NILE TRANSBOUNDARY ENVIRONMENTAL ACTION PROJECT

REGIONAL WATER QUALITY WORKING GROUP

PROCEEDINGS OF THE 2nd WORKSHOP, 19-21st JULY, 2005, HELD AT THE NOVOTEL HOTEL, BUJUMBURA, BURUNDI

Prepared by Mr. John M. Omwenga,

Water Quality Lead Specialist

PMU, Khartoum, Sudan,

November, 2005

TABLE OF CONTENTS

EXECUTIVE SUMMARRY

These Proceedings comprises the bulk of the actual proceedings of the Workshop and is in seven Chapters and has been written closely following the Work shop Program.
Chapter One, covers the Official Opening and contains the Speeches of H.E. Ambassador Albert Mbonerane, Minister for Land, Environment and Tourism, of the Republic of Burundi. It also contains remarks by the UNDP Country Representative, Remarks by the National Project Coordinator for Burundi, Mr. Audace Ndayizeye and remarks by the Water Quality Lead Specialist, Mr. John Omwenga.
Chapter Two, covers the country presentations, on real and potential pollution threats on the Nile. The chapter also gives the national level perspectives on how to handle, transboundary pollution.
Chapter Three, summarizes the Field visits to the Central Water Testing Laboratory for REGEDISO, and the Water Supply intake and treatment works.
Chapter Four, highlights the presentation of the Regional Baseline water Quality monitoring report, and comments and discussions thereupon, which was the main focus of the Workshop**.**
Chapter Five, features the group presentations and discussions of key water quality management issues.
Chapter Six is the most important, as it outlines and summarizes the recommendations of the Workshop, and the Closing remarks.
Chapter seven outlines the Appendices

REGIONAL BASELINE REPORTSUMMARY

The baseline report summarizes the nine individual National Water Quality Monitoring Baseline Reports and includes the main water quality issues in the Nile Basin, including recommendations for both regional and national action plans.

This report does not go into all the details recorded in the National Reports but highlights significant points regarding the Nile monitoring. Most of the countries have undertaken analyses of the Nile but the quality of the data is very mixed and it is impossible to draw any detailed accurate overview. To derive an accurate picture, recommendations on sampling and analysis are included in the report.

Most of the countries are riparian and use the Nile in similar ways causing similar problems, which include: siltation, pollution from domestic and industrial waste water together with agricultural products such as pesticides and fertilisers. National and Transboundary recommendations have been proposed to address these issues and need to be developed.

Similarly the laboratories are of a mixed standard with the laboratories in Egypt and those within the LVEMP being significantly better than the others. Recommendations include improving the equipment and training of the under-resourced laboratories and by establishing regional laboratories from the best laboratories to assist the others.

The legislative regulations also differ between the countries, but all the governments consider water quality a major issue and have passed numerous excellent regulations and proclamations to control them. However despite these, the implementation of the regulations is very limited and needs to be improved. Most countries suffer from under-funding but if more commitment was made by applying the Polluter Pays Principal, then the pollution control could be eventually be self sustainable.

The water monitoring of the Nile by each country is again variable and there needs to be a consistent simple approach for the transboundary monitoring, whilst each country will need to expand for the national monitoring.

Thematic Water Quality Maps and Water Quality Profiles have been produced for Sudan it is recommended that these are used as a basis for similar maps for each country and then amalgamate them into one definite map.

Report Format

Baseline Water Quality Status reports and Country Reports have been submitted from each of the nine participating countries.
The salient points on water quality has been summarised in this report as a means of comparing the conditions in the different countries. This has included the following:

- Description of the location and properties of the water supply.
- Review of the institutional framework of mentoring water quality.
- Review of the water quality data and monitoring program.
- Review of the Water Quality Laboratories.
- Review of the sources of water pollution along the Nile basin.

This report is not a substitute for the original individual reports, as they will provide much more details in these areas and also additional information such as public awareness campaigns and ground water quality.

CHAPTER ONE: OPENING SESSION

1.1 Welcome Remarks by Mr. Audace Ndayaziye National Project Coordinator, Burundi

- His Excellency, The Minister for Land, Environment & Tourism
- World Bank Resident Representative
- UNDP Country Director
- Nile Basin Initiative TAC member
- Water Quality Lead Specialist
- The Steering Committee member
- The National Project Coordinator
- Water Quality Working Group members

I am pleased, as National Project Coordinator, to welcome all the honourable guests who have taken the trouble to come, in spite of their tight and busy agenda, to support us in this workshop of water quality status in the Nile Basin within the framework of the activities of the Nile Transboundary Environmental Action Project of the Nile Basin Initiative.

This workshop follows a first one held in Cairo in 2004. The participants in this workshop come from the nine countries of the NBI, namely, Burundi, Egypt, Ethiopia, Kenya, Democratic Republic of Congo, Uganda and Rwanda, Sudan and Tanzania. Each of these countries is represented by two representatives. I take this opportunity to wish all the participants coming from far a very nice stay in Burundi, where the southernmost source of the Nile is located.

The activities of this workshop will be facilitated by the international consultant Mr. Ralph Michael Jack man, whom we highly and warmly welcome in Burundi.

The opening ceremonies of this workshop will follow the following pattern:

After this intervention the Water Quality Lead Specialist will address the participants.

Then follow the speeches of the World Bank Resident Representative and the UNDP Resident Representative and an opening remark by His Excellency, Minster for Land, Environment and Tourism.

This is the end of Session One
We wish to apologize for the Anglophones for not being able to secure them translation services due to the lack of functioning equipment but during the deliberations translation will be provided to ensure full participation.

Thank you all for your attention.

1.2 Opening Remarks by Mr. John Omwenga, Water Quality Lead Specialist

Our Guest of Honor,

Your Excellency Ambassador Albert Mbonerane,

Minister for Land Management, Environment and Tourism

The Director General of Environment, (INECN)

Mr. Festus Ntanyungu

Distinguished Guests, Ladies and Gentlemen:

On behalf of the NTEAP, and on my own behalf, I wish to thank you all for coming to this beautiful city of Bujumbura for our second Regional Workshop. May I take this opportunity to welcome you to the Workshop and to wish you a very comfortable stay for the next few days.

Distinguished Guests, Ladies and Gentlemen:

It gives me great pleasure indeed to be here with you, and to make these few Opening remarks. This is another historic occasion for all of us, to be here as water resources management experts from the Nile riparian countries, to meet and share experiences on water quality management issues. We are meeting here under the auspices of the Nile Basin Initiative, whose shared vision is indeed fitting and appropriate to this occasion. Water is a catalyst for cooperation. Cooperation on water is a long term investment, requiring realistic objectives, and phased implementation of projects and programs. The key factors for success, include a shared vision, political commitment and broad based partnerships, all of which are ingrained in the Nile Basin Initiative.

Distinguished Guests, Ladies and Gentlemen:

As you are aware, this is the second NTEAP Regional Water Quality Working Group Workshop. Our first Workshop was held last December in the Nile water Sector, Naser City, Cairo, Egypt. The focus of the first workshop was the official inauguration of this Regional Water Quality Working Group which also initiated trans boundary networking between all of us. You will also recall that we spent some time in discussing a number of water quality issues. Consensus was reached on some issues while others were deferred for consideration during this workshop.

Distinguished Guests, Ladies and Gentlemen:

Some of you may have been surmising why Bujumbura was selected to host this Workshop. The reason is simple. Bujumbura is one of the cities within the Nile basin and all cities within the Nile Basin are eligible to host future Workshops. It is the policy of NTEAP to spread out Regional Workshops and events across all the cities of the Nile Basin.

Distinguished Guests, Ladies and Gentlemen,

We are gathered here today, courtesy of the generous hospitality of the Government of Burundi, and in particular the Ministry of Land Management, Environment & Tourism. My sincere thanks and gratitude go to our Guest of Honour, the Honourable Minister His Excellency Ambassador Albert Mbonerane. I wish to thank him for finding time from his busy schedule to come and officiate at this function. On the same vein, I wish to thank Mr. Festus Ntanyungu, the Director General of the National Institute for Environment and Nature Conservation, who is also an active NTEAP Project Steering Committee Member. May I also take this opportunity to thank all the other invited guests from Burundi.

I also wish to take this opportunity to thank our development partners, particularly, WB, UNDP, CIDA and other bilateral partners for being very supportive to NTEAP.

Distinguished Guests, Ladies and Gentlemen,

The main focus of this second Workshop is to:

- Review and adopt the recommendations of the Cairo Workshop
- Review and adopt the National WQ Monitoring Baseline Reports

- Receive, review, discuss and adopt the Regional WQ Monitoring Baseline Report
- Discuss other Basin wide water quality management issues, and
- Visit water quality testing and environmental monitoring facilities,

The outputs of this workshop are expected to be :

- Adoption of the Cairo Workshop Report with agreed upon actions
- Adoption of the National Water Quality Monitoring Baseline Reports
- Adoption of the Regional Water Quality Monitoring Baseline Report and Action Plan

We have started on the right path, addressing the transboundary challenges highlighted in the Trans boundary Environmental Analysis. Our common environmental problems continue to be loss of biodiversity, desertification, flooding, water weeds, declining fisheries, and encroachment on wetlands. Poverty, often made worse by civil strive, continues to afflict many communities while having a significant impact on the environment.

We are far from solving these problems. What is required is to initiate transboundary solutions to transbounday problems and to create and support strong institutions, and encourage partnerships and strong regional networks.

Water resources within the Basin are scarce and are unevenly distributed. Where water is available, it has to be checked for suitability for use, in order to ensure its safety. Our countries acknowledge the importance of water resources management. In this regard also, it should always be remembered that the Nile River is transboundary in nature. As demand for its waters and resultant pollution increases, a basin wide approach for its protection and management is the only viable and sustainable option, if it has to continue flowing as it has done for centuries, servicing and meeting the many basin-wide demands.

Distinguished Guests, Ladies and Gentlemen:

One of the objectives of the Water Quality Component is to initiate a basin wide dialogue on water quality management .Your meeting today is a true testimony to this objective. In the next few days, you will be focusing on the findings and recommendations of the Regional Water Quality Monitoring Baseline Report. Some of the issues that will come up for discussion include, from a basin wide perspective, the designation of focal point, Nile basin water testing laboratories, the creation of regional water quality testing centres, modalities for the management of transboundary pollution, the procurement of Field Equipment, water quality modelling, data management and water quality maps. You will also examine, *interalia,* the proposed national and regional actions to address the water quality monitoring shortfalls.

Country level inventories will also be presented to provide the necessary baseline and background on which interventions can be initiated. It will be good to learn from one another's efforts and where possible replicate the good practices elsewhere in the Basin.

Distinguished guests, Ladies and gentlemen:

On behalf of the NTEAP, I wish to take this opportunity to thank you for your attendance and wish fruitful discussions.

THANK YOU ALL.

19/07/2005

1.3 Speech by the Minister for Environment Land Management and Tourism, His Excellency Ambassador Albert Mbonerane

REPUBLIQUE DU BURUNDI

MINISTERE DE L'AMENAGEMENT DU TERRITOIRE, DE L'ENVIRONNEMENT ET DU TOURISME
Initiative du Bassin du Nil: Projet d'Action Environnementale Transfrontalière du Nil

DISCOURS D'OUVERTURE DES TRAVAUX DU DEUXIEME ATELIER REGIONAL DES GROUPES DE TRAVAIL SUR LA QUALITE DE L'EAU DU BASSIN DU NIL
Par
Ambassadeur Albert Mbonerane,
Ministre

Hôtel NOVOTEL, du 19 au 21 juillet 2005

- Monsieur le Représentant Résident du PNUD
- Monsieur le Représentant de la Banque Mondiale
- Directeur Exécutif de l'Initiative du Bassin du Nil
- Monsieur le Membre du Comité Consultatif de l'initiative du Bassin du Nil,
- Monsieur le Conseiller Principal du Directeur Régional du Projet « Action Environnementale Transfrontalière du Nil
- Monsieur le Membre du Comité Directeur
- Monsieur le Coordonnateur National du Projet,
- Messieurs les Membres des groupes de travail sur la qualité de l'eau du Nil
- Mesdames, Messieurs,

C'est un grand plaisir et un honneur pour moi, de procéder aujourd'hui à l'ouverture des travaux du deuxième atelier des groupes de travail sur la qualité de l'eau du Bassin du Nil dans le cadre du Projet d'Action Environnementale Transfrontalière de l'Initiative du Bassin du Nil.

Le contrôle de la qualité de l'eau à l'échelle du Bassin du Nil est une des cinq composantes du Projet d'Action Environnementale Transfrontalière du Nil, projet qui fait partie des huit projets du Programme de la Vision Commune de l'Initiative du Bassin du Nil.

Rappelons que ce projet a pour objectifs :

• De mettre à la disposition des pays riverains du Nil, un cadre stratégique environnemental pour la gestion des eaux transfrontalières afin de lever les défis environnementaux dans le bassin du Nil ;

•D'améliorer la compréhension des interdépendances entre le développement des ressources en eau et l'environnement ;

•De créer un cadre pour discuter les options et les voies de développement avec les différents partenaires de développement;

• De renforcer la coopération et la sensibilisation environnementales à l'échelle du bassin;

•De renforcer les capacités des pays riverains du Nil dans la gestion de l'environnement à l'échelle du Bassin du Nil.

Mesdames, Messieurs,
La politique nationale de gestion des ressources en eau dans notre pays reconnaît que le Burundi partage ses ressources en eau avec les pays voisins. Elle donne par conséquent des orientations en matière de coopération avec les états riverains pour le partage équitable et la gestion des eaux transfrontalières.

Comme dans la plupart des pays riverains du Nil, le secteur de l'eau au Burundi est caractérisé par une faible capacité humaine et institutionnelle à gérer les ressources en eau d'une façon intégrée. La gestion de l'eau est encore fragmentée entre les secteurs socio-économiques et il y a très peu de coordination entre les différents utilisateurs et gestionnaires de l'eau.

Et, de façon générale, à l'échelle du bassin ce secteur est caractérisé par des faiblesses d'ordre institutionnel, une insuffisance du personnel qualifié,

des faiblesses de capacités techniques, une absence d'outils normatifs et manque de données pour le suivi et le contrôle de la qualité de l'eau.

C'est ainsi que le premier atelier des groupes de travail tenu au Caire en 2004 avait pris comme priorité :

- De définir les critères pour identifier les paramètres d'importance transfrontalière ;
- D'élaborer des cartes sur la qualité de l'eau à l'échelle du bassin du Nil ;
- De définir les méthodes d'échantillonnage pour le contrôle de la qualité de l'eau
- De sélectionner les stations d'échantillonnage à caractère transfrontalier.

L'atelier aussi avait recommandé l'équipement des laboratoires de l'eau à l'échelle du bassin et la mise en place des normes environnementales plus particulièrement en RDC, au Rwanda, au Burundi et en Ethiopie.

En matière de capacités, il avait été noté que le renforcement des capacités était plus urgent surtout pour le Burundi, l'Ethiopie la RDC et le Burundi. C'est ainsi que l'atelier avait recommandé à l'Egypte et à l'Ouganda de jouer un rôle clé dans le renforcement des capacités étant donné que ces pays sont forts en avance par rapport aux autres pays du Bassin du Nil.

Il vous revient donc Mesdames, Messieurs membres des groupes de travail d'évaluer pendant cet atelier le pas déjà franchi dans la mise en oeuvre des recommandations issues du premier atelier.

Par sa nature, la gestion des eaux transfrontalières est une question assez complexe. Dans le cas du Nil, un développement collectif du Nil est même plus difficile par le fait que le commerce et les échanges entre les pays riverains sont limité. Les différences culturelles, politiques, économiques et sociales entre les pays posent un défi majeur à cet échange.

Le manque d'opportunités d'échange d'expérience entre les professionnels de l'eau du Bassin du Nil en particulier et entre les peuples en général a été une contrainte pour construire la fraternité autour de la question de l'eau.

Les ateliers de ce genre constituent des opportunités pour permettre aux professionnels de l'eau d'échanger leurs expériences et de trouver ensemble des solutions aux problèmes de gestion de l'eau à l'échelle du Bassin du Nil.

Mesdames, Messieurs

L'Agenda de cet atelier est très important. En effet vous aurez à délibérer notamment à revoir et endosser les rapports des études de référence sur la qualité de l'eau dans chaque pays riverain du Nil. Nous osons espérer qu'à travers l'analyse de ces rapports vous allez dégager une stratégie pour la protection des eaux du Nil et un plan de renforcement des capacités des institutions et des ressources humaines pour le suivi et le contrôle de la qualité de l'eau à l'échelle du Bassin du Nil en privilégiant là où c'est possible une coopération entre les pays riverains.

Mesdames, Messieurs

Je profite de cette occasion pour souhaiter la bienvenue au Conseiller Principal représentant le Directeur Régional du Projet d'Action environnementale Transfrontalière de l'Initiative du Bassin du Nil et à tous les membres des groupes de travail provenant des pays riverains du bassin du Nil qui ont fait le déplacement jusqu'à Bujumbura pour participer à cet atelier.

La source la plus méridionale du Nil se trouve au Burundi, au cœur d'Afrique, pays des milles collines. Nous osons espérer que cet atelier au Burundi sera aussi la source mère d'un plan d'action et d'une stratégie pour la protection de l'environnement et plus particulièrement les ressources en eau du bassin du Nil.

C'est sur cette note d'espoir que je déclare ouverts les travaux du deuxième atelier régional sur la qualité de l'eau du Bassin du Nil.

Je vous remercie

1.4 Opening Remarks by the UNDP, Country Representative

- His Excellency, Minster for Land, Environment & Tourism
- World Bank Resident Representative
- NTEAP Water Quality Lead Specialist
- Project Steering Committee Member
- Working Group members
- Distinguished guests
- Ladies and gentlemen

It is a great pleasure and interesting to join you here at the Second Regional Water Quality Workshop to be organised by ***Nile Transboundary Environmental Action Project.*** I wish, therefore, to express my sincere thanks to our regional partners who have been keen on inviting to and sharing with us this important event.

Nile Basin Initiative is a baby born into our hands whose objectives appear in the human development objectives of the UNDP in particular and in those of the Millennium Development Goals in general.

In fact, the UNDP has always supported water quality management and enhancement initiatives. From 1964 on, initiatives, isolated and timid, succeeded one another but this cooperative process was launched in 1998 with the support of the UNDP. Conscious of the fact that unity is strength, several countries agreed to come together and engage a constructive dialogue aimed at creating a regional framework for a sustainable management of the water resources of the Nile.

Distinguished guests,

As a fact totally unknown to most of us, Burundi, is lucky for hosting the southernmost source of the Nile and, *ipso facto,* belongs to the nine countries of the Nile Basin Initiative who have agreed to unite their efforts, with the support of the international community, towards the establishment of a strategy for rational and equitable management of this heavenly gift, based on shared vision, from a perspective of a sustainable regional development.

Allow me to indicate below the goals being pursued and strongly supported by the international community through this initiative:

- The sustainable and equitable development of the Nile water resources in view of achieving prosperity, security and peace for the populations
- The achievement of efficient management of water and optimal utilization of resources
- The achievement of cooperation and concerted actions among the member countries
- Poverty eradication and promotion of economic integration
- Making sure that planned activities produce expected

The present workshop addresses a crucial question: **water**. As you all know, water is a source of life but at the same time, it can be a source of death. Well managed, it gives life, but when it is mismanaged, it becomes a source of mortal diseases. Unfortunately, in most of developing countries, water undergoes improper management and there is a flagrant lack of awareness of the population on the rational use of water.

The crisis the country has gone through has not favoured the rational management of water. Different studies have shown that this resource has deteriorated not only in terms of quantity, but also in quality in the aftermath of the massif influx of refugees and displaced persons fleeing drought hitting the north of the country.

