

ANNEXES

ANNEX1

Concept Paper on Establishing and Making Operational the Basin wide Nile Trans boundary Water Quality Monitoring (NTBWQM) Network

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INTRODUCTION

1. The purpose of this Concept Paper is to highlight the need for Nile Transboundary Water Quality Monitoring (NTBWQM) and to propose strategies for effective and sustainable Transboundary water Quality Monitoring in the Nile Basin. The Paper further seeks the approval of the TAC and seeks additional funding to support and make operational the proposed (NTBWQM) Program.
2. During the past Project Steering Committee (PSC) Meetings, the under-funding to the Water Quality Component has been raised, and discussed. This issue is also noted in the Project Implementation Plan (PIP) which states that *“the emphasis of this Component is to launch a basin wide dialogue supplemented by exchanges and training, the Project will not support significant laboratory development or equipment purchases. Additional resources are still required to upgrade national capacities in a number of Nile basin countries (including laboratories, equipment, identification of sampling points), which is largely outside the scope of the present regional effort. An assessment of the experiences from this regional engagement on water quality will provide the basis for recommending future Nile Basin Initiative investment and grant funded activities and the development of water quality action plans for the Nile Basin.”*
3. Both the PIP and the PSC underscore the importance of water quality issues, and the low funding to the Component. Indeed the cornerstone for cooperation in the Nile Basin is the waters of the river Nile; whose quantity and quality should be safeguarded by all the Nile riparian countries.
4. This Concept Paper in addition highlights the achievements of the Component to date, and justifies the need for regular transboundary water quality monitoring. Estimates of annual budgetary requirements of each of the Nile Basin countries, and the total funds required to establish and operate and sustain quarterly transboundary water quality sampling and analysis activities is given (Annex 8).

BACKGROUND

5. The Nile Basin (NB), is home to about 160 million people with some of the countries being among the worlds poorest. This extreme poverty is closely linked

to water and other natural resources availability, on which so many of the basin's people depend for survival. The unsustainable use and management of the natural resources has led to continuing water quality and environmental degradation in all the riparian countries. These adverse environmental trends are undermining many of the attempts by the riparian nations to make a transition towards sustainable economic development

6. Many key environmental issues go beyond national boundaries and are regional or even global in scope. This is true of the shared water resources of the Nile, which is a lifeline to many people in the Nile Basin. The true value of the Nile waters to riparian communities is both its availability and quality.
7. The Nile Basin Initiative, conceived and created in 1999 is guided by a Shared Vision "To achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the common Nile Basin water resources."
8. Nile Transboundary Environmental Action Project (NTEAP) is one of the 8 SVP projects, whose main focus is to support the development of a basin-wide framework for actions to address high-priority transboundary environmental issues within the context of the Nile Basin Initiative's (NBI's) Strategic Action Program.
9. The objectives of NTEAP are to provide a strategic environmental framework for the management of the transboundary waters and environment challenges in the Nile River basin. The Basin wide Water Quality Monitoring is one of the 5 Components, of NTEAP
10. One of the major outputs of the NTEAP Project will be enhanced cooperation and capacity in wetlands management and enhanced national capacities for water quality monitoring. Again this underscores the importance of trans boundary water quality monitoring, in the Nile Basin

BASIN WIDE WATER QUALITY MONITORING COMPONENT

11. Objectives of the Water Quality Component

Main objective:

'Establish and make operational a Nile Transboundary Water Quality Monitoring (NTBWQM) Network through the establishment of a Regional Water Quality Monitoring Program supported by all Nile basin countries'.

Specific objectives:

- Initiate basin wide dialogue on Water Quality Management;
- Initiate transboundary Water Quality assessment;
- Initiate exchange of information on key transboundary parameters;

- Enhance awareness on water quality issues;
- Enhance capacities for Water Quality Monitoring, and
- Improve understanding of transboundary Water Quality Management issues.

These objectives are to be met by working together with the Regional Water Quality Working Group (RWQWG) members and in collaboration with other SVPs and SAPs.

