GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

MONIQUE BARBUT
Chief Executive Officer and Chairperson

1818 H Street, NW
Washington, DC 20433 USA
Tel: 202.473.3202
Fax: 202.522.3240/3245
E-mail: mbarbut@TheGEF.org

July 06, 2011

Dear Council Member,

UNEP as the Implementing Agency for the project entitled: ***Regional (Burundi, Cote d'Ivoire, Ghana, Kenya, Malawi, Mozambique, Nigeria, Rwanda, Tanzania, Uganda): SIP-Equatorial Africa Deposition Network (EADN)*** under the **Strategic Investment Program for SLM in Sub-Saharan Africa (SIP)**, has submitted the attached proposed project document for CEO endorsement prior to final approval of the project document in accordance with UNEP procedures.

The Secretariat has reviewed the project document. It is consistent with the project concept approved by the CEO and the proposed project remains consistent with the Instrument and GEF policies and procedures. The attached explanation prepared by the UNEP satisfactorily details how Council's comments and those of the STAP have been addressed.

If by August 03, 2011, I have not received requests from at least four Council Members to have the proposed project reviewed at a Council meeting because in the Member's view the project is not consistent with the Instrument or GEF policies and procedures, I will complete the Secretariat's assessment with a view to endorsing the proposed project document.

We have today posted the proposed project document on the GEF website at www.TheGEF.org. If you do not have access to the Web, you may request the local field office of UNDP or the World Bank to download the document for you. Alternatively, you may request a copy of the document from the Secretariat. If you make such a request, please confirm for us your current mailing address.

Sincerely,

M Barbut

REQUEST FOR CEO ENDORSEMENT/APPROVAL

PROJECT TYPE: Full-sized Project
THE GEF TRUST FUND

Re-submission Date: 30 June 2011

PART I: PROJECT INFORMATION

GEFSEC PROJECT ID: 3401
GEF AGENCY PROJECT ID: 00547
COUNTRY(IES): Burundi, Cote d'Ivoire, Democratic Republic of Congo, Ghana, Kenya, Malawi, Mozambique, Nigeria, Senegal, Tanzania, and Uganda (11 countries)
PROJECT TITLE: Equatorial Africa Deposition Network (EADN)
GEF AGENCY(IES): UNEP, (select), (select)
OTHER EXECUTING PARTNER(S): African Collaborative Center for Earth System Science (ACCESS) in collaboration with UNU-International Network on Water, Environment and Health (UNU-INWEH), and the World Bank
GEF FOCAL AREA(s): Land Degradation and International Waters
GEF-4 STRATEGIC PROGRAM(s): LD-SP-1, IW: SP-2: Reducing nutrient over-enrichment and oxygen depletion from land-based pollution
NAME OF PARENT PROGRAM/UMBRELLA PROJECT: Strategic Investment Program for SLM in Sub-Saharan Africa (SIP)

Expected Calendar (mm/dd/yy)	
Milestones	**Dates**
Work Program (for FSPs only)	June 2007
Agency Approval date	Aug. 2011
Implementation Start	Sept. 2011
Mid-term Evaluation (if planned)	August 2013
Project Closing Date	Aug. 2015

A. PROJECT FRAMEWORK (Expand table as necessary)

Project Objective: To establish a working dialogue between equatorial African Governments that focuses on transboundary transport of major macronutrients in view of creating regional cooperation to advocate for changes in national and regional rural development programs.

Project Components	**Indicate whether Investment, TA, or STA[2]**	**Expected Outcomes**	**Expected Outputs**	**GEF Financing[1]**		**Co-Financing[1]**		**Total ($)** c=a+ b
				($) a	%	($) b	%	
1. Quality Assurance (QA) and Quality Control (QC)	STA	Standardized sampling processes across the network Enhanced delivery of SIP IR 4 on generation and dissemination of targeted knowledge and establishment and strengthening of monitoring and evaluation systems at all levels	QA/QC Plan developed; procedures documented	373,500	33	745,200	67	1,118,700

2. Training & Awareness	TA	Enhanced capacity for assessment and monitoring of atmospheric deposition. Information derived from EADN Project taken into account for the development and/or modification of rural development strategies of the World Bank, UNDP and other ODAs operating in Equatorial Africa. Enhanced delivery of Strategic Investment (SIP) Intermediate Result (IR) 4 as in the above	Training courses delivered on field instruments/ sample collection; laboratory analysis; auditing; atmospheric chemistry/ physics	364,000	53	319,800	47	683,800
3. Air and Precipitation Monitoring	STA	Network established to monitor air and precipitation; Enhanced delivery of SIP IR 4.	Estimates availabe of nutrients transport from and deposition to areas due to precipitation and airborne concentrations of target meteorological parameters in place; 1 database set up and functional; modeling used species	570,500	34	1,100,000	66	1,670,500
4. Database and Modeling	STA	Increased understanding of atmospheric nutrient sources and sinks, prediction and response to management.	Atmospheric deposition database set up; predictive models of responses to management scenarios	147,000	33	303,746	67	450,746

5. Stakeholder Involvement, communication with policy/decision-makers and Information Dissemination	TA	Increased understanding of issues as well as impacts on project/ policy in rural areas along Lake Victoria and other African Great Lakes Modification of strategies for rural development in equatorial Africa taking into account the impacts of agricultural and pastoral activities on the lakes and other water bodies Enhanced delivery of SIP IR 2 on promoting effective and inclusive dialogue and advocacy and enabling policy conditions and for SLM scale up.	Workshops and training sessions held Participation by technical staff in water conferences; Incorporating of QA/QC into CAS Number of key stake holders (multilateral and bilateral donors, research agencies, universities) who understand that inflow of micronutrients in African Lakes might be related to rural development -A Working dialogue between Equatorial African Governments established that focuses on transboundary transport of polluting elements and compounds, particularly major macronutrients	260,000	49	275,000	51	535,000
6. Project management				150,000	23	500,000	77	650,000
Total Project Costs				**1,865,000**		**3,243,746**		**5,108,746**

[1] List the $ by project components. The percentage is the share of GEF and Co-financing respectively of the total amount for the component.
[2] TA = Technical Assistance; STA = Scientific & Technical Analysis.

B. SOURCES OF CONFIRMED CO-FINANCING FOR THE PROJECT (expand the table line items as necessary)

Name of Co-financier (source)	*Classification*	*Type*	*Project*	*%**
Operating Agencies (The Countries)	Beneficiaries	In-kind	1,352,720	41
DFID (through East African Great Lakes Observatory, EAGLO)	Bilat. Agency	Grant	791,026	24
UNU-INWEH	Multilat. Agency	Grant	700,000	23

AGRA (Alliance for a Green Revolution in Africa)	Multilat. Agency	Grant	400,000	12
Total Co-financing			**3,243,746**	100%

* Percentage of each co-financier's contribution at CEO endorsement to total co-financing.

C. FINANCING PLAN SUMMARY FOR THE PROJECT ($)

	Project Preparation a	***Project b***	***Total c = a + b***	***Agency Fee***	***For comparison: GEF and Co-financing at PIF***
GEF financing	50,000	1,865,000	1,915,000	172,350	2,087,350
Co-financing	50,000	3,243,746	3,293,746		6,050,000
Total	**100,000**	**5,108,746**	**5,208,746**	**172,350**	**8,137,350**

D. GEF RESOURCES REQUESTED BY AGENCY(IES), FOCAL AREA(S) AND COUNTRY(IES)[1]

GEF Agency	***Focal Area***	***Country Name/ Global***	***(in $)***		
			Project (a)	***Agency Fee (b)***[2]	***Total c=a+b***
UNEP	Land Degradatic	Regional	890,000		890,000
UNEP	International W	Regional	975,000	97,500	1,072,500
(select)	(select)				
Total GEF Resources			**1,865,000**	**97,500**	**1,962,500**

[1] No need to provide information for this table if it is a single focal area, single country and single GEF Agency project.

[2] Relates to the project and any previous project preparation funding that have been provided and for which no Agency fee has been requested from Trustee.

E. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	***Estimated person weeks***	***GEF amount ($)***	***Co-financing ($)***	***Project total ($)***
*Local consultants**	0	0	0	0
*International consultants**	172	458,000	265,000	723,000
Total		**458,000**	**265,000**	**723,000**

* Details to be provided in Annex C.

F. PROJECT MANAGEMENT BUDGET/COST

Cost Items	***Total Estimated person weeks/months***	***GEF amount ($)***	***Co-financing ($)***	***Project total ($)***
- Regional Coordinator	208	0	178,000	178,000
- Regional Finance & Procurement Manager (RFPM)	124	75,000	51,000	126,000
- Project Data & Information Technology Manager	76	60,000	101,400	161,400
*Office facilities, equipment, vehicles and communications**			79,600	79,600
*Travel**		15,000	90,000	105,000
Total		**150,000**	**500,000**	**650,000**

* Details to be provided in Annex C.

G. DOES THE PROJECT INCLUDE A "NON-GRANT" INSTRUMENT? yes ☐ no ☒

(If non-grant instruments are used, provide in Annex E an indicative calendar of expected reflows to your agency and to the GEF Trust Fund).

H. DESCRIBE THE BUDGETED M &E PLAN:

Monitoring and evaluation of the project will address project execution, delivery of outputs, project performance and project impact. It will be conducted in accordance with established procedures laid out in the GEF 'Minimum Requirements for Project M&E and will be provided by ACCESS (African Collaborative Center for Earth System Sciences), the executing agency for this project and the Project Steering Committee. The Project Results Framework (Appendix 1 of Project Document) will form the basis for the project's monitoring and evaluation system. The detailed monitoring, evaluation and reporting plan, presented in Appendix 6, including (SMART) indicators and needs for specific baseline information against which to monitor changes, will be refined and finalized at the project's inception workshop immediately following GEF CEO Endorsement.

A mid-term review will be carried out by an independent international consultant according to terms of reference drawn up by ACCESS (the executing agency) and agreed by UNEP. This review will take place towards the end of the second year, and will focus principally on helping to guide the project through its all-important third and fourth year. The terminal evaluation at the end of project will follow the standard UNEP-GEF format and terms of reference (see Appendix 8 of project document). To be most useful it will be carried out some six months before the project actually terminates – so that there is still an opportunity to act on recommendations. The indicative cost of M&E for this project is shown in Table G1.

Table G1. Monitoring and Evaluation Plan, with Indicative costs

Type of M & E activity	Responsible Parties	Time-frame (3 years)	Indicative cost to GEF US$	Indicative cost to Executing Agency
Inception workshop	EADN Regional Programme Office/Project Coordinator (PC)	Within 2 months of project approval	30,000	20,000
Project inception report	Project Coordinator and UNEP/DGEF TM	Within first 3 months	0	500
Project implementation Review, PIR	EADN RPO/Project Coordinator	Yearly	0	1,000
Project Progress /Operational Reports to UNEP	EADN Regional Programme Office/Project Coordinator with inputs from Operating Agencies (OAs)	Half-yearly (as at 30 June & 31 December)	0	2,000
Half-yearly progress reports to GEF	EADN Regional Programme Office/Project Coordinator to UNEP/ DGEF TM	Half-yearly (as at 30 June & 31 December)	0	2,000
Meetings of EADN Regional Executive Secretariat (EADN RES) and EADN TC	EADN Regional Programme Office/Project Coordinator	3, Annually	30,000	20,000
Reports of EADN RES & EADN TC meetings	EADN RPO/PC	Annually	0	1,000
Monitoring visits (EADN RPO, EADN TC, etc.)	EADN RPO/PC + EADN TC + UNEP/DGEF TM	As appropriate	20,000	15,000
Field Surveys (to fill gaps in baseline information, refinement of indicator, etc.)	EADN RPO/PC, EADN TC with Operating Agencies (OAs)		20,000	10,000
Independent mid-term Review/ Evaluation	UNEP/DGEF Task Manager	End of Project Year-2	30,000	10,000
Independent final Evaluation	UNEP/DGEF Task	3 months prior to the	30,000	10,000

	Manager	"terminal" review meeting		
Project terminal report	EADN RPO/Project Coordinator, final clearance and processing by UNEP/DGEF TM	Within 60 days of project completion (PY-3)	0	1,000
		Total indicative cost	**160,000**	**92,500**

PART II: PROJECT JUSTIFICATION: In addition to the following questions, please ensure that the project design incorporates key GEF operational principles, including sustainability of global environmental benefits, institutional continuity and replicability, keeping in mind that these principles will be monitored rigorously in the annual Project Implementation Review and other Review stages.

A. STATE THE ISSUE, HOW THE PROJECT SEEKS TO ADDRESS IT, AND THE EXPECTED GLOBAL ENVIRONMENTAL BENEFITS TO BE DELIVERED:

GEF International Waters projects on African Great Lakes verify the early research-identified links between increasing eutrophication and atmospheric deposition of macronutrients. Unfortunately, there are no estimates of the regional atmospheric transport of phosphorus (P) within tropical Africa nor export of nitrogen (N) and phosphorus from the continent in tropical latitudes. The proposed Lake Victoria Environmental Management Project phase 2 (LVEMP2) will include more extensive monitoring of wet/dry deposition of macronutrients, both at the Lake shore and offshore islands, and within the catchment as a whole. But this information alone will not indicate how much material is transported directly from outside the basin and onto the Lake surface. Nor will a basin-only network shed light on how much phosphorous is deposited generally within the Lake Basin from outside sources and remobilized either by surface runoff or wet/dryfall into the Lake. Long range transport of soil particles in the atmosphere is a well known phenomenon (for example, the deposition of African soils in the Caribbean and Central and South America) and P is always associated with particulates in the atmosphere. The monsoonal climate of equatorial Africa strongly suggests that regional contribution of P to Lake Victoria could come from as far away as West Africa.

Transport of macronutrients may be both a regional and global problem. Africa through deflation of dust from the Sahara and the Sahel is a major global source of dust and associated P (Okin et al. 2004). Long distance transport of African dust originating in northern Africa may sustain the productivity of tropical forests in the Amazon (Chadwick et al. 1999), but may also be degrading reefs in the Carribean (Garrison et al. 2003). Seasonally, winds in the troposphere will also distribute this Saharan dust over western and eastern Africa. Globally, atmospheric particulates have been estimated to contribute 50% of the total annual P load to the oceans (Duce et al. 1991), a percentage remarkably similar to that estimated for atmospheric P loading to the African Great Lakes. Existing scientific data strongly suggests that a significant, and potentially very significant, concentrations of phosphorus that enters Lake Victoria is coming regionally from those parts of equatorial Africa defined by monsoonal airmass movement patterns. These monsoonal patterns are well known and continue to be monitored through an Africa-wide meteorological network.

With the above as evidence of long-range atmospheric transport of soil particles, and remembering that atmospheric phosporus is always associated with soil particles, the EADN will need to include a distribution of stations across all of equatorial Africa if it is to produce the information needed in the LVEMP2.

Although African savannas have received close attention as emission sources (Scholes and Andreae 2000), deposition estimates are very few in Africa, and largely generated through empirical measurements out of the GEF projects. The lakeside location of most of the few estimates may limit their extrapolation to over-lake deposition on one hand while on the other hand they may also not be representative of terrestrial ecosystems where vegetation is a much more efficient collector of aerosols than water surfaces. The high surface area of vegetation is highly efficient at intercepting dryfall, and its vegetation cover reduces aerodynamic turbulence near the ground and enhances particle settling Depending on the climatic aridity of a site, the relative importance of wet and dryfall varies from site to site although dryfall is broadly comparable to wet deposition of TN and TP in all studied sites (Tamatamah et al 2004, Bootsma et al. 1999). Similarly, only Bootsma et al. (1999) addressed interannual variability, and even then only over two years.