Water, being the first vital resource for any population, we take this opportunity to encourage the Government to implement the national water policy it adopted in 2001 as well as the different strategies

for sustainable development of the water sector. We promise you our permanent support to your efforts for the achievement of this mostly laudable initiative.

Distinguished guests,

Before I conclude my speech, I have to address my sincere thanks once again to the different authorities present here sharing with us the common vision of the Nile Basin Initiative which is the following:

"Achieving socio-economic sustainable development through the equitable utilization and exploitation of the common resources of the Nile Basin".

Long Live Water, Source of Life

Long Live International Cooperation

Thank you all

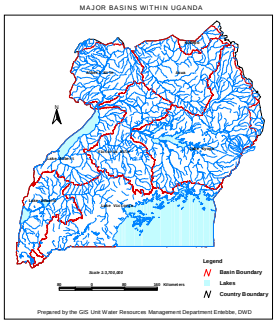
CHAPTER TWO: COUNTRY PRESENTATIONS

2.1 UGANDA

Major activities

- Agriculture - subsistence
- Commercial
- Fishing
- Agriculture
- Mining
- Tourism

Introduction
Uganda's Water Resources



- *Area 241,040 sq km*
- *24.7 million people (2000)*
- *Open water bodies (Lakes, Rivers, etc)*
- 15 % open water
- 3 % permanent wetlands
- 9.4 % seasonal wetlands
- Mean Annual rainfall 600 - 2500 mm
- Mean Temp. 21ºC

WQ Issues - man made

- Microbiological contamination
- Eutrophication
- Salination
- Toxic metals & organic compounds (micro-pollutants)
- Erosion and sedimentation

POTENTIAL THREATS

- Inadequate or no treatment of domestic sewage – use of septic tanks, pit latrines, etc
- Inadequate controls of industrial Effluent & urban run-off
- Loss and destruction of catchment areas
- Ill-siting of industries
- Deforestation
- Uncontrolled shifting cultivation and nomadism
- Poor Agricultural practices – Pesticides & Nutrients
  - Horticulture, sugar cane growing, rice growing
- Mines wastes/tailings – leaching of HM
- Accidental spillage
- Atmospheric deposition

- International – Trans-boundary pollution transfer


WATER RESOURCES

Wetlands in focus catchment used for intensive rice cultivation

Threats to ground water pollution & poor land practices, eutrophication, water hyacinth infestation

River Kagera from Rwanda flowing into L. Victoria, Uganda. Silt degraded from highlands transported to the Lake and the quality of this water cannot sustain life.

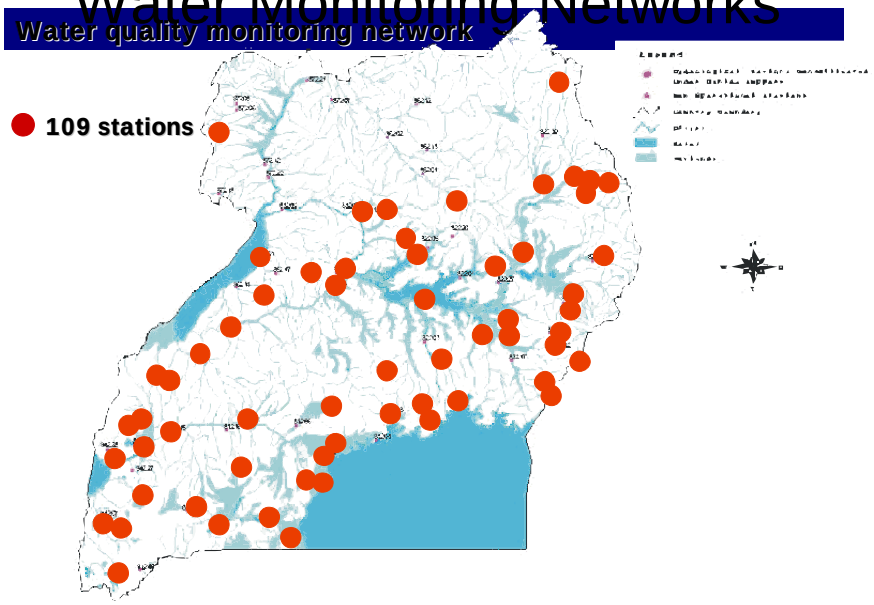
Regulation

- NEMA
- MWLE (DWD, Wetlands, Land/ forestry)
- UNBS
- MoH

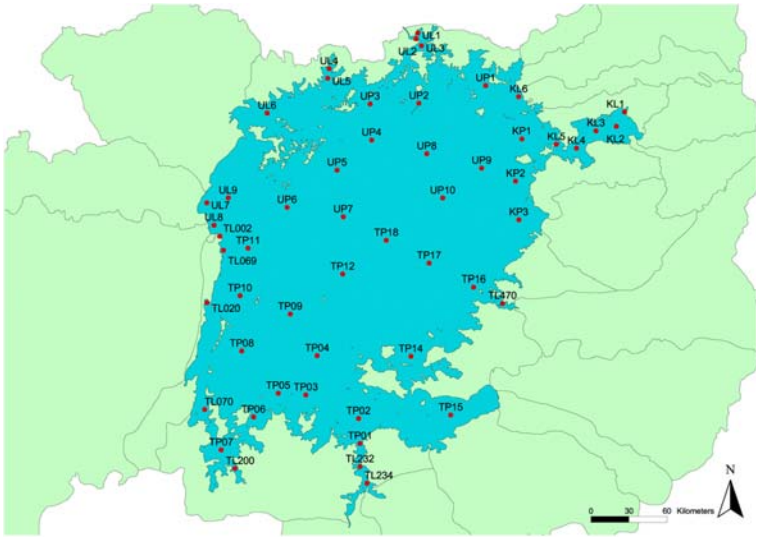
Districts

- MoLG

Water Monitoring Networks



Map showing the Regional sampling stations in L. Victoria



WQMgt Instruments - Uganda

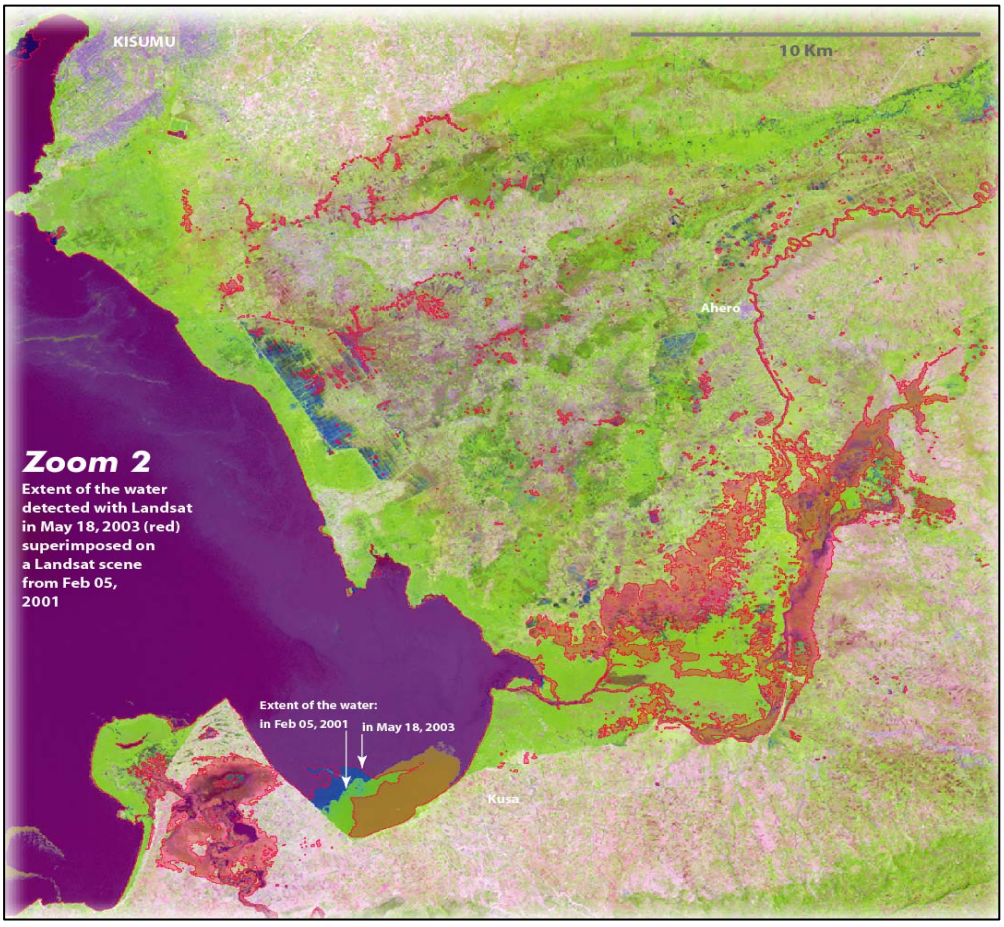
- A combination of 4 environmental management instruments
  - Regulatory - Permits
  - Market-based – Pricing /charges
  - Self-regulatory – ISO provides e.g. encourage ISO 14001 certification,
  - Civil management
  - HOWEVER- Implementation & Enforcement – a big setback.

Way Forward

- National Water Quality Monitoring strategy
  - Share responsibility, coordination framework, networking
- Review of network – issue based, specific
- Harmonization of database
- Information dissemination & support to developments

2.2 **KENYA**

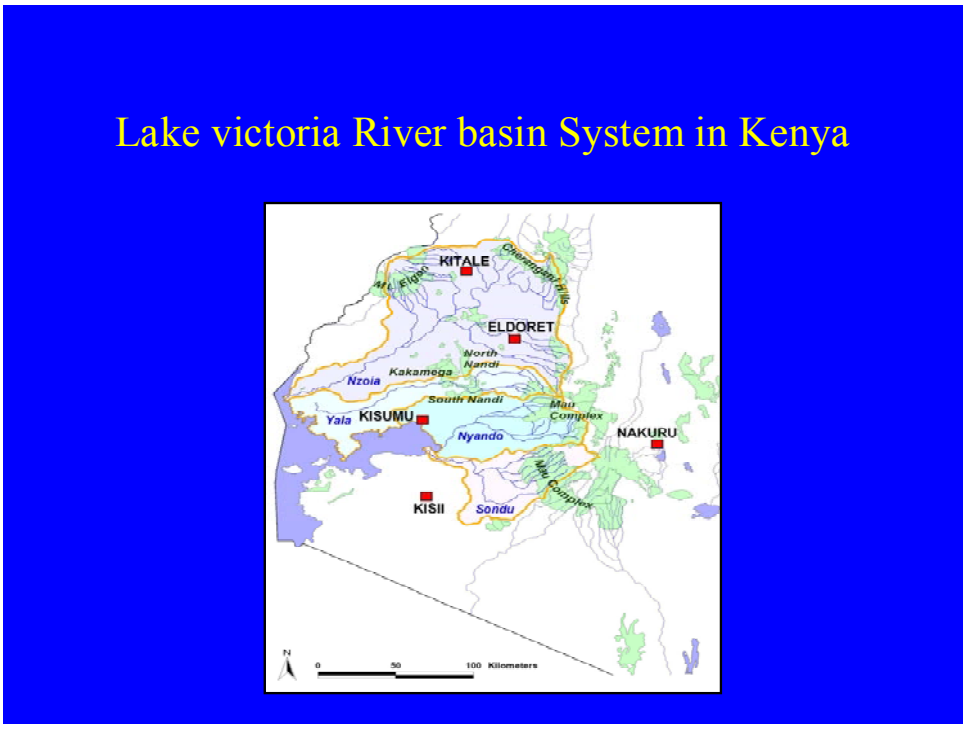
POLLUTION THREAT TO NILE BASIN SYSTEM



BACKGROUND

- L. VICTORIA ATOTAL CATCHMENT OF 194,000KM^2 EXTENDING UPTO RWANDA & BURUNDI
- KENYA CONSTITUTE 42,480KM^2 OF THE TOTAL AREA
- SEVEN RIVERS DRAINS THE CATCHMENT
- THESE RIVERS BRINGS POLLUTANTS INTO THE LAKE
- THERE ARE OVER 150 NON-POINTS SOURCES IN THE CATCHMENT

KENYA CATHMENT



WATER RESOURCES PROJECTS

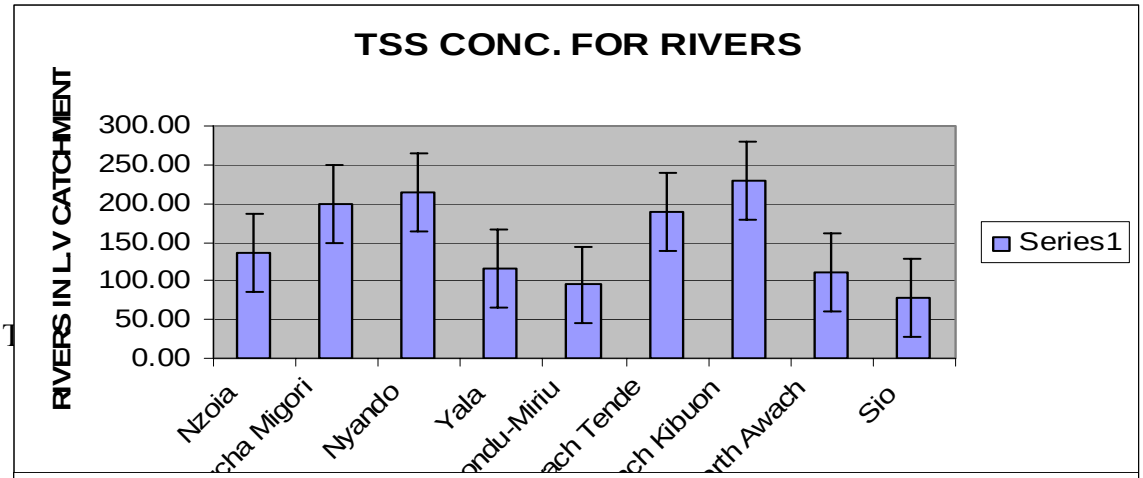
SWAMP RECLAIMATION

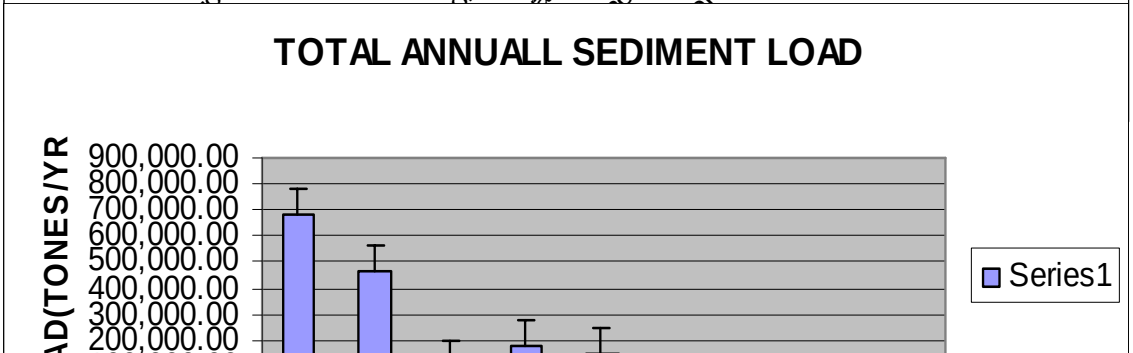
- YALA(yala system

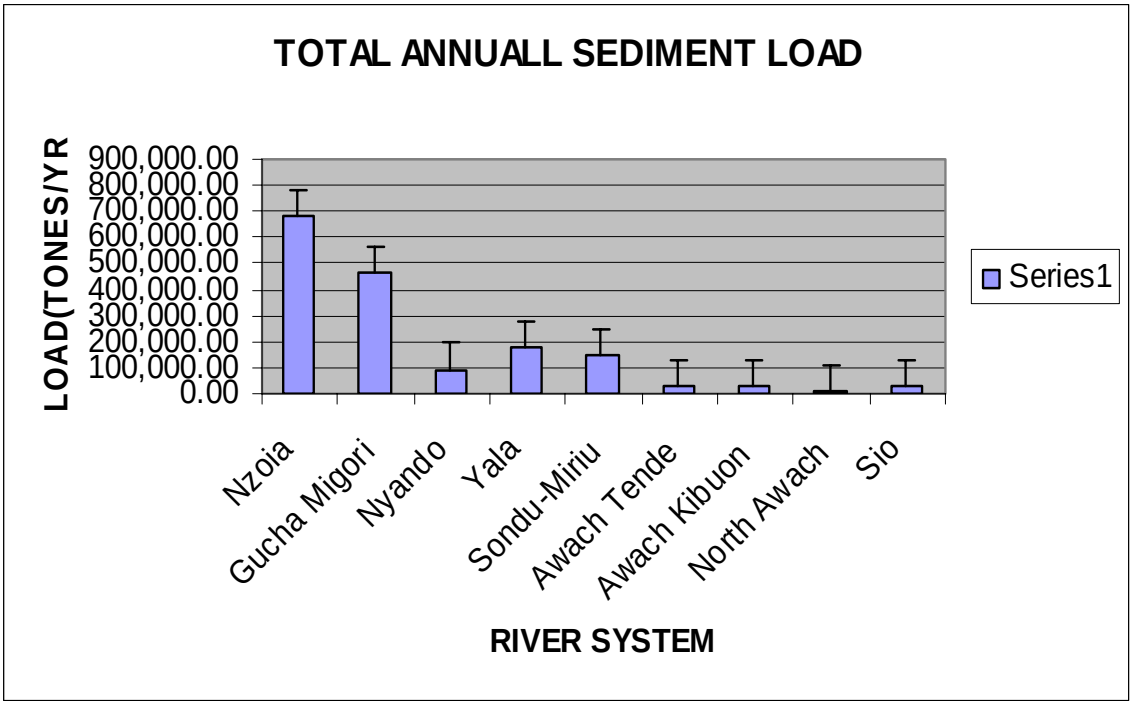
- BUNDALANGI (Nzoia System
- Sondu Miriu- Power generation plant
- Water hyacinth project –undertaken KARI under LVEMP
- Oil Pipeline -Mombasa to Kisumu Via Eldoret
- Small scale mining in Nyanza and Western Provinces