12. The ultimate objective therefore of this Component is to establish and make operational a Nile Transboundary Water Quality Monitoring Network, of selected and agreed upon water quality sampling stations.

Major Achievements of the Component

The Component has made the following milestone achievements:

13. At the *regional level*, a functional Water Quality Working Group has been established. Forty four (44) Transboundary sampling stations and eleven (11) transboundary parameters have been agreed on (See Annex 7). Water Quality Operational Manuals, comprising of common methods of water sampling and testing have also been prepared. A regional Water Quality Orientation Seminar, a Regional training on Water quality Measurements and another on Awareness Materials Development have been held, to enhance regional capacities for water quality monitoring.
14. Consolidation of the National Baseline Water Quality Monitoring Study reports into a Regional Nile Basin Water Quality Monitoring Baseline Study Report has been done and copies are available in English and in French. 9 (nine) Focal laboratories have been identified and 4 (four) Reference laboratories selected (See Annexes 5&6). This Draft Concept Paper on “Establishing and making operational the Nile Transboundary Water Quality Monitoring Network” has also already been discussed with the RWQWG.
15. At the *national level*, Water Quality Monitoring Baseline Studies have been carried out. The status of water quality data management and a training needs and institutional capacity assessments have also been carried out. Water quality monitoring and enforcement for compliance issues have been reviewed and discussed in all countries and procurement of laboratory equipment, for selected focal laboratories has been done.

JUSTIFICATION FOR NILE TRANSBOUNDARY WATER QUALITY MONITORING NETWORK

16. Although the waters of the Nile and its tributaries are not under serious pollution threats at the moment. (Incidences of pollution are but localized), pollution hotspots can be identified in all the countries. These are often located immediately downstream of industries, or agricultural farmlands, or urban centers and

- settlements. Such point and non-point sources of pollution may contribute heavy metals trace elements, or pesticides and fertilizer residues or organic matter from untreated sewage. This contamination making the water unsuitable for some uses adds to the water scarcity.
17. As indicated in the Transboundary Environmental Analysis (TEA), at the moment the most serious transboundary threat in the Nile Basin is Sediment and suspended matter as a result of soil erosion. Another serious threat, but localized, is eutrophication, as a result of excessive use of fertilizers, manifesting itself as water weeds, such as water hyacinth. Also contributing to this is discharge of untreated sewage.
 18. Bearing in mind that population, industrialization, and agriculture are growing steadily, the waters of the Nile will continue to face a growing pollution threat from industries agriculture and domestic sources. For this reason, it is important that regular transboundary water quality monitoring of the shared water resources is carried out to ensure that the water quality of a particular stretch of river is known at all times, and where there is a threat of pollution, remedial measures are immediately taken.
 19. Sampling and testing of water samples from the transboundary water quality monitoring stations, offers the first intervention and precautionary measure to ensure that the quality of the waters of the Nile are safeguarded for posterity by all countries.
 20. The water quality data and information generated will be used for planning purposes by decision makers, by engineers, researchers and scientists in the basin, to make informed developmental decisions. The data will also feed into the DSS being developed by the NBI, and can be used to prepare water quality maps to determine trends and changes in the water quality parameters, and be used for water pollution forecasting, in addition to contributing to GEMS/water quality monitoring.
 21. NTEAP recognizes the noble water quality monitoring efforts going on in some countries. The proposed NTBQW Network will build on these existing water quality monitoring initiatives, as many of the stations that have been adopted as NTBQW stations happen to be national water quality monitoring stations.

PROPOSED NILE TRANSBOUNDARY WATER QUALITY MONITORING (NTBWQM) NETWORK REQUIREMENTS

22. The proposed Nile Transboundary Water Quality Monitoring (NTBWQM) Network of sampling stations comprises of forty four (44) stations. These stations were selected using criteria which were developed, discussed and agreed on by the RWQWG, (Annex 3).