All current data suggest that failure to address the root sources of atmospheric mobilization and subsequent wet/dry-fall deposition of phosphorus into all of the African Great Lakes and particularly Lake Victoria will lead to continued eutrophication to a point likely to severely damage the ecological and productive value of these important water bodies. Even concerted and expensive solutions to urban sewage, drainage and sanitation, and other "catchment-oriented" works designed to minimize effluent runoff into the Lake will have only marginal and short-term impacts on the trophic status of these Lakes, buying time to identify sources of macronutrient mobilization into and transport through the atmosphere. There is no alternative. Without dealing with the largest source of nutrients driving enrichment of these Lakes, the devastating symptoms of eutrophication (fundamental changes in the microflora and fauna including a shift to algal species that produce toxins, reduced light penetration into the water column, increased algal blooms and associated fish kills, etc.) will continue and probably become worse.

UNEP as a GEF implementing agency will partner with the World Bank to take advantage of and use the information to come from the EADN. The EADN will integrate with the second phase of the GEF-supported Lake Victoria Environmental Management Project. This will ensure that the data from the EADN is applied in a practical way within the 5 countries of the Basin, and also provide the driving force needed to mobilize the Lake Victoria Basin governments to make regional efforts to address land use issues central to the mobilization of macronutrients that impact on Lake Victoria.

Establishment of a monitoring network covering a very large geographic region requires standardization of sampling and analytical methods, site location criteria, staff training, and organization of a comprehensive QA/QC program amongst all sites and agencies involved in the monitoring network. The EADN will likely start before the LVEMP2 becomes "effective. The EADN will therefore support establishment and initial operation of all stations across equatorial Africa, including those in the Lake Victoria Basin. Once the LVEMP2 becomes operational, Lake Basin monitoring sites will be turned over to it for operation. If any expansion of monitoring sties is needed in the Basin, the LVEMP2 may provide the funding and management. Overall coordination of the EADN during preparation and implementation will be through ACCESS, which is based in Kenya, ensuring a strong focus on Lake Victoria and interaction with the LVEMP2.

In addition, this project will generate outcomes that contribute to two of the SIP Intermediate Results: IR2 and IR4: establishment of enabling policy conditions and generation and dessimination of targeted knowledge of relevance to SLM scale-up in SSA. Environmental benefits will be tracked by a small set of proxy ecosystem function indicators listed in the SIP results framework including no losss in net primary productivity.

B. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH NATIONAL AND/OR REGIONAL PRIORITIES/PLANS:

The governments building on existing regional collaboration framework have formally expressed their intentions to work along the lines consistent with TerrAfrica and the SIP and the NEPAD Environment Action Plan and the NEPAD CAADP (Comprehensive African Agricultural Development Programme).

Participants at the regional meeting of 12 equatorial African nations organized by African Collaborative Center for Earth System Science (ACCESS) in Nairobi in May, 2005 strongly endorsed the need for EADN and committed to participate in the project implementation. These 12 countries are: Burundi, DR Congo, Cote d'Ivoire, Ghana, Kenya, Malawi, Mozambique, Nigeria, Rwanda, Senegal, Tanzania, and Uganda. Formal commitments - endorsement letters - from 9 governments (Kenya, Nigeria, DR Congo, Rwanda, Uganda, Mozambique, Cote d'Ivoire, Tanzania, and Senegal) were received and 3 countries are expected to send their endorsments soon.

C. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH GEF STRATEGIES AND STRATEGIC PROGRAMS:

The proposed project "the Equatorial Africa Deposition Network (EADN)" project fits with GEF Land Degradation focal strategy and will contribute to its strategic objective (SO-1) in developing an enabling environment that will place SLM in the mainstream of development policy and practices at regional, national and local levels. It is also consistent with the GEF Strategic Programs under its International Waters focal area: SP-2. Reducing nutrient over-enrichment and oxygen depletion from land-based pollution of coastal waters in LMEs consistent with the GPA. It is also in conformity with both Strategic Long-Term Objectives of GEF International Waters focal area: 1. "to foster international, multi-state cooperation on priority transboundary water concerns"; and 2. "to catalyze transboundary

action addressing water concerns". The project will be a constituent part of the Strategic Investment Program for SLM in SSA (SIP), contributing to its long-term Program Goal. The expected project outcomes will facilitate the achievement of two of the SIP Intermediate Results: IR2 and IR4: establishment of enabling policy conditions and generation and dessiminatyion of targeted knowledge of relevance to SLM scale-up in SSA.

D. JUSTIFY THE TYPE OF FINANCING SUPPORT PROVIDED WITH THE GEF RESOURCES.

The project seeks GEF financing of US$ 1,865,000 within the TerrAfrica SIP for upscaling SLM in Sub-Saharan Africa that was approved in the Land Degradation focal area by GEF Council in November 2006. The project in turn is attracting a co-finance contribution of US$ 3,243,746, a ratio of more than 1:1.7 It is a science-oriented project that is setting up network for monitoring atmospheric deposition in equatorial regions of Africa and has no income generating activities that could utilize a loan facility and so a grant is the most fitting type of funding. Besides, the main purpose of the project is to enhance our understanding of transboundary transport of macronutrients and other pollutants so as to inform policy on rural development, especially land use so that global environmental benefits could be secured for the GEF investment in SLM and International Waters.

E. OUTLINE THE COORDINATION WITH OTHER RELATED INITIATIVES:

As part of the SIP portfolio, the EADN would reinforce the goals other SIP operations in all the countries participating in this project. EADN has a strong linkage to the TerrAfrica partnership that aims to mobilize additional resources and to generate and disseminate key knowledge in support of SLM upscalling in Africa. It will serve as a testing ground for and source of new knowledge for development of strategic policies and their financing.

During implementation, EADN is expected to cooperate closely with the TerrAfrica Program, the Lake Victoria Environmental Management Project - Phase 2, and the Lake Tanganyika IW project - Phase 2. Consultation and coordination will also be particularly important with other related projects, government and donor-supported activities, UNEP, the World Bank, and the GEF. African Collaborative Center for Earth System Science (ACCESS) and UNU-UNU-INWEH are fully committed to a partnership to coordinate the execution of EADN.

F. DISCUSS THE VALUE-ADDED OF GEF INVOLVEMENT IN THE PROJECT DEMONSTRATED THROUGH INCREMENTAL REASONING :

Recent research (Goldman et al., 1990; Li et al. 2004) observed a dramatic increase in algal photosynthetic rates in Lake Tahoe, a large, remote oligotrophic following large forest fires in the region. They attributed this increase to the atmospheric deposition of phosphorus-containing ash produced by the forest fires. Also the potential for long range transport of particulate P sources has received attention in regards P loading of distant ecosystems, including tropical forests and coral reefs. The origin of this long range transport is arid and semi-arid regions of the globe and deflation of open, exposed soils.

There are still many questions about sources and areas of contribution to atmospheric loading of particulates and no historical or existing monitoring networks in equatorial Africa to provide data needed to answer these questions. For example, substantial uncertainty remains about the quantitative and relative contribution of atmospheric loading to ecosystem nutrient budgets. This is particularly true in Africa where the highest rates have been measured, but only over a very few locations. Another example is that deposition estimates are very few in Africa, and largely generated through empirical measurements out of the GEF projects. The lakeside location of most of the few estimates may limit their extrapolation to over-lake deposition on one hand while on the other hand they may also not be representative of terrestrial ecosystems where vegetation is a much more efficient collector of aerosols than water surfaces.

All current data suggest that failure to address the root sources of atmospheric mobilization and subsequent wet/dry-fall deposition of phosphorus into all of the African Great Lakes and particularly Lake Victoria will lead to continued eutrophication to a point likely to severely damage the ecological and productive value of these important water bodies. Without dealing with the largest source of nutrients driving enrichment of these Lakes, the devastating symptoms of eutrophication will continue and probably become worse.

Based on the latest research outcomes in this field, major incrementality in terms of generating global environmental

benefits from the proposed EADN project can be summaries as follows:

The proposed EADN project would address transboundary impacts and thus respond holistically in all areas rather than target its regional resources and stratify its efforts according to nutrient mobilization hotspots. The expected outcomes of EADN would help, for example, the Lake Victoria Basin countries address problems caused by significant quantities of phosphorus transported into the Basin from unidentified outside sources.

The proposed project will further help address land use issues central to the mobilization of macronutrients that impact on the Great Lakes in Africa, including the Victoria Lake. The project is expected to be integrated with TerrAfrica and the second phase of the GEF-supported Lake Victoria Environmental Management Project. This would ensure that the data from the EADN is applied in a practical way within the 5 countries of the Lake Victoria Basin and countries within TerrAfrica, and thus provide the driving force needed to mobilize relevant governments to strengthen regional efforts to address land use issues, critical to the whole African continent.

The EADN would establish a monitoring network covering a very large geographic region requires standardization of sampling and analytical methods, site location criteria, staff training, and organization of a comprehensive QA/QC program amongst all sites and agencies involved in the monitoring network. The EADN will therefore support establishment and initial operation of all stations across equatorial Africa, including those in the Lake Victoria Basin. Once the LVEMP2 becomes operational, Lake Basin monitoring sites will be turned over to it for operation. Overall coordination of the EADN during preparation and implementation will be through ACCESS, which is based in Kenya, ensuring a strong focus on Lake Victoria and interaction with the LVEMP2.

The EADN will help the GEF to achieve its operational policy of addressing "degradation of the quality of transboundary water resources, caused mainly by pollution from land-based activities" while simultaneously providing information that will allow the UNEP and the World Bank to appropriately scope geographically and operationally any intervention needed to address offsite impacts associated with nutrient mobilization into, and movement through, the atmosphere.

In summary, with the above as evidence of long-range atmospheric transport of soil particles, and remembering that atmospheric phosporus is always associated with soil particles, the EADN is designed to be very strategic and fill an important gap that will thus generate global environmental benefits by distributing stations across all of equatorial Africa to produce the information needed in the Lake Victoria phase 2 project and other GEF supported projects in equatorian Africa. Therefore, the propose EADN is very much qualified for GEF incremental financing.

G. INDICATE RISKS, INCLUDING CLIMATE CHANGE RISKS, THAT MIGHT PREVENT THE PROJECT OBJECTIVE(S) FROM BEING ACHIEVED AND OUTLINE RISK MANAGEMENT MEASURES:

Two potential risks which are identified may affect project implementation: political instability which may occur in few participating countries; and uneven performance among the participating countries. The project design has taken these risks into consideration.

The proposed risk reducing measures to address political instability include establishment of a network of cooperation among the participating countries. The network designed in the EADN project is to encourage active interaction and exchange among technical people in the region and thus mininizing eventual risks caused by political unstability. Under this network, the project will be implemented at both the national and regional levels, similarly project finances and cash flows will be managed at both levels. In addition, Regional Coordination of Project Implementation will be through a centralized agency representing all participating countries (the role of ACCESS). Implementation coordination at the regional level will involve two structures: a Regional Executive Secretariat (and the participating countries have designated ACCESS to fill this role) which will manage the operational aspects of the project, and a Regional Management Board, comprised of the technical heads of the agencies responsible for operating and maintaining the monitoring sites in participating countries. The Regional Management Board will provide technical oversight over the secretariat and the project.

The designed network described above will also be able to prevent and reduce eventual negative impacts caused by uneven performance among the participating countries. Together with the committed support from ACCESS and UNU, EADN is expected to provide an enabling environment to promote a close country cooperation based on good national

performance. The project is also expected to benefit from a strengthened capacity through other frameworks and programs, such as, TerrAfrica, the Lake Victoria Environmental Management Project, and the Lake Tanganyika IW project.

H. EXPLAIN HOW COST-EFFECTIVENESS IS REFLECTED IN THE PROJECT DESIGN:

As mentioned above, all current data suggest that failure to address the root sources of atmospheric mobilization and subsequent wet/dry-fall deposition of phosphorus into all of the African Great Lakes and particularly Lake Victoria will lead to continued eutrophication to a point likely to severely damage the ecological and productive value of these important water bodies. Even concerted and expensive solutions to urban sewage, drainage and sanitation, and other "catchment-oriented" works designed to minimize effluent runoff into the Lake will have only marginal and short-term impacts on the trophic status of these Lakes, buying time to identify sources of macronutrient mobilization into and transport through the atmosphere.

The proposed EADN project is the most cost-effective to address the challenges of depostion of macronutrients into African Great Lakes. African countries and the GEF Implementing Agencies will be able to take advantage of and use the information to come from the EADN. The most likely sources of macronutrients mobilized and transported to Lake Victoria are regional, coming from within and a wide area outside the Lake basins.

PART III: INSTITUTIONAL COORDINATION AND SUPPORT

A. INSTITUTIONAL ARRANGEMENT:

The proposed Equatorial Africa Deposition Network (EADN) will involve the African Collaborative Center for Earth System Science (ACCESS) in the University of Nairobi, Kenya serving as the executing agency in collaboration with UNU-International Network on Water, Environment and Health (UNU-INWEH), UNEP as the GEF implementing agency and the participating national research institutions. ACCESS is an existing regional body of African scientists and institutions that is associated and housed in the University of Nairobi, but is financially independent from it. It has rights granted from the Government of Kenya to operate a USD account. UNEP, as the GEF Implementing Agency for this project provides co-ordination of the activities of partners, technical and scientific expertise and enhancement of regional cooperation. The operating agencies, OAs (e.g. local universities or government environmental departments) will implement EADN project at national level and will oversee the operation of each monitoring stations that will be established.

B. PROJECT IMPLEMENTATION ARRANGEMENT:

Implementation of the project will involve five main entities: (i) The EADN Regional Executive Secretariat within the African Collaborative Center for Earth System Science (ACCESS) in the University of Nairobi, Kenya; (ii) The EADN Technical Committee; (iii) The Operating Agencies (OAs), (iv) A Central Analytical Laboratory (CAL) and (v) EADN Regional Steering Committee (EADN RSC). Implementation arrangement and structures for the project is outlined in detail in Section 4 of the Project Document.

EADN will be implemented at the national level, but coordinated regionally by the African Collaborative Center for Earth System Science (ACCESS) in the University of Nairobi, Kenya, which will serve as the EADN Regional Executive Secretariat (RES) responsible for running the project. It will provide overall management of the EADN by coordinating the network activities of the Operating Agencies, Site Supervisors, Site Operators and the CAL. It will also manage the network quality assurance program by coordinating the quality assurance activities of the CAL, and the various training aspects. RES will also manage the agreement that establishes the services provided by the CAL. EADN will not need to set up a separate, transitory, project implementation unit. Nor will EADN need to establish national Project implementation units, as national implementation will be through identified (based on mutually agreed terms) research institutions.

Implementation coordination at the regional level will involve two structures: the Regional Executive Secretariat, which will manage the regional administrative aspects of the project, and an EADN Technical Committee comprised of the technical heads of the agencies responsible for operating and maintaining the monitoring sites in the participating countries. The Technical Committee will provide technical oversight over the secretariat and the project. It will have

the supreme power and authority over all matters relating to the overall technical operation of the EADN. The Technical Committee will be made up of one representative of each Operating Agency, the RES, and regional experts in the fields of agriculture, natural resource management (fisheries, forestry, water resources), meteorology, and environmental chemistry (including atmospheric chemistry, biogeochemistry, and persistent organic pollutants). The Technical Committee will physically meet once per year to review program progress and recommend any necessary revisions. All decisions taken regarding the operation of the EADN by the Technical Committee are binding on national Operating Agencies. The Operating Agencies, OAs will oversee the operation of each monitoring station and operate one or more sites and will be members of the EADN Technical Committee. OAs will designate a Site Supervisor (SS) who oversees site operations and assists in solving operational or logistical problems. The OAs will be responsible for ensuring that the sites are operated according to the EADN protocols and for general maintenance activities.

