are undertaken by other agencies on an irregular basis: research institutes, ad hoc studies and projects. More sophisticated river flow and sedimentation modelling within Government organizations would require capacity building in this field. The same applies for implementation of an overall river basin management system: an almost indispensable planning and management tool.

The situation of sediment monitoring in upper catchments is relatively poor in comparison to monitoring in larger catchments. Only a small number of SWC projects have included assessments of the impact of their activities in their evaluation reports. None of these efforts have made a direct connection between research and implementation of SWC measures, and in none of the activities were sediment measurement devices installed in small streams at the outlet of micro-catchments where also watershed management implementation was taking place. It is one of the main general shortcomings of the overall Soil and water Conservation programme in Ethiopia that, despite the enormous resources spent, little attention has been paid to its impact and, in particular, to its cost effectiveness.

Only very few research activities are reported from Ethiopia. Within the framework of the Soil Conservation Research Project (SCRIP), standard erosion plots were installed during the 1980's and 90's in a number of

representative agro-ecological sites in the Highlands. The Soil Conservation Team of MoARD is managing the SCRIP data in a database.

The Ethio-Belgian Inter-University Cooperation project – IUC (University of Mekele in Tigray and of Leuven in Belgium) is carrying out research on, among others, the effect of SWC measures, the applicability of models used elsewhere, siltation of small dams in Tigray and Specific Sediment Yields of their catchments. Their observations include the following:

- Analysis of specific sediment yields show that there is a large spatial variation between catchments. There are no adoptable methodologies for sediment yield assessment in the country. The risk of siltation is usually poorly addressed at the planning stage of the reservoirs. (Nigussie Haregeweyn et al., 2005); and
- transposing environmental models from one region to another appears to be difficult; extensive fieldwork remains necessary for site-specific calibration and validation. (Jan Nyssen et al., 2005).

### **(ii) Processes for Cooperation in Information Sharing**

#### **(a) Data Acquisition and Harmonization**

The required mechanism of ENB cooperation with regard to monitoring of larger rivers will be the exchange of key data on a readily access basis or at the best, on a basis of regular pro-active exchange.

As far as monitoring is concerned, continued acquisition of data at the national level would be the preferred option. There would be scope under ENSAP successor for network upgrading. This would to some extent concern operational quality and harmonization of measuring methodologies (especially of sediment monitoring). More important would be a reassessment of the station network and installation of additional stations. This would facilitate monitoring for the purpose of River Basin Management. For example looking at the Abbay Sub-basin an additional flow/sediment gauging station would certainly have to be established in the Beles watershed, where so many development activities (hydropower, irrigation, watershed management) are planned.

#### **(b) Data processing into Information**

ENB cooperation provides a suitable opportunity for monitoring the ENB as a River Basin System, i.e. as an aggregate of interrelated functional subsystems, rather than purely hydrological units or segments. This would require stations at locations in the river basin related to these functional sub-systems (floodplains absorbing important sediment outputs, the cataract system in Sudan, main swamp areas, sub-watersheds where large scale

watershed management activities are anticipated, lowlands with intensive land use changes and resettlement). These subsystems would also serve as broad management or the main development units.

### **(c) Role of Research**

There remains ample scope under ENSAP for applied research on erosion, sediment production, nutrient losses and the mitigating effect of soil and water conservation/integrated watershed management practices. It is very important to address simultaneously, the dual purpose of both monitoring of sediment (and nutrient) transport in water courses on the one hand, and monitoring/research of (i) erosion-sedimentation processes and (ii) the effect of watershed management practices in micro-catchments on the other. Thus, a balance needs to be found between a purely scientific approach and a more pragmatic approach in implementation. Hitherto, these activities have been undertaken separately or in isolation. The result of this is that either sediment is measured without precisely knowing its origin or the underlying causes of its mobilization, or that erosion processes are studied without quantifying the amount of sediment ultimately entering the rivers at different levels in the river basin.