23. The selected Geo-referenced transboundary sampling stations are distributed as follows;: Burundi 4; Rwanda 4; DRC 3; Kenya 7; Uganda 10; Tanzania 4; Ethiopia 5; Sudan 5; and Egypt 2, making a total of 44. (Annex 7).
24. Eleven (11) parameters of transboundary importance were agreed on, to be the parameters to be tested for quarterly, on samples drawn from the transboundary sampling stations (Annex 2).
25. The analysis of the water samples will be carried out in any reputable national laboratories, but preferably in the agreed, designated NTEAP Focal and Reference Laboratories. The list of names of these Laboratories is in Annexes 5&6.
26. Additionally, countries will require well-trained and motivated staff, well equipped laboratories as well as stocks of glassware, chemicals and biological media. Some laboratories have the capacity while others will require to be supported to meet these requirements.
27. Once the NTBQM program is established, the NTEAP Focal laboratories will have to participate in a Water Quality Assurance program, to ensure that the results of analysis obtained are of comparable and acceptable accuracy. An arrangement for Inter-Laboratory Proficiency Testing among the laboratories is already under way.
28. The data from the transboundary water quality monitoring stations are to form a basis on which to initiate and enhance transboundary water quality data and information sharing, and also to feed into the DSS being developed under the WRMP project.
29. A Regional Water Quality Database has been established, to store data from all the transboundary stations. The creation of, and support to, such a regional water quality data centre is one of the objectives of the Water Quality Component and the Component Strategy.

BUDGETARY SUPPORT REQUIRED FOR NILE TRANSBOUNDARY WATER QUALITY MONITORING (NTBWQM) PROGRAM

30. The National and Regional Water Quality Monitoring Baseline Study Reports have indicated that the capacity to undertake regular water quality monitoring differs considerably between the countries.
31. In order to effectively carry out water quality monitoring, countries will require the following :
 - Qualified, trained motivated and experienced staff,
 - Modern Laboratory equipment
 - Chemical Reagents and Biological media

- Sampling equipment
 - Support for Sampling tools,
 - Funds to cover Fuel and transport costs
 - Laboratory Analysis costs
32. Countries submitted their annual budgetary requirements, to cover the above costs. The country budget requirements are diverse, ranging from US \$8,470 for Ethiopia to \$48,667 for Sudan. The summary of the country budget requirements is shown in Annex 8.
33. Some countries will require more financial support than others. The funds currently available under the Component cannot finance this important transboundary program, and hence the request being made for additional or alternative funding, and support by the countries themselves where possible.
34. The total country budget submissions, is **US \$ 200,000** annually. These are the funds required to establish and operate the Nile Transboundary Water Quality Monitoring Network. However, in order to initiate this trans boundary program, those countries which are able to operate their on-going national programs, should continue to do so, while sourcing for extra funds to augment their efforts.

PROPOSED STRATEGIES TO SUSTAIN THE NILE TRANSBOUNDARY WATER QUALITY MONITORING (NTBWQM) PROGRAM

37. Collaboration and support to both ENSAP and NELSAP, on agreed activities targeting transboundary water quality issues as highlighted in the Nile Trans boundary Water Quality Monitoring Strategy Paper.
38. Enhance support to the RWQWG members, while further collaboration will be sought with ongoing sub-regional projects such as LVEMP, LEAF Project and LVBC seeking their support.
39. Agree on modalities of sharing and exchange of water quality data and information. This will be worked out in consultation with the DSS unit of the WRMP Project.
40. Quarterly water quality monitoring activities be guided by the enhanced and funded and fully operated and supported by the countries themselves, as part of their national and transboundary water quality monitoring long-term commitment.
41. Short - term activities related to the NTBQM, to be supported by NTEAP, have been identified and will be funded under the 2007 Work plan and Budget. These include training and support to establish the transboundary stations. Other non-routine long-term activities will be earmarked for additional alternative funding possibly through another long term project, or other financial arrangements.