The EADN Regional Steering Committee (EADN RSC) serves as overall-policy setting body for the project. The RSC will be composed of GEF Operational Focal Points of the participating countries, Director of ACCESS, Executive Secretary of LVEMP, Chair of EADN Technical Committee, representative of UNEP/DGEF (Implementing Agency), and the STAP (Scientific and Technical Advisory Panel) of GEF. The RSC will be co-chaired by UNEP/DGEF and the Director of ACCESS and will meet annually. It will maintain regular communications and contacts by e-mails. The RSC will finalize and adopt its own terms of reference on the occasion of the first session.

PART IV: EXPLAIN THE ALIGNMENT OF PROJECT DESIGN WITH THE ORIGINAL PIF:

The project is fully aligned with the original PIF except that there are now 12 countries instead of the original 10 in the PIF. All 12 participating countries have contributed co-finance.

PART V: AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF policies and procedures and meets the GEF criteria for CEO Endorsement.

Agency Coordinator, Agency name	Signature	Date *(Month, day, year)*	Project Contact Person	Telephone	Email Address
Ms Maryam Niamir-Fuller Director GEF Coordination Office, UNEP		30 June 2011	Mohamed Sessay	+254 20 762 4294	mohamed.sessay@unep.org

ANNEX A: PROJECT RESULTS FRAMEWORK

Equatorial Africa Deposition Network (EADN)

Narrative Summary	Objectively Verifiable Indicators (OVIs)	Sources/Means of Verification (MOV)	Milestones	Assumptions
Objective: To establish a network for monitoring the atmospheric transport and deposition of nutrients (phosphorus and nitrogen) in sub-Saharan Africa, and to use the data collected by the network, along with model simulations driven by the data, to determine sources of atmospheric nutrients and their contribution to lake nutrient budgets. Information on nutrient sources and transport mechanisms will be used to inform Sustainable Land Management (SLM) programmes at the national and regional scales.	- Quantification of nutrient deposition rates at 11 sites in sub-Saharan Africa. Use of database and model outputs by managers, policy makers, researchers in the natural resource and agriculture sector	- Regional data reports, computer models, and analyses of data and model simulations. - Project Evaluation Commissioned reports	- Establishment of a network of specialists trained in atmospheric deposition monitoring and QA/QC methods. - Establishment of a functional monitoring network. - Quantification of annual P and N deposition rates at all monitoring stations. - Model simulation of P and N transport within the study region.	
Components, outputs and outcomes:				
Component 1: Quality Assurance (QA) and Quality Control (QC) Output: QA/QC Plan developed; Procedures documented. Outcomes: Standardized sampling processes across the network. Enhanced delivery of SIP IR 4 on generation and dissemination of targeted knowledge. Establishment and strengthening of monitoring and evaluation systems at all levels.	Production of data along with QA/QC metadata by monitoring sites (Operating Agencies) and the Central Analytical Laboratory.	- QA/QC programmes documented (hard copy and digital). - QA/QC assessment by auditors.	- Documented Quality Assurance and Quality Control Programmes (month 18). - QA/QC audits conducted annually.	- QA/QC contract initiated in timely manner.
Component 2: Training & Awareness Outpu: Training courses delivered on field instruments/ sample collection; lab. analysis; auditing; atmospheric chemistry/ physics; atmospheric modeling. Outcomes: Network of specialists trained in QA/QC procedures, including QA/QC auditing	- Completion of training sessions. - No. of key decision makers and other stakeholders participating in the training workshops and conferences on the use of atmospheric deposition data in Equatorial Africa.	- Capacity for all necessary nutrient analyses within network; -Implementation of QA/QC protocols; Capacity for independent operation of atmospheric models within EADN network.	- Minimum of 6 auditors trained in application of the ISO 17025 Laboratory Accreditation standard (month 24) - 4 trained analytical technicians (month 18) - 6 specialists trained in basics of atmospheric chemistry, meteorology, and	- Qualified personnel available for training.

Narrative Summary	Objectively Verifiable Indicators (OVIs)	Sources/Means of Verification (MOV)	Milestones	Assumptions
specialists. Enhanced capacity for assessment and monitoring of atmospheric deposition. Information derived from EADN Project taken into account for the development and/or modification of rural development strategies of the World Bank, UNDP and other ODAs operating in Equatorial Africa. Enhanced delivery of SIP IR 4 as in the above.	-	- Commissioned surveys	biogeochemistry (month 24). - 4 trained model operators (month 42) - Functional Central Analytical Laboratory (month 8).	
Component 3: Air and Precipitation Monitoring Output: Estimates available of nutrient transport from and deposition to areas due to precipitation and airborne concentrations of target nutrients. Collection of meteorological data necessary to run models. Outcomes: Network established to monitor air and precipitation; Enhanced delivery of SIP IR 4.	- Production of quality-assured meteorological data. - Provision of atmospheric deposition samples from Operating Agencies to Central Analytical Laboratory. - Production of quality-assured atmospheric deposition data by the CAL. - Percentages of new estimations of inputs of macronutrients(and particularly phosphorus) into African Lakes resulting from atmospheric deposition	- Development and publication (via internet) of a dynamic atmospheric nutrient deposition database.	- 6 functional monitoring stations by month 12; 12 functional stations by month 24.	- Operating Agencies provide logistic support as agreed. - Monitoring equipment installed on schedule. - Efficient flow of funds between RES Office, Operating Agencies and Monitoring Stations.
Component 4: Database and Modelling Output: Atmospheric deposition database set up; Fully operational models of regional meteorology and atmospheric transport of various forms of phosphorus and nitrogen. Outcomes: Spatial analysis of atmospheric nutrient sources and sinks; Prediction of atmospheric nutrient deposition response to management scenarios.		- All EADN data incorporated into functional models simulating atmospheric nutrient transport in EADN region.	- EADN website and database (month 24). - Remote sensing report (month 42). - Atmospheric transport model (month 42).	- Contractors meet terms of reference. - Adequate quantity and quality of data available for models.

Narrative Summary	Objectively Verifiable Indicators (OVIs)	Sources/Means of Verification (MOV)	Milestones	Assumptions
Component 5: Stakeholder Involvement, communication with policy/decision-makers and Information Dissemination Outputs: Workshops and training sessions held. Participation by technical staff in water conferences; EADN technical reports disseminated to stakeholders. Outcomes: Increased understanding of issues as well as impacts on project/ policy in rural areas along Lake Victoria and other African Great Lakes. Enhanced delivery of SIP IR 2 on promoting effective and inclusive dialogue and advocacy and enabling policy conditions for SLM scale up.	- Use of database and model output by managers, policy makers and researchers in the natural resource and agricultural sectors. - Modification of strategies for rural development in equatorial Africa taking into account the impacts of agricultural and pastoral activities on the lakes and other water bodies - Number of key stake holders (multilateral and bilateral donors, research agencies, universities) who understand that inflow of micronutrients in African Lakes might be related to rural development i.e. land use management, soil fertility, livestock and agriculture - A working dialogue between Equatorial African Governments is established that focuses on transboundary transport of polluting elements and compounds, particularly major macronutrients	- Data and information exchange between EADN and other stakeholders. - Commissioned surveys	- See above component for database development. - RES establishes communication links between EADN and other regional stakeholders (throughout project, with emphasis on year 1) - Stakeholder workshops (month 24 and month 48) Working dialogue between Governments established by end of Yr 2.	- Stakeholders understand the relevance of atmospheric nutrient deposition to land management and water quality.
Component 6: Project Management Outputs: A workable project management structure, effective M&E of the project, wide dissemination of the project tools. EADN Project website and database. Outcomes: A successfully managed project, thorough evaluation, global awareness of the project tools.	Work program adhered to Objective met Outputs delivered Budget adhered to Partner disbursements made on time	Progress reports Annual reports Impact assessment Audits	- SSC and STAP meeting months 1, 12, 24 and 36 after project start. - Project website (month 6) and internet-accessible database (month 24). - Consolidated progress and financial reports to UNEP months 6, 12, 18, 24, 30, 36 and 42.	Funding sources delivered on time. Good collaboration established

Narrative Summary	Objectively Verifiable Indicators (OVIs)	Sources/Means of Verification (MOV)	Milestones	Assumptions
			- Project mid term review completed end of year 2. - Financial audits completed and sent to UNEP months 15, 27, 39 and 45 days after the end of the project. - All in place for project terminal evaluation month 48.	

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF)

Title: SIP-EQUATORIAL AFRICA DEPOSITION NETWORK (EADN) (GEFSEC Project ID: 3401)

Questions	Secretariat Comment at PIF/ Work Program Inclusion	UNEP Response
1. Is the participating country eligible?	Yes	
2. Has the operational focal point endorsed the project?	The PIF states that UNEP has received endorsement letters from 9 out of the 12 countries, but only the following are documented: Cote d'Ivoire, Kenya, Mozambique, Nigeria, Tanzania, Uganda (not OFP)	UNEP has received endorsement letters from the GEF OFPs of the ten countries now participating in the project. These are attached with this submission for CEO Endorsement.
3. Which GEF Strategic Objective/ Program does the project fit into?	LD SO-1, IW SO-1 LD SP-3, IW SP-2	
4. Does the Agency have a comparative advantage for the project?	Yes.	
5. Is the proposed GEF Grant (including the Agency fee) within the resources available for (if appropriate):		
The RAF allocation?	N/A	
The focal areas?	Yes	
Strategic objectives?	N/A	
Strategic program?	Yes, LD contribution (1.025 mill $) slightly exceeds SIP budget for this project (1 mill $)	LD contribution has been slightly adjusted downwards to less than 1 mill $ (actual $ 997,350). As a consequence Section B and C have been duly revised and parts of Section A (mgt costs and total project costs) adjusted accordingly.
6. Will the project deliver tangible global environ-mental benefits?	Yes. This project will foster cooperation between countries across Equatorial Africa, build capacity within these countries and deliver crucial knowledge for an informed joint response to an important Transboundary environmental problem that affects the nutrient balance of both land and water ecosystems.	
7. Is the global environmental benefit measurable?		

Questions	Secretariat Comment at PIF/ Work Program Inclusion	UNEP Response
8. Is the project design sound, its framework consistent & sufficiently clear (in particular for the outputs)?	Yes, the project design is basically sound. Project preparation should carefully address: the balance between monitoring and modeling; the balance between establishing the data network, actual data acquisition and data handling and dissemination; and the financial and institutional sustainability of the EADN beyond the duration of the project	The issue has been addressed fully (see Section 4: Institutional framework and implementation arrangements and in Section 3.8: Sustainability and Appendix 13) of Project document.
9. Is the project consistent with the recipient country's national priorities and policies?	There is no apparent conflict between this project and the countries' national policies. The project reaches beyond the national priorities of individual countries by addressing a Transboundary environmental problem.	
10. Is the project consistent and properly coordinated with other related initiatives in the country or in the region?	Yes, but coordination and dissemination of results should be further elaborated on during project preparation.	Mechanisms for coordination and dissemination of results have been elaborated further in Section 4: Institutional framework and implementation arrangements of the Project document.
11. Is the proposed project likely to be cost-effective?	Yes, but this needs to be further analyzed and documented during project preparation.	This is addressed fully in Section 7.3 of Project Document.
12. Has the cost-effectiveness sufficiently been demonstrated in project design?		
13. Is the project structure sufficiently close to what was presented at PIF?		
14. Does the project take into account potential major risks, including the consequences of climate change and includes sufficient risk mitigation measures?	Yes.	
15. Is the value-added of GEF involvement in the project clearly demonstrated through incremental reasoning?	GEF involvement is crucial	
16. How would the proposed project outcomes and global environmental benefits be affected if GEF does not invest?		

Questions	Secretariat Comment at PIF/ Work Program Inclusion	UNEP Response
17. Is the GEF funding level of project management budget appropriate?	Overall management costs are appropriate, but GEF contribution to mgt costs should be proportionate to overall GEF contribution	Noted, GEF contribution to mgt cots has been adjusted slightly downwards (from $195,000 to $150,000 $) to make it proportionate.
18. Is the GEF funding level of other cost items (consultants, travel, etc.) appropriate?		
19. Is the indicative co-financing adequate for the project?	Yes.	
20. Are the confirmed co-financing amounts adequate for each project component?		
21. Does the proposal include a budgeted M&E Plan that monitors and measures results with indicators and targets?		Yes, See Appendix 5 of project document and Section H of CEO Endorsement request
STAP & Convention Secretariat	Not received yet. STAP should be consulted during project preparation	STAP has been consulted fully as necessary and will be serving on the Steering Committee of this project to provide further policy and scientific guidance.

ANNEX C: CONSULTANTS TO BE HIRED FOR THE PROJECT USING GEF RESOURCES

Position Titles	*$/ person week**	*Estimated person weeks***	*Tasks to be performed*
For Project Management			
Local			
- Project Manager	0	0	Responsible to the Regional Management Board for overall project management activities. Leads QA/Q and distance education/training components of project; provide technical support required in design, implementation and operationalizing nutrient deposition network in consultation with regional and international consultants. Responsible for preparation of workplans and budgets and terms of engagement by participating countries.
Regional Finance and Procurement Manager	605	124	Responsible for establishing a finance and procurement management system that will be adequate to account and report for project resources and expenditure. Also responsible for preparation of financial management manual for project and for facilitating harmonization and uniformity of procedures used by each participating country.
Data & Information Manager	789	76	Responsible for documentation requirements for data recording and storage as well as for development of database features including the computer platforms and software required for its operation. Also responsible for maintenance of website and the databases
International			
Justification for Travel, if any:			
For Technical Assistance			
Local			
International			
CAL Auditors	$2,500	32	- Annual audit of Central Analytical Laboratory. - Audit will include assessment of chemical analyses, data management, and QA/QC program implementation - Produce annual CAL audit report.
Consultants to consolidate and report data, collect auxiliary data and do modeling and scenario building	$2,760	50	- Collaborate with CAL, Operating Agencies, and RES to collate and summarize data from all monitoring sites in years 2-4. - Produce annual data report for years 2 and 3, and final, multi-year report in year 4. - Collaborate with Operating Agencies and RES to collect all necessary data required for modeling atmospheric transport and deposition that are not available from EADN partners. Includes meteorological data, topographic data, land use / land cover data.

Consultants to conduct capacity building activities (training, mentoring of national and regional experts)	$2,000	30	- Carry out capacity building activities, training and education and mentoring national and regional experts especially in high-tech depositional station operations, QA/QC, modeling, scientific data interpretation and dissemination of results to national and regional stakeholders.
Development of QA/QC Program	$3,000	50	- Approval or revision of initial monitoring site plans. - Assess qualifications of staff. - Develop QA/QC manual to be used both for training and for implementation of QA/QC program - Develop and provide QA/QC training program. Training will consist of three major components: 1. Training in operation of monitoring sites. This will be conducted at one central location that is fully equipped for sampling (including meteorological equipment). Attendees will include two staff from each Operating Agency. 2. Training in data processing and management. This will be a sub-component of both the monitoring site training and the chemical analyses training. - Provide instrument manuals, including maintenance procedures and schedules - Develop QA/QC documentation procedures and provide QA/QC manuals.
Justification for Travel, if any: CAL Auditor will need to travel to CAL once per year. Data consolidator / reporter will travel in years 2-4 to meet with the RES and the CAL. Model data collector will need to visit some regional data centers to collect data.			

* Provide dollar rate per person weeks or months as applicable; ** Total person weeks/months needed to carry out the tasks.

Please note that the tasks included below have already being budgeted for under the various contracts. Inclusion here is simply to provide additional details and clarity on tasks that will be performed.

Development of QA/QC Program			- Approval or revision of initial monitoring site plans. - Assess qualifications of staff. - Develop QA/QC manual to be used both for training and for implementation of QA/QC program - Develop and provide QA/QC training program. Training will consist of three major components: 1. Training in operation of monitoring sites. This will be conducted at one central location that is fully equipped for sampling (including meteorological equipment). Attendees will include two staff from each Operating Agency. 2. Training in data processing and management. This will be a sub-component of both the monitoring site training and the chemical analyses training. - Provide instrument manuals, including maintenance procedures and schedules - Develop QA/QC documentation procedures and provide QA/QC manuals.
Operating Agencies (Operation of monitoring stations)			- Maintenance of collector sytems. - Ensuring provision of electrical power. - Collection of atmospheric deposition samples. - Collection of meteorological data.