IMPACT OF IN LAKE FLOODS NZOIA BASIN

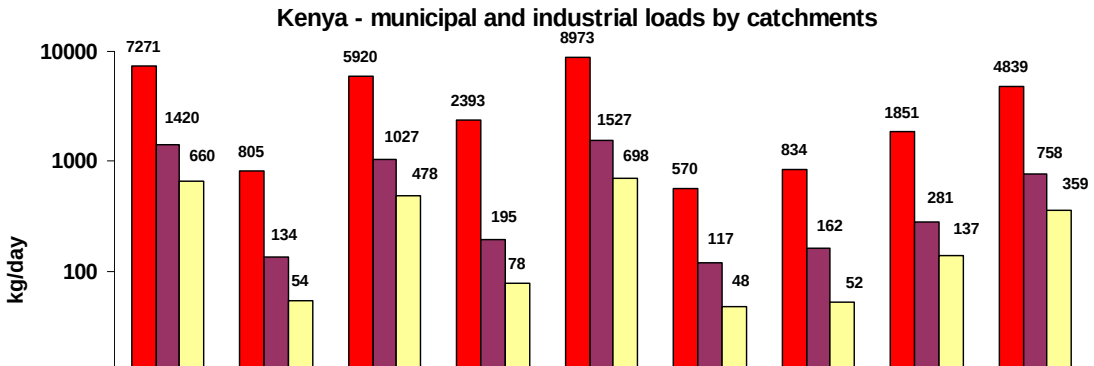
TSS CONCENTRATION





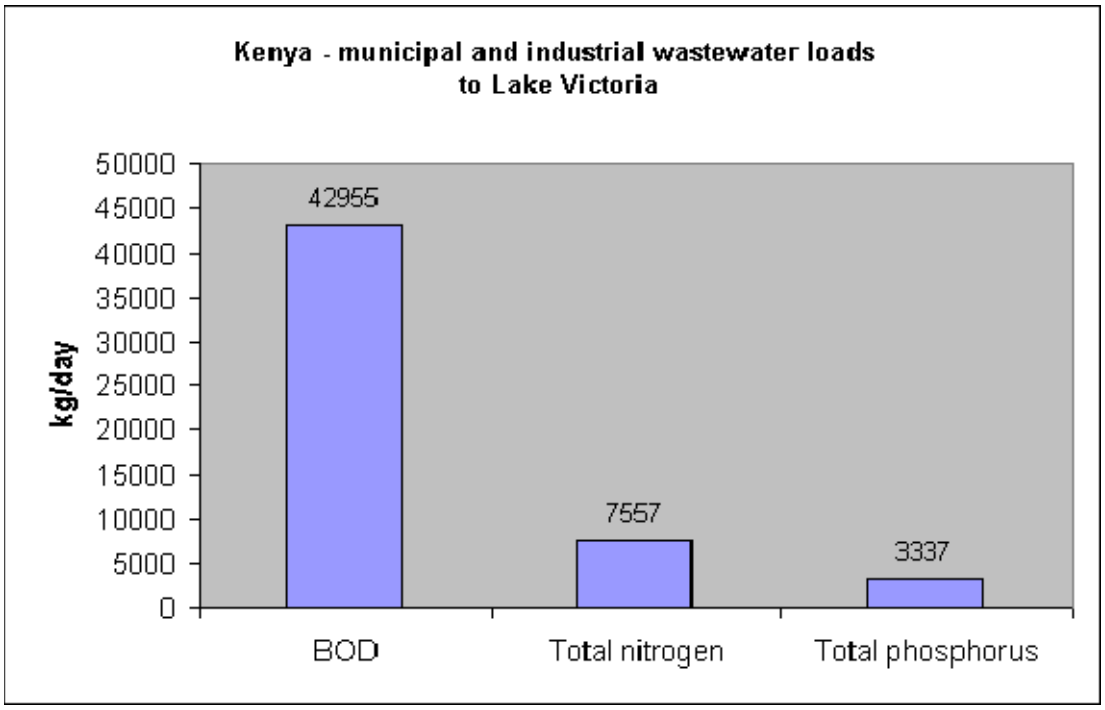


POLLUTION LOAD FROM INDUTRIAL AND MUNICIPAL ESTABLISHMENT

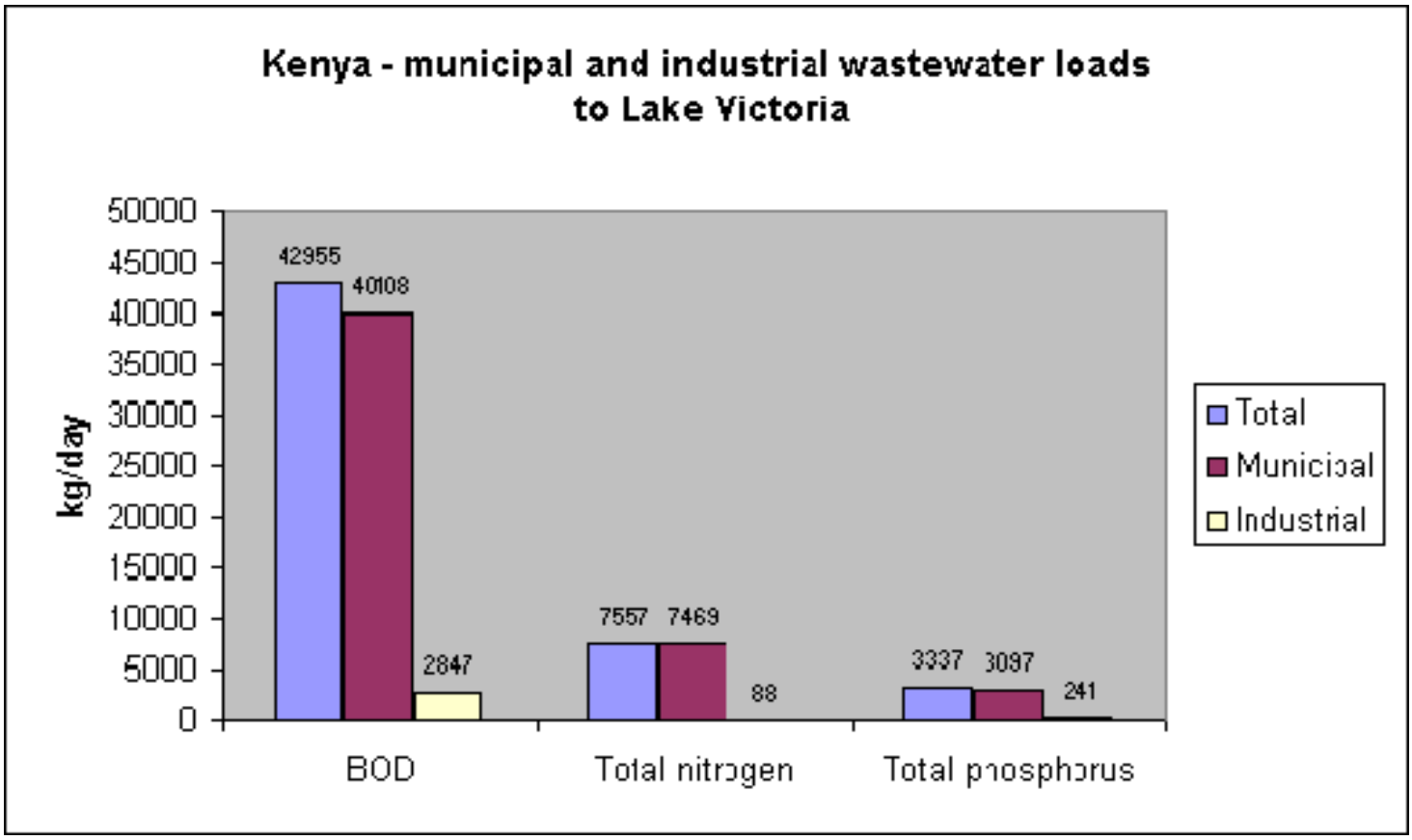


MUNICIPAL AND INDUSTRIAL LOADS IN LAKE VICTORIA

POINT SOURCES



MUNICIPAL AND INDUSTRIAL POLLUTION



COMBINED LOAD FROM MUNICIPAL AND INDUSTRIAL

Municipal and industrial loads

	BOD	Total nitrogen	Total phosphorus
Total	42955	7557	3337
Municipal	40108	7469	3097
Industrial	2847	88	241

POLLUTION LOAD PER CATCHMENT

By catchments

	BOD	Total nitrogen	Total phosphorus
Gucha-Migori	13624	2479	1082
Mara	1610	268	107
North Awach	4077	720	356
Nyando	2340	390	156
Nzoia	9694	1744	780
Sio	521	122	50
Sondu	199	86	26
South-Awach	3132	494	223
Yala	7757	1253	558

Nzoia catchment

	BOD	Total nitrogen	Total phosphorus
Municipal	6900	1667	680
Industrial	2794	77	100

AGRICULTURAL LAND USE IN LAKE VICTORIA CATCHMENT

CROP	AREA(ha)	PERCENTAGE (%)
Maize	550000	48.2
Beans	2040000	17.5
Sugar cane	110000	9.6
Sorghum	60000	5.2
Cassava	40000	3.5
Bananas	35000	3.0
Tea	30000	2.6
Cotton	30000	2.6
Coffee	25000	2.2
Millet	25000	2.2
Sweet Potatoes	20000	1.7
Others	15000	1.3
Total	1140000	100

AMOUNT OF FERTILISERS APPLIED PER A CROP IN THE CATCHMENT

CROP	AREA (ha)	NIROGEN (TONNES)	PHOSPHATE (TONNES)
Maize	550	4070	11495
Beans	200	1480	4180
Sugar Cane	110	5484	2640
Sorghum	60	444	1254
Bananas	35	126	63
Tea	30	1500	300
Coffee	25	1776	2143

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Coffee	25	1776	2143

FUNGICIDES USED IN LAKE CATCHMENT

Trade Name	Active Ingredient	Concentration
Daconil WP	Chlorothalonil	750g/kg
Dithane M-45	Mancozeb	800g/kg
Copper Nordox WP		50g/kg
Microcop	Copper oxychloride	Nd
Antocol	Propineb	70g/kg
Dursban	Chlopyriphos	Nd
Benlate	Benomyl	Nd
Bayleton		Nd
Ridomil	metalaxyl	Nd
Difolatan	Capthafol	480g/L

HERBICIDES USED IN THE LAKE CATCHMENT

Trade Name	Active Ingredient	Concentration
Actril DS	Loxynil and 2,4D	Nd
TriChloro acetic acid(TCA) WP Sodium		Nd
Salt		
NaTa		
Asulam	Asulox	40g/kg
Diuron WP	Urea	80g/kg
Gesaprim	Atrazine	300g/kg
Round up	Glyphosate	Nd

INSECTICIDES USED IN THE LAKE CATCHMENT

Trade Name	Active Ingredient	Concentration
Dawa ya Mboga	Carbaryl & Acephate	5%
Sevin85	1naphthyl N-methyl Carbanate	50g/L
Ambush CY	Cypermethrin	2.5g/L
Stalk borer granules	Trichlorphon	Nd
Dipterex	-	Nd
Anthio 33	Formothion	-
Rogor EC	Dimethoate	40g/L
Neocidal	Diazinon	230g/L
Thiodan EC	Endosulphan	35g/L
Decis EC	Deltamethrine	25g/l
Furadan	Carbofuran	5g/Kg
Sumithin	Fenitrothion	Nd

2.3 RWANDA

REPUBLIC OF RWANDA MINISTRY OF LANDS, ENVIRONMENT, FORESTRY, WATER AND MINES

POTENTIAL THREATS TO NILE RIVER SYSTEM.

Presentation contents

- Industrial wastes
- Domestic wastes
- Solid or garbage wastes
- Agricultural chemicals
- Coffee processing
- Mining zones
- Water hyacinth

Some of those Industries are:

- Paint factories such as Amaki Color
- Textile factories such as Utexirwa
- Iron sheet factories such as Tolirwa
- Tin and Coltan Smelting.

Utexrwa Industry

Waste water coming from the above industry

2. Domestic wastes

The most important sources of domestic wastes are big towns such as Kigali City where a million of residents live.
Like most of African towns there is no sewerage collection and there no proper waste treatment system that exists.
In Kigali only toilettes are given much attention but domestic wastes are drained towards river Nyabugogo as you see it from the following photos.

One of the city drainages

Collecting point of the city drainages on river Nyabugogo

3. Solid or Garbage wastes

Any undesirable wastes is thrown at Nyanza by

Kigali City Council.

These solids range from rotten vegetables, metals, dry cells, any solids industrial wastes ..

to expired chemical products.

Some of these solids are buried, burnt or left in the open.

Nyanza hill is about 15 kms from the centre town and it is about 5 kms up stream of river Nyabarongo.

Nyanza hill

Down stream of Nyanza hill ; Nyabarongo river

4. Agricultural Chemicals

- Fertilizers
- Herbicides
- Fungicides
- Rodenticides
- Insecticides,
- Etc…

All these are used as agricultural Chemicals in Rwanda.

Rwanda is situated in the highland region such that for millions of years its soil has been subjected to intensive soil erosion.

Agriculture is therefore supported by the use of Fertilizers.

These Fertilizers are used for both food crops and cash crops.

We can mention a few: Potatoes, Coffee, Tea and Tomatoes. Pesticides are used especially in cash crops.

5. Coffee Processing

In most Provinces where coffee is cultivated, there are coffee beans washing stations.

These stations are located on the banks of big rivers such as river Mwogo in Maraba District.

The following photo is one those stations

One of the coffee processing stations

6. Mining zones

These zones are scattered in the country and are found in high lands such that there is soil mass movement that is carried to rivers during rainy seasons. This soil mass movement contains heavy metals that are a potential threats to the Nile River System.

7. Water Hyacinth

This plant exists in most of the lakes of Rwanda such Lakes Burera, Ruhondo, Ihema, Muhazi, Mugesera, etc…

Even though it is on a small scale, if no urgent measures are undertaken, it might spread up to river Akagera . From the photo they are some on the banks of river Nyabugogo which shows its potential threat to the Nile River System.

Water hyacinth on banks of Nyabugogo river

Strategies Undertaken by Rwanda government

The Rwanda Government has put in place an Institution called REMA (Rwanda Environment Management Authority) whose main responsibility is to control the degradation of Environment. This Authority was created in 2004 and we hope to see its goals in the near future.

The decentralisation of power is also producing fruits as People have been sensitised on the impact of this rampant degradation of our Environment.

2.4 TANZANIA

1.0 Introduction.

Nile Basin – Tanzania

Catchment Area: 115,400 km2
Lake Area : 35,720 km2
Main rivers : Kagera, Mara,
Magogo-Moame
Mbarageti,Mori
And Grumeti.

Urban Centres:

Mwanza- 500,000 people

Only centre of city sewered

- Solid waste generated= 375 tons/day.

Musoma- 126,628 people

- Not sewered, septic tanks and pit lat.

Bukoba – Not sewered, septic tanks and pit lat.

Main Activities:

- Agriculture, Livestock rearing, Fishing, Industrial, Commercial, Mining.

Figure 01: Lake Victoria Basin - Tanzania

2.0 Potential Threats:

Increased population and their associated activity and economic development have resulted in:

- Deforestation,
- Overgrazing,
- Soil erosion,
- Increased mun.&ind. Effluents
- Destruction of wetlands and LV satellite lakes
- Increased atmospheric

Nutrient deposition

Figure 02: Raw municipal effluent discharging into the Mirongo River (in Mwanza) before closure of the by-pass

Hence: - Pollution leading to
Eutrophication &toxic

algae,
proliferation of water
hyacinth and water-borne
and other water related diseases.

Figure 03: A typical Algal bloom in Mwanza gulf

Water-borne and other water related diseases:
-cholera, typhoid, dysentery,
diarrhoea, malaria, bilharzias,
and intestinal worms.

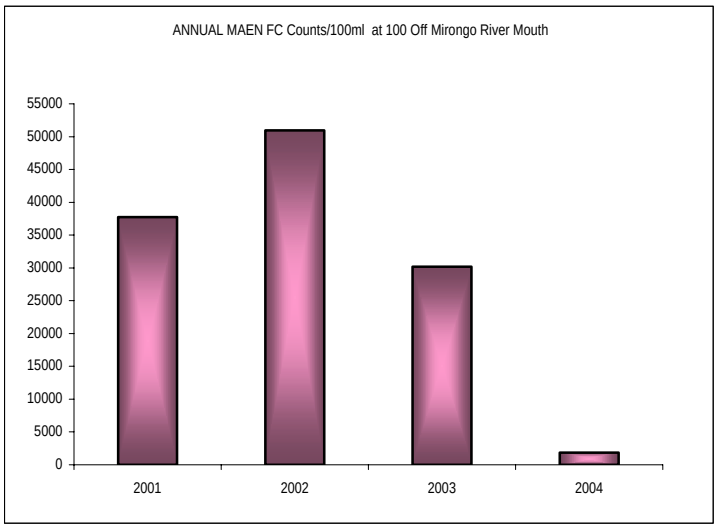


Figure 04 : Annual mean FC counts at 100m off Mwnza City

3.0 Agrochemicals in use:

3.1 Pesticides

- Betacyfluthrin,
- -deltamethrin,
- endosulfan,
- lambda cyhalothrin,

- fenvalerate,
- cypermethrin +pro ferophos,
- cypermethrin,
- primophosmethyl,

3.2 Fertilizers

-triple super phosphate,

- sulphate of ammonia,
- calcium ammonium
- nitrate,
- urea.

4.0 Studies on Contaminants: (Mercury & Pesticides)

4.1 Mercury:

A rapid assessment of mercury levels in water, biota, sediments and the atmosphere has concluded that generally, at present the mining activity has had no impact on levels of mercury in the LV system. However, artisanal gold mining remains a potential source of mercury pollution.

4.2 Pesticides:

Although not extensively used in the Simiyu R. catchment, the pilot study has established that organo-chlorine pesticides such as DDT and HCH were frequently detected in water samples.

5.0 WQ Management:

5.1 Monitoring network

(18)

Urban In-lake HMN (29 st.)
Impact n run-off (57 st.)
Industrial effluents (31) Rivers (10 st.) Atmospheric deposition (8 st.)

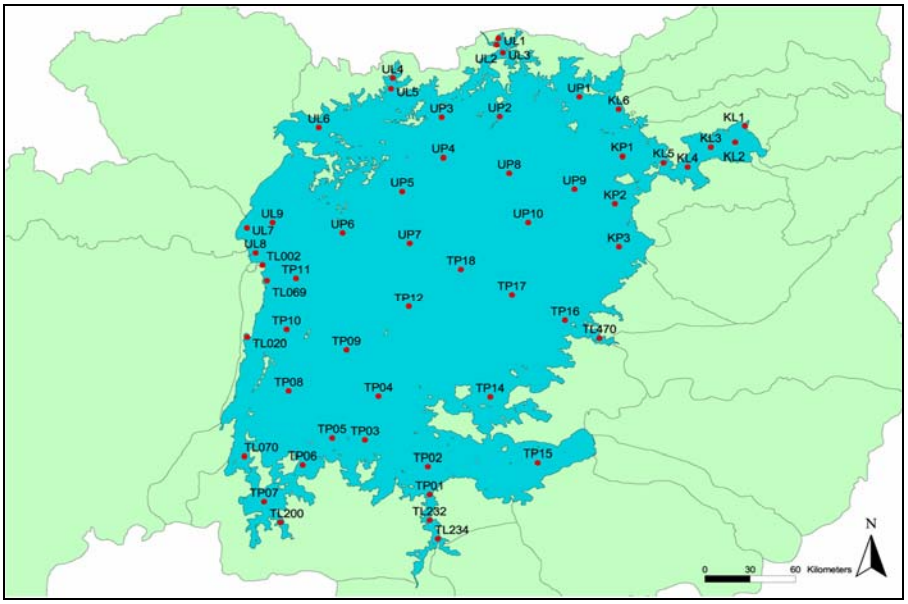


Figure 05:The harmonized in-lake water quality monitoring network

A functional database is in place.

Results disseminated to stakeholders through various avenues.

5.2 Water Utilization (Control & regulation) Amendment Act of 1981

-Establishes receiving
water, effluent and
Drinking water standards.

5.3 Laboratories:

Mwanza, Bukoba, and Musoma.

Mwanza is a reference lab equipped with pH meters, spectrophotometers, mercury analyser, etc. A QA/QC programme is in place and participates in Regional and GEMS-Water PA Programmes

2.5 EGYPT

REGIONAL WATER QUALITY MONITORING BASELINE COUNTRY LEVEL INVENTORIES

A. Inventory of potential pollution threats

Identify the existing development projects along the Nile river system, and indicate which one may have a potential pollution threat now, or in the future, also mention its Geographical location. How can the hazard be handled if it occurs?

1-Water resources projects:

- Swamp reclamation
-Irrigation projects

-Dams, and new storage reservoirs
-Water hyacinth control projects
-others

2-Industrial development project

-Refineries
-Oil pipeline (Petrolium by-product, gas supplies and distribution)
-Mining
-Tanneries companies
-Textiles industries
-Wate water treatment plants
- Power generation plants
-Busy road conveying dangerous cargo
-others

B. Inventory of types and quantities of Fertilizers, applied and Crops on which they are applied

1- What types of fertilizer have been used in farms and Cultivated areas over the last 10 years?