42. Countries will need to agree on measures and procedures to handle transboundary pollution emergencies including method of reporting accidents, early warning systems and collaboration between affected countries. These issues are an important component of transboundary water quality management.
43. The countries under the NBI shall agree and delegate among themselves which laboratories will coordinate the transboundary water quality monitoring activities after NTEAP ends, including the decision on which country, or laboratory will host and ran the regional Water Quality Assurance program.
44. The following short-term measures will be funded under the current NTEAP water quality components arrangements.
 - Technical capacity building
 - Support procurement of low cost equipment, glassware, biological media and chemical reagents
 - Short-term training of laboratory analysts on data management and quality assurance
 - Short-term training of technicians on sampling and analytical procedures
 - Short-term training on Operation and Maintenance of laboratory and field equipment
 - Support countries to establish and initiate transboundary water quality monitoring
45. The following long-term measures FOR FUNDING AND SUPPORT BY NBI will require external alternative funding:
 - a. Capacity building for Masters and Doctorate training courses
 - b. Procurement of advanced modern laboratory equipment
 - c. Support to the operation of the regional water quality data base
 - d. Long-term inter laboratory quality assurance
 - e. Continued support to the NTEAP Focal and Reference Laboratories
 - f. Support research on biological monitoring and other innovative techniques of pollution control
 - g. Support to undertake advanced water quality analysis of pollutants
46. Based on the findings of the both the national and the regional water quality monitoring baseline reports, Uganda, Egypt, Kenya, Tanzania and Sudan which have functional water quality monitoring programs, should continue operating their national water quality monitoring programs, which cover the identified transboundary water quality monitoring stations. It is recommended that other countries to do the same once their stations are established.
47. The NBI through the Governments of NB countries are finally the ones that will sustain and oversee the regular monitoring of the Nile Transboundary Water Quality Monitoring Stations. They should therefore factor into their national programs, the monitoring of these transboundary stations, with a view to sustaining them in their own countries, after the NTEAP closes.

References:

1. Nile Basin Initiative et al, *Nile River Basin Transboundary Environmental Analysis*, May 2001
2. Nile Basin Initiative, *Nile Transboundary Environmental Action Project, Project Implementation Plan, Working Document*, December 2002
3. Water a Shared Responsibility, The UN WW Development Report 2, 2006
4. NTEAP Documentation/Reports, 2004-2006
5. WB/UNDP Supervision Mission, 2006
6. NTEAP MTR Mission, 2006
7. The Danube River Commission, Annual Report, 2005.
8. Minutes of the 4th NTEAP PSC Meeting, Khartoum, Sudan, Feb. 2007

ANNEX 2: PARAMETERS OF TRANSBOUNDARY IMPORTANCE

The following Transboundary parameters (Parameters of transboundary importance) were regionally discussed and have been agreed on for regular monitoring, on samples drawn from the transboundary sampling stations:

- Heavy Metals
- Toxic substances
- Pesticide residues
- BOD
- COD
- TSS
- TDS
- Conductivity
- Nutrients (P, N)
- Faecal Coli forms
- Oil and Grease
- Conductivity
- Sediment

ANNEX 3: CRITERIA OF SELECTION OF TRANSBOUNDARY WATER QUALITY PARAMETERS

The following criteria were agreed on and used in the selection of Transboundary parameters.

- Substances that can have a profound adverse effect on human and animal health
- Substances that adversely affect the aquatic environment and may have serious socio-economic effects between countries
- Substances that adversely affect the ecosystems
- Substances that show persistence
- Substances that show bioaccumulation
- Substances that can travel long distances downstream without degradation, and are capable of toxic or adverse effects on the environment

ANNEX 4: CRITERIA FOR SELECTION OF TRANSBOUNDARY STATIONS

In- order to select transboundary sampling stations, the following criteria was developed, discussed and agreed on:

- Nature and type of Land use activities in the upstream catchments
- Drainage pattern or characteristics
- Nature and movement patterns of pollutants
- Accessibility of station during sampling
- Importance of selected point to the surrounding community