Site selection for such monitoring/research activities should similarly strive at bringing together the scientific and the pragmatic approaches. Within the ENB context, locations should be selected where the issue is most prominent, i.e. in the Ethiopian Highlands. From a scientific point of view, representativeness needs to be sought of agro-ecological zones, and zones with either severe degradation or high erosion risk. From the pragmatic point of view, locations would preferably be chosen in areas where watershed management activities are also planned. For example these could include watersheds selected for fast-track watershed management projects in the Lake Tana Catchment. These areas additionally qualify as they will serve as models for future, more wide-spread, watershed management activities.

Selected sites would be micro-catchments, because these are the basis for sediment measurement (at its outlet). Selected micro-catchments should be large enough to cover representative combinations of land units (in terms of relief, land use/land cover and cropping pattern). Contrarily, they should be small enough to enable quantification of the impact of specific WM measures in one part of the catchment on sediment transport at its outlet.

### **3.1.5 Organizational Implications for Cooperative Information Sharing**

**(i) Need for Basin-wide Ex-ante Strategic Social and Environmental Assessment and Ex-post Monitoring and Evaluation of Projects and Programmes within the Eastern Nile Basin**

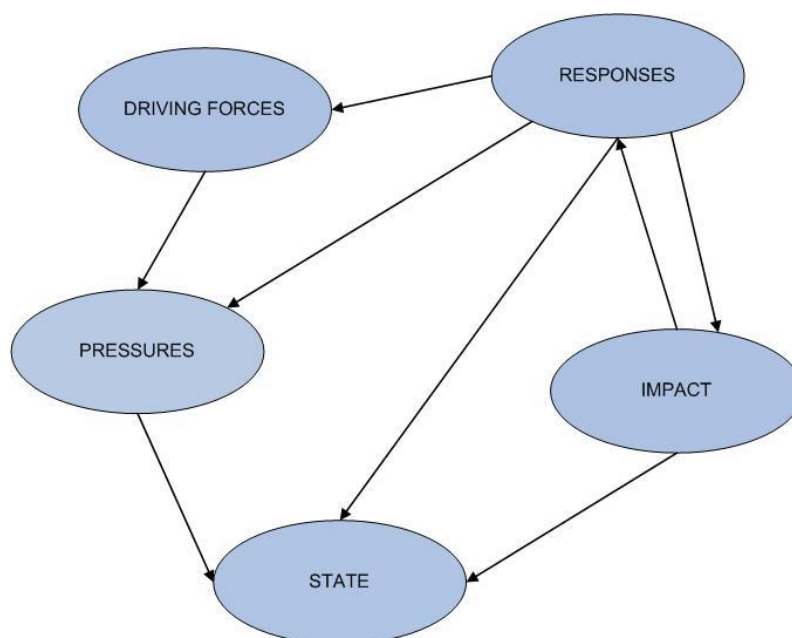
**(a) Ex-ante Strategic Social and Environmental Impact Assessment**

It will be important that a process of strategic social and environmental impact assessment (SSIA) is integrated into the process of policy, strategy and programme formulation. The NBI are developing sustainability strategies and guidelines and these would inform the SSIA process. This would be a separate exercise from the more project orientated Social and Environmental Impact Assessment undertaken as part of the project level preparation process.

**(b) Ex-post Evaluation and Policy Review**

Within the context of ENSAP and watershed management data by itself is of little use unless it is translated into information that can be used by policy makers to understand e.g. underlying causes of poverty and environmental degradation and determine the social, economic and environmental impacts of current programmes within the Basin in a process of policy review.

A Background Paper on information management in trans-boundary water cooperation in countries of the Eastern Europe, Caucasus and Central Asia (EECCA) Region (UNECE-IWAC, 2005) recommended the use of the "Driving Forces-Pressures-State-Impact-Responses (DPSIR) Framework when specifying information needs. The framework (figure 5) assumes that are inter-related linkages between social, economic and environmental systems.