			- Measurement of pH and conductivity in all rain samples. - Keeping data records and operation records in accordance with the EADN QA/QC protocol. - Maintenance of sample storage facilities. - Shipping of samples and provision of data to CAL. - Ensuring security of monitoring station. - Participate in EADN Technical Committee - Assist in acquisition of auxiliary data as input for atmospheric model(s).
Equipment Installation			- Assess electrical power availability and power needs at each monitoring site. - Provide recommendations for building and site renovations where necessary (e.g. fencing, dust control facilities, etc.) - Work with the Operating Agency at each site to install: 1. rain collector 2. dry deposition collectors 3. CO_2 monitoring system 4. meteorological equipment (where applicable) 5. refrigerators and freezers (where applicable) 6. pH and conductivity meters - Provide advice and supervision regarding equipment servicing and maintenance for one year after installation.
Chemical Analyses Training (Note: may be combined with QA/QC contract)			- Develop and provide manual with all analytical methods (CD and hard copy). - Provide training in analysis of various phosphorus and nitrogen fractions. - Provide training in analysis of major ions. - Training in data management (to be coordinated with QA/QC training). - Training to be provided to CAL staff at CAL location.
Central Analytical Laboratory			- Manage equipment / materials depot for EADN network - Supply monitoring sites with sampling and shipping materials, and distilled water. - Implement laboratory QA/QC program - Keep Program Office informed of equipment / material needs in timely manner. - Perform chemical analyses of all wet and dry deposition samples received from monitoring sites. These will include various phosphorus and nitrogen compounds, major ions, and gravimetric analysis of filters. - Provide the Regional Executive Secretariat and Operating Agencies with analytical results in a timely manner. - Participate in audit exercises by providing analytical services required for audit. - Manage all analytical data.
Remote Sensing			- Collect remotely sensed data in years 2-4 of project, for measurement of fire frequency / distribution, and atmospheric properties (e.g. aerosols, ozone) that may be related to burning or particle transport. - Provide a spatial and temporal analyses of these data. - Acquire data on land use / land cover within the EADN region. - Provide the above data, in a useable format, to atmospheric / meteorological modelers.

Training in ISO 17025 Auditing			- Provide training to at least one of the CAL staff and up to four other EADN participants (e.g. Site Supervisors, Site Operators, and participating universities) in auditing. Trainees will work with the external QA/QC auditor to conduct annual audits of all sites, including the CAL.
Training in atmospheric chemistry and physics			- Development and provision of a short course on basics of atmospheric physics and chemistry - Minimum of 26 hours of training (not including assignments and grading) - To be provided at a central location. Trainees will include at least one member of each Operating Agency who is directly involved with atmospheric deposition monitoring, as well as participating staff / faculty from EADN partner universities.
External QA/QC Audit (Note: this task may be performed in conjunction with the QA/QC subcontract).			- one audit of each monitoring site annually. Audit will assess: 1. status of equipment 2. implementation of all documented QA/QC protocols 3. quality of data collected to date (with data being provided by both the Operating Agency and the Central Analytical Laboratory) 4. viability of continued operation of site - provide recommendations, if necessary, for improvement of QA/QC practices. - provide audit report for each site to the Regional Secretariat, for distribution to Technical Advisory Board, Steering Committee, Operating Agencies, and Site Supervisors.
Atmospheric modeling			- Develop and provide a model training course that includes an overview of numerical models, training in the use of the modeling software applied within EADN, and simulations exercises applicable to the EADN region. Course duration ~ 3 weeks. Approximately 10 trainees drawn from a pool of Operating Agencies, and participating government agencies, NGOs, and universities. - Select appropriate model(s) (e.g. EMEP, CASTNET, CALPUFF, etc.) for simulating atmospheric transport and deposition of nutrients in the EADN region. - Modify model(s) as necessary to include both phosphorus and nitrogen. - Use data collected within context of EADN (deposition data, meteorological data, land use/cover data, remotely sensed data) to drive atmospheric transport / deposition model. - Use model simulations to derive temporal and spatial distributions of phosphorus and nitrogen transport and deposition within the EADN region during the monitoring period. - Conduct model simulations to explore the effects of various scenarios (land use change) on nutrient transport and deposition.
Justification for Travel, if any:			

* Provide dollar rate per person weeks or months as applicable; ** Total person weeks/months needed to carry out the tasks.

ANNEX D: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS

A. EXPLAIN IF THE PPG OBJECTIVE HAS BEEN ACHIEVED THROUGH THE PPG ACTIVITIES UNDERTAKEN.

The PPG activities included: (i) Preparation of Program Manual which provides details on location and design of monitoring stations, laboratory methods and their standardization, a basic training program for staff operating the sampling stations, installing, operating and troubleshooting network instrumentation and equipment. The manual is listed in the reference section of the Project document and is available on request. (ii) Workshops during which the Program Manual was validated and agreements reached with the twelve participating countries on terms of engagement and financing. (iii) Identification/Selection of Pilot Demonstration Sites (see Appendix 13 of Project document) and (iv) Preparation of GEF Project Document. Throughout this PPG phase, both local and international experts were used on consultancy services and advised the Technical and Training Group, and Project Management and Implementation Working Group that prepared inputs for the GEF Project Brief under the close supervision of the UNEP/GEF Task Manager. The findings and inputs from the consultants and the various technical and working groups have gone into formulation of the FSP proposal of the EADN.

B. DESCRIBE FINDINGS THAT MIGHT AFFECT THE PROJECT DESIGN OR ANY CONCERNS ON PROJECT IMPLEMENTATION, IF ANY:

None

C. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES AND THEIR IMPLEMENTATION STATUS IN THE TABLE BELOW:

Project Preparation Activities Approved	*Implementation Status*	*GEF Amount ($)*				*Co-financing ($)*
		Amount Approved	*Amount Spent To date*	*Amount Committed*	*Uncommitted Amount**	
1. Review and complete preparation of Program Manual	completed	20,000	20,000	0	0	15,000
2. Invite potential participants from across Africa to a regional workshop to vet the Manual and finalize operational program and implementation details of the EADN Project.	Completed	15,000	15,000	0	0	25,000
3. Identification/Selection of sampling sites and laboratories that will analyze the samples and linkages between EADN and other national/regional monitoring activities in Africa as well as preparation of terms of engagement and financing by participating countries.	Completed	15,000	15,000	0	0	5,000
4. Preparation of GEF Project Document	Completed	0	0	0	0	5,000
Total	(Select)	**50,000**	**50,000**	**0**	**0**	**50,000**

* Any uncommitted amounts should be returned to the GEF Trust Fund. This is not a physical transfer of money, but achieved through reporting and netting out from disbursement request to Trustee. Please indicate expected date of refund transaction to Trustee.

UNITED NATIONS ENVIRONMENT PROGRAMME

Programme des Nations Unies pour l'environnement | Programa de las Naciones Unidas para el Medio Ambiente
Программа Организации Объединенных Наций по окружающей среде | برنامج الأمم المتحدة للبيئة
联合国环境规划署

UNEP

PROJECT DOCUMENT

SECTION 1: PROJECT IDENTIFICATION

1.1	**Project title:**	Equatorial Africa Atmospheric Deposition Network (EADN)
1.2	**Project number:**	GFL/3401 PMS:
1.3	**Project type:**	FSP
1.4	**Trust Fund:**	GEF
1.5	**Strategic objectives:**	
	GEF strategic long-term objective:	An enabling environment will place SLM in the mainstream of development policy and practice at regional, national and local levels; and IW SO1: To foster international, multi-state cooperation on priority water concerns
	Strategic programme for GEF 5:	LD-SP-1, IW: SP-2: Reducing nutrient over-enrichment and oxygen depletion
1.6	**UNEP priority:**	Ecosystem Management
1.7	**Geographical scope:**	Regional: Africa (Burundi, Cote d'Ivoire, Democratic Republic of Congo, Ghana, Kenya, Malawi, Mozambique, Nigeria, Senegal, Tanzania, Uganda)
1.8	**Mode of execution:**	External
1.9	**Project executing organization:**	African Collaborative Center for Earth System Science (ACCESS) in collaboratio with UNU-International Network on Water, Environment and Health (UNU-INWEH)
1.10	**Duration of project:**	48 months Commencing: September 2011 Completion: August 2015

1.11	**Cost of project**	**US$**	**%**
	Cost to the GEF Trust Fund	**$1,865,000**	**36**
	Co-financing		
	Cash		
	Operating Agencies	412,920	8
	UK-DFID	791,026	15
	UNU-INWEH	250,000	5
	Sub-total	***1,453,946***	***28***
	In-kind		
	Operating Agencies	939,800	18

UNU-INWEH	450,000	9
AGRA	400,000	8
Sub-total	***1,789,800***	***35***
Total	**$5,108,746**	**100**

1.12 Project summary

A number of recent studies in central and east Africa, including several conducted within the context of GEF-supported projects on the African Great Lakes, have documented atmospheric deposition rates of nitrogen and phosphorus that are much greater than in other parts of the world. This atmospheric deposition makes significant contributions to the nutrient loads to these aquatic systems, and thus contributes to the negative effects of eutrophication, which are especially evident in Lake Victoria, including deoxygenation of deep waters, excessive growth of the invasive water hyacinth, and loss of biodiversity. Changes in Lake Malawi and Lake Tanganyika have not been as dramatic, but there are indications that these lakes are also beginning to respond to increased nutrient loads.

Apart from its negative impact on aquatic systems, atmospheric nutrient transport represents a loss of nutrients from terrestrial systems. In many parts of the region, soils are already low in nutrients, and therefore the transport of these nutrients from land to lakes represents an agricultural loss. There is evidence that biomass burning may be a major process, through which these nutrients are mobilized, with other mechanisms, such as soil deflation by wind, also playing a potentially important role.

The studies conducted to date indicate that high atmospheric nutrient deposition rates occur throughout east/central African, and perhaps extend to other parts of Africa. However, a number of critical questions must be answered before the problem can be addressed. These include: 1) Where are the sources of atmospheric nutrients in Africa? 2) What are the mechanisms by which nutrients are introduced to the atmosphere? 3) What are the spatial scales and atmospheric pathways over which nutrients are transported? 4) What contribution does atmospheric deposition make to the nutrient budgets of Africa's aquatic ecosystems.

To answer these questions, an Equatorial African Deposition Network (EADN) is proposed. The initial network will consist of ten stations spanning a large portion of the continent. The primary objective of the network is to continuously monitor dry and wet atmospheric deposition rates of various nitrogen and phosphorus species at all sites, allowing for spatial characterization of atmospheric deposition within the region. The focus will be on the African Great Lakes, but stations in other parts of east, central and west Africa will be included, as the Great Lakes regions may very well serve as a nutrient source or sink for these areas. Data collected by the network will be used, along with remote sensing data and modelling tools, to determine the spatial and temporal patterns of atmospheric nutrient transport and their relationship to land use patterns.

Coordination of the network will be facilitated by a Regional Program Office housing the Regional Executive Secretariat, based in Nairobi, Kenya. In addition to coordinating EADN network activities, the Regional Executive Secretariat will facilitate collaborative efforts with other national and regional agencies, especially those within the agricultural sector, so that these agencies may remain informed of EADN findings, develop synergistic programs where appropriate, and work with EADN to develop policy and management recommendations related to nutrient management.

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ACRONYMS AND ABBREVIATIONS

ACCESS	African Collaborative Centre for Earth System Science
AERONET	Aerosol Robotic Network
ATSR	Along Track Scanning Radiometer
BIRD	Bi-spectral Infrared Detection
CAADP	Comprehensive African Agricultural Development Programme
CAL	Central Analytical Laboratory
CAPMoN	Canadian Acid Precipitation Monitoring Network
CASTNeT	Clean Air Status and Trends Network
DEBITS	Deposition of Biogeochemically Important Trace Species
EAC	East African Community
EADN	Equatorial African Atmospheric Deposition Network
EMEP	Environmental Monitoring, Evaluation and Protection
EP/TOMS	Earth-Probe Total Ozone Mapping Spectrometer
FLUXNET	Network of regional micrometeorological sites measuring earth-atmosphere CO_2, water vapour and energy fluxes
GAW	Global Atmosphere Watch
GEF	Global Environmental Facility
GOME	Global Ozone Monitoring Experiment
HIV	Human Immunodeficiency Virus
IADN	International Atmospheric Deposition Network
IDA	International Development Association
IDAF	IGAC/DEBITS/Africa Programme
IGAC	International Global Atmospheric Chemistry
ISO	International Organization for Standardization
LIDAR	Light Detection and Ranging
LTBP	Lake Tanganyika Biodiversity Project
LVEMP	Lake Victoria Environmental Management Project
MODIS	Moderate Resolution Imaging Spectroradiometer
N	Nitrogen
NADP	National Atmospheric Deposition Program
NBI	Nile Basin Initiative
NELSAP	Nile Equatorial Lakes Subsidiary Action Plan
NEPAD	New Partnership for Africa's Development
OA	Operating Agency
P	Phosphorus
PAH	Polyclic Aromatic Hydrocarbons
PC	Project Coordinator
QA	Quality Assurance
QC	Quality Control
RES	Regional Executive Secretariat
RPO	EADN Regional Program Office
SIP	Strategic Investment Program
SLM	Sustainable Land Management
SO	Site Operator
SQL	Structure Query Language
SS	Site Supervisor
TC	Technical Committee
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization

SECTION 2: BACKGROUND AND SITUATION ANALYSIS (BASELINE COURSE OF ACTION)

2.1. Background and context

1. Lakes require an input of nutrients to support algal production, which in turn serves as the basis for the entire aquatic food web, including fish. However, excessive nutrient loading alters the composition and the productivity of algae in ways that often lead to undesirable consequences. These include the growth of inedible algae, which can act as bottle necks within aquatic food webs, the production of toxic algae, which can lead to massive fish deaths and render water dangerous for human consumption, the deoxygenation of water which results in the death of fish and loss of fish habitat, reduced water clarity, and negative impacts on recreation and tourism. These scenarios have played out in numerous lakes around the world where human activities have accelerated nutrient loading. Large lakes are not immune to these impacts. Eutrophication of the North American Great Lakes in the 1960s and 1970s resulted in the decimation of fish populations, declines in biodiversity, fouling of drinking water, and aesthetic deterioration. More recently, Lake Victoria in Central Africa has experienced a similar sequence of events, including elevated nutrient and algal concentrations, deoxygenation of bottom waters, and reduced water clarity. When compounded by the invasion of the exotic Nile Perch, these changes have led to a significant loss of biodiversity. While the other African Great Lakes, Tanganyika and Malawi, have not changed as dramatically, there is evidence that the algal communities in these lakes are also responding to increased nutrient loads.