ANNEX 5: NTEAP FOCAL LABORATORIES

The following Laboratories have been selected as NTEAP focal Laboratories:

1. Water Quality Laboratory, Entebbe, Water Resources Management Department, Directorate of Water Development, Ministry of Water Lands and Environment, Uganda
2. Central Water Quality Testing Unit, Cairo; and the High Dam Laboratories, Aswan
3. Ministry of Water and Irrigation, Laboratory, Kisumu, Kenya
4. Ministry of Water and Livestock Development, Laboratory, Mwanza, Tanzania
5. Ground water and Wadis laboratory, Khartoum, Sudan
6. Ministry of Water Resources Laboratory, Addis Ababa, Ethiopia
7. Regideso Laboratory, Goma, DRC
8. Regideso Water Laboratory, Bujumbura, Burundi
9. Central Water Testing Laboratory, Kigali, Rwanda

ANNEX 6: NTEAP REFERENCE LABORATORIES

The following Laboratories have been designated as NTEAP Reference laboratories:

1. Water Quality Laboratory, Entebbe, Water Resources Management Department, Directorate of Water Development, Ministry of Water Lands and Environment, Uganda
2. Central Water Quality Testing Unit, Cairo, Egypt and the High Dam Laboratories, Aswan
3. Ministry of Water and Irrigation, Laboratory, Kisumu, Kenya
4. Ministry of Water and Livestock Development, Mwanza, Tanzania

ANNEX 7: NILE TRANSBOUNDARY SAMPLING STATIONS

The following ticked geo-referenced stations have been selected and agreed on. Distributed as follows:

KENYA (7)

| NO | RIVER/SITE | STATION | LONGITUDE | LATITUDE |
|-----------|-------------------|---|------------------|-----------------|
| 1 | Nzoia | ✓ Rwambwa | 35.0545 | 07.279 |
| 2 | Mara | ✓ Keekorok | 35.0218 | -11.3380? |
| 3 | Malaba | ✓ Malaba | | |
| 4 | Gucha/Migori | ✓ Wathonger | 34.1563 | -0.5824 |
| 5 | Yala | ✓ Daraja | 34.0840 | +00.1280 |
| 6 | Sondu /Miriu | ✓ Nyakwere | 34.4483 | -02.1267 |
| 7 | L. Victoria | ✓ Offshore Muhuru Bay near Tz border at KP3 | | |

SUDAN (5)

| NO | RIVER | STATION | LONGITUDE | LATITUDE |
|-----------|----------------|-----------------|------------------|-----------------|
| 1 | Main Nile | ✓ Dongola | 19.20 | 30.60 |
| 2 | W/Nile | ✓ Juba | 04.55 | 31.74 |
| 3 | B/Nile | ✓ Eddeium | 11.04 | 34.94 |
| 4 | Sobat, W/ Nile | ✓ Malakal | 09.57 | 31.60 |
| 5 | Atbara | ✓ Kashm Algirba | | |

TANZANIA (4)

| NO | RIVER | STATION | LONGITUDE | LATITUDE |
|-----------|--------------|------------------------------------|------------------|-----------------|
| 1 | Kagera | ✓ Mumwendo | 30.4683 | -2.6352 |
| 2 | Kagera | ✓ Kvaka | 31.4185 | -1.2507 |
| 3 | Mara | ✓ Kogatende, Tanzania/Kenya border | 34.97103 | -1.57717 |
| 4 | Mara | Mara Mine | 34.5541 | -1.5484 |
| 5 | Mara | Tarime Mugumu bridge | 34.5926 | -1.6036 |

| | | | | |
|---|------|-----------------|---------|---------|
| 6 | Mara | ✓ Kirumi Bridge | 33.9751 | -1.5287 |
|---|------|-----------------|---------|---------|