-Nitrogenous fertilizers
-Super phosphate
-Potassium
-Natural Manure

Table (1) Use of different types of fertilizers in Egypt, 1960 to 1988

Year	Nitrogen	Phosphate	Potassium
	actual (000 t)	actual (000 t)	actual (000 t)

60-61	192	48	2
65-66	314	43	0.7
70-71	325	46	1.6
75-76	428	66	2.8
80-81	568	104	2.9
81-82	626	134	3.6
82-83	660	143	3
83-84	746	160	5.5
84-85	639	164	7.5
85-86	775	183	7.6
86-87	777	185	n.a.
87-88	791	190	n.a.

2-Mention the size of the cultivated area

Year	Cultivated area (Feddans) …… (1ha = 2.38 feds)
1978	5.938
1982	6.624
1987	6.764
1992	7.177
1997	8.102
2002	8.713

3-What types of Crops use these types of fertilizers

Crop	Area 1000 ha
Clover, Permanent	639
Clover, Transitory	515
Wheat	821
Broad Beans	145

Winter Tomato	66
Barley	53
Sugar Beet	14
Others	96
Total winter Crops	2349
Maize,Summer	649
Rice	436
Cotton	417
Sorghum	131
Summer Tomatoes	53
Soybeans	42
Summer Potatoes	29
Sesame	18
Groundnuts	12
Others	218
Total Summer Crops	2005
Maize,Nili	180
Potatoes, Nili	50
Tomatoes, Nili	37
Others	66
Total Nili Crops	333
Sugarcane	116
Fruit Trees	217
Total Permanent	387
Total Crop Area	5074

4-Mention the Quantities of fertilizers used in kg/ha/yr
It depends on Crop type , growing stages, prices and availability
Moreover the data are not available at our Ministry . The National Consultant should be able to collect and processed the required data.
As average of year 1985-2000 it is evaluated as 347 kg/ha/year

5-What is the amount of water used for each type of crops in m^3/ha/yr

Crop	Consumptive Use m3 / ha	Crop Duration days
Clover, Permanent	6616	215
Clover, Transitory	2514	150
Wheat	4605	162
Broad Beans	3698	150
Winter Tomato	4052	135
Barley	4571	160
Sugar Beet	6500	190

Others		
Total winter Crops		
Maize,Summer	6230	117
Rice	10987	105
Cotton	7976	185
Sorghum	6546	110
Summer Tomatoes	4565	105
Soybeans	6100	90
Summer Potatoes	4565	90
Sesame	4552	90
Groundnuts	4832	150
Others		
Total Summer Crops		
Maize,Nili	5579	105
Potatoes, Nili	2863	90
Tomatoes, Nili	2863	105
Others		105
Total Nili Crops		
Sugarcane	19372	365
Fruit Trees	14432	365
Total Permanent		
Total Crop Area		

6-Mention the period of fertilizer application
According to fertilizer application management for each crop for each region (Upper – Middle – Lower and Delta region)

7-What is the level of fertilizer use:
-it is medium level because of the prices and the availability

8- What is the trend in fertilizer usage?
It is going down due to extension program for agriculture exportation

C. Inventory of types and quantities of pesticides used and the Crops on which they are used

1-What types of pesticide are used in the Nile Basin in your Country?

Table (2) Pesticides Used for Main Crops in one representive Districts during 2003:

Crop	Damanhour Agricultural	Kafr El Dawar	Used Pesticides	Rate of use per

	Land	Agricultural Land		Feddan (F=4200 m^2)
Cotton	**16,270**	**15,500**	**Bestian**	**1L/ F**
			Teleton	**750 cm^3 / F**
			Super alpha	**250 cm^3 / F**
			Sumi Gold	**150 cm^3 / F**
			Sumi alpha	**600 cm^3 / F**
			Skip	**1.5 Kg / F**
			Consult	**200 cm^3 / F**
Wheat	**20,019**	**16,624**	**1 Fox**	**31.5 gm/ 100 L.Water**
			Sumi 8	**35 cm^3/ 100 L. Water**
			Topic	**140 gm/ F**
			Puma Super	**1.25 L./ F**
			E.B.Flu 50%	**500 cm^3 / F**
Maize	**16,368**	**9,830**	**Sia Fox 50% EC**	**750 cm^3 / F**
			Marshal 25% WP	**600 gm/F**
			Hostavion 40% EC	**1.25 L./ F**
			Lanet 90% SP	**300 gm/ F**
			Neodrin	**300 gm/ F**
Rice	**16,411**	**17,406**	**Fuoridan 10%G**	**6 Kg / F**
			Beem 75% WP	**100 gm/ F**
			Sinozan	**100 cm^3 / L. water**
			Rotstar 25%	**750 cm^3 / F**
			Saturn 50% EC	**2 L./ F**
			Mashit 60% EC	**1.5 L. / F**

Source: Directorate of Agriculture and Land Reclamation Directorate at Behira Governorate

The List of Pesticides used in agricultural fields at representative Governorate, During 2003 (Follow..)

No.	Commercial Name	Active Ingredient
1	Ezerderine	Monocotophos
2	Oreon	Alany carb

3	Ortis	Venipro-oxymate 5%
4	Aploid	Pyromythrin
5	Agreen	Bacillus terngythis
6	Actelic	Premyifos methyl
7	Oreon Suspension	Iso-proturon
8	Estearine	4 amino 3,6 dichloro 6 fluoro 2 pyridyfoxy acetic acid
9	Apollo	Clofentezine
10	Agrathion 57%	Malathion
11	I.B.Flu 50%	Iso-proturon
12	Icon 2.5%	Lampada thiohaloutrine
13	Ataproun	Chloro flouzyron
14	Pominal	Dissolved organic protein
15	Pasta	Glyfosinate ammonium
16	Payrethroid	Ciflouthrin
17	Poldoc	Beta Ciflouthrin
18	Percal	Chloroperfos
19	Beem	tricylazole
20	Buma Super	Fenoxy prop bi ethyl
21	Parouk	Etaxazole
22	Pestox	Alpha methrin
23	Bravo	Chloro thalonil
24	Nebleet	Benomyl
25	Basodeen 600	Diazinon
26	Tobek 15%	Clodino feppropargyl
27	Tobo guard	Terbutrin
28	Tri-meltox Fort	Mancozeb
29	Grasp	Tralic oxydem 5%
30	Gool 24	oxyflorven
31	Galin Mancozeb	Mancozeb
32	Doursban	Chloropyrifos ethyl
33	Diazinox	Diazinon

34	Deltaneb	Vura thiocarb
35	Raisolex	Dimethyl carbamyl disulphide
36	Ratac	Divenacom
37	Clerate	Bro divenacom
38	Racomeen	Coma tetralyl
39	Rido Z 72%	Mancozeb + metalxil
40	Redomil Mancozeb 58%	Mancozeb
41	Redomil 50%	Copper 35% + metalxil 15%
42	Reldane 50%	Chloroperfos methyl
43	Rawind Ap 48%	Phosphor mono methyl glycin + isopropyl amine
44	Ransho 70%	Mefenacet
45	Redomil Plus	Copper oxychloro + metalaxil
46	Sencor	Metrobuzine
47	Somiton	Ventrothion
48	Somi Alpha	ES, fenvalerate
49	Somi Gold	ES, fenvalerate
50	Sevin 85%	Carbaryl
51	Sepercal	Cyper methrin
52	Slicron	Profenfos
53	Cyanoxy	Cynofos
54	Sidial 50	Ventoate
55	Saidoun 40%	Dimethoate
56	Saturn	Thiopencarb
57	Savix	Flam prop isopropyl
58	Sovix	Sulphur
59	Zinc Phosphide	Active phosphorus
60	Fabco mec	Abamectine
61	Fengsho	Denconazole
62	Vitfex 300 (57%)	Capatan
63	Fertemik	Abamectine
64	Victra 10%	Bromo canazole

65	Chlorozan 48%	Chloropyrefos
66	Caliron	Brofenofos
67	Korachron	Brofenofos
68	Calical	Carbaryl
69	Kotabroun	Chloroflouron + brofenofos
70	Kotran 80%	fluometren
71	Copper sulphate	Metallic copper
72	Agriculture sulphur	Sulphur
73	Agriculture sulphur superfine	Sulphur
74	Agriculture sulphur liquid	Sulphur
75	Agriculture sulphur microni	Sulphur
76	Komit 72% E.C.	Propargit
77	Larvin	Thiodecarb
78	LibaCid	Fenythion
79	Lannite	Methomyl
80	Malathione	Malathion
81	Marshal	Carbosulfan
82	Memiek	Thiolynoron
83	Muthrin	Vepropathrin
84	Mancozan	Mancozeb
85	Mashit	Butachlor
86	Modawon	Bifynoxy
87	Malatox	Malathion

2-Mention the quantities of pesticides consumed in tons/yr during the last 10 years?

Table 3 Import of pesticides in Egypt, 1971 to 1989

Year	Imported Value (MLE)
71-72	10.90
80-81	61.6
81-82	56.7
82-83	37.9
83-84	53.1
84-85	54.1
85-86	53.5
86-87	54.9
87-88	55
88-89	55.5

3-What are the categories of pesticides?

-Highly degradable non-persistent organophosphate

4- Which types of control?

-Control pest of crops (Integrated Pest Management strategy)

5-Which modes have been used for the application of pesticides

-Dusting (Smoking may be ???)

-Fumigation (for stored product, soil insects, and Nematodes.)

-Granular application (control soil pest, and seeding pest

-Seed-dressing)

6-How are the empty containers, and application equipment disposed of?

-Returned to the companies if it is in a big containers

7 Have any surveys been conducted in your country regarding any indication of pollution by pesticides?

Within the National Monitoring water quality program.

8 Which categories and types of pesticides are usually used for pest control:

actually I have no data or ideas . The Agriculture Sectors Knows much better

9 – How are expired pesticides disposed of?

actually I have no data or ideas . The Agriculture Sectors Knows much better also.

Table 1. Operating Wastewater Treatment Plants in Year 2000

	Governorates or Cities	Number of Plants	Operating Capacities (1,000 m^3/day)
1	**Damiatta**	3	127
2	**Daquahlia**	3	138
3	**Sharquia**	4	130
4	**Qalubia**	4	188
5	**Kafr ElSheikh**	1	19
6	**El Gharbia**	3	161
7	**El Beheira**	5	88
8	**El Monufia**	4	104
9	**Matrouh**	1	25
10	**Port Said**	1	190
11	**El Ismailia**	1	90
12	**El Suez**	1	130
13	**El Giza**	3	900
14	**El Fayoum**	1	40
15	**Beni Suief**	1	10
16	**El Menia**	2	60
17	**Assyout**	2	60
18	**Sohag**	1	22
19	**Qena**	1	30
20	**Luxor**	1	26
21	**Aswan**	1	21
22	**Greater Cairo**[1]	5	3,230
23	**Alexandria**[1]	2	317
24	**North of Sinai**	1	50
25	**South of Sinai**	5	31
26	**New Valley**	2	22
		59	**6,209** (2.27 bcm / year)

Note: 1) 5 plants in Cairo under GCGOSD, 2 plants in Alexandria under AGOSD, and another 52 plants at 2.662 mcm/day under NOPWASD.

2) Data source: Table 1 in Appendix 1.

D. Inventory of effluent producers along the Nile,

1- Identify the geographical location for the point source Pollution along the Nile river system,
- Give the location and no. of major non-point sources

2- Which one of the following pollution source are discharging their waste direct into the surface water course:

Surface water course (Canals , Drains , Lakes)

-Municipal sewage (Treated , partially treated , Un treated)
-Industrial waste, effluent from the factories
-Urban drainage and other collected waste water
-Runoff from Irrigated schemes

3-If the point source pollution is existing, what is the flow rate and the volume (m^3) of liquid waste which influent into the treatment plant and what is the effluent flow rate in the out let in m^3/day

4-What is the average concentration of the pollutant in the effluent into the Nile system

Table ( ): Results of Field Analysis for Canals and Rayahs

Canal & Rayah	DO	COD	BOD	RDS	TSS	FC
Consent standards	5	10	6	500	NA	1000
Menoufi Rayah	5.97	16	3.02	225	29	10000
El-Beherri Rayah	7.58	14	1.74	220	6	1000
El Nasey Rayah	6.71	12	3.96	220	16	10000
Astoun Canal	7.03	11	1.82	200	8	1600
Kelabia Canal	7.57	15	1.71	205	12	1500
East Naga Hamadi Canal	6.31	25	5.78	213	9	1750
West Nagahamadi Canal	7.22	18	4.32	200	6	2500
Ibrahimia Canal (Dairot)	7.84	37	3.55	200	8	2000
Ibrahimia Canal (El-Minia)	8.12	23	3.08	200	17	650
Ibrahimia Canal (Beni-Suef)	7.38	21	2.01	230	12	1500
El-Lahoun	7.08	10	1.89	305	12	5000
Sako	6.98	10	2.68	280	40	1100

Table : Loads of organic and inorganic pollutants discharged into the Nile from Upper Egypt drains.

No.	Drain Name	Location (KM) From HAD	Discharge mm3/day	COD ton/day	BOD ton/day	Heavy metals ton/day
1	Khour El sail Aswan	9.9	0.1	10.08137	3.241854	0.030333075
2	El Tawansa	37.25	0.01	0.08	0.01	0.003245242
3	El Ghaba	46.55	0.19	2.134957	0.194087	0.146341598
4	Abu Wanass	47.15	0.2	1.393427	0.254798	0.078330504
5	Main Draw	48.85	0.003	0.058752	0.005115	0.002106432
6	El Berba	49.1	0.15	16.95	6.4	0.10720323
7	Com Ombo	51	0.14	21.2	5.81	0.309122726
8	Menaha	55	NA	0	0	0
9	Main Ekleet	57	0.02	0.080664	0.030854	0.049174791
10	El Raghama	64.65	0.04	0.44712	0.069304	0.013346532
11	Fatera	70.45	0.78	3.89746	1.590164	0.418197458
12	Khour El sail	70.75	0.17	0.340774	0.178906	0.058016774
13	Selsela	73.9	0.004	0.01296	0.0054	0.005454
14	Radisia	99.85	0.13	2.0912	0.399942	0.02908075
15	Edfu	116.2	0.27	4.0335	0.427551	0.63742745
16	Houd El Sebaia	139.5	0.05	0.783824	0.08965	0.037256135
17	Hegr El Sebaia	149.1	0.05	0.941279	0.12633	0.02524114
18	Mataana	187.7	0.12	4.777461	0.385872	0.158207459
19	El Zeinia	236	NA	0	0	0
20	Habil El Sharky	237.7	0.08	2.37357	0.140832	0.084222176
21	Danfik	251.55	0.01	0.279616	0.020724	0.00865576
22	Sheikia	265.3	0.06	2.21371	0.102908	0.279794995
23	El Ballas	270.7	0.01	0.919152	0.068809	0.003788311
24	Qift	275.9	0.03	0.97911	0.052219	0.012744749

25	Hamed	331.2	0.07	0.737748	0.067068	0.023239062
26	Magrour Hoe	340.35	0.06	1.232889	0.190217	0.061497678
27	Naga Hammadie	377.8	0.21	2.7937	0.466333	0.35920535
28	Mazata	392.75	0.01	0.05868	0.012851	0.001329102
29	Essawia	432.7	0.07	0.667818	0.180311	0.037731717
30	Souhag	444.55	0.05	0.4275	0.133475	0.01826375
31	Tahta	486.4	0.01	0.131796	0.012615	0.001829454
32	El Badary	525.4	0.12	0.71964	0.392204	0.05703147
33	Bany Shaker	588.6	0.02	0.254826	0.044105	0.005968809
34	El Rayamoun	637.4	NA	0	0	0
35	Etsa	701.15	0.57	57.0	21.66	0.105359548
36	Absoug	780.5	0.19	5.637194	0.36739	0.066965977
37	Ahnasia	807.2	0.54	7.583128	0.709564	0.138933738
38	El Saff	871.3	NA	0	0	0
39	El Massanda	879.6	0.14	6.3666	0.705985	0.02624454
40	Ghamaza El Soghra	884.5	0.06	2.503872	0.150232	0.027214704
41	Ghamaza El Kobra	884.95	0.05	1.537152	0.182056	0.013618206
42	El Tibeen	898.1	0.02	0.50425	0.306584	0.007795705
43	Khour Sail Badrashin	910.15	NA	0	0	0

5-Indicate the pollutant load in kg/day in the effluent that emanates from different sectors of industries

6- What is the pollution reduction ratio for each plant?

Data are not available

7-Identify the efficiency of the waste treatment plants existing along the River Nile system

Data are not available and it varies from one station to another depending on budget allocation for operation and maintenance

E. Dedication of one good Laboratory, as a Nile water testing laboratory, indicating existing capacity and required support in equipment and training

This Part has been answered

1-How many **water quality** testing laboratories exist in your country

2-What lab facilities are available for water analysis:

-Basic /simple lab

-Routine physico-chemical lab

-Advanced lab

-Sophisticated and very advanced lab

3-Mention the manpower experience and staff qualification

-MSc

-BSc

-Diploma
-Higher diploma
-others

4-Experience with water analysis and methods adopted
-Instrumental
-Titrimetric and gravimetric
-Field- mobile lab
-Other

5- Required support in equipment and manpower

6-Do the labs execute a quality assurance program or share in any inter-Comparison regionally, or national labs

7-Identify a **water testing lab** in your country that can be **dedicated** to the NTEAP and be used to test water samples from the Nile and also to be a direct beneficiary of all Basin wide water quality monitoring support.

8- Indicate the Training needs for the senior level cadre of staff in the chosen dedicated laboratory

F. Inventory of settlements along the Nile and the status of environmental sanitation

1-What is the number of population living in the towns or villages nearest to the Nile system?

Total population of Egypt are estimated as 72 millions (currently)
Tow third of them are living in Delta region
One third of them in Upper Egypt very close to the River Nile Course
Total Number of villages about 4600 with inhabitants ranged between 2000 to 20000. in addition to 700 sub villages belong to each main village with inhabitants of 100 to less than 2000 peoples.

2-Which types of sanitation system are adopted in the settlements:
-Pit latrine, bucket, dug well (in small villages)
-Septic tank (in most of the villages)
-Sewage and network system (in Cities and towns)
-None (at the desert areas)

3-What is the amount of solid waste produced ton/day/village

Location	Population (million)	Collected Wastes kton/day	Needs to be Collected Wastes kton/day

Urban	23.35	16.92	15.23
Peri-urban	10.3	4.12	2.88
Rural	22.0	6.60	1.32
Total	55.65	27.64	19.43

4-What solid waste management practices are in place?
Partially recycled and partially dumped in specific places.
5- What types of water related diseases are common in the resident area?

-Water borne diseases
-water related diseases

G. Procedure to be adopted for handling transboundary pollution

- Identify one reliable procedure from the following; that you think can be adopted for handling trans boundary Pollution, and give your comments, and ideas.

1-To develop a permanent commission, with membership from all the Nile basin countries: The Commission is to be given specific mandates

2 – To develop, only at the trans boundary and cross- border levels, Standing Water Quality Committees, on which the respective countries are represented by a team of stakeholders. These committees will have to develop their on TORs.

3 – From your own experience, outline the cross- border and trans- boundary, pollution reporting steps and response and action mechanisms, that should be institutionalized to handle trans boundary pollution effectively.

This to be discussed with the WQ working group next meeting

2.6 SUDAN

Inventory of Potential Threats to Nile Water Quality

By
N. B. I Shakak
M. K. Ahmed Ali

Ministry of Irrigation and water Resources
Groundwater and Wadis Directorate, Labs

1- The Nile System development

1-1 Main tributaries and Discharge Fig(1)

	Km cubic
The Blue Nile + (Dinder & Rahad)	50
The White Nile	28
The River Atbara	12
The Main Nile (Total)	94

1-2 Dams :(see table(1)

Table (1)

Dam Name	Date of construction	Design capacity km cubic	River	Coordinates	
Sennar	**1925**	**0.9**	**B. Nile**	**33 38 .22**	**13 32 .857**
Rosarse	**1966**	**2.4**	**B. Nile**	**34 23 .309**	**11 47 .975**
Khashm ElGirba	**1964**	**1.3**	**Atbara**	**35 45 .153**	**14 57.900**
Jebel Aulia	**1937**	**3.5**	**W. Nile**	**32 29 .202**	**15 14 .291**

The function; is to store and control water for agriculture, Hydropower, and to control flood.
Merrawi dam is under construction and mainly for hydropower generation (on the main Nile and expected to be completed in 2008.