2. Mitigation of nutrient loads to lakes has generally focused on riverine nutrient sources, because rivers are seen as the primary nutrient delivery conduit. However, in many regions the atmosphere can be an important source of nutrients, especially nitrogen, to lakes (e.g. Scheider et al. 1979; Manny and Owens 1983; Cole et al. 1990). In the North American Great Lakes, the concentration of dissolved inorganic nitrogen has risen steadily over the past century, probably due to increased atmospheric deposition of nitrogen (Bennett 1986). Despite these demonstrations that atmospheric deposition can increase nutrient concentrations in lakes, the role of atmospheric deposition as a potential cause of lake eutrophication has been largely ignored. This is probably because, in most temperate lakes, algal production is limited by phosphorus (P), for which rivers are the major loading pathway. Atmospheric sources of P are generally low in temperate latitudes where most studies on atmospheric chemistry and lake eutrophication have been performed. For examples, atmospheric deposition is estimated to account for about 11% of the total P loading to Lake Michigan (Miller et al. 2000). This is because P does not have a stable gaseous form. Combustion processes leave P in the ash and particulate fraction (Lewis 1981). In developed countries, internal combustion for energy production injects little ash into the atmosphere, and in general open burning is discouraged, with even wildfires being suppressed. Leenhouts (1998) has recently estimated that total particulate mass (TPM) release into the atmosphere in the USA is less than 10% of what it was before the industrial age when most population growth in US and other developed countries occurred. Internal combustion and changing cultural attitudes towards open burning have probably reduced P inputs into the atmosphere since the dawn of the industrial age. Consequently, atmospheric deposition of P is low in developed countries (Table 1) even when human populations are large. Therefore, with a small number of exceptions (e.g. Schindler et al. 1976), atmospheric P deposition is rarely studied.

3. In contrast with temperate regions, open burning of biomass fuels are recognized as a major mechanism that influences the atmospheric transport of elements in the tropics (Andreae et al. 1988; Crutzen and Andreae 1990). Biomass burning is especially pervasive within tropical Africa (Delmas 1982; Andreae 1993; Dwyer et al. 2000). However, as in the rest of the world, studies of atmospheric chemistry and atmospheric deposition have rarely been related to nutrient cycles in African lakes. Early studies within Africa include those by Visser (1961), who examined the chemical composition of rain near Kampala, Uganda, Ganf and Viner (1973), and Bromfield (1974; Bromfield et al. 1980) who measured the concentration of sulphur in rainwater in Ethiopia and Kenya. Prior to 1990, there were only two studies investigating the role of atmospheric deposition in lake element cycles in Africa (Gaudet and Melack 1981; Rodhe et al. 1981), but neither of these included phosphorus.

4. A small number of measurements made at Jinja, Uganda in 1991 (reported in Lindenschmidt et al) indicated that the atmospheric deposition rates of phosphorus and sulphur on Lake Victoria could be substantial and may have increased significantly over the previous three decades since the measurements of Visser (1961). While no data existed at the time to compare atmospheric deposition rates with other sources of nutrients to Lake Victoria, the coincidence of increased atmospheric deposition of P with the eutrophication of Lake Victoria hinted at a possible causal link. Recently, numerous measurements of both atmospheric P deposition and other nutrient sources have been made for Lake Victoria (e.g. Tamatamah 2005) in studies conducted as part of the GEF-supported Lake Victoria Environmental Management Program. The measurements of atmospheric deposition were confined to coastal locations, but when extrapolated over the large area of the lake and compared to river inputs of nutrients, they suggest that atmospheric deposition is responsible for more than 60% of phosphorus input to the lake.

5. Recent GEF-supported research in the African Great Lakes region indicates that the atmosphere is a major source of nutrients to these lakes. In Lake Malawi atmospheric input of phosphorus and nitrogen is similar to that from rivers (Bootsma et al. 1996, 1999; Table 1), and comparison with the limited historic data suggests that these rates have been increasing (Bootsma et al. 2006; Hecky et al. 2006). In Lake Victoria numerous measurements of both atmospheric P deposition and other nutrient sources have been made in studies conducted as part of the GEF-supported Lake Victoria Environmental Management Program (e.g. Tamatamah 2005). The measurements of atmospheric deposition were confined to coastal locations, but when extrapolated over the large area of the lake and compared to river inputs of nutrients, they suggest that atmospheric deposition is responsible for more than 60% of phosphorus input to the lake. A small number of measurements made at Jinja, Uganda in 1991 (reported in Lindenschmidt et al. 1998) indicated that the atmospheric deposition rates of phosphorus and sulphur on Lake Victoria may have increased significantly over the previous three decades since the measurements of Visser (1961). Similar findings have been reported for Lake Tanganyika (Langenberg et al. 2003) and for the Okavango Delta (Garstang et al. 1998). The importance of atmospheric deposition as a P source to these lakes, along with the apparent increase in atmospheric deposition in recent decades, suggests that this mechanism may be responsible at least in part for the eutrophication of Lake Victoria, and the observed recent increase in sediment P deposition rates in both Lake Victoria (Hecky 1993) and Lake Malawi/Nyasa (Hecky et al. 1999). There is concern that atmospheric deposition of nutrients may also be affecting other aquatic and terrestrial ecosystems in equatorial Africa.

6. The atmospheric P deposition rates measured in the African Great Lakes region are similar to the few other measurements that have been made in the tropics, but are 8-10 times the reported deposition rates in North American non-urban areas (Table 2). Biomass burning, Aeolian deflation of soil dust, and biogenic particles from exposed, tilled fields have been invoked as likely emission sources that result in higher gaseous and particulate atmospheric loading and deposition rates in the tropics (Echalar et al. 1998; Scholes and Andreae 2000; Eck et al 2003). While these mechanisms increase the loading of nutrients to aquatic systems, they may also result in the loss of nutrients from agricultural soils. Indeed, a number of studies have pointed to biomass burning as a factor promoting the declining fertility of soils in Africa (Wright and Bailey 1982; Roy 1991; Mills and Fey 2003). Hence accelerated atmospheric transport of nutrients has negative implications both for the agricultural systems from which much of the nutrients are derived and for the receiving aquatic systems. In this case, atmospheric transport of nutrients is an important process to understand even in those parts of equatorial Africa without large water bodies.

Table 1. Fluxes of nitrogen, phosphorus, and silicon (a critical nutrient for some algae) in the Lake Malawi/Nyasa nutrient budget (from Bootsma and Hecky 1999). Units are mmol m^{-2} yr^{-1}.

	Source	Nitrogen	Phosphorus	Silicon
INPUTS	Atmosphere	149	7.9	51
	River Inflow	231	10.7	872
OUTPUTS	River Outflow	4.4	0.18	12.9
	Sedimentation	129	10.2	1011

Table 2. Comparison of atmospheric deposition rates of phosphorus for various parts of the world, illustrating the high deposition rates in tropical Africa.

Location	P Deposition (mmol m^{-2} yr^{-1})	Source
Lake Victoria	5.7-8.5	Tamatamah 2001
Lake Malawi	7.9	Bootsma et al. 1999
Lake Valencia (Venezuela)	5.4	Lewis 1981
Hubbard Brook (New Hampshire)	0.23	Likens 1980
Colorado Mountains	0.9	Grant and Lewis 1979
Experimental Lakes Area (Canada)	1.1	Schindler et al. 1976

7. A number of other studies have highlighted the potential significance of atmospheric deposition as a P sources to lakes, especially in areas where there is extensive biomass burning. Lewis (1981) has shown that ash from biomass burning is a rich source of available P, and Okin et al. (2004) concluded that particulates in tropical air are enriched in P relative to P in the earth's crust because of P enrichment by biomass burning. Similarly airborne surveys in North America have shown that smoke plumes from forest fires are enriched 10x in P relative to air masses not influenced by fires (Zhang et al. 2002), and that these P-enriched plumes have the potential to impact algal productivity in lakes (Goldman et al. 1990; Li et al. 2004). Tropical Africa has the highest areal coverage of biomass fires of any area of the globe by a significant margin (Dwyer et al. 2000; Fig. 1), and African fires dominate the global biomass burning budget for many compounds (Scholes and Andreae 2000). This supports the findings of the initial GEF-supported studies that have found the atmosphere to be a significant source of P to the African Great Lakes. But because these studies covered short time periods, and were limited to a small number of locations, they provided limited information with which to guide intervention and management strategies. Critical questions that must now be addressed include:

(i) Are the high nutrient deposition rates observed in these two locations typical for much of equatorial Africa, or are there regional hot spots where emissions to the atmosphere and/or atmospheric deposition rates are exceptionally high?

(ii) Where are the geographic sources of the nutrients that are being deposited to the African lakes?

(iii) What are the mechanisms by which nutrients are introduced to the atmosphere (e.g. biomass burning, soil deflation by wind, vegetation emissions of gases and aerosols, urban/industrial emissions)?

(iv) Is atmospheric nutrient emission, transport and deposition also affecting other aquatic and terrestrial/agricultural systems in Africa?

(v) Are there other components of atmospheric deposition (e.g. metals, organo-chlorines, organo-phosphates) that may have an influence on the health of humans and terrestrial / aquatic ecosystems?

2.2 Global significance

8. The contribution of biomass burning in Africa to large scale transport of nutrients and trace metals is well documented (Prospero et al. 1996; Scholes and Andreae 2000). Deflation from the Sahara and the Sahel is a major global source of atmospheric dust and associated P (Okin et al. 2004). Long distance transport of African dust originating in northern Africa may sustain the productivity of tropical forests in the Amazon (Chadwick et al. 1999), but may also be degrading reefs in the Caribbean (Garrison et al. 2003). Recent studies suggest copper in Saharan dust may be toxic to some marine phytoplankton species, altering community composition and potentially affecting the global carbon cycle (Paytan et al. 2009). Seasonally, winds in the troposphere will also distribute this Saharan dust over western and eastern Africa. Globally, atmospheric particulates have been estimated to contribute 50% of the total annual P load to the oceans (Duce et al. 1991), a percentage remarkably similar to that estimated for atmospheric P loading to the African Great Lakes. Africa may also be a significant source of organochlorines such as DDT, and dieldrin, which continue to be used in many parts of the continent, and may travel long distances via the atmosphere (Tatsukawa et al. 1990). Information collected by an Equatorial African Deposition Network will improve understanding of the source areas for globally distributed compounds and indicate the degree to which mechanisms other than desert dust transport, such as biomass burning, may contribute to large-scale atmospheric transport patterns.

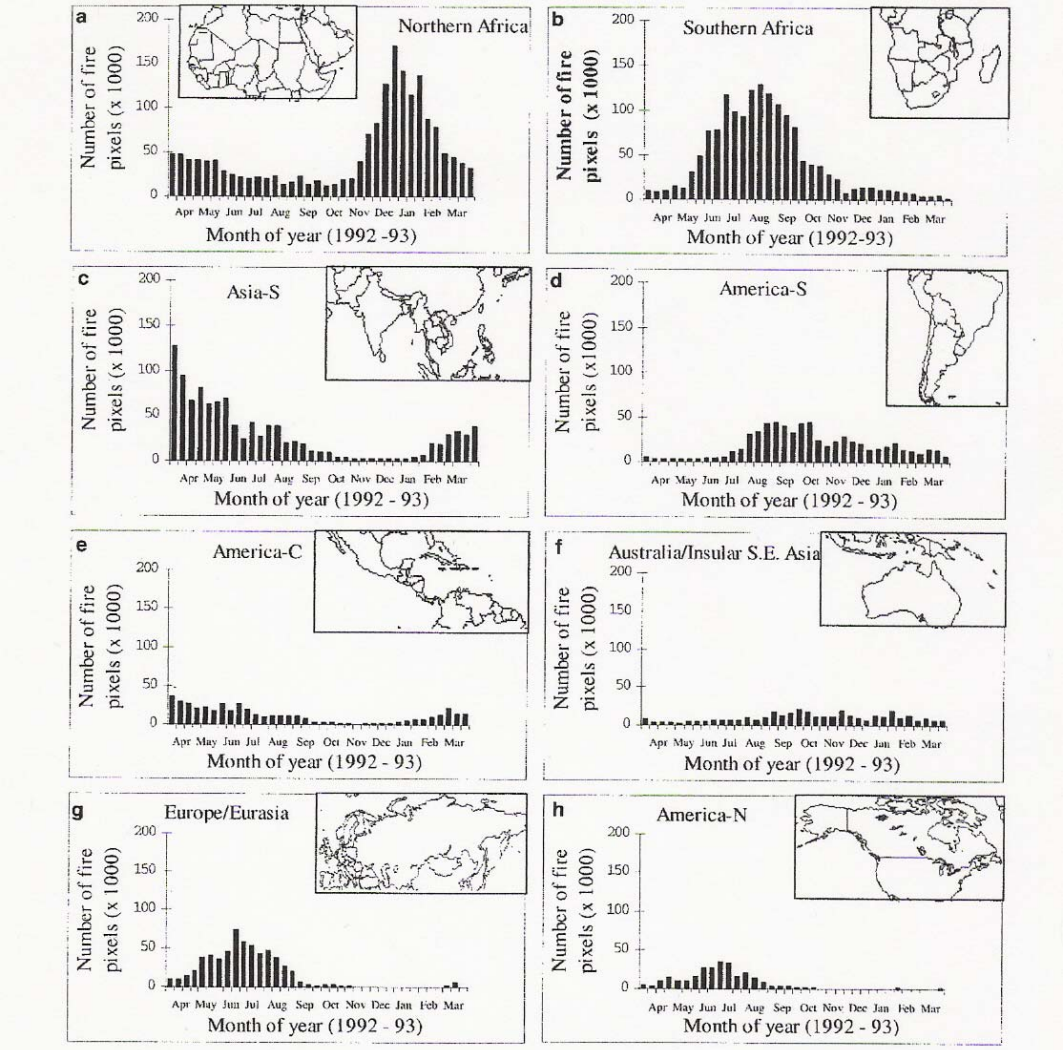


Fig. 1. Intensity of fires (determined as the number of "hot" pixels in satellite images) for eight regions of the world between April 1992 and March 1993. Africa has the highest incidence regardless of season. Different timing of the fire seasons in western and southern Africa provides an excellent opportunity to determine the effect of fires on atmospheric loading of phosphorus. (Figure from Dwyer et al. 2000)

9. The African Great Lakes are home to the world's most species-rich assemblages of freshwater fishes. In addition to their great value as a food source for the communities surrounding these lakes, the biodiversity of these fish communities is an asset not only for the lakes' riparian human populations, but for the entire world. This value is recognized in UNESCO's designation of Lake Malawi National Park as a World Heritage Site. Excessive nutrient loading to these lakes has very real implications for the conservation of this biodiversity. Eutrophication may impact the integrity of fish communities through several mechanisms. High algal production leads to deoxygenation of deep waters, thereby reducing available fish habitat as well as facilitating fish kills through the upwelling of anoxic water (Hecky et al. 1994). Eutrophication also tends to be accompanied by the production of algal species that are less useful as sources of food for fish and zooplankton (Paerl 1988), or even toxic. For example, historic comparisons suggest that a potentially toxic alga, such as the blue-green (cyanobacteria) species, Cylindrospermopsis raciborski, has become more prevalent in Lake Malawi/Nyasa (Hecky et al. 1999). While no direct links have been made between this apparent shift in algal species composition and fish health, toxic algae was considered a likely cause of a massive fish kill that extended along the entire length of Lake Malawi/Nyasa in late 1999 (based on reports from research staff in the Malawi Fisheries Department). Excessive algal growth may also impact biodiversity through its influence on water clarity. For example, Seehausen et al. (1997) have demonstrated how changes in underwater irradiance and spectral qualities have led to hybridization and loss of genetic diversity in the nearshore cichlid fish communities of Lake Victoria.

10. Currently there is a number of atmospheric deposition monitoring programs around the world (Table 3). These programs include virtually no stations in Central and East Africa, and none of them measures the atmospheric deposition of phosphorus. Hence the role of Central and East Africa as both sources and sinks for nutrients and contaminants at the global scale is poorly understood, despite the recognition that the continent is a major contributor to the atmospheric cycles of a number of elements, including carbon, nitrogen and sulphur. By linking the proposed EADN to existing regional and global atmospheric monitoring networks, it will be possible to obtain a more reliable and complete understanding of global circulation patterns of particulates and important polluting elements and compounds.

Table 3. List of existing large-scale atmospheric deposition monitoring programs.