**Figure 5. The DPSIR Framework**

The linkages are illustrated conceptually by driving forces of environmental change, causing pressures on the environment, which in turn affect the state of the environment. The sub-subsequent changes in the state of the environment are termed impacts. These impacts comprise impacts on the environment, livelihoods and the economy. Negative impacts may influence policy responses from government that will in turn influence driving forces and so on. In the context of Watershed Management framework the driving forces are the underlying and proximate causes of land degradation. The pressures are seen as increased rates of soil erosion, sedimentation and deforestation. Impacts are seen in crop and livestock production, increased collection times for fuelwood, sedimentation in reservoir and irrigation systems and loss of biodiversity. Responses are watershed management interventions in their various forms and their adoption by the relevant stakeholders.

The Study found that information collected in the EECCA countries tended to be too narrowly focussed on the "state" and "impact" elements (physical and chemical parameters) of the framework, to the detriment of the other three elements. Information on these elements was seen to be particularly important to policy and decision makers. Thus information and monitoring systems should also endeavour to incorporate data gathering and information assessment on these elements.

## **(ii) Organizational Implications**

Whilst evaluation and review of national policies, strategies and programmes is well developed in the three countries such a process is still in its embryonic stage in terms of trans-boundary policies, strategies and programmes such as ENSAP, that affect the Eastern Nile basin as a whole. ENTRO is charged with

serving ENCOM and ENSAPT in providing technical expertise for "the coordinated identification, preparation and possible implementation of regional development programmes and projects in the Eastern Nile" (ENTRO web site). It would be logical for ENTRO to expand its mandate to one encompassing trans-boundary programme evaluation and policy review for ENSAPT and ENCOM.

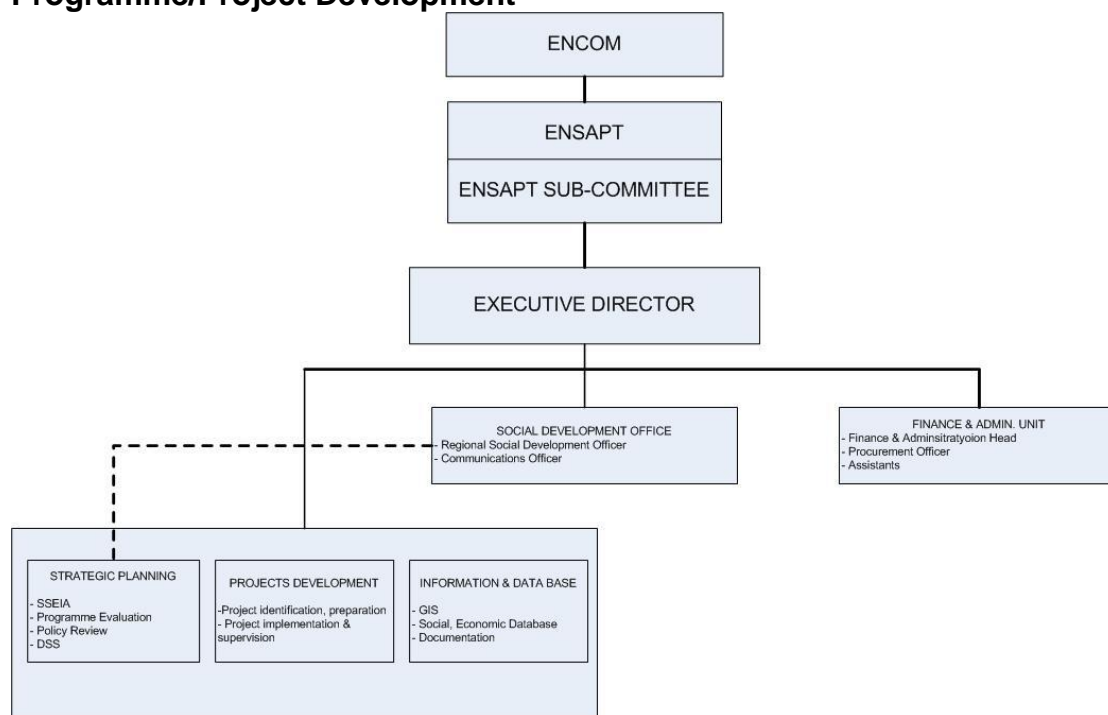
This expansion of its mandate would impact on the current "Project's Coordination Unit", which currently focuses on project identification, preparation and implementation/coordination, with an increasing function as a knowledge base and GIS data base (from the One Source Inventory and the CRA's). Three core functions can be identified:

- Project Identification, Preparation and Implementation/ Management/ Supervision,
- Strategic Planning, Strategic Social and Environmental Impact Assessment, Programme Evaluation and Policy Review, and
- Data and Information Collation and Coordination, GIS and Structural Database (social, economic, demographic).

The three functions are closely inter-related and a strong case be made for having them grouped within one organizational unit. There are a number of thematic areas which would be reflected in the three functions. Currently these are:

- Watershed Management,
- Flood Mitigation and Management,
- Irrigation and Drainage,
- Transboundary Power, and
- Multi-purpose Programme Development.

**Figure 6. ENTRO: Expanded Organizational Structure for Programme/Project Development**



## 3.2 Additional Requirements in Institutional Capacity Strengthening

### 3.2.1 Technical

Institutional strengthening in suspended sediment data collection, analysis and database management has been identified as an area for technical capacity building. Technical capacity building in the areas of GIS and natural resources database management has also been identified as a need. More sophisticated river flow and sedimentation modelling within Government organizations would require capacity building in this field. The same applies for implementation of an overall river basin management system: an almost indispensable planning and management tool. All these could be implemented under the NBI Applied Training Project or under the auspices of the NBCBN-RE project.

### 3.3.2 Financial

The paucity of financial resources for long-term and sustainable trans-boundary data collection, management and dissemination was found to be a severe restraint in the EECCA countries (UNECE, 2006). Within the ENB an assured and long-term commitment to funding will be required if an effective erosion-sediment data collection, analysis and monitoring system is to be implemented.

## **4. COOPERATIVE MECHANISMS FOR COLLABORATIVE ACTIVITIES**

### **4.1 Types of Collaborative Activities**

Collaborative activities include undertaking joint activities with a Sub-basin perspective. Within the context of Watershed Management in the Eastern Nile Basin specific examples such activities could include:

- Collaborative Planning: e.g. developing a Dinder-Rahad Watershed Management Plan;
- Collaborative Research: e.g. soil erosion, shifting sand and shelterbelts, river bank erosion;
- Collaborative Studies: e.g. Hydro-ecological-livelihood relationships in the Baro-Sobat White Nile Sub-basin;
- Collaborative Surveys: e.g. wildlife and habitat surveys in the area in and around the Boma and Gambella Nation Parks (White-eared Kob and Elephant migratory routes);
- Adaptation of National Watershed/Basin Plans to accommodate a trans-boundary basin-wide perspective.

### **4.2 Institutional Mechanisms**

The first four of these activities are essentially space and time bound projects with very clearly defined objectives, inputs and outputs. They would have an identified source of funding that could include both country and international financing. These could be undertaken by joint teams of experts from the collaborating countries, by Consultant Teams working with joint national steering committees or a mix of both. Overall supervision and coordination would be undertaken by the Projects Unit of ENTRO. ENTRO could undertake or facilitate project preparation, sourcing of international funding, project implementation, dissemination of results and identification of follow-on projects.

The modalities for such cooperative mechanisms have been well developed by ENTRO with the planning, preparation, sourcing of financing, facilitation and coordination of the implementation of the CRA's. These would serve the first four types of collaborative activities indicated above.



The fifth type of "collaborative" activity is less defined than the others. The cooperative mechanisms for this type of activity have no precedent in the Eastern Nile Basin and are much further along the continuum of cooperation than collaborative planning, research, studies or surveys. A first step in such mechanism would be "prior information" where a country would merely inform or share through ENCOM information on the Plan's components. A second and more complex step would discussion and negotiation on one or more areas of contention and the subsequent adaptation of the plan to accommodate other country's' concerns.