UGANDA (10)

| NO | REGION | MONITORING SITE | LONGITUDE | LATITUDE |
|----|---------------|-------------------------------------|-----------|----------|
| 1 | Albert | ✓ Semliki at Bweramule | 30.1800 | 0.9500 |
| 2 | Albert Nile | ✓ R. Nile at LaropiR | 31.8100 | 3.5500 |
| 3 | Albert Nile | R. Nile at Panyango | 31.45000 | 2.5800 |
| 4 | Kyoga Nile | R. Nile at Masindi port | 32.09000 | 1.6900 |
| 5 | Victoria | ✓ R. Sio at lukali | 34.05000 | 0.3100 |
| 6 | Victoria | ✓ R. Kagera at Kasera road | 31.75000 | -0.9400 |
| 7 | Victoria Nile | ✓ R. Nile at Jinja* | 33.20000 | 0.4100 |
| 8 | Aswa | R. Aswa at Atiak-Palabek road | 32.31036 | 3.3300 |
| 9 | Kyoga | ✓ R. Malaba at Kenya/ Uganda border | 34.05196 | 0.5800 |
| 10 | Edward | ✓ R. Nyamugasani | 29.8300 | -0.1200 |

RWANDA (4)

| NO | RIVER | STATION | LONGITUDE (Y, m) | LATITUDE (X, m) |
|----|------------------|----------------------|------------------|-----------------|
| 1 | Nyabarongo | ✓ Kigali -Nyabarongo | | |
| 2 | Akanyaru | ✓ Akanyaru-Gihinga | | |
| 3 | Rusumo | ✓ Rusumo | | |
| 4 | Muvumba/ Akagera | ✓ Kagitumba- Akagera | | |

BURUNDI (4)

| NO | RIVER | STATION | LONGITUDE | LATITUDE |
|----|---------|---------------|-----------|----------|
| 1 | Ruvubu | | | |
| 2 | Kanyaru | Rwanda border | | |
| 3 | Kagera | | | |
| 4 | | | | |

DRC (3)

| NO | RIVER | STATION | LONGITUDE | LATITUDE |
|----|-------------------|---------|-----------|----------|
| 1 | Semliki | | | |
| 2 | Semliki/L. Edward | | | |
| 3 | Semliki/L. Albert | | | |

EGYPT (2)

| NO | RIVER | STATION | LONGITUDE | LATITUDE |
|----|-------|------------|-----------|----------|
| 1. | Nile | Lake Naser | | |
| 2. | Nile | Nile Delta | | |

ETHIOPIA (5)

| NO | RIVER | STATION | LONGITUDE | LATITUDE |
|----|--------------|------------------|-----------|----------|
| 1 | Baro | Itang Town | 34.16E | 8.11N |
| 2 | Abbey river | Sudan Border | 34.59E | 11.14N |
| 3 | Tekeze river | Near Siraro town | | |
| 4 | Gilo river | Near Pinudo | 34.16E | 7.37N |
| 5 | Akobo river | Near Dima | 35.15E | 6.30N |

ANNEX 8: TRANSBOUNDARY WATER QUALITY MONITORING BUDGETARY REQUIREMENTS BY COUNTRY

| Country | Technical and other Support to Analysts | Sampling costs (Tools, Fuel transport, | Analysis Costs +Equipment | Total Cost IN US \$ |
|-------------------------|---|--|---------------------------|---------------------|
| Burundi | 8,905 | 10,328 | 8,040 | 27,273 |
| DRC | 9,000 | 11,000 | 9,000 | 29,000 |
| Rwanda | 3,680 | 3,270 | 5,000 | 11,950 |
| | | | | |
| Kenya | 5,999 | 11,354 | 4,507 | 22,140 |
| Uganda | 8,620 | 9,210 | 1,810 | 19,640 |
| Tanzania | 3,500 | 5,500 | 2,600 | 11,600 |
| | | | | |
| Egypt | 1,700 | 2,600 | 1,800 | 6,100 |
| Sudan | 31,135 | 16,000 | 1,531 | 48,667 |
| Ethiopia | 4,143 | 3,452 | 875 | 8,470 |
| Total | | | | 184,040 |
| Contingency, 10% | | | | 16,000 |
| Total | | | | 200,000 |