Program	*Region*	*Objectives*
Canadian Acid Precipitation Monitoring Network (**CAPMoN**)	Canada	Study atmospheric processes; Determine the spatial patterns and establish the temporal trends of atmospheric pollutants related to acid rain and smog.
Global Atmosphere Watch (overseen by the World Meteorological Organization)	Global	Improve the understanding of interactions between the atmosphere, ocean and biosphere; provide the scientific community with the means to predict future atmospheric states.
Clean Air Status and Trends Network (**CASTNet**)	U.S.A.	CASTNet provides atmospheric data on the dry deposition component of total acid deposition, ground-level ozone and other forms of atmospheric pollution; provides provide information for evaluating the effectiveness of national emission control strategies.
National Atmospheric Deposition Program (**NADP**)	U.S.A.	Provides a long-term, high-quality database to assess the magnitude of the acid precipitation problem and to determine spatial and temporal trends in the chemical composition of the atmosphere and the removal of atmospheric compounds as deposition.
International Atmospheric	U.S.A. and	To monitor atmospheric deposition as a source of

Deposition Network (**IADN**)	Canada, Great Lakes region.	contaminants to the North American Great Lakes.
Environmental Monitoring, Evaluation and Protection (**EMEP**) Programme	Europe	Assesses the transboundary transport of substances causing acidification and eutrophication; monitor the formation of ground-level ozone, persistent organic pollutants (POPs), heavy metals and particulate matter.
IGAC/**D**EBITS/**AF**rica program (**IDAF**). An initiative of IGBP/IGAC/DEBITS (International Geosphere Biosphere Program, International Global Atmospheric Chemistry Program and Deposition of Biogeochemically Trace Species Program, respectively) to determine atmospheric deposition.	West Africa; South Africa	To estimate, from measurements in wet and dry deposition fluxes, important chemical species involved in the C, N and S biogeochemical cycles at regionally representative sites. To identify the relative contributions of natural and anthropogenic sources to these deposition fluxes.

11. Around the world, ecosystems are responding to climate change. A major challenge for managers and policy makers is the prediction of future changes in ecosystem functioning as climate continues to change. Atmospheric deposition may be influenced by climate change, and may also interact with direct climate change effects by either masking or exacerbating them. For example, warming of lakes may lead to increased anoxia due both to higher oxygen consumption rates by bacteria and stronger and prolonged thermal stratification. This may be exacerbated by nutrient deposition, which promotes algal growth and the delivery of organic carbon to deep waters. At the same time, atmospheric deposition and climate warming may have antagonistic effects on plankton production. In both Lake Tanganyika and Lake Malawi/Nyasa, water temperatures have been increasing and vertical stratification has been strengthening over the past century (Verburg et al. 2003; Vollmer et al. 2005). Because these lakes rely on vertical mixing as a primary nutrient cycling mechanism, increased stratification may be having a negative influence on plankton and fish production (Verburg et al. 2003). The degree to which this is offset by atmospheric nutrient deposition is uncertain.

12. In terrestrial systems, the response of vegetation to increased atmospheric CO_2 concentrations depends in part on the atmospheric deposition of N (Luo et al.). At the same time, climate warming may increase N flux to the atmosphere by facilitating the conversion of particulate nitrate to gaseous phases such as nitric acid (Civerolo et al. 2008). In marine systems, atmospheric deposition of nutrients can have a strong influence on carbon fixation, which in turn can affect atmospheric CO_2 and climate (Jeckells et al. 2005). Predicting climate change effects at both the regional and global scales requires an understanding of the interactions between climate change and atmospheric deposition. Clearly these interactions are complex. Better measurements of the atmospheric mobilization of nutrients within Central and East Africa will increase the capacity to predict climate change impacts regionally, while also filling a critical gap in the global atmospheric deposition monitoring network.

2.3. Threats, root causes and barrier analysis

13. The two primary first-order impacts of high atmospheric nutrient deposition rates in Africa are deterioration of water quality and loss of soil fertility. These impacts in turn have a number of second-order effects. As described above (section 2.1), lake eutrophication resulting from high atmospheric nutrient deposition rates may result in the growth of undesirable algae, loss of dissolved oxygen, loss of fish habitat, fish deaths, loss of tourism potential, and loss of biodiversity. These impacts are most evident on Lake Victoria, where nutrient concentrations and algal abundance began to increase several decades ago (Bootsma and Hecky 2003), and where atmospheric deposition accounts for a large fraction of nutrient loads. As a result, the volume of the anoxic zone in the lake has increased (Hecky et al. 1994), fish kills have occurred (Ochumba 1990), and the combination of eutrophication and the explosion of the Nile perch population have led to the decimation or extinction of numerous fish species. High nutrient loads have also compounded the problem of excessive growth of the invasive water hyacinth, which had a marked impact on transportation and fisheries activities. While the abundance of this aquatic plant has declined in recent years, it remains a serious threat (Williams et al. 2005).

14. Impacts of nutrient loading on Africa's other Great Lakes, Tanganyika and Malawi/Nyasa, have been less dramatic, which may be due in part to the greater average depth of those lakes, which results in longer response times to external perturbations. But sediment records and historic comparisons of phytoplankton community composition indicate that nutrient loads to Lake Malawi/Nyasa have probably increased in the past forty years (Hecky et al. 1999). In October of 1999 a large fish kill occurred in Lake Malawi/Nyasa, extending the entire length of the lake's western shore over a two-week period. The precise cause of the kill was never confirmed, but it has no known precedent in the lake. While these large, deep lakes respond slowly to external impacts, they have long response times, and so the impacts of atmospheric deposition of nutrients and contaminants may be felt for years after any mitigation efforts. This lesson has been learned in the Laurentian Great Lakes, where PCB concentrations in some fish species remain high enough to warrant consumption advisories, despite the ban on PCB manufacturing over three decades ago.

15. Soil nutrient depletion is high through much of Africa, and is one of the major contributors to poor crop production and hunger (Dreschel et al. 2001; Sanchez 2002). It is estimated that soil and nutrient loss in sub-Saharan Africa result in an annual loss of agricultural GDP of more than 3%. (Drechsel and Gyiele 1999). Biomass burning, in turn, can be a significant cause of soil nutrient depletion. Burning may have a short-term positive effect on plant growth by accelerating the nutrient mineralization process (e.g. Van de Vijver et al. 2001), but it results in long-term loss of nitrogen that is volatilized to the atmosphere in the combustion process (Wright and Bailey 1982; Roy 1991; Mills and Fey 2003). Phosphorus has no gaseous phase, but it is retained in ash which can become airborne, resulting in phosphorus export from the site of burning. This can be an especially serious problem in areas with sandy soils and in the acidic, weathered soils of the humid and subhumid tropics, where phosphorus is often the limiting soil nutrient (Buresh et al. 1997).

16. Apart from its effect on nutrient cycles and aquatic ecosystems, biomass burning can produce a number of chemicals associated with adverse health impacts, including carbon monoxide, nitrogen dioxide, ozone, benzene, acrolein. Biomass burning is also a major source of polycyclic aromatic hydrocarbons (PAHs) within the tropics (Masclet et al. 1995). In addition, particulate aerosols produced by biomass burning, especially those smaller than 2.5 um, can have a significant impact on human health, resulting in an increase in respiratory problems that can be even greater than those resulting from industrial and automotive emissions (Cançado et al. 2006). Because the small particles produced by biomass burning are easily airborne, they can have impacts on biogeochemical cycles and human health over very large distances (Prospero 1999).

17. Recent surveys at several sites in the African Great Lakes region indicate that concentrations of organochlorines are moderate in fish and birds (Kidd et al. 2001; Hollamby et al. 2004). However, concentrations in the air are greater than those observed at higher latitudes (Karlsson et al. 2000), and sediment cores collected from Lake Victoria suggest deposition rates have been increasing (Lipiatou et al. 1996). Application of pesticides and herbicides, which are a major source of organochlorines, has been limited in the

region, due to economic constraints. As economic conditions improve and the need for greater crop production increases, use of these chemicals may increase, and there will be an ongoing need to monitor their concentrations and their atmospheric transport. Like organochlorines, mercury is transported primarily via the atmosphere. Its primary source is biomass burning (Campbell et al. 2003). Mercury concentrations in most biota of the African Great Lakes appear to be at acceptable levels, but concentrations in the water of Lake Victoria are higher than in the North American Great Lakes (Campbell et al. 2003), and concentrations in some top predators, such as the Nile perch, are high enough to warrant concern (Campbell et al. 2002). There is evidence that mercury deposition rates in Lake Victoria have been increasing (Hecky et al. 2006). Bioavailability of this mercury depends largely on bacterial mercury methylation rates, which in turn may be accelerated by increased sulphate concentrations. Sulphur is atmospherically mobilized by biomass burning, and therefore increased burning and sulphur deposition may compound the effect of increased mercury deposition rates on biota.

18. If biomass burning is indeed shown to be a major source of atmospheric nutrients and contaminants, then there are a number of root causes that can be linked to the above threats. These include agricultural practices in which burning is conducted to aid in plowing and to control pests, the burning of grasslands to promote early growth of new shoots in the dry season, the expansion of agriculture, which is linked to population pressure (Dreschel et al. 2001), and various traditions that promote annual burning of grasslands. However, while biomass burning has been identified as a potentially important source of atmospheric nutrients and contaminants, the links between burning, nutrient deposition, and aquatic ecosystem response are not well defined. There is a need to better document the sources of these atmospheric constituents, the mechanisms of atmospheric loading, and the atmospheric transport pathways.

2.4. Institutional, sectoral and policy context

19. Atmospheric transport of nutrients and contaminants has multi-sector implications. A main impetus for EADN has been the observation of high atmospheric nutrient deposition rates in East and Central Africa, and concern about their impact on the African Great Lakes. Therefore the issue of atmospheric deposition is closely linked to the fisheries and water quality sectors. However, as discussed above, the increase in nutrient loads to lakes is balanced by nutient loss from terrestrial systems, and therefore atmospheric nutrient transport has strong implications for the agricultural sector. While atmospheric transport of particles and contaminants also has a direct impact on human health, it is probably a relatively minor health concern compared to the larger problems of infectious diseases in Africa, such as malaria, HIV, schistosomiasis, and cholera. Nevertheless, atmospheric deposition may have acute impacts on health at the local scale, and it will have other indirect effects on human health through its impact on food production in fisheries and agriculture.

20. The implementation of any management strategies to address atmospheric transport of nutrients and contaminants will need to be multi-sectoral. While atmospheric deposition may have negative impacts on water quality, fisheries, and human health, the ultimate source of atmospheric nutrients and contaminants is likely to be closely linked to processes related to agriculture, including deforestation, burning, and cultivation practices. Farmers and rural populations directly involved in these activities have little incentive to change their practices for the betterment of aquatic ecosystems, and therefore any attempt to modify these practices will only be successful if it is linked to improved agricultural production.

21. Within the African Great Lakes region, there has been an increased recognition by governments that the challenges of water supply, water quality, fish production and aquatic biodiversity conservation must be addressed within an ecosystem context. As populations have grown and human impacts on these sytems have increased, so has the realization that a strictly sectoral approach to natural resources management is not effective. For example, fish stocks can no longer be managed solely through the immediate intervention of fishing regulations; there is a need to account for larger scale impacts such as land use change and climate change. As a result, there have been a number of initiatives to promote a multi-sectoral, ecosystem-based approach to environmental management, through such agencies as the National Council for the Environment

in Malawi, the National Environmental Management Council in Tanzania, and the National Environmental Management Program in Mozambique. Africa's largest three lakes are each shared by at least three countries, and so an ecosystem management approach requires international collaboration. This need has resulted in the formation of several international forums, including the Lake Malawi/Niassa/Nyasa Basin Commission, and a partnership agreement within the East African Community (EAC) that focuses on a basin-wide, multi-sectoral approach to environmental management in the Lake Victoria region. At the larger regional scale, the Nile Basin Initiative (NBI) serves to coordinate development activities in ten countries that share the Nile drainage basin. Within the NBI, the Nile Equatorial Lakes Subsidiary Action Plan (NELSAP), managed from Entebbe, Uganda, coordinates development programs in the natural resources and agricultural sectors related to the management of Lake Victoria.

22. The issue of atmospheric transport of nutrients and contaminants has received little attention from managers and policy makers in Africa, both at the national and international levels. This is probably due to several reasons. The atmosphere is not as obvious a transport pathway as waterways, and so it has been overlooked for many years. The links between sources and sinks of atmospheric constituents are not as spatially or temporally consistent as terrestrial and aquatic pathways, making them more difficult to discern. Long transportation distances result in impacts that are diffused over large areas, masking the connections between cause and effect. However, throughout much of Africa there is now a recognition that natural resources must be managed within a multi-sectoral, ecosystem context, and within the region there are national and international institutions in place to address large scale environmental problems using this approach. The NBI's function in coordinating management and development of water resources within a large drainage basin may serve as a useful model for addressing problems related to atmospheric deposition within the region.

23. A major umbrella forum for land management in Africa is TerrAfrica, which facilitates sustainable land management at the national level by promoting knowledge flow, financing mechanisms, and harmonizaton of policy and implementation strategies within an international, sub-Saharan African context. Particulalry relevant to the proposed EADN is TerrAfrica's goal to support and strengthen the implementation of the Action Plan of the Environment, which was initiated by NEPAD (New Partnership for Africa's Development) in 2003 to address environment challenges while combating poverty and promoting socio-economic development. As such, TerrAfrica will serve as a useful organizational context within which to address the key environmental questions and problems that are highlighted by EADN. The proposed EADN partners represent ten countries spanning a large part of the African continent. These are: Burundi, Cote d'Ivoire, Democratic Republic of Congo (in collaboration with Rwanda), Ghana, Kenya, Malawi, Mozambique, Senegal, Tanzania, Uganda. The governments of these countries, building on an existing regional collaboration framework, have formally expressed their intentions to work along lines consistent with TerrAfrica, the GEF Strategic Investment Program (SIP) for Sustainable Land Management (SLM), the NEPAD Environment Action Plan, and the NEPAD CAADP (Comprehensive African Agricultural Development Programme).

2.5 Stakeholder mapping and analysis

24. Data currently available indicate that nutrient deposition rates are high near Lakes Malawi and Victoria. If, as suspected, biomass burning is partly responsible for these high rates, then it is expected that much larger areas of equatorial Africa will also be experiencing high deposition rates (and emission rates), since biomass burning is prevalent throughout much of Africa, especially in the regions 5 to 20^{o} north and south of the equator (Andreae 1993; Dwyer et al. 2000; Fig. 1). The large geographic area subjected to burning, along with the long transport distances of atmospheric constituents, necessitate a pan-African monitoring program that can describe the spatial dynamics of atmospheric deposition and link sinks with likely sources. Movement of particulates from the African Continent towards the Caribbean and Central America are well known. Significant deposition of African-sourced soils is documented in these areas and impacts of African sediments on Caribbean coral reefs can also be found in the literature. It is very likely that macronutrient transport will

follow the same equatorial monsoonal pattern of transport/dispersal as sediment. But although we know there is transport of material across the Atlantic, we do not know what proportion of the material mobilized stays within the Africa region, or what the distribution patterns are within the continent.