1-3 Agricultural Schemes and Crops: - Fig (2)

The Total cultivated area by the Nile water is 4 million Fadden's. Gezira, Rahad and Halfa are the main schemes.
Durra , Cotton, Vegetables. Nuts, Horticulture is the main crops.
Flood irrigation technique is implemented.
Wad Medani (The 2nd largest town in Sudan) is the head quarter of the Gezira Scheme.

2- Natural threats:

2-2 Suds Swamps and weeds:-

The White Nile and its tributaries crossed different ecological systems. The swamps extension is about 770 km upper stream while swimming weeds continue to middle stream, However swamps and weeds create good environment for fishing and act as natural purification system also constrain navigation and flow and increase evaporation rates. The quality analysis of water shows a marked increase in DO, PH, Sulfate and Ammonia Nitrogen.

2-2 Sedimentation

Due to its flashy and rapid nature the Blue Nile, Atbara Dendir and Rahad rivers carry annually huge load of Sediments affects negatively the capacity of water storage facilities and canals. More over it increases turbidity and causes blockage of the hydropower generation turbines and dams gates.

2-3 Desertification and bank erosion:-

Especially in the north where and climate conditions prevail, the geomorphology of the Nile system is threatened by the sand dunes and creeping sand sheets. More over bank erosion leads to emerging of river islands. The geomorphologic changes constrain navigation as
Well as agricultural practices.

3-Man made threats:-

Point and non point pollution threats result from urbanization, agricultural and industrial practices. The facts that over 70% of the country population clustered along the Nile and its tributaries putting more pressure of the Nile water quality. Point pollution threats occur in forms of direct or indirect drain of waste in to the Nile system.

3 -1 Point pollution threat:-

3-1-1 Municipal Wastes Disposal:-

Most of the towns in Sudan lack unique waste disposal system. Solutions including pit – latrines, open areas and septic tank are used by individuals.
Few waste disposal systems found in old Khartoum Hag Yousif in Khartoum North, Soba and Goz in South Khartoum.
These systems serve about3 % of the capital population. A plan for new extension in Khartoum North is formulated. Leeching of solid waste is also a sort of pollution threats.
The first waste disposal plant was established in 1959 at El- Goz South Khartoum and consists of waste stabilization ponds. In 1985 and due to the extension of the capital this plant was stopped and replaced by Soba plant with a capacity of 31420 cubic m/day.

The second plant is located in Khartoum North with a capacity of 13200 cubic m/day. Due to the different industries in the area the plant failed to continue. Inefficiency is due to old sewer, corroded and leaky manholes.

3 -1 -2- Industry waste Disposal Threats:

However Sudan is agricultural country, small scale industries were established. The lack of waste treatment plant is against legislation and causes quality threats to the water resources system including the Nile. In most cases no proper treatment and the industrial waste drain to municipal waste system.

Sugar mills, industrial area (El Bagair), Textile Tanneries, poultries, Slaughter houses, thermal electric power station are the main industries.

Table (2) Liquid Waste Disposal of selected Sugar Mills

factory	location	Estimated Disposal as waste m3/hr	Disposal site
Gunied sugar mill		5000	Blue Nile
Sennar sugar mill		2000	Blue Nile
Assalaya sugar mill		3000	White Nile
New halfa		500	Open field, washed to the Nile
Kenana		1850	Open field washed to the Nile at the flood time

3-2 Non- Point pollution Threats:-

3-2-1-Pesticides

Agrochemical applications were introduced into Sudan since 1930
in Gezera Scheme for capacity cotton pests and extended to other agriculture schemes and horticulture field. A total of about 200 active ingredients
Compared with previous years the trending is rising.
Ingredient were registered in Sudan in 600 formula of pesticides (450 tones), insecticides 150 Tones (1993-1997). Threats are due to

- Pesticides residue and degradation products.
- Improper spray
- Empty container handling
- Dumping of surplus and application

Example organ chlorine is persistent serious contamination problem in Gezira scheme canal and borehole in Hassahessa

Types of Pesticide:-

- DDT
- Cyclodienes
- Organophosphanes, compounds
- DDT and Dimetheate (mixture)
- Pyrelhroids
- Endosulfan chlorinated cyclodiene as the largest single pesticides used vegetable and suit all crop bests including locust birds and rodents and mosquitoes

Tables (3): The annual quantities of pesticides consumed in kg during (1993-1997) presented by the active ingredient content Rather than total weight of the formulations:

Quantity of active ingredient

Item	1993	1994	1995	1996	1997
1-Insecticides:					
1-1-chlorinated hydrocarbons	85314	181855	223021	526031	211436
1-2-Organo-phosphates	171493	504366	500204	519770	568015
1-3-Carbamates insecticides	65590	24588	60626	82577	45397
1-4-Pyrethroides	32347	32185	1238366	3372	81146
1-5-Others	6168	-	-	-	568015
Total insecticides	360912	743024	2122217	113950	905994
2-Herbicides:					
2-1-phenoxy hormones product	-	-	46080	19928	432
2-2-Triazines	-	179000	23939	64416	23474
2-3-Amides	28657	1037	10499	-	
2-4-Carbamates herbicides	-	-	-	-	78000
2-5-Dinitroaniline	64785	18000	28634	720	78353
2-6-Urea derivative	11165	11165	10437	128000	-
2-7-Others	-	2880	35046	-	94215
Total herbicides	94607	76982	172635	213058	274474

Table (4): Stock of obsolete unwanted pesticide found in PPD, and Irrigation schemes for period 1996-1998

location	Liquid	Liquid	Solid	Solid
	1996	1998	1996	1998
PPD	113936	176240	37455	119149
BLUE NILE	200	1000	3000	-
WHITE NILE	1700	1700	-	-
SUKI	1825	1850	-	4900
RAHAD	200890	50023	6540	77230
NEW HALFA	46000	21040	-	9540
SUDAN GEZIRA BOARD	216850	152661	2000	30300

- The practices of dumping solid waste in the seasonal streams result in point source pollution during the rainy season when was out and drain to the Nile.

3-2-2-Fertilizers:

The annual consumption of Fertilizer in the whole Sudan is estimated buy ministry of Agriculture authorities as:

1- Urea used in the irrigated schemes in a total area of 1.9 million hectares (80000-200000 tons of Urea /y)

2- Super phosphate, is mainly used in the northern states for the Wheat crop (20000-40000 Tons/ y) (See table 5)

Table (5): Imported Quantities of fertilizers during the period 1993-1997
In metric tons

Item	1993	1994	1996	1997
Urea 45% Nitrogen	199222	73299	183550	170838
Super phosphate	34005	28400	3630	26378

4-Lab Facilities: **(see table 6)**

Table (6) Existing water quality Laboratories in Sudan, their capacity and Required support

ution	Name of laboratory	Lab. facilities	manpower experience & staff qualification	methods adopted	quality assurance program	Required support	Training needs for the senior level staff
ry of ion and resources	1-Ground water and Wadis central lab	Routine physico-chemical lab	MSc : 8 chemist BSc : 2 5 Technicians 3 Assistant	Standard method for examination of water -chemical analysis - Bacteriological test in field	Periodical Inter comparison program by IAEA& African countries	Equipment ,chemical, training	-Short training courses -New equipment and techniques -Quality assurance methods -Data management -Mapping water quality data
try of ion and resources	2-Two regional labs: -Sinnar State -North kordofan lab, -Kassala state	Basic /simple labs	-BSc: one chemist for each lab -Tow assistances for each one	Standard method for examination of water -chemical analysis - Bacteriological test in field	none	Equipment ,chemical, training	-Shore training courses -New equipment and techniques -Quality assurance methods -Data management
sity of oum	Institute of Environmental studies analytical lab(IESAL). Mainly for Students limnological-research	-Chemical analysis -Biological characteristics of water: - phytoplankton -Zooplank, and Benthos -Aquatic weeds	1-Ph.D coordinator 2-Tow technician 3-Three assistants	Standard method for examination of water	none	Equipment ,chemical, training	New equipment and techniques -Quality assurance methods -Data management

4-Ministry of Health	**National health laboratories**	**Routine physico-chemical lab.**	**-tow scientific researcher -tow scientific research assistance -three lab technicians -tow lab attendants**	**Standard method for examination of water -chemical analysis -Bacteriological test**	**Issuing quality assurance certificates for potable water**	**Equipment ,chemical, training**	**-Short training courses -New equipment and techniques -Quality assurance methods -Data management**	**Old equipment and some need repaired**
Ministry of Engineering Affairs	**5-Khartoum State water corporation laboratory**	**Drinking water Quality control and treatment labs.**	**One MSc Five BSc Tow technicians with diploma**	**Standard method for examination of water -chemical analysis -Bacteriological test**	**none**	**-Equipment --chemical for water treatment -training**	**training courses and Modern --new techniques -Quality assurance methods -Data management**	**Old models equipment and some need repaired**
Ministry of Engineering Affairs	**Construction and environmental laboratory**	**Routine Physical and chemical analysis for industrial and domestic sewage**	**One scientist with MSc -five BSc -one technicians with diploma**	**Standard method for examination of water and waste water**	**none**	**-Equipment maintenance -chemicals -Training courses**	**Training courses, to the higher and lower level staff -Modern new techniques -Quality assurance methods -Data management**	**Old equipment and some need repaired**
Ministry of Irrigation and water resources	**The Hydraulic research station lab.**	**Sedimentation research and silt monitoring in Blue Nile system**	**-one PhD -Five technicians**	**Standard method for examination of water**	**none**	**-Equipment maintenance -chemicals -Training courses**	**Training courses, to the higher and lower level staff -Modern new techniques -Quality assurance methods -Data management**	**Old equipment and some need repaired**

Recommendations

1-To develop, only at the Trans boundary and cross- border levels, Standing Water Quality Committees, on which the respective countries are represented by a team of stakeholders. These committees will have to Develop their on T.O.Rs.

2- Two good Laboratories were recommended as a Nile water testing laboratory (see table)

a- Ground water and Wadis central laboratories for physico Chemical analysis and Bacteriological test

b- Institute of environmental studies analytical lab (IESAL), for Biological characteristics of water:

3-We recommend that research studies should be conducted to:
- Control of water hyacinth and its risk on water resource
-Biodiversity in River Nile
-Studies in Biological indicator

Reference:

1-UK, (1969), Hydro Biological research unit, sixteenth annual report, Khartoum

2-Tahani.A, Alawia .A,(1998), Report on the inventory of obsolete and Unwanted pesticides stocks, contaminated soils and empty drums required Disposal in Sudan, PPD, M. of Agriculture

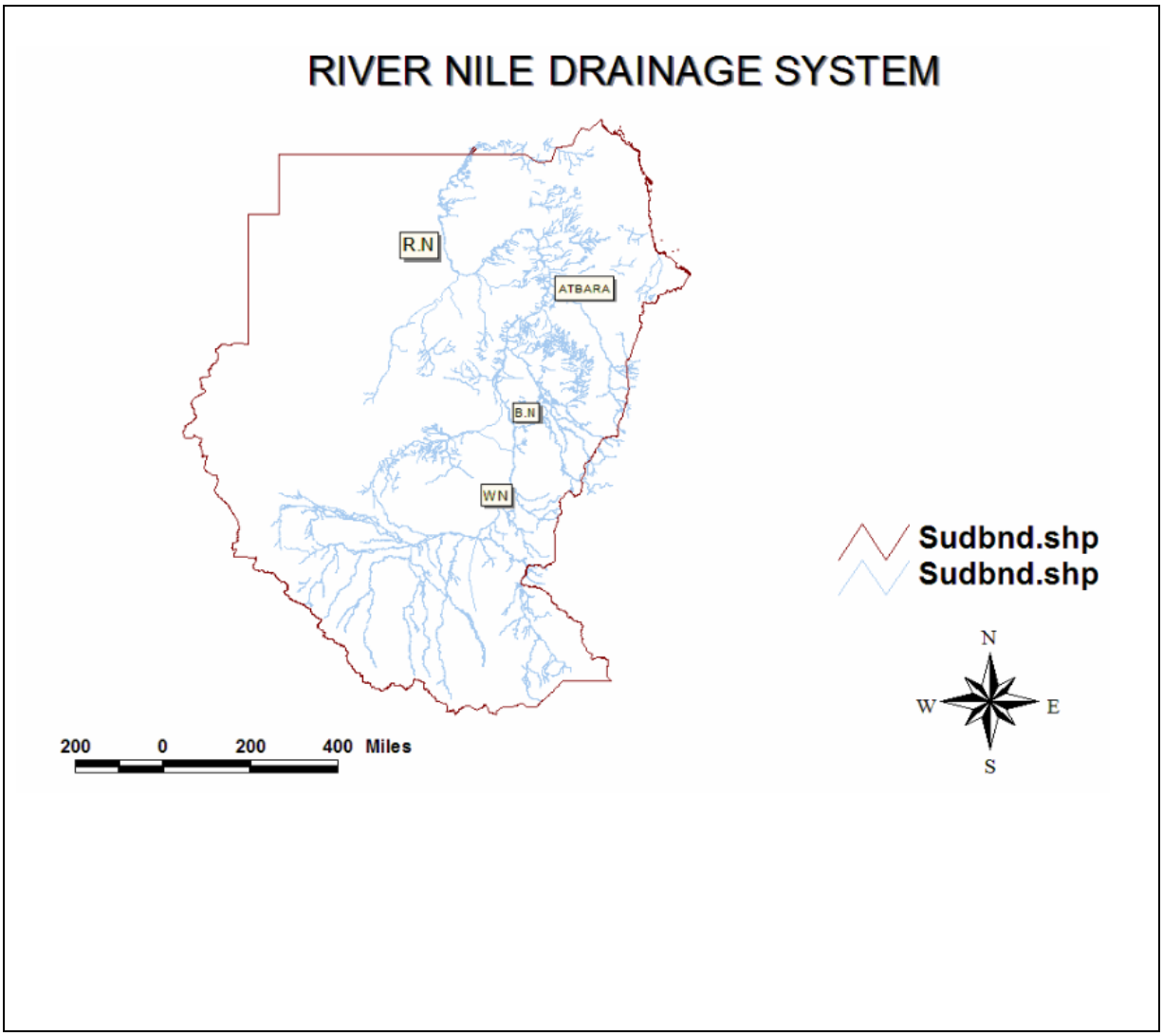
3- UNESCO, (2003), Workshop on water research and future, Khartoum Sudan

4-National Research Council, (1997), Water Resources of the Sudan, Khartoum

5-Riham Z, Dr Basheir M,(2003).Environmental impacts of industrial wastes in El Bagair industrial area, Journal Sudan Engineering Society. Volume 49

Annex:

Fig (1)


RIVER NILE DRAINAGE SYSTEM
R.N
ATBARA
B.N
WN
200 0 200 400 Miles
Sudbnd.shp
Sudbnd.shp
N
W
E
S

Fig(2)

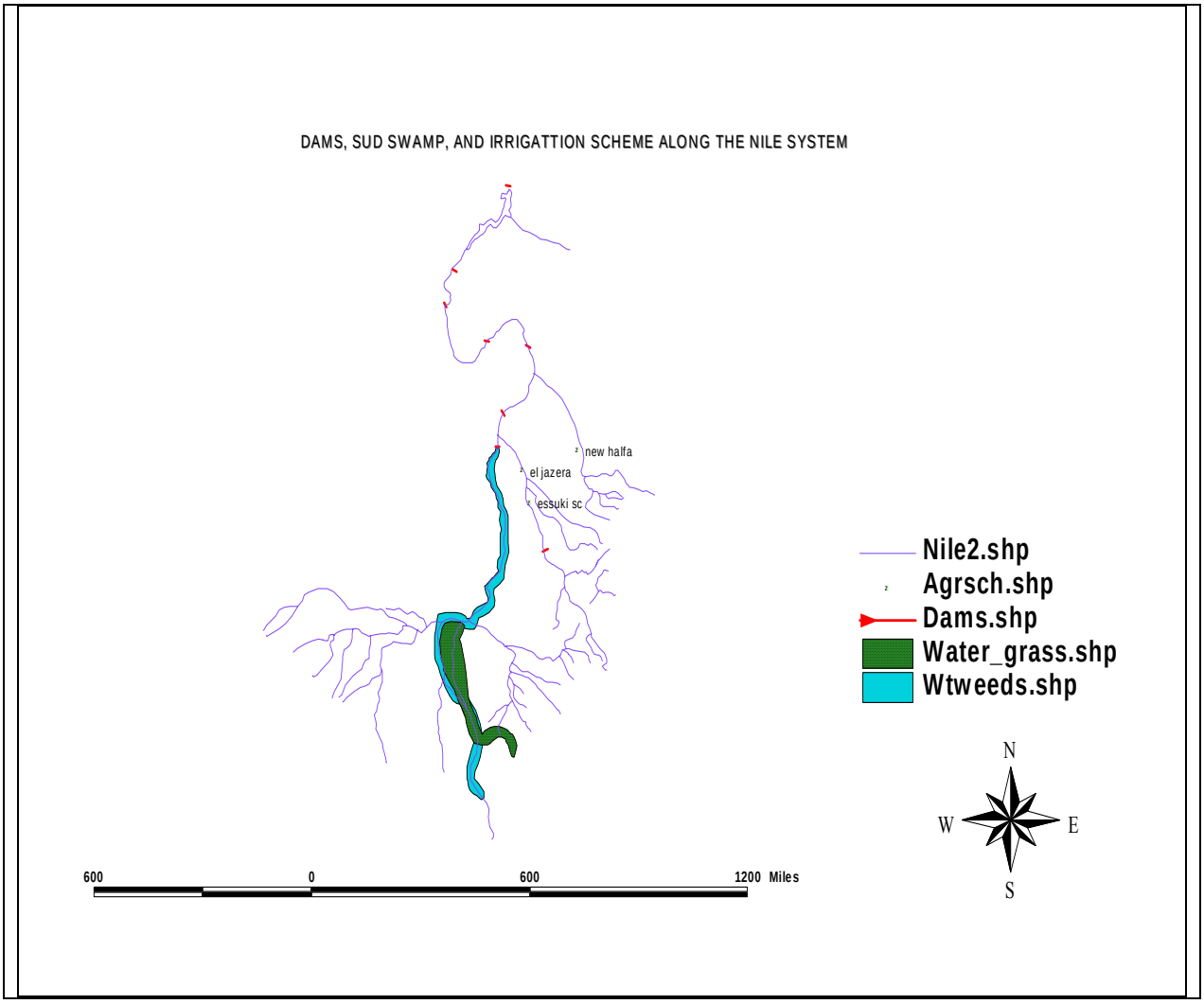

DAMS, SUD SWAMP, AND IRRIGATTION SCHEME ALONG THE NILE SYSTEM
new halfa
el jazera
essuki sc
Nile2.shp
Agrsch.shp
Dams.shp
Water_grass.shp
Wtweeds.shp
N
W
E
S
600
0
600
1200 Miles

Fig (3)