ENTRO's role here could be to provide impartial technical advice to ENCOM on specific aspects of the Plan that ENCOM had requested. ENTRO could also commission outside impartial technical opinion or provide outside technical support to the Country developing the Plan on potential basin-wide impacts of their plan. Collaboration in this case will likely to be more forthcoming if it can be demonstrated that the benefits of such changes in a national plan would benefit not only the "aggrieved" country but also the country making the changes – the so called "win-win" situation. This may require additional and more complex analysis than either country could afford and here again ENTRO could play a supporting or facilitating role in financing and obtaining impartial and transparent analysis that would find support from both (or all) affected countries.

## **5. COOPERATIVE MECHANISMS FOR JOINT ACTIVITIES**

### **5.1 Types of Long-term Joint Activities**

Long term joint action occurs when riparians are partners in the design, investment and management of a trans-boundary entity. The type of cooperative mechanisms required for the type of cooperation is much more complex and situation specific. This level of cooperation will have to be formalized by international legal agreements. Situations that lend themselves to such level of cooperation are where there is already some mutual interest in the collaborative activity and where there are national institutions that are in favour of such collaboration.

Within the watershed management context in the Eastern Nile Basin one such example could be the establishment of a Transboundary Park incorporating the Dinder National Park in the Sudan and the Alatish regional Park in Ethiopia. A second example would be the establishment of a joint Biosphere Reserve in the Wadi Allaqui by Egypt and the Sudan. In both cases expressions of interest have been made and there are institutions in both countries that are mutually supportive.

### **5.2 Institutional and Organizational Implications**

#### **5.2.1 Preparation, Negotiation and Implementation**

There are a number of recommended principles to be established that should guide the preparation and negotiation process and these include:

- identify and promote common values,
- promote coordinated and co-operative activities, achieve coordinated planning and harmonized, coordinated or joint management,
- involve and benefit local people,
- work towards funding sustainability, and
- obtain and maintain support of decision-makers.

The flexibility of the guidelines implies that the form and level of cooperation can be site-specific, the levels of cooperation can be chosen at convenience as to best fulfil objectives.

The following considerations are recommended for the establishment of a Dinder-Alatish trans-boundary park:

- 1) During development of a management plan for the Alatish National Park, harmonization would have to be sought with the management plan of the Dinder National Park, since the latter is in a more advanced development status and management plans are already being implemented there.
- 2) Special care should be taken to avoid deviating approaches on either side of the border. This would create confusion and manipulation among recipient parties benefiting from development activities.
- 3) Full integration of management plans for one joint management team of a trans-border park would probably be too ambitious a target initially. It would be more pragmatic to ultimately strive at a joint management plan, prepared in cooperation by the parties concerned, with a national sub-plan implemented by a national management team on either side of the border.
- 4) Project monitoring would be carried out in each partner country. Reports could be issued at the national level and be aggregated at the international level. Regular meetings would be organized for coordination purposes, the schedule of which would be part and parcel of the management plan.
- 5) Supra-national financing could be sought jointly, but budget allocation from international donors would be split proportionately among the partner countries and managed separately.

### **5.2.2 Roles of ENCOM, ENSAPT and ENTRO**

Trans-boundary Parks have been established outside the framework of a River Basin organization. However, in the present context going through the process of establishing such a Transboundary Park would enable ENCOM, ENSAPT and ENTRO to gain experience in the cooperative mechanisms required for such a joint venture. The position as a Transboundary Park would facilitate the pursuing of interests at higher (international) levels. Among these are issues to be addressed in a broader context and originating elsewhere are the nomadic issue or the refugee issue. These Trans-boundary issues could be addressed within the ENB cooperative network.

ENTRO could facilitate much of the preparatory work in terms of establishing joint working institutions, obtaining technical support and identifying potential sources of financing. Through the ENSAP Teams access to the higher echelons of Government could be made to ensure the political support that a joint venture of this type would require. There are clear linkages to the other trans-boundary collaborative activities such as the collaborative planning of the Dinder-Rahad Catchment.

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