25. In May of 2005, a workshop organized by the African Collaborative Centre for Earth System Science (ACCESS) was held in Nairobi, Kenya to discuss available information on atmospheric deposition of nutrients and contaminants in Africa, and to initiate a coordinated response to the concern of high atmospheric nutrient deposition rates, with a focus on the impact on aquatic ecosystems. The workshop was attended by representatives from twelve African countries spanning sub-Saharan Africa. Workshop discussions led to a proposal for a network of sites, along with a review of appropriate methods for the development of an Equatorial African Deposition Network (EADN). The workshop recognized and endorsed the need for establishing a network in Equatorial Africa consistent with atmospheric deposition networks in other parts of the world, namely North America (Canada and the US) and Europe. To achieve this end and to establish spatial and long-term temporal data trends, several basic needs were identified:

(a) Establish quality assurance / quality control (QA/QC) programs through appropriate training of qualified staff and development of a training / QA/QC manual.
(b) Establishing infrastructure and operation of the field components of the network (siting, installation of equipment and instrumentation, sample storage facilities, sample transportation networks, documentation and reporting systems.
(c) Creation of a regional database and application of existing transport and depositional models.
(d) Application of acquired data in the development of nutrient / contaminant budgets for selected watersheds

26. At the Nairobi workshop it was agreed that ACCESS would be a suitable organization to coordinate and preparation and implementation of EADN. Following the Nairobi workshop, ACCESS contacted all participating countries and requested letters of endorsement for EADN. As a result, twelve countries initially expressed a desire to participate in the program:

(1)Burundi (2) Cote d'Ivoire (3) Democratic Repulbic of Congo (4) Ghana (5) Kenya
(6) Malawi (7) Mozambique (8) Nigeria (9) Rwanda (10) Senegal (11) Tanzania (12) Uganda

27. The proposed network will extend from West Africa, where Sahelian dust might be expected to dominate P sources, to central and southern Africa where biomass burning may dominate. The network will extend over several biophysical regions with different climatic and vegetation characteristics as well as different seasonalities of burning (Fig. 1). Comparison of spatial patterns of deposition with patterns of meteorology, burning and vegetation will also help to determine the sources of atmospheric nutrients and the mechanisms of transfer – two pieces of information that are critical prerequisites to considering any management strategies.

2.6. Baseline analysis and gaps

28. Within Africa, there is currently very limited monitoring of atmospheric deposition. IDAF (see Table 3 above) conducts a monitoring programme at several stations in west Africa and one station in South Africa, but it conducts no monitoring in central and east Africa. In particular, there is no monitoring in the African Great Lakes region.

29. The focus of Global Atmosphere Watch (GAW) is on reactive gases, with an emphasis on those compounds that play a role in climate change, including ozone, carbon monoxide, carbon dioxide, methane, oxidized nitrogen compounds, and sulphur dioxide. GAW has a small number of monitoring stations in Africa, operated by national meteorological departments, but many of the stations that it originally established are no longer functional. The existing stations measure meteorological variables and greenhouse gases.

30. Neither IDAF nor GAW measure atmospheric deposition of phosphorus. In fact, none of the atmospheric deposition monitoring programmes listed in Table 3 monitor phosphorus deposition. There are likely several reasons for this. Phosphorus has no volatile, gaseous phase, and therefore it does not play a significant role in atmospheric chemistry. While phosphorus is recognized as a critical nutrient that influences biological and chemical processes in aquatic and terrestrial ecosystems, most studies of temperate systems have downplayed the significance of the atmosphere as a phosphorus source, although there have been some exceptions (Lewis 1981; Goldman et al. 1990; Li et al. 2004). It was not until recently that studies in the Great Lakes region of Africa highlighted the importance of the atmosphere as a phosphorus cycling pathway. There is evidence that atmospheric phosphorus is having a significant impact on aquatic ecosystems in Africa, but the few studies that have been conducted provide limited information with regard to the sources of this phosphorus and the geographic scale and patterns of atmospheric P deposition. Although the current understanding of the distribution of particulate emissions to the atmosphere and their chemical composition are consistent with a strong inference that the atmosphere may be a significant source of P and N (and other compounds and pollutants) to the African Great Lakes (and other aquatic ecosystems), substantial uncertainty remains about the quantitative and relative contribution of atmospheric loading to ecosystem nutrient budgets. African savannas have received close attention as emission sources (Scholes and Andreae 2000), but deposition estimates are very few for other eco-regions in Africa, largely generated through empirical measurements of previous GEF projects. The lakeside location these few estimates may limit their extrapolation to over-lake deposition on one hand while on the other hand they may also not be representative of terrestrial ecosystems where vegetation is a much more efficient collector of aerosols than water surfaces. The high surface area of vegetation is highly efficient at intercepting dryfall, and its vegetation cover reduces aerodynamic turbulence near the ground and enhances particle settling. Depending on the climatic aridity of a site, the relative importance of wet- and dry-fall varies from site to site, although dry-fall is broadly comparable to wet deposition of TN and TP in all studied sites (Tamatamah et al 2004, Bootsma et al. 1999). Similarly, virtually nothing is known of interr-annual variability, and therefore it is uncertain to what degree the few measurements made in Africa are representative of long-term conditions. Only one study (Bootsma et al. 1999) has addressed inter-annual variability, and that was for two years only.

31. Accurate measurements of dry atmospheric deposition are difficult to make. The method of passive collection onto a water surface used for dryfall estimates in GEF projects provides an index of dry deposition, but it is subject to error due to factors such particle resuspension and differences in physical and chemical properties between the collection device and the lake surface. Active aerosol collectors are required to establish atmospheric concentrations of aerosols which, when combined with meteorological data and appropriate transport models, will permit calculation of export of materials from a site as well as more standardized estimates of deposition at the site based on standard transport-deposition models such as the Dust Emission and Deposition (DEAD) model (for coarse particles, Okin et al. 2004) or CALPUFF, an air quality dispersion model for fine aerosols.

32. Current data in Africa for deposition in rain are based on manual collectors deployed at the beginning of an event. These measurements are probably more reliable than dry deposition measurements. However, because the concentration of materials is highly time-dependent as the atmosphere is washed out early in a rain event, errors in mass deposition can occur if there are delays in the manual deployment. Another disadvantage of manual collectors is that entire rainfall events can be missed if they occur at night or during the absence of a site operator. Current estimates of deposition based on these simple manual methods are subject to both high and low bias depending on site characteristics and operator error. More accurate and complete measurements of wet deposition require the deployment of automated collectors.

2.7. Linkages with other GEF and non-GEF interventions

33. This proposed project has its origins in three large GEF-supported projects on African Great Lakes – the Lake Malawi/Nyasa Biodiversity Conservation Project, the Lake Tanganyika Biodiversity Project (LTBP), and

the Lake Victoria Environmental Management Project (LVEMP). These projects all yielded data strongly linking macronutrients (especially phosphorus, as the limiting element) to changes in trophic status of these lakes. Research conducted within these projects has also highlighted the significance of atmospheric deposition as a source of both phosphorus and nitrogen to the lakes.

34. The proposed Equatorial Africa Deposition Network (EADN) project fits with the GEF Land Degradation focal strategy and will contribute to its strategic objective (SO-1) in developing an enabling environment that will place SLM in the mainstream of development policy and practices at regional, national and local levels. It is also consistent with the GEF Strategic Programs under its International Waters focal area: SP-2. Reducing nutrient over-enrichment and oxygen depletion from land-based pollution of coastal waters in large marine ecosystems (LMEs) consistent with the UNEP Global Programme of Action (GPA). It is also in conformity with both Strategic Long-Term Objectives of the GEF International Waters focal area: 1. "to foster international, multi-state cooperation on priority transboundary water concerns"; and 2. "to catalyze transboundary action addressing water concerns". The project will be a constituent part of the Strategic Investment Programme for SLM in sub-Saharan Africa (SIP), contributing to its long-term program goal. The expected project outcomes will facilitate the achievement of two of the SIP Intermediate Results: IR2 and IR4: establishment of enabling policy conditions and generation and dessimination of targeted knowledge of relevance to SLM scale-up in sub-Saharan Africa.

35. As part of the SIP portfolio, the EADN would reinforce the goals of other SIP operations in all the countries participating in this project. EADN has a strong linkage to the TerrAfrica partnership that aims to mobilize additional resources and to generate and disseminate key knowledge in support of SLM upscaling in Africa. It will serve as a source of, and testing ground for, new knowledge for development of strategic policies and their financing.

36. During implementation, EADN is expected to collaborate closely with the TerrAfrica Program, the Lake Victoria Environmental Management Project - Phase 2, and the Lake Tanganyika IW project - Phase 2. Consultation and coordination will also be particularly important with other related projects, government and donor-supported activities, UNEP, the World Bank, and the GEF.

37. As outlined above (Table 3 and section 2.6), some monitoring of atmospheric chemistry is currently conducted in Africa through the IDAF Programme and the GAW Programme. While the major objectives of these two programmes are somewhat different than those of the proposed EADN, there are conceptual overlaps. All three programmes are concerned with large-scale atmospheric transport pathways, and some of the mechanisms regulating the movement of greenhouse gases and carbon, nitrogen and sulphur compounds, which are the focus of the two existing programmes, may also regulate the atmospheric transport of macronutrients. For example, biomass burning is a major contributor to atmospheric loading of carbon monoxide and carbon dioxide, which are constituents of interest to the GAW, while it is also a likely source of atmospheric N and P. The proposed EADN will provide information that fills in existing geographic gaps (neither IDAF nor GAW has a strong presence in central and east Africa) and atmospheric chemistry data gaps (various forms of phosphorus and nitrogen). Integration of EADN with IDAF and GAW will be fostered by the fact that EADN and IDAF will share a monitoring site at Lamto, Cote d'Ivoire, and EADN will share a site with GAW on Mount Kenya. Individuals who oversee the operation of the IDAF and GAW monitoring stations at the above two sites will also participate in the EADN Programme, which will help to ensure similar monitoring protocols and data compatibility. These linkages between EADN and other atmospheric monitoring programmes (e.g. the AERONET network which measures atmospheric aerosol properties, and FLUXNET which measures earth-atmosphere fluxes of CO_2 and water vapor) will provide better insight into the global movement of atmospheric nutrients, and allow for a better understanding of both regional and global impacts of land use in Africa.

38. Data collected as part of EADN will feed directly into and harmonize with the proposed Phase 2 Lake Victoria Environmental Management Project. It will help to improve the estimates of atmospheric loading of nutrients and its importance relative to other sources, and it will provide the first opportunity to assess

atmospheric loading mechanisms (e.g. burning, soil deflation, vegetations aerosols, industry) and geographic sources of these atmospheric nutrients. The result of this analysis will drive remedial planning and land use interventions within East Africa and provide a basis for cooperation between East African and other equatorial African nations, which is needed to fully address the nutrient loading issues related to Lake Victoria.

SECTION 3: INTERVENTION STRATEGY (ALTERNATIVE)

3.1. Project rationale, policy conformity and expected global environmental benefits

39. Previous GEF International Waters projects on African Great Lakes verify the early research-identified links between increasing eutrophication and atmospheric deposition of macronutrients. Unfortunately, there are no estimates of the regional atmospheric transport of phosphorus (P) within tropical Africa nor export of nitrogen (N) and phosphorus from the continent in tropical latitudes. The proposed Lake Victoria Environmental Management Project phase 2 (LVEMP2) will include more extensive monitoring of wet/dry deposition of macronutrients, both at the Lake shore and offshore islands, and within the catchment as a whole. But this information alone will not indicate how much material is transported directly from outside the basin and onto the Lake surface. Nor will a basin-only network shed light on how much phosphorous is deposited generally within the Lake Basin from outside sources and remobilized either by surface runoff or wet/dryfall into the Lake. Long range transport of soil particles in the atmosphere is a well known phenomenon (for example, the deposition of African soils in the Caribbean and Central and South America) and P is always associated with particulates in the atmosphere. The monsoonal climate of equatorial Africa strongly suggests that regional contribution of P to Lake Victoria could come from as far away as West Africa.

40. Transport of macronutrients may be both a regional and global problem. Africa through deflation of dust from the Sahara and the Sahel is a major global source of dust and associated P (Okin et al. 2004). Long distance transport of African dust originating in northern Africa may sustain the productivity of tropical forests in the Amazon (Chadwick et al. 1999), but may also be degrading reefs in the Carribean (Garrison et al. 2003). Seasonally, winds in the troposphere will also distribute this Saharan dust over western and eastern Africa. Globally, atmospheric particulates have been estimated to contribute 50% of the total annual P load to the oceans (Duce et al. 1991), a percentage remarkably similar to that estimated for atmospheric P loading to the African Great Lakes. Existing scientific data strongly suggests that a significant, and potentially very significant, concentrations of phosphorus that enters Lake Victoria is coming regionally from those parts of equatorial Africa defined by monsoonal airmass movement patterns. These monsoonal patterns are well known and continue to be monitored through an Africa-wide meteorological network.

41. With the above as evidence of long-range atmospheric transport of soil particles, and remembering that atmospheric phosporus is always associated with soil particles, the EADN will need to include a distribution of stations across all of equatorial Africa if it is to produce the information needed in the LVEMP2.

42. Although African savannas have received close attention as emission sources (Scholes and Andreae 2000), deposition estimates are very few in Africa, and largely generated through empirical measurements out of the GEF projects. The lakeside location of most of the few estimates may limit their extrapolation to over-lake deposition on one hand while on the other hand they may also not be representative of terrestrial ecosystems where vegetation is a much more efficient collector of aerosols than water surfaces. The high surface area of vegetation is highly efficient at intercepting dryfall, and its vegetation cover reduces aerodynamic turbulence near the ground and enhances particle settling Depending on the climatic aridity of a site, the relative importance of wet and dryfall varies from site to site although dryfall is broadly comparable to wet deposition of TN and TP in all studied sites (Tamatamah et al 2004, Bootsma et al. 1999). Similarly, only Bootsma et al. (1999) addressed interannual variability, and even then only over two years.

43. To date the methods used to assess the atmospheric inputs to the lakes and affected land surfaces have indicated substantial inputs but the efforts have been on too small a scale and the methods too rudimentary to provide the needed quantitative estimates of deposition and to support quantitative inferences of likely emission sources. This proposal will greatly enlarge the geographic and temporal scale of past and ongoing studies and to use improved, standardized methods employed by other current regional networks to gain much better quantitative estimates of deposition for Inter-tropical Africa wide basis and to relate these measures to other global networks. A proposal for a network of sites and choice of appropriate and desirable methods was

the subject of a workshop in Nairobi Kenya (23 to 26 of May 2005). A substantial side benefit of this proposal will be the transfer of technology and required in order to establish capacity for sophisticated environmental monitoring on the African continent. The network will establish a continental network of scientists and technicians expert in this field, particularly in the equatorial region. This network will harness and enhance the technical capacity to quantify atmospheric deposition and transport that will enable determining the impact of these atmospheric processes on receiving aquatic and terrestrial ecosystems in tropical Africa. Such a network does not now exist although there are networks (e.g. AERONET and FLUXNET) evaluating the contribution of biomass burning to global GHG and climate change.

3.2. Project goal and objectives

44. The primary objective of the proposed EADN project is to provide regional input to government interventions targeting rural development, and particularly those interventions targeting land use management, soil fertility, livestock and agricultural productivity, that would allow the estimation of their offsite impacts associated with the loading of macronutrients to African lakes.

45. Within this context, the primary goals of the proposed project are:

(a) To better quantify the atmospheric deposition of macronutrients – phosphorus and nitrogen – onto aquatic systems in Africa;

(b) To determine how deposition of these nutrients varies in space and time;

(c) To assess potential geographic sources of these nutrients and mechanisms by which they are introduced to the atmosphere. This will be achieved using atmospheric transport models to assess spatial sources and transport routes, and using both spatial land use data and chemical tracers (e.g. major ion ratios) to determine source mechanisms.

3.3. Project components and expected results

46. A primary objective of EADN is to accurately quantify the atmospheric deposition rates of nitrogen and phosphorus to the African Great Lakes. Therefore it will be critical to establish a number of monitoring stations around these lakes. At the same time, it will be necessary to establish a network expanding beyond the immediate Great Lakes region in order to meet a second objective, that of identifying nutrient sources and production / transportation mechanisms. Ideally, the network would cover as wide a range as possible of land cover, land use practices, and climate, with a spatial density that allows for reliable inter-site interpolation of results. From a practical perspective, there will need to be a compromise between this ideal arrangement and the financial and logistic restrictions of the project. At the inception workshop in Nairobi it was agreed that the initial network would consist of a minimum of 12 stations in 12 African countries spanning the diversity of land cover, climates and land management practices (especially burning) in inter-tropical Africa. A follow-up assessment has resulted in the selection of sites presented below (Section 4).