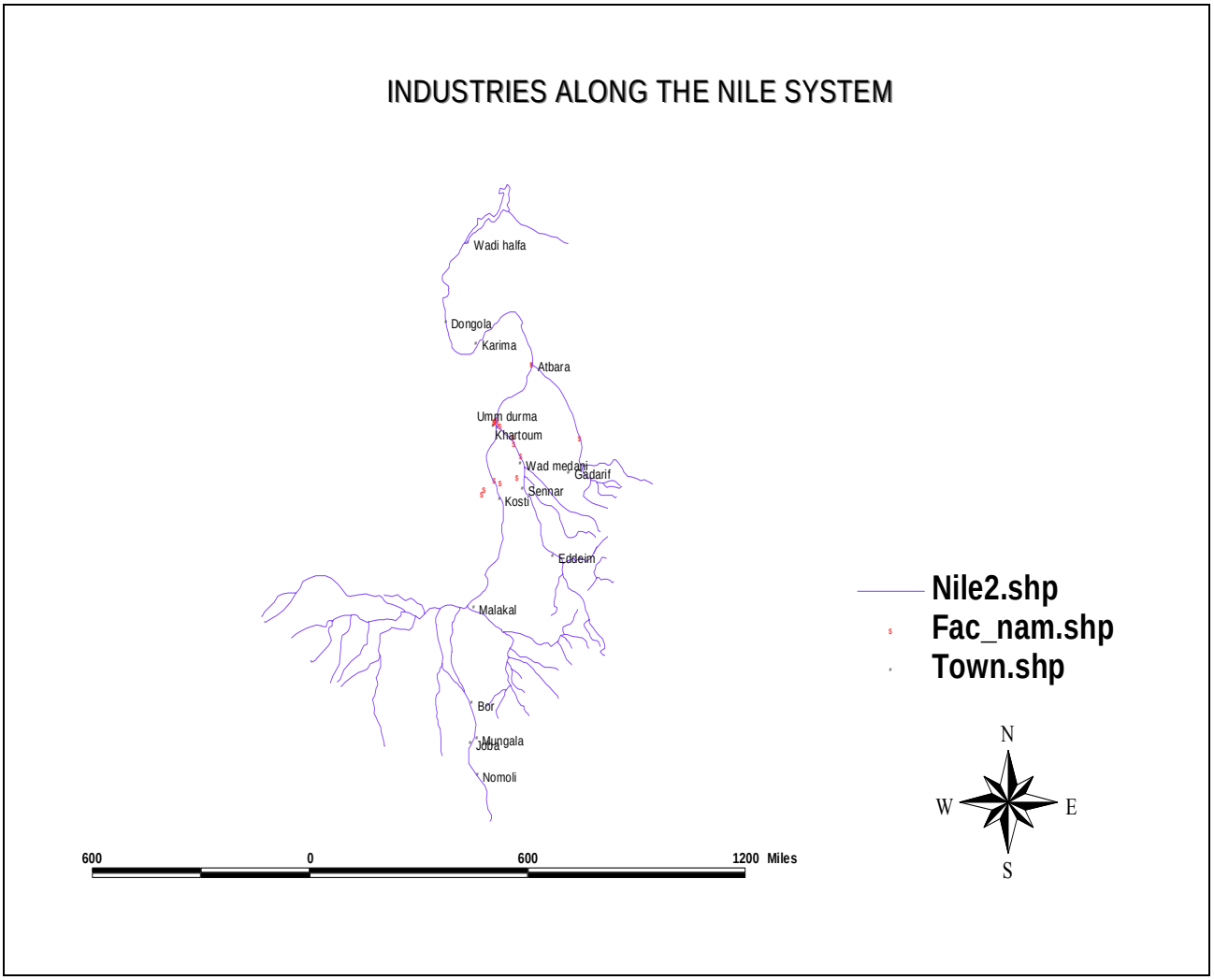

INDUSTRIES ALONG THE NILE SYSTEM
Wadi halfa
Dongola
Karima
Atbara
Umm durma
Khartoum
Wad medani
Gadarif
Sennar
Kosti
Eddeim
Malakal
Bor
Mungala
Jobra
Nomoli
600
0
600
1200 Miles
Nile2.shp
Fac_nam.shp
Town.shp
N
W
E
S

Fig (4)

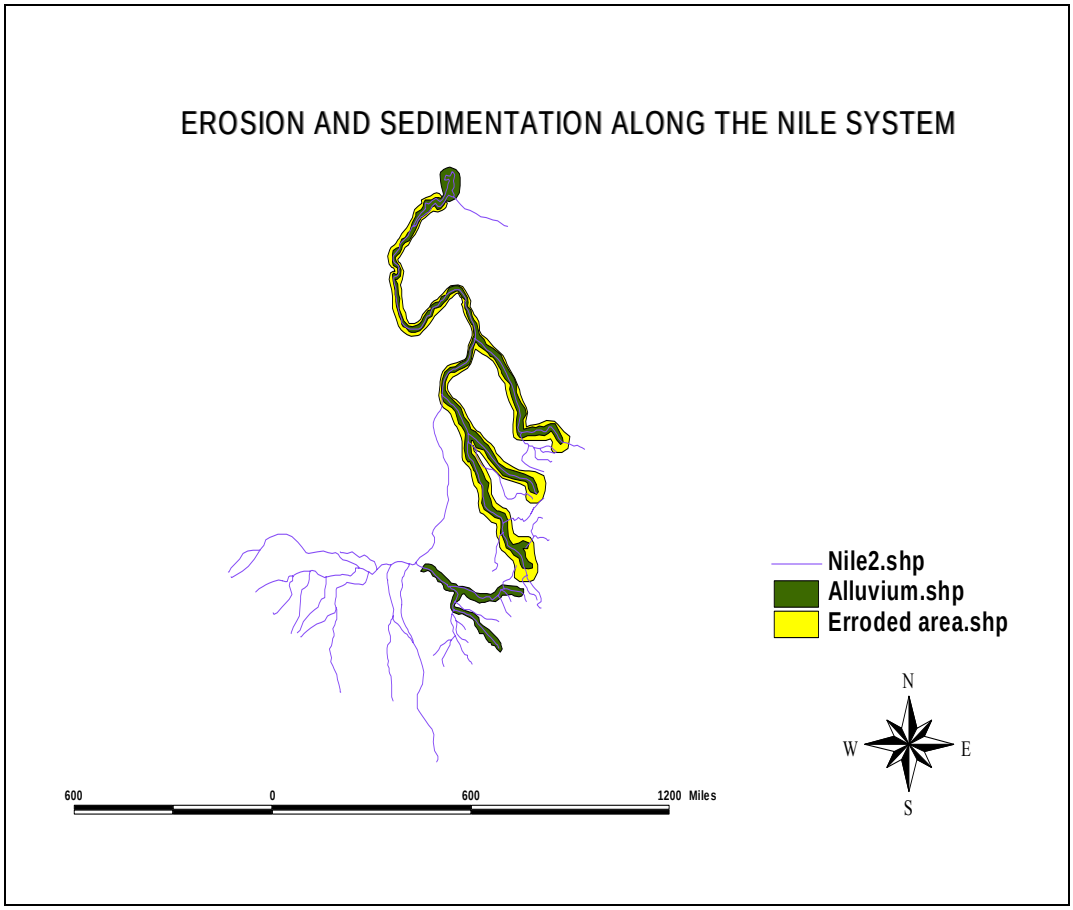


Table (7): The water characteristics of the Blue Nile between Khartoum and Sennar (June 25th-July 1st 1966)

Station	**Bagair**	**Maseed**	**Dinder**	**Sennar**
Date	25-6-1966	26-6-1966	26-6-1966	1-7-1966
Distance from Khartoum	32km	48km	280km	357km

Sample depth	**0 meter**	**1meter**	**2meter**	**4meter**	**Bottom' meter**	**0 meter**	**0 meter**	
Temperature c°	28.4	28.4	28.5	28.3	28.0	27.7	26.0	28.
PH	8.2	8.2	8.2	8.3	8.4	8.4	8.4	8.2
O2	7.5	7.5	7.5	7.5	7.1	7.0	6.8	7.5
NO3 N mg/l	-	-	-	-	-	-	trace	trace
Po4.P mg/l	0.5	0.5	0.39	0.38	0.48	0.6	0.3	0.39
calcium	43.2	43.2	43.2	44.1	44.6	43.2	43.2	43.2
SiO2	21	21	21	22	22	27	20	23
Fe	-	-	-	-	-	-	-	-
Conductivity(µmho /cm)	193	195	195	195	196	196	193	191

Source: hydro biological research unit

Fourteenth annual report.1966-1967
Discussion:
-Result at st.1 (Bagair), show relatively, and inconsistent different were recorded between different levels. These due to high current Velocity and may be due to absent of temperature stratification

CONTENT:

2.7 DRC

National Baseline Water Quality InventoryDR Congo

A. **Inventory of Potential Pollution Threats** :

A1. Water resources projects:

- Fishing development centres in Vitshumbi and Kasenyi
- Water supply (Rural development project)
- Fishery project in the lakes Albert and Edward: It is a regional project bringing together Uganda and DRC (a Nile Basin Initiative project)

A2. Industrial Development Projects

- Mining: There is only the indigenous method of coltan exploitation
- Electric energy production in Butemba and Ruthuru
- High traffic roads (considered to be dangerous) : Beni-Goma, Beni-Bunia (for the transport of petrol products from Uganda)

B. Inventory of the Type and Quantity of Fertilisers the Cultivations

B1. What are the types of fertilisers in the farms and cultivated area in the last 10 years?

- The use of fertilizers (chiefly NRK, 17-17-17 and urea), is minimal in the wetlands cultivations

B2. In what type of cultivations are these fertilizers used?

- Garrotte, onion and leek

B3. What is the trend in the utilization of fertilisers?

- The trend is one of gradual decrease

C. Inventory of the Type and Quantity of Pesticides Utilised in Cultivations

C1. What is the fate of t pesticides containers?
-Small are boxes thrown into the nature?
- The large boxes are cleaned in the rivers and rehabilitated by the rural people
In fact the use of pesticides is sporadic and negligible.

D. Inventory of Sources of Waste along the Nile

E. Designation of Baseline Laboratory for water quality in the Nile, indicating is capacity and required support in terms of equipment and training

E1. How many water quality laboratories are there in country?
- 6 labs more or less

E3. What is the existing water quality analysis equipment?
- Routine physicochemical labs
- Advanced analyses labs : CRENK-K and REGIDESO

E4 Staff experience and qualifications
- Bachelor – more or less 15 persons

E5. Required Support in Equipment and Personnel

- The need for an itinerant laboratory
- The need to rehabilitate the laboratories of the Nile Basin
- The need to enhance the capacities of the human resources

E7. We wish call for the rehabilitation of two water quality laboratories in the Nile basin, one at Lake Albert and another at Lake Edward. For the enhancement of the capacities of the advanced laboratories, we recommend the laboratories of CRENK-K and REGIDESO.

E8. The need for training for senior and junior staff of the selected laboratories in the following fields:

-Water quality analyses and monitoring techniques and the use of modern equipment in this respect
- Methods of analysis and interpretation of results

F. Inventory of Settlements (villages) along the Nile and the sanitary status

F1. What types of sanitation are being adopted in the villages?
-Latrines in the villages situated far from waterways
- For the villages which are close to waterways, these waterways are their latrines

F5. What are the common water-borne diseases in the residential areas?

G. The measures to be adopted to tackle Transboundary Pollution

- Identify from amongst the procedures selected hereunder, one which you judge the most appropriate for transboundary pollution control and give your comments and ideas.

1. Setting up a permanent commission composed of members from the Nile Basin countries. The commission must have a clear mandate.

The Mandate:

- Prepare an inventory of and harmonize the existing norms in the different countries of the Nile
- Lay down the norms for the whole Basin
- Monitor periodically the application of the adopted norms
- Conduct the periodical assessment through the national laboratories: the commission can conduct the assessment in each of the Nile Basin countries.

Our wish is that the Water Quality Working Group members be automatically coopted into this regional commission, two member per country.

2.8 ETHIOPIA

By Solomon Gabret Sadik

Potential Threats:

Alwero Irrigation Scheme

Fincha Irrigation Scheme

Power Generation stations

Sediment

Tanneries

FERTILIZERS

Nitrogenous compounds

DAP

Natural Manure

CROPS

Pulses

Teff

Barley, wheat and maize

Quantity applied 12- 40 kg/ha/yr, usual before rains (June, July. Aug. and Sept.)

PESTICIDES

All types in use

Qty. unknown

Used to control pests and locusts

Areal spraying and manual

Disposal is by burying containers

Exposé: **Présenté par Docteur NDA YEGAMIYE Joseph**

EFFLUENT **PRODUCERS**

Poor sanitation practices, and poor solid waste management.

Runoff, and untreated domestic waste

1. INFORMATIONS GENERALES SUR LE PAYS

1.1. Contexte phvsique et démographique

Le Burundi appartient à l'ensemble du pays dits des Grands Lacs
Pays limitrophes: RWANDA au Nord, TANZANIE à l'EST et au Sud, CONCO à l'OUEST.

Superficie	: 27.834 km2
Population	: 7.032.000 habitant
Population urbaine (2002)	: 10%
Popuiation rurale (2002)	: 90%
Densité moyenne	: 192 habitants/km2
	Ou 210 habitants/km2 (si on ne tient pas compte de la superficie occupée par les lacs)

LABORATORIES

Il est divisé en 5 grands ensembles caractérisés par : Federal 9

Regional 31

Often poorly equipped

Manpower- mostly BSc.

No QA

Training will be required and support to labs.

3.9 BURUNDI INFORMATIONS GENERALES SUR LE PAYS

Le Burundi appartient à l'ensemble du pays dits des Grands Lacs
Pays limitrophes: RWANDA au Nord, TANZANIE à l'EST et au Sud, CONCO à l'OUEST.

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Densité moyenne	: 192 habitants/km2 Ou 210 habitants/km2 (si on ne tient pas compte de la superficie occupée par les lacs)

		T° en °C	Altitude (m)	Pluviosité (mm)	Superficie (%)	Densité (habitant/km2)
1	Plaine de l'IMBO	Moyenne > 23	774-1000	800-1100	7	100-200
2	MUMIR W A	18-28	1000-1900	1100-1900	10	300
3	Crête Congo-Nil	14-15	1700-2500	1300-2000	15	280
4	Plateaux centraux	17-20	1350-2000	1200-1500	52	400
5	Dépressions de l'Est et du Nord-Est	20-23		**1100-1500**	16	120

1.2 Le réseau hydrographique

Le réseau hydrographique appartient à 2 grands bassins:
le bassin de Nil (13.800 km2) : drainé par la rivière RUVUBU
le bassin du Congo (14.034 km2) : drainé par la RUSIZI au Nord et la MALAGARAZI au Sud.

2. Sources potentielles de pollution dans le Bassin versant du NIL

2.1. Pollution d'origine fécale

Elle est due à la population et au bétail
La charge polluante engendrée par le bétail est moins importante que celle des êtres humains car une grande partie des bouses sont récupérées pour faire du fumier (dégradation naturelle).

Charge polluante du bétail aux différentes horizons en kg/j

Province	1995			2000			2010		
	DB05	Azote	Phosph	DB05	Azote	Phosph	DB05	Azote	Phosph
Bubanza	]8496	4460	] 7]5	23 488	5664	2]78	33 473	807]	310
Bujumbura rural	8658	2087	802	10056	2425	932	12 851	3099	119
Bururi	34550	8327	3203	44207	10 655	4098	63 521	15310	588
Cankuzo	13 799	3328	1 281	17 085	4 121	1 585	23 659	5708	219
Cibitoke	14954	3604	1 386	18314	4414	1698	25 032	6033	232
Gitega	29 153	7035	2706	39 183	9458	3637	59 246	]4301	550
Karuzi	Il 378	2742	] 055	13 801	3326	] 279	18 646	4493	172
Kayanza	16 860	4063	1 563	21 143	5 120	1969	30010	7231	278
Kirundo	14 960	36]3	1 389	]8531	4477	] 722	25 673	6204	238
Makamba	14 203	3420	] 3]5	17 682	4257.	1 637	24 639	5932	228
Muramvya	26 717	6436	2476	32 133	7742	2978	42 965	]0353	398
Muyinga	17938	4334	1666	23125	5589	2 149	33 497	8097	311
Ngozi	20 906	5042	1 939	27 577	6650	2558	40 924	9870	379
Rutana	15 248	3676	] 4]4	]8742	4518	1 737	25 732	6203	238
Ruyigi	15 176	3659	] 407	18 876	4550	] 750	26 272	6332	243
Bujumbura-ville	0	0	0	0	0	0	0	0	
Burundi	272 995	65 826	25 317	344 045	82 965	31 907	486 141	117 234	4509

Taux net de desserte en eau potable en milieu rural (2003)

Type de point d'eau	Nombre	Nombre de ménages desservis
Source aménagées fonctionnelles	13282	360102
Bornes fontaines fonctionnelles	3036	83417
Branchements privés	2479	2479
Puits fonctionnels	205	6313
Total	19002	452311
Total ménages pouvant Etre desservis	1053955	
Taux de desserte net	42,9	

Source: Statistique de l'eau potable 2003.

Taux net de couverture en assainissement en milieu rural (2003)

Type de latrines	Nombre total de latrines	Population couverte (ménages)
Latrines traditionnelles en bon état	209 056	209.056
Latrines VIP	3203	3203
Latrines améliorées	15918	15918
Latrines à fosse sceptique	940	940
Total	229 117	229 117
Total ménages		1 053 955
Taux net de couverture	21,7%	

Source: Rapport annuel sur l'état de l'environnement, édition 2004.

2.2 . Pollution agricole et phytosanitaire

Due surtout aux méthode culturales et aux feux de brousse qui accentuent le transport des matières vers les cours d'eau. Elle est aussi due à l'utilisation des insecticides dans les cultures de café.

Culture	Superficie	Insecticide		Période d'application
		Matière active	Produit commercial	
Café	60.000 ha	FENTHION	LEBA YCID	mi-juillet et mi-août
		FENITROTHION	SUMITHION	

Quantités: - 72.000 l par an de matière active pour tout le pays
- 2.400.000 kg par an de produit commercial pour tout le pays caféiers traités: 120.000.000

2.3.Pollution industrielle

2.3.1. Le secteur industriel est dominé en milieu rural par les usines à café, à thé, par quelques petites fermes rurales et par des usines de dépulpages de café implantées sur tout le territoire national et produisant une forte charge de matières organiques.
Ces usines n'ont pas de système de pré traitement des effluents et ne sont pas branchées à une station de traitement des eaux usées, ce qui entraîne une réduction de la capacité naturelle d'auto-épuration des rivières réceptrices de ces effluents, particulièrement aux tronçons de rivières situés en aval des usines de dépulpage du café.

2.3.2. L'exploitation minière

- L'exploitation minière étant encore au stade artisanal, les problèmes d'ordre environnemental ne se posent pas encore.

- Mais les eaux de nettoyage du minerais de colombo-tantalite de KABARURE polluent, à un certain degré, la KAN Y ARU par le biais de son affluent (la MWOGERE).

- La tourbe

Evolution de la production de la tourbe (en tonnes)

Site	2000	2001	220	2003
Gitanga	362	2192	2927,4	2128,2
Kuruyange	871	1485	2713,3	1914,1
Gishubi	973	0	1337	537,8
Buyongwe	1735	488	0	0
Production Totale	3941	4165	6977,7	4580,1

- 6800 Tonnes de tourbe produit actuellement
- une étude d'impact sur les écosystèmes de marais est nécessaire.

2 .4.Exploitation de certaines ressources en eau

2.4.1. Les marais

- Représentent actuellement en potentiel de production considérable
- Ils couvrent une superficie de plus de 112.000 ha (4,5% de la superficie du pays)
- Ils sont concentrés au Nord des plateaux centraux (dans le bassin du Nil) 10% de la superficie totale des marais
- La pression démographique, ainsi que la dégradation des terres des collines entraîne une exploitation de plus en plus important des marais.

Superficie en ha des marais par bassin versant de 2ème **ordre pour 1995**

Bassin versant	Marais aménagé	Marais on aménagés	TOTAL
RUSIZI	1.365,5	1.192	2.557,50
LAC TANGANIKA	2.064,7	1.573,30	3.638
MALAGARAZI	11.294,7	12.223,10	23.517,80
RUVUBU	43.037,4	18.597,70	61.635,10
KANYARU	5.838,4	12.318,90	18.157,30
KAGERA	1.489	5.936	7.425
TOTAL	65.089,70	51.841	116.930,70

Total Bassin du Nil : 87.217,4, soit 75%
Marais aménagés: 50364,8
Marais non aménagés: 36.852,6

Certains de ces marais sont utilisés pour l'exploitation de la tourbe

2.4.2. L'irrigation

L'irrigation n'est pas courante au BURUNDI car il existe très peu de plaines.
En outre, la situation météorologique, hydrologique et les besoins de la population font que la demande en irrigation soit actuellement limitée.
Le développement des projets et des systèmes d'irrigation existent surtout dans la plaine de l'IMBO-Centre, non loin de la ville de BUJUMBURA.

2.4.3 La production d'énergie

Au Burundi, la production d'énergie est essentiellement basée sur les sources d'énergie traditionnelles (le bois)
Le potentiel hydroélectrique est relativement important, mais il n'y a pas de production de pétrole.

Source	
Charbon de bois	92,2 %
Produits pétroliers	3,2%
Electricité	0,5%
Tourbe	0,05%

-Plus de 95 % d'électricité sont produits par les centrales hydroélectriques.
-Quelques barrages existent dans le bassin du Nil.

Répartition des centrales par bassin Versant.

Bassin Versant	**Nombre existant**	**Puissance garantie** en KW	**Nombre existant et planifié**	**Puissance garantie en KW**
RUSIZI	3	4.236	6	45039
LAC TANGANYIKA	5	3.739	6	7.039
MALAGARAZI	3	36	3	36
RUVUBU	13	3.963	13	3.963
KANYARU	2	295	2	295
TOTAL	26	12.269	30	56.381

Recommandations

- Faire un contrôle régulier de la qualité de l'eau dans le Bassin du Nil
- Augmenter la couverture en assainissement dans le Bassin du Nil
- Multiplier les adduction d'eau potable en milieu rural dans le Bassin du Nil
- Pratiquer un élevage rationnel.

Pollution agricole et phytosanitaire

- Améliorer les méthodes culturales
- Eviter les feux de brousse par la sensibilisation de la population
- Reboisement intensif afin de compenser la consommation de plus en plus forte du bois.
- Multiplier les projets d'électrification en milieu rural afin de réduire la consommation du bois pour la production d'énergie.

Pollution industrielle

- Installer des systèmes de pré traitement des effluents et de traitement des eaux usées issues des usines de dépulpage du café.
- Faire l'étude d'impact de l'exploitation de la tourbe sur les écosystèmes de marais ou sur l'environnement en général.

CHAPTER THREE: FIELD VISIT

3.1 VISIT TO THE WATER TREATMENT PLANT

1. Presentation

REGIDESO's core mission is the production and distribution pf water and electricity in the urban centre and related areas.

In 2001, REGIDESO's production totalled 30, 836, 2006 m^3 of potable water of which 25,263,794 m^3 went to the city of Bujumbura (82%) and 5,572,412 m^3 for other urban centres (18%).

Currently 90% of water supply in Bujumbura comes from Lake Tanganyika.

2. A Visit to REGIDESO

The targets of the visit were the main production and treatment units.

2.1. Visit of the First Pumping Station

Crude water is taken at a distance of 3500 m from the shore and 20 m deep from the surface then channelled to the first pumping station through two canals of 900 mm of diameters each.

2.2. Visit of the Treatment Plant and the Second Pumping Station

Crude water is then pumped into the treatment plant where it undergoes two purification phases: the slow sand filtration and disinfection by chlorine.
After purification, water is then distributed through out the different parts of the city of Bujumbura through pumping (Into the storage reservoirs or directly to the clients).

WQWG Members at the Pump house at the shore of Lake Tanganyika.

3.2 VISIT TO THE WATER LABORATORY (REGIDESO)

REGIDESO possesses 3 water quality control laboratories:

2.2.1. The Central Laboratory of Bujumbura
2.2.2. The Laboratory of GITEGA
2.2.3. The Itinerant Laboratory

The main missions of these laboratories are:

1. Chemical and bacteriological control of the quality of water produced by REGIDESO
2. Water treatment
3. Training and oversight of student activities in the University
4. Water analyses for clients outside REGIDESO

Inside the Regideso laboratory in Burundi

CHAPTER FOUR: PRESENTATION OF THE REGIONAL WATER QUALITY MONITORING BASELINE REPORT

4.0 Presentation of the Regional Water Quality Monitoring baseline Report

The International Consultant Mr. Ralph Michael Jackman, took to the floor for much of the 1st and 2nd day and went through the 14 chapter report highlighting key areas of each of the countries strengths and weaknesses with regard to Water Quality monitoring. He allowed at intervals to be questioned by the participants.

The following is a summary of the key issues in the presentation.

General Observations

It is clear that the countries all seem to suffer from similar problems viz.:

1) Many are riparian countries dependent on an agricultural economy which gives the following problems:
    i) Non-point pollution from fertilisers giving high nitrate and phosphate levels.
    ii) Non-point pollution from pesticides, herbicides, and other complex organic compounds.
    iii) Over cultivation by deforestation resulting in soil erosion and sedimentation.
2) Poor, domestic wastewater treatment, resulting in faecal contamination resulting in high bacteriological counts, as well as higher ammonia, and chloride concentrations, high BOD & COD values. In severe cases they can lower the DO values resulting in fish kills.
3) Insufficient treatment of industrial waste waters which can raise also the BOD values and produce additional pollutants such as heavy metals, and complex toxic organic compounds.
4) Tanneries cause great problems with chromium pollution.
5) Mining causes problems with acids, heavy metals such as mercury and toxic compounds such as cyanides.
6) Some countries particularly those on the rift valley can have natural pollutants such as fluoride.

4.1 Point Water Pollution Control

The point pollution problems can be solved by wastewater treatment prior to disposal or by clean production procedures. All the countries have the legislation to enforce wastewater treatment, although the quality of this legislation is very variable between the countries. The main problem is the enforcement of the legislation. It is comparatively, easy to pass laws and produce commendable water quality policies promising high ideals, but the difficulty appears to actually implement these laws and policies. However it could be argued that though this maybe true initially, but once the policing becomes efficient

the “polluter pays principal” should make the system self sustaining. However there is concern that these penalties could make companies less viable, which may encourage companies to relocate abroad, thus producing adverse economic consequences for the country.

To overcome this dilemma it is recommended that a concerted effort be made to set up a more acceptable pollution monitoring system, which accepts that many industries may not be able to completely cease discharging immediately. However, if they can quantify their problems and are charged accordingly, initially not punitively, but can agree dates to reduce their pollution loads with financial incentives, as in the banded system, then this would motivate the effluent producers to reduce their pollutants.
The first step to initiate this scheme, and as part of the baseline data, would be for each country to complete a full inventory of all effluent producers along the Nile Basin. This should include: the geographical co-ordinates, the type of effluent and the possible pollutants. Some countries such as Egypt and Uganda have already produced this. This information should be secure by not divulging the name & contact details of the company externally.

4.2 Non Point Water Pollution Control

Non-point pollutants such as pesticides are more difficult to control. However, a means of assessing the situation is a desktop study that should be undertaken by of all the agricultural areas in the Nile Basin recording:

1) A list and locations of crops;
2) Pesticides associated with these crops;
3) Quantities of pesticides imported and purchased by the farmers;
4) Frequency of applications, and
5) Times the pesticides are applied.

This information should be collated from the FAO, the Farmers, The Farmers Union, The Ministry of Agriculture, and the Pesticide Suppliers.

From this data, a sampling scheme should be drafted and implemented. The results of this pesticide water-monitoring programme could be submitted at a country workshop with all the stakeholders to produce an action plan to reduce run-off by the priority pesticides. Farmers should be encouraged to localise run-off by the use of ditches and channels, etc., which could be used as sampling points, which could then be monitored as a point source. Similar schemes could be used for other agricultural chemicals such as fertilisers.

With all these schemes it is important to involve the local stakeholders to ensure that they understand the concepts and the importance of pollution control.

4.3 Siltation

Siltation is arguably one of the worst problems that affect the Nile particularly from Ethiopia where soil erosion is extensive on the plateau amounting to 140 million tons per

year and causing the dams in Sudan to silt up by 5% each year, this problem also occurs elsewhere and on the White Nile.

Fig 6 Large Siltation Islands on the Blue Nile Outside Khartoum, Sudan

This problem causes high turbidities and total suspended solids in the rivers, silts up the dams and erodes the lands initiating desertification. The benefits are that the silt is excellent fertile soil and could act as an absorbent coagulant for certain pollutants. One way to reduce the soil erosion is by the planting of trees, but often with the demographic changes caused by the wars and natural disasters, the reverse happens with deforestation prevalent. To prevent this the government need to be especially vigilant in managing the land especially on the river basins.

Research is continuing into siltation prevention schemes and it would be useful to investigate whether the sediment in the water does actually improve the self-purification of the river and which pollutants are removed. It would also be useful to process the data to investigate if there is a relationship between total suspended solids and turbidity values.

4.4 Pollution Threats

Solid waste dumping is variable in each country and this can only be controlled by good legislation, controls and designated waste tips. In the developed countries waste tax and recycling schemes have been established to reduce this pollution load.

Countries should also list threats to pollution such as storage of chemicals close to the Nile, or factories that do not produce effluent but could produce a waste problem following a disaster. It is recommended that an inventory of such sites be also made. A Hazard Assessment study could then be undertaken to produce emergency contingency plans. In the developed countries periodic emergency trials are undertaken to ensure all the stakeholders can efficiently deal with such a crisis.

This is particularly important in dealing with trans-boundary pollution control.

4.5 Trans-Boundary Pollution Control

During this study it was noted that a minor pollution incident did occur between two countries in February 2005. Unfortunately there appeared to be no definitive guidelines to deal with this situation. It must be one of the priority issues for this project to establish

very clear- cut procedures to deal with these situations, formally agreed between all countries. These procedures should include the following:

1) Contact details of all the senior stakeholders.
2) Prioritised action plan diagram with all contact details.
3) A rota drawn up to ensure at least the main senior stakeholders are available 24 hours a day.
4) When the pollution incident occurs, all parameters should be noted and analysed as quickly as possible. By using the recorded river flow from the closest hydrological station to track the lifetime of the pollutant as it flows downstream, as well as continually monitoring the pollution site. At the time it may be expedient to monitor a surrogate indicative parameter, rather than track the pollutant itself, but taking preserved samples for further analysis later.
5) When the pollution has disappeared, a report should be submitted by each affected country. This should be discussed technically by the senior stakeholders, including the appropriate NBI members in an enquiry held in private.
6) The output of the investigation should establish ways to improve the procedures, and to prevent such an incident happening again. It should never be used as a way of apportioning blame between different countries, as this will only encourage countries to try to hide such incidences, resulting in the deterioration of the Nile for all countries.

4.6 Laboratories

Each country has facilities to monitor and analyse the water, but the quality of these are very mixed. At least four countries had fairly advanced equipment the rest had minimal facilities. For a baseline study to be undertaken, it is vital that quality of the data is reliable and consistent. Ideally each country should have the same good quality equipment but at this time it is not feasible. Therefore it is recommended that certain analyses, particularly heavy metals and organic pesticides, be undertaken by regional laboratories in neighbouring countries. These laboratories could also check on the basic analysis as well to ensure parity of the results.

All the reports would be an ideal platform for proposals to justify support from other donors for water monitoring resources on a National level. It is recommended that this be discussed at the next NBI water quality workshop including training and advice in producing such proposals.

Many laboratories have requested further training. It would be useful for each country to submit details of their training requirements which could be submitted at the NBI water quality workshop with a view to establish a training programme.

The quality control, sampling procedures and analytical methods are variable. It is recommended that all these procedures are standardised and written out as formal NBI methods and issued for compliance by all members.

4.7 Water Quality Maps

As a means of presenting the baseline data in an understandable format, water quality thematic maps are proposed.
A number of maps have been drafted for Sudan, (Appendix 4), which show the following:

i. Values for the 4 parameters: pH, electrical Conductivity, Chloride, and Nitrate
ii. Land Cover
iii. Settlements

This data will be integrated together to ascertain the relationships between these variables. The data has also been presented as a water quality profile along the Nile to also show how the parameter changes along the Nile.

It is proposed that similar maps are produced for each country and then amalgamated to produce single water quality maps of the Nile with the corresponding Water Quality Nile Profile.

It is feasible to refine the maps to calculate the water quality polygons as a function of river flows. This could be used to show the purification zones within the river and the distances pollutants could travel before disappearing.

4.8 GIS & Computer Modelling

Thematic maps and water quality profiles can be an excellent way of assisting in the understanding and managing the water quality within the Nile basin and should be developed for all countries.

A Decision Support System (DSS) is an interactive computer-based system intended to help managers make decisions, through support for retrieving, summarising and analysing decision relevant data. DSS can be designed to help river basin managers (and other users) identify their water quantity and quality problems and select appropriate best management practices (BMP). The strategic choice and placement of BMP in the river basin can successfully reduce the input of individual pollutants and can improve water quality.
In practice, this corresponds to gathering of selected geo-referenced data in a searchable database, and applying models that will retrieve and analyse this data for pre-defined purposes.

It is recommended that computerised models should will be developed as a part of the DSS for the Nile Basin management, addressing water quantity, pollution dynamics, eutrophication and siltation forecasting. The data from the databases built up within the project and extended with hydrological measurements will be used for the calibration of the models. This could be a sub- project using the facilities at LVEMP and the NBI.

4.9 Water Quality Monitoring

Many countries recommended a large number of sampling points to establish the water quality baseline, which is true for a National Baseline. However for the trans-boundary baseline, resources are limited, so the sampling points will have to be a minimum of 3 or 4 per each major country Nile or tributary, though ideally more points would be useful especially if they will be monitored under the national programmes.

It is recommended that the site for each of these points will be at a Hydrological Station, so that flows and levels can be recorded at the same time of sampling. It is therefore proposed that each country recommend these three sampling points ensuring they will be indicative of the water quality as it arrives, travels and exits the country.

It is recommended that water and sediment samples are taken quarterly and ideally the sampling should be sequentially between countries so that parameters are monitored and tracked as they flow down the Nile.
The recommended parameters are shown in Appendix 1. Initially simple biotic indices should be carried out; training will be required for sampling and analysis possibly by experts from the LVEMP.
This list of recommended parameters will be a large increase in the analysis of most countries compared with previous analysis to date but this is essential for the baseline water quality study.

4.10 Future Monitoring

When the NBI Water Quality Team are confident in the above recommended analysis, it should progress to undertake more comprehensive ecological surveys at each point called the Biological Quality Element (BQE) which focuses on abundance & species composition of:

- Phytoplancton,
- Phytobentos,
- Macrophytes,
- Macro-invertebrates, &
- Fish.

Similarly when all countries are confident in this analysis with validated methods and quality control procedures in place, the list should expand to include those detailed in Appendix 1.

4.11 Action Plan

As a guide to progress the recommendations and the Baseline Study a draft action plan is submitted in Appendix 5.

CHAPTER FIVE: GROUP DISCUSSIONS AND PRESENTATIONS

5.1 GROUP ONE

Members:

Nadier Babiker

Dickson Rutagemwa

Samuel Gor

Prof. Dr. M. A.Abdelkhalek -

Topics to be Discussed:

1 Training needs

2. Water Quality maps

3. Biological Monitoring

Discussion of these topics were resulted to the following:

1. Training - Two levels for staff training were recognized

Level 1 - concern on decision makers

Level 2 - focused on technical staff where to be conducted on two level also:

- Profficinals (chemist,…)
- Technicians (, ,).

Proposed modules:

1 Principles of Water Quality Management for Decision Makers for 2 days.

2 Principles of Water Quality networks design and application on national (3 days) network and transboundary net for proficinals (a + b).

3 Water Quality Parameters sampling measurement – OC/QA (5 days) for field staff and/or lab staff including practical application.

4 Water Quality Assessment and Information their modules will be targeted to highly experience prefficianals ableng to interperation and concessistant:

- It include statistical analysis for Water Quality
- Principles of Data base and applicant
- Introductory on G/S and application
- Water Quality reporting and Data presentation.

(3 days).

5 In more advanced profficienal Water Quality modules application (equal 2, WASP,……).

(3 days).

Developing Water Quality Atlas:

-Layout Options
- 1 map for the nile course
- Lakes within the basin
- National monitoring map with distinguished
- Transpoundary stations.

- Information Presentations: (Water Quality Indicators) as contor lines as it was presented.
- Presented hydrograph and histogram
- Colours according to some proposed standard (good-bad)
- Landure and activities indicatiors
- Some advanced technique may be used (use models to generate impacts)

3. Biological Indicators of monitoring:
   - The idea is good initives but in some country there are constraints due to climatic changes of flood occurrence.
   - If these activity running within the basin lesson learned and the effectiveness and reliability of result must be presented and evaluated.

5.2 GROUP TWO

Group Members:

Mohamed Khalafalla (Sudan)

Mohamed (Egypt)

Prof. Mafuka Mpie Mbie (DRC)

The group looked at the 3 suggested options, for sharing out the funds and final adopted the one below

Labs (regional and mobile), data management and quality assurance.

Sharing Funds (compromise)

Egypt	7,500
Uganda	12,000
Kenya	15,000
Tanzania	15,000

Tanzania	15,000
Sudan	20,000
Ethiopia	20,000
Burundi	40,000
Rwanda	40,000
DR of Congo	40,000
Total	210,000

LABS:-

1. Mobile labs (provided that transportation mean is available)

"t, ph, DO, Turbildity, Depth, Ec Amonium, Nitrates Chloride" propes of photmetrics

≈ 5,000 $ + Drill kit like hach

≈ 3000 $

Incupator ≈

1. Regional Labs

For advance chemical analysis including heavy metals.

Sudan Ethiopia – Egypt

DR of Congo + Rwanda + Burundi = Uganda

Kenya and Tanzania take care of themselves.

EXTRA

Rwanda Congo Burundi+

Flame pholemeter + oven + S balance glass ware regents + computer facilities

DATA MANGEMENT

Standardization of

Sampling through manuals + training

Analysis

Data booking forms

Same software

Data Base

Analysis (statistical)

Interpretation

Retrieval

QUALITY CONTROL AND QUALITY ASSURANCE:-

Eternal - within the lab

External - Egypt (Canada) + Uganda

5.3 GROUP THREE

Group Assignment

Sampling stations and frequency

Procurement of Equipment

Issue 1: SAMPLING STATIONS & FREQUENCY

- Points selected following previous recommendation on criteria at the 1st workshop
- Prioritized – as baseline & impact measurement stations

Rwanda

- Many rivers converge to join Akagera at different confluences & various activities take place in the catchment
- 10 sampling points on rivers
- 3 sampling points on 2 lakes shared with Burundi
- Total = 13 sampling points recommended

Kenya

- 9 rivers join Lake Victoria
- Various economic activities traverse the river sub-basins with impact on water quality
- Prioritized at least 7 rivers of which at least 2 sampling points will be monitored = 14
  - Including R. Sio & Malaba
- Reference sampling points on rivers and 9 sampling points in L. Victoria under LVEMP

Burundi

- 2 main rivers
- Kanyaru & Ruvumbo drain the catchment
- Kanyaru joins 2 lakes at the border of Burundi-Rwanda
- 5 sampling points on rivers + 3 sampling points on lakes
- Total = 8

Uganda

- Shares rivers/lakes with DR – Congo, Tanzania,Rwanda & Kenya
- In addition the whole country is one basin, drainage complex
- Proposed sites on R. Kagera (1), Semiliki (2), Victoria Nile(2), Kyoga Nile (1), Albert Nile(2), Malaba(2), Sio-Malakisi (2)
- Kazinga channel/L, Edward/George(2)
  - Nile sampling points = 12
- 19 sampling points on Lake Victoria under LVEMP
- Lakes monitoring (Kyoga, Albert, Edward/George though trans-boundary not considered)
- Total = 31

Tanzania

- To monitor Kagera instead of Rwanda before it enters Uganda
- Rivers = 15 sampling points
- Lake Victoria Under LVEMP = 28
- Prioritized 2 rivers (Mara 4 & Mara bay 1 under LVEMP) Kagera (5),
- Total 9

- Ethiopia
  - 10 sampling points

Sudan

- Sudan = 3
  - White Nile
  - Blue Nile
  - Main Nile to Cairo
- Egypt = 2
- DRC = 5 sampling points
  - On Rivers and Lakes Edward & Albert

Summary of Sampling Points

Countries	No. of Sampling points
Rwanda	13
Kenya	14
Burundi	8
Uganda	12
Tanzania	9
Ethiopia	3
Sudan	3
Egypt	2
DR Congo	5

Frequency of sampling

- Lakes – Quarterly
- Rivers - Monthly

Members

• Benard M	Kenya
• Florence A	Uganda
• John N	Rwanda
• BonifaceN	Burundi

5.3 GROUP FOUR:

Transboundary Emergency Procedures

- Reporting be the responsibility of the Country where the emergency problem is emanating from (country of cause - impacted country)

- Adopt international conventions related to emergency issues e.g the UN Convention on Non-Navigable Uses of water 1997.

- Adopt the polluter pays principle to rectify the problem

- Establish committee for Action on Transboundary Emergency issues that should include the countries affected due to that problem

- Conduct cross-border Environmental Assessments

- Inform the TAC members and the Ministers concerned for action and PMU

- Develop Early Warning systems

- Draw action program and implement recommended actions

Water Quality Parameters

Same criteria was used

- Persistence
- Threat to Socio-economic development
- Threat to ecosystem
- Adversely affect human and animal health
- Travel long distances without change and ability to accumulate

Parameters

- PH
- **DO, NH3, Flows, Geographical Position, FC, Temp.**

- BOD, COD, Nutrients

- Total Suspended Solids

- Total Dissolved Solids

- EC

- Oil and Grease

- Pesticide Residues
- Heavy metals and other toxic substances

Networking

Networking with the PMU-Inter Networking

- NPC be the contact person with the PMU, though direct contact be maintained with members of the WQWG.

- PMU should send information by internet as well as follow up with telephone calls to individual working group members

- Use of Registered mail for letters of invitation for such workshops be explored.

- Possibility of WQWG members to have access to the facilities (computers, fax, telephone) in the office of the NPC be explored in terms of internet services

- WQWG members should participate in producing articles in the newsletters/publications coordinated by the NPC

- Hold regional workshops similar to the one being held now

- Tour to Lake Victoria Management Program to learn experiences on networking

Within Country Networking - Intra Networking

- Country level meetings to brief other sectors on implementation of the project activities

- Regular meetings be held with NPC on quarterly basis

- NPC should be in touch with the WQWG members

Country to Country Networking

- Existing avenues of networking could be strengthened e.g LVEMP

- New avenues be explored for networking at country-country levels like Uganda has had its staff trained by Egypt.

- Promote the sharing of Information

- Promote inter laboratory analysis of samples

- Designate Regional Laboratories for supporting other countries

CHAPTER SIX: RECOMMENDATIONS

6.1 Group Recommendations

The Recommendations of the Group discussions may be summarized as follows:

- Agreed to designate some national laboratories as NTEAP focal designated laboratories to receive equipment support and to carry out analysis of Nile waters
- Agreed to share out available funds based on laboratory classification based on available facilities to carry out water analysis as follows;

Egypt	Excellent
Uganda	Very good
Kenya Tanzania,	Good
Sudan and Ethiopia	Fair
DRC, Rwanda and Burundi	Just Adequate

- Agreed to designate the Laboratories in Egypt, Uganda, Kenya and Tanzania as reference regional laboratories
- Agreed to select and dedicate a few national water quality sampling stations as Nile trans boundary stations,
- Agreed to develop a protocol to manage transboundary pollution,
- Agreed to strengthen transboundary networking.

The team also received the national water quality baseline reports from Kenya, Uganda, Tanzania, Rwanda, Burundi, DRC and Sudan and adopted them along with the Draft Regional Water Quality Monitoring Baseline report, which the Consult was supposed to finalize, taking into consideration, the comments received at the Workshop.

Consultant's Recommendations

The following recommendations were made for all member countries to undertake the following:

- Submit a full inventory of all effluent producers along the Nile Basin.

- Undertake a desktop study of the application of pesticides along the
- Nile Basin to establish a pesticide analytical programme.
- Submit an inventory of all threats of pollution via storage facilities

1) Promote an efficient self-monitoring pollution monitoring tariff departments scheme to encourage effluent producers to reduce their pollution loads such as the banded scheme, which is monitored by the water pollution control departments. This could be initially established as a pilot scheme.

2 A hazard assessment should be undertaken at each point &

determine appropriate contingency emergency procedures

Establish clear-cut formal procedures to deal with Trans boundary

pollution incidents.

Submit details of training requirements to be presented at the NBI water quality workshop with a view to establish a unified training programme.

Propose three or four sampling points at each major country Nile or tributary, ensuring the sites are also Hydrological stations so that flows and levels can be recorded at the same time of sampling. The sites must also be good indicators of the changes of water quality as the river enters and exits the country.

Four of the countries have the facilities to undertake advanced analysis such as heavy metals by Atomic absorption Spectrometry, and pesticide analysis by Gas Liquid Chromatography. These should be established as regional laboratories to assist the other countries.

The baseline summary reports would be an ideal platform for proposals to justify support from other donors for water monitoring resources on a National level. This will be discussed at the next NBI water quality workshop & will include training and advice in producing proposals.

All quality control, sampling procedures and analytical methods to be standardised and written out as formal NBI methods and issued for compliance by all members.

As a means of presenting the baseline data in an understandable format, water quality thematic maps are proposed.

A number of maps have been drafted for Sudan, which show the following:

i. Values for the 6 parameters: pH, electrical Conductivity, Chloride, and Nitrate

ii. Land Cover

iii. Settlements

6.2 Closing Remarks

This Session was chaired by the TAC member Mr. Denis Barandamaje, and the Guest of Honour was the NTEAP, Project Steering Committee member, Mr. Festus Ntanyungu. Closing Remarks were given by Mr. J. Omwenga, the WQLS, while Prof. Mafuka Mbie mbie gave a Vote of Thanks on behalf of his fellow Colleagues, the Regional Water Quality Working Group Members .

Closing Remarks by Mr. Festus Ntanyungu, NTEAP PSC, member

- UNDP Resident Representative
- World Bank Resident Representative
- Nile Basin Initiative TAC member
- Water Quality Lead Specialist
- Steering Committee member
- The National Project Coordinator
- Water Quality Working Group members
- Ladies and gentlemen,

Two days ago exactly, our Minister, today unable to attend, was inaugurating the activities of this second workshop of the Nile Basin Water Quality Working Group members in the framework of the Nile Transboundary Environmental Action Project of the Nile Basin Initiative.

You have for the last three days listened attentively to national water quality baseline reports, you have treated important topics such as water quality monitoring training, the type of water analysis or monitoring equipment, you have also determined provisionally the sampling stations in the entire Nile basin. Through your deliberations you have

reviewed and endorsed the water quality baseline studies in each of the Nile riparian countries.

By analysing these reports you have managed to formulate a strategy for the protection of the Nile water resources and a plan for capacity building for institutions and human resources in the field of water quality monitoring and control basin-wide, emphasizing where possible, cooperation among the riparian countries. The activities carried out during these three days are laudable.

The work of water quality control the Lead Specialist requires a methodology and modern equipment. You will therefore my dear specialists understand the work waiting for the populations of the Nile Basin will be long and require investment from t each country. We confirm our total support.

Ladies and Gentlemen,

In conclusion, I would like firs of all to wish for all our guests a safe and happy return home hoping that all the recommendation proposed will be implemented. I am very glad to respond warmly to the gratitude and appreciation remarks delivered by Professor Mafuta MB-Mpie and Mr. John Omwenga, Water Quality Specialist. I would like also to thank The Director-general of IGEBU for his role as fascinator in the workshop. Finally I congratulate the National Project Coordinator for the success of this workshop.

It on this word of hope that I declare the second regional Nile Basin water quality workshop closed.

Thank you all.

Festus Ntanyungu
INECN Director-general

ANNEXES

ANNEX 1 RECOMMENDED ANALYSIS

Appendix 1

Recommended Parameters for Baseline Survey

1) **Ammonia-Nitrogen (OS)**
2) *Arsenic
3) **Alkalinity (OS)**
4) BOD
5) *Cadmium
6) Calcium
7) Chloride
8) *Chromium (VI)
9) COD
10) Colour
11) *Copper
12) *Cyanide (Total)
13) Detergents
14) **Dissolved Oxygen (OS)**
15) **Electrical Conductivity (OS)**
16) Fluoride
17) Kjeldahl Nitrogen
18) *Iron
19) *Lead
20) Magnesium
21) *Manganese
22) *Mercury
23) **Nitrate-Nitrogen (OS)**
24) **Nitrite – Nitrogen (OS)**
25) *Oil & Grease
26) Pesticides- from Desktop Survey
27) *Phosphate (Total)
28) Phosphate (Soluble)
29) **.pH (OS)**
30) Silicate (Dissolved)
31) Sodium
32) Sulphate
33) TDS
34) Turbidity (OS)
35) Temperature
36) TSS
37) Turbidity
38) *Zinc
39) Faecal Streptococci

40) Faecal Coliform
41) Total Coliform
42) Chlorophyll- a
(* = Analysis carried out on the wet-sieved 63 µm fraction)

Key:
***** = Parameters should be analysed also in sediments. Sediments should always be taken from both left and right profile when sampling at the main river bed. Only *wet-sieved 63 µm fraction* of sediments should be analysed in order to be able to compare data from different sampling sites.
OS= Parameters analysed on-site confirmed in laboratory

Recommended Extra Parameters to be analysed in Future Baseline Studies with Limits

Name of substance	**Maximum Acceptable Concentrations in µg/l**
Alachlor	0.7
Aluminum	
Anthracene	0.4
Atrazine	2.9
Benzene	49
Barium	
Boron	
Brominated diphenylether	
deca BDE	--
octa BDE	--
penta BDE	1.4
Chloroalkanes, C10-13	1.4
Chlorfenvinphos	0.3
Chlorpyrifos	0.1
*Chromium Total	
1,2-dichloroethane	1180
Dichloromethane	1900

Di(2-ethylhexyl)phthalate (DEHP)	--
Diuron	1.8
Endosulfan	0.01
(alpha-endosulfan)	
Fluoranthene	0.9
Hexachlorobenzene	0.05
Hexachlorobutadiene	0.6
Name of substance	**Maximum Acceptable Concentrations in µg/l**
Hexachlorocyclohexane HCH gamma-isomer, Lindane)	0.04
Isoproturon	1.3
Naphthalene	80
Nickel	
Nonylphenol(4-(para)nonylphenol	2.1
Octylphenol(para-tert-octylphenol	0.13
PCB's	
*PAH's: (benzo(a)pyrene),(benzo (b)flouranthene), (benzo(k)flouranthene	
Pentachlorobenzene	1
Pentachlorophenol	1
*Selenium	
Simazine	3.4
TOC	
Tributyltin compounds	0.002
Trichlorobenzenes (all isomers)	50
Trichloromethane	270
Trifluralin	1
DDT total	0,025

para-para-DDT	0,010
Aldrin	0,010
Dieldrin	0,010
Endrin	0,005
Isodrin	0,005
Carbontetrachloride	12
Tetrachloroethylene	10
Trichloroethylene	10

Extra Microbiological Parameters

Chlostridia Perfingens
Giardia
Cryptosporidai

APPENDIX 2

Summary Country Water Quality Control Data

This data is in the Regional Baseline report

APPENDIX 3

Recommended Equipment
Appendix 3

Recommended Major Laboratory Equipment

Basic Chemical analysis

1. UV/Vis Spectrophotometer
2. Analytical balance
3. Top-pan balance
4. pH meter
5. Conductivity Meter
6. DO Meter
7. Water still
8. Water Bath
9. Hot plate
10. Refrigerator
11. Flame photometer
12. Turbidimeter
13. Dessicators
14. Computer (Desktop)
15. Printer
16. Fuming cupboard
17. Titration Equipment
18. Oven
19. Centrifuge

Advanced Chemical Analysis

a. Atomic Absorption Spectrophotometer (Flame, Furnace & Hydride generation)
b. Gas Liquid Chromatograph (FID and ECD)

Field Equipment

1. pH meter,
2. DO meter
3. Conductivity Meter
4. , Water Sampling Equipment
5. Comparator or Field Photometer
6. Portable Bacteriological Equipment

Basic Bacteriological Analysis

1. Two Incubators
2. Membrane Filtration Apparatus
3. Autoclave

Advanced Bacteriological/ Biological Laboratory

1) Inverted microscope
2) Centrifuge

ANNEX 4 ACTION PLAN

ANNEX 5 LIST OF PARTICIPANTS

NAME

1. Mr. John Omwenga
2. Mr. Boniface Nyakageni
3. Joseph Ndayegamiye
4. Prof. Mafuka Mbe- Mpie
5. Mrs Marie Rose Mukonkole Mayele
6. Prof. Dr. Mohamed Abdel Khalek
7. Mr. Solomon Gebretsadik
8. Mr. Mohamed Khalafalla Ahmed Ali
9. Ms. Nadia Babiker Ibrahim Shakak

10. Mr. Dickson K. Rutangemwa
11. Mr. Benard Mulwa
12. Mr. Samuel Gor
13. Mr. Audace Ndayizeye
14. Mr. John Nkongori
15. Dr. Florence G Adongo
16. Mr. Mohamed Badaza
17. Nsabiyuma Capitoline
18. Hasubuntima Antoine
19. Nimbome Choilal
20. Consultant
21. Liduine

ANNEX 7 WORKSHOP PROGRAM **DRAFT WORKSHOP PROGRAM**

Nile Basin Initiative
Nile Trans boundary Environmental Action Project

2ND REGIONAL WATER QUALITY WORKING GROUP WORKSHOP BUJUMBURA, BURUNDI 19TH –21ST JULY, 2005

DATE **:** 19th – 21st July, 2005

VENUE **:** Novatel Hotel, Bujumbura, Burundi

OBJECTIVES

- Presentation of the Cairo Workshop Report and adoption of its recommendations
- Review and endorsement of the National WQ Monitoring Baseline Reports
- Presentation, discussion and adoption of the Regional WQ Monitoring Baseline Report
- Discuss Basin wide water quality management issues,
- Visit water quality testing and environmental monitoring facilities,
- Get an update of overall Project implementation in Burundi.

EXPECTED OUTPUTS:

Adoption of the Cairo Workshop Report with agreed upon actions
Adoption of the National Water Quality Monitoring Baseline Reports
Adoption of the Regional Water Quality Monitoring Baseline Report and Action Plan

WORKSHOP PROGRAM

DATE/TIME	ACTIVITY	ACTORS
18/7/05	**Arrival** in Bujumbura and check in Novatel Hotel	NPC/WQLS/LA
19/7/05	**DAY ONE**	**TUESDAY**
8.00 - 8.30 am	**Registration**	**National Project Coordinator (NPC)/LA**
8.30-10.00 am	**Session 1- Opening Session**	**Facilitated by the TAC Member, DG IGEBU, Mr Denis Barandemaje**
8.30- 10.00 am	-Welcome Remarks -Opening Remarks -Address by WB Rep. -Address by UNDP Rep. -Address by DG, INICEN -Address by Guest of Honor, Minister for Land Management, Environment and Tourism	Audace Ndayi zeye, NPC John Omwenga, WQLS Alassane Sow, WB RR Mr.Ibrahim Fall, UNDP RR Mr. Festus Ntanyungu S.E Ambassador Albert Mbonarane
10.00-10.30 am	**TEA BREAK**	

10.30-1.30 pm	**Session 2 –Presentation of the Cairo W/Report; Presentation of Country Inventories.**	**Chair: Dr. Florence Adongo Rapp. Samuel Gor, Audace Ndayizeye**
10.30- 10.40 am	Review and adoption of the Agenda/Program	John Omwenga
10.40-11.10 am	Overview of Cairo W/Report and adoption of Recommendations	John Omwenga,
11.10-11.25 am	Discussion of matters arising and deferred items	John Omwenga
11.25-1.15 pm	Country reports on Inventories	Country presentations Bur, DRC, Egy, Eth, Ken, Rw, Su Tz, Ug.
1.15-1.30 pm	Discussions on Country Inventories	J. Omwenga/R. M. Jackman

1.30 – 2.15 pm	**LUNCH**	

2.15 – 5.00 pm	**Session 3- Presentation of Regional WQM Baseline Report (Part 1)**	**Chair:Prof: M. Abdel Khalek Rapp: Nadia Shakak, NPC**
2.15- 4.15 pm	Presentation of the Regional WQM, Baseline Report (Part 1)- Overview/Baseline Status	I/ Consultant R. Jackman
4.15 -5.00 pm	Discussions	R. Jackman

5.00 – 5.30 pm	**TEA BREAK**	

	END OF DAY ONE	

20/7/05	**DAY WO**	**WEDNESDAY**

8.30-10.30 am	**Session 4 – Presentation of the RWQM Baseline Report, (Part 2)- Recommendations**	**Chair: Prof. Mafuka Mpie Mpie Rapp: Mohamed Badaza A. Ndayizeye**
8.30-10.00 am	Presentation of Baseline Report	Mr. R. Jackman
10.00- 10.30 am	Discussion	Mr. R. Jackman/ J. Omwenga

10.30-11.00am	**TEA BREAK**	

11.00-1.00 pm	**Session 5 –Discussion of Recommendations and Action Plan and formation of Groups Group1, 2, 3, 4.**	**Chair: Benard Mulwa Panelists: R. Jackman/J Omwenga Rapp: M.Rose Mukonkole A. Ndayizeye**

1.00.1.30 pm	**LUNCH**	

1.30- 6.00 pm	**Session 6- Group Work and Field Trip**	**Chair:Mohamed Khalafalla Rapp: S. GebreTsadik**

1.30- 3.30 pm	Group Work	**Facilitators**:R. Jackman, J. Omwenga
3.30- 6.00 pm	Field Visit	**Facilitators**: NPC, Boniface Nyakageni and Joseph Ndayagamiye

	END OF DAY TWO	

7.30- 9.30pm	RECEPTION	NPC/WQLS/LA

21/7/05	**DAY THREE**	**THURSDAY**

8.00- 10.30am	**Session 7- Group discussions and Presentations**	**Chair: Dr. M. Mokhtar Rapp:A. Ndayizeye**
8.00-9.00 am	Group Discussions	**Facilitators; R. Jackman, J. Omwenga**
9.00- 9.20 am	Group 1 Presentation	
9.20-9.40 am	Group 2 Presentation	
9.40- 10.00 am	Group 3 Presentation	
10.00 -10.20 am	Goup 4 Presentation	

10.20- 11.30 am	**TEA BREAK**	

11.30- 12.30 pm	**Session 8 – Recommendations and Closing Ceremony**	**Chair:Dr. Hassani Mjengera Rapp: A.Ndayizeye**
11.30-12.00 noon	Summary of Discussions, Comments/ Recommendations	**Presenters:** John Omwenga/R.Jackman
12.00-12.30 pm	**Closing Ceremony**	**Chair- TAC member**
	Closing Remarks	WQLS
	Remarks	NPC
	Vote of Thanks	Participant
	Remarks by DG INECN	Festus Ntanyungu
	Closing Address	Hon. Min. for Energy and Mines, H. E.Thadee Nkanira
12.30-1.00 pm	**LUNCH AND DEPARTURE**	