47. The monitoring network will need to be linked to and produce information needed by government land management agencies and donors that support their work. The network should also support regional collaboration in land management. Before recommending policies and practices to address widespread and traditional land management practices including burning, the estimates of elevated atmospheric deposition on African aquatic ecosystems including the Great Lakes need to be made more accurate, and the following hypotheses must be tested:

(a) Nutrient loading to the African Great Lakes is dominated by atmospheric deposition.
(b) Atmospheric nutrient deposition rates over the great lakes are as high as or similar to rates measured near the lakes' shorelines.

(c) The source for elevated atmospheric loading rates for N and P in western Africa is Sahelian dust while savanna burning is the dominant source in eastern and southern Africa
(d) The sources of the atmospheric burden of particulates are regional and widespread and not just local or point sources.

48. To test these hypotheses an Equatorial African Deposition Network (EADN) must be established with extensive spatial coverage and operating in all seasons to evaluate differences in regional sources (different vegetation covers, different land use practices, different burning practices, etc.) and to evaluate deposition over large water surfaces relative to land surfaces. If deposition rates are similar over wide areas and over lakes, then reducing these rates to provide protection to aquatic resources will require regional and possibly pan-African management action and agreements. If certain source emissions dominate the loading of the African atmosphere, action may become more targeted, but regional coordination of policies will still be necessary. If high deposition rates are a result of local sources and practices then addressing these issues at the catchment or lake basin scale will be successful.

49. The establishment of a successful network will require six major interrelated activities (described below) before the hypotheses of this proposal can be answered and implications for environmental management can be determined with confidence.

COMPONENT 1: Establish Quality Assurance and Quality Control Capacity

50. The importance of a well designed quality assurance / quality control (QA/QC) programme cannot be over-emphasized. While atmospheric deposition rates of nutrients are relatively high at the stations where measurements have already been made, the concentration of nutrients in any given rainfall or dry deposition event can be low. For example, the mean concentration of total dissolved phosphorus measured in rain collected near Lake Malawi/Nyasa was 13 umol l^{-1} (403 parts per billion by weight) between 1996 and 1998 (Bootsma et al. 1999). At these low concentrations, small errors in sample collection and analysis can result in high levels of contamination. The potential for these errors was highlighted in an inter-lab quality assurance exercise conducted as part of LVEMP, which revealed nutrient concentration discrepancies of greater than 300% among laboratories. Small mistakes in sample collection and analysis can lead to large errors in calculated deposition rates. These rates will ultimately be used to develop policies and management strategies for multiple sectors over large geographic areas. These strategies will require significant financial and human resources for implementation. It is critical that the data used to design these strategies are reliable.

51. A cornerstone of any quality assurance program is development of a QA/QC plan and well-documented methods and protocols. The implementation of a quality control program requires independent auditing, both internal and external, to ensure that procedures are being followed, that problems are tracked and dealt with in a timely fashion and that a QA/QC document is attached to the data before release to allow data users to qualify their assessments. Included in a QA/QC plan are details on training of field, laboratory and data processing staff to ensure uniformity of execution of tasks across the network and consistent documentation.

52. Why is the QA/QC component so important? Samples from the EADN will be collected and analyzed by different organizations, individuals and laboratories. If the sampling is not uniform and consistent from one location to the next, sampling errors (which are difficult, if not impossible to measure) will result in data that cannot be compared across sites in the network. Even if sampling processes are standardized and rigidly monitored, laboratory assessments of these samples may also result in estimates of concentration that, while "accurate", are not representative and reproducible (i.e. will result in a standard error for a particular analysis on a particular standard sampling day across the network that is so large that no meaningful comparisons with other standard sampling days and sties are possible). It is difficult to minimize internal sampling and analytical errors when a monitoring network is within a single country. When a network crosses multiple countries spanning an entire continent and involves many institutions and laboratories, a strong QA/QC is

absolutely essential to avoid producing a lot of "precise" numbers that are not statistically useful for location and time comparisons.

53. ***1A. Development of a QA/QC Plan***: A QA/QC plan will be developed that identifies the aspects of QA/QC that need to be addressed as integral to the network's operation. This will include:

(i) Siting considerations
(ii) Instrument manuals
(iii) QA/QC manuals for field and laboratory operations, including equipment operation / maintenance, sample collection, sample preservation, sample transportation, and sample analysis.
(iv) Data management
(v) Sample collection and analysis procedures

54. A corollary benefit of the detailed QA/QC plan will be that it will provide an index of all network documentation as well as a record of all changes made to documents (and procedures) as the network develops. Additionally, the QA/QC plan will identify the basic proficiency levels of staff required for each of the fundamental tasks in the network (sample collection, analysis and database management). The plan will provide an operational framework and document the management structure, including responsibilities of various staff positions in the network. This is especially important as the network will be operating in a number of countries and a clear understanding of roles and responsibilities will be essential to the smooth operation of the network.

55. ***1B. Documentation of Procedures***: Clearly documented procedures for all aspects of network operation are essential to ensure consistent operation within and among sites, and comparable data. This is especially important because of the number of different countries involved, and the use of different languages in some of the countries (French, English and Portuguese). To minimize ambiguity, each procedure will need detailed documentation. The specific tasks or elements requiring documentation include:

- Specification of equipment and method characteristics and performance parameters.
- Site requirements, specifications and documentation.
- Instrumentation manuals and equipment maintenance procedures and schedules.
- Operational procedures for precipitation sample collection, storage, transport to the laboratory and documentation. (This will require input from each of the participants as transportation and laboratory arrangements in particular are likely to be country-specific).
- QA/QC procedures for precipitation sample collection.
- Operational procedures for air concentration sample collection (air concentration data will eventually be modeled using meteorological, orographic and vegetation information to provide deposition rates).
- Documentation requirements for all samples and the means of recording the data.
- Meteorological data collection specifications. At a minimum, wind speed and direction need to be recorded, and frequency of measurement needs to be defined. Some sites may require this instrumentation since national meteorological stations may be too far away. This is critical as meteorological data are required as input for the deposition model.
- Laboratory analysis procedures for wet and dry samples.
- QA/QC procedures for laboratory analysis.
- Documentation of laboratory data including raw data and calculation, and detailed QC data.
- Reporting requirements and details of where data will reside.
- Type and characteristics of the database and documentation of database features including the computer platform and software required for its operation.

56. One external audit per site will be conducted annually to assist with identifying problems and to document the viability of each site's operation.

57. The QA/QC manager and ultimately the network manager will be responsible for the output of the network's operation and thus responsible for maintenance of this QA/QC system and the documentation. This will need to be a collaborative effort between the Regional Executive Secretariat (RES) and the Central Analytical Laboratory (CAL).

COMPONENT 2: Training & Awareness

58. Training will be required since the type of network and measurements being proposed are new to the region and thus it is unlikely that staff can be recruited with sufficient experience in the specific (and often novel to the staff) instrumentation and methods to be employed in the network. Moreover, the purpose and eventual outcome of the network and its organization need to be described to ensure that all participants understand the objectives. Detailed training on methods will ensure that all participants are operating on a common footing and that the operation in the field, laboratories and in data documentation will be as consistent and uniform as possible. The basis for the training will be the QA/QC plan and the documentation procedures developed as part of Component 1 (above). The countries will also benefit from the training materials and database of tools that will be developed.

59. ***2A. Field instruments and sample collection, including QA/QC and documentation***. A course will be developed and materials provided (preferably distribution will be by internet to minimize distribution costs) and subsequently delivered based on the procedures documented in the previous activity, addressing siting, establishment of sites, instrumentation, operational procedures, storage and transport methods and documentation of sample collection. This will be for precipitation collection as well as sampling to determine airborne levels of particulate matter and nutrients. The course will include training for initial sample processing and analyses that will be conducted on-site, which will include filtration of aqueous samples, and measurement of pH and conductivity. Measurement of meteorological parameters will also be described.

60. ***2B. Laboratory analysis, QA/QC, and database development***. A second course will be developed and materials provided addressing laboratory analysis procedures and data documentation. This will include methods of analysis for gravimetric determination of suspended particulate matter and analysis of nitrogen and phosphorus species. QA/QC procedures will also be described. Since this activity will lead directly to processing of data for the entire network, overall network QA/QC and the database will form a good complementary topic and will be covered in this course. Because these analyses will be conducted at a Central Analytical Laboratory (i.e. not at individual laboratories associated with each monitoring station), the course need only be offered to individuals who will be involved in sample handling, sample analyses and data management at the Central Analytical Laboratory (CAL). However, it is anticipated that some preliminary analyses of wet deposition samples will be conducted at each monitoring site. These will include measurement of pH and conductivity. Training in these measurements will be provided as part of the field instrument and sample collection training provided to all site operators (see 2A above).

61. ***2C. Auditing***. Certification of network performance will require site and laboratory audits. The goal of auditing is to develop and ensure a monitoring and analytical protocol that produce valid, reliable information. It is recommended that the auditing system for ISO 17025 be used for this purpose, and that several auditors, including the network QA/QC manager, be trained in these procedures so that site and laboratory audits can be regularly undertaken. A training course developed using these principles will require about 3 days to deliver.

62. ***2D. Introductory course in atmospheric chemistry and physics***. Effective participation in an atmospheric deposition monitoring network requires a basic understanding of meteorology, atmospheric chemistry, and nutrient biogeochemistry. Monitoring sites are more likely to be properly maintained, and QA/QC procedures are more likely to be adhered to, if participants have an understanding of the scientific and management context within which EADN is set. To achieve this, a core group of network scientific managers

will be provided with a course on basic atmospheric physics and chemistry including basic methods of measurement. The course will require at least 26 course hours of training, not including assignments and marking, to provide a certificate. Course duration will be 8 to 10 days, with a maximum of 3 hours of formal instruction per day. One-on-one assistance will form the balance of the day. To be more relevant to the students the material will use African examples as much as possible. This training will include an introduction to atmospheric chemistry and physics, as an understanding of basic nomenclature and atmospheric processes would provide a common basis of understanding for the network staff. It is important that course attendees are participants who will be directly involved in the overseeing of EADN monitoring stations. A prerequisite for attendees will be a Bachelor's degree in the natural sciences.

63. ***2E. Introductory course in use of meteorological and air quality models.*** Atmospheric transport modeling will be an integral part of EADN. While raw data from each of the EADN sites will provide a crude picture of spatial atmospheric deposition patterns, models that are guided by the EADN data (for model input, calibration and validation) will provide much more detailed information on nutrient transport patterns and potential sources and sinks of atmospheric nutrients. While this modeling will be conducted by experts in the field, there are two reasons why it is important to provide model training to EADN members: 1) If Operating Agencies are aware of how their data will be used to guide model development and use, they will have a greater vested interest in the data, and they will understand the significance of QA/QC procedures, as the models can be used to illustrate how erroneous conclusions may result from poor quality data; 2) Following the completion of EADN, it is expected that monitoring will continue at a subset of the EADN stations. There will be a need to incorporate these new data into the simulation models to monitor long-term changes in atmospheric deposition and how it may relate to factors such as land use change and climate change. EADN participants who are trained in model operation and who have an understanding of the model structure and assumptions will be able to perform these updated simulations. This training will be provided as part of the modeling contract, and will include: A) An introduction to numerical models, highlighting the benefits and limitations of such models; B) An introduction to the specific model(s) to be used for atmospheric transport modeling, with a description of model structure and parameterization; C) Training in use of the model software, so that trainees are capable of independently operating the software; D) Simulation exercises, in which the model(s) is (are) used to demonstrate how atmospheric nutrient transport may vary under different scenarios of land use, climate and physiography. Course duration is expected to be approximately three weeks, with 4 to 8 attendees. Attendees do not necessarily have to be members of Operating Agencies, but may originate from other government, NGO, or university groups that are members of the EADN Technical Committee.

64. ***2F. Training of policy and decision-makers.*** The focus is on developing new knowledge skills, and attitudes among decision-makers and other stakeholders from the participating countries to use EADN Project results and innovation to advocate for changes in national and regional rural development programmes. The Project will organize workshops and roundtable discussions with small focus groups of senior policy and decision-makers from the participating countries to investigate how information, evidence and tools from the EADN Project are used in real-world decision making. Using participatory action research methodology in which decision-makers work in iterative loops with researchers, the project will pose questions on atmospheric deposition problems in Africa, do analysis, plan action based on results, evaluate the use of information, reflect on how to improve and tailor information delivery and use, as well as how to improve institutional response.

COMPONENT 3: Air and Precipitation Monitoring

65. Past and current monitoring has highlighted the need for regional monitoring of atmospheric nutrient deposition. In addition to improving the spatial coverage of measurements, there is a need to upgrade sampling methods so that deposition rates can be determined more accurately. Experience in Europe and North America since the 1970s has resulted in standardized, science-based methods to quantify deposition of airborne particulate sulfates and nitrates and gaseous contaminants. The conceptual approach has been to undertake detailed diagnostic studies at selected, well controlled locations to provide fundamental scientific

data on mechanisms and detailed budgets for target compounds. With reference to the network proposed in this proposal, such budgeting exercises are being done or have been done for phosphorus and nitrogen in Lake Malawi and Lake Victoria. However, as discussed above (section 2.6), the accuracy and completeness of the data used in these studies is less than ideal. Strategic network monitoring coupled with already available sophisticated models can enable estimates of transport from and deposition to areas due to precipitation and airborne concentrations of target species. Such networks, with defined spatial density and frequency of monitoring, provide information on geographic and temporal trends (e.g., diurnal, daily, weekly, monthly, seasonal and annual trends) required for linkage with terrestrial and aquatic phenomena.

66. ***3A. Precipitation monitoring.*** Monitoring at network sites will be undertaken with automated precipitation collection (examples of some models include the TPC-3000 [Yankee Environmental System], the MIC [Meteorological Instruments of Canada], the NSA 181/S [Biral, UK]), and the N-CON ADS. These detectors all have similar modes of operation. A collection chamber is covered with a sealed cover. Upon detection of rainfall a sensor triggers opening of the cover, allowing collection of rainfall. Upon termination of rainfall, the heated sensor dries and causes the cover to move back and cover the rainfall collector. The precipitation sample can be collected every 24 hours on a regular schedule and sent for analysis. Some models also include a dry deposition collector. In these models, the lid covers either the dry or wet deposition collection chamber; so that at any one time either wet deposition or dry deposition is being collected. While this is a simple and convenient way to collect dry deposition, the reliability of the method is uncertain, as dry particle deposition within the chamber can be quite different from that on a natural surface, due to turbulence created within and above the collection chamber.

67. The precipitation collection chamber needs to be matched up with a rain gauge that allows accurate measurement of rainfall amount during each sampling period. The laboratory-measured concentrations of nutrients and the volume of rainfall from the rain gauge will be combined to determine the wet deposition of nutrients to the land or water surface accurately. Several proposed monitoring sites are already equipped with meteorological monitoring equipment. For those sites that are within 10 km of a meteorological station, meteorological data required for deposition modeling can be acquired from the existing meteorological station, but a manual rain gauge will be installed at the atmospheric deposition site to ensure accurate on-site measurement of rainfall. For deposition monitoring sites that are further than 10 km from the nearest meteorological station, an automated meteorological station will be installed at the monitoring site to provide the meteorological data required for atmospheric deposition modeling.

68. Where electrical power is accessible, the collector will be connected directly to the mains electrical power supply. Where this is not possible, the collector will be powered by batteries charged with solar panels.

69. ***3B. Air sampling of dry constituents (particles, particle-bound compounds gaseous N).*** Passive dry deposition samplers, such as those that have been used in the previous studies near the African Great Lakes, can be influenced by local aerodynamic effects and electrostatic effects that lead to biased collection of airborne particles of different size fractions. Small particles in particular have been shown to adhere to external surfaces rather than the collection surfaces normally extracted and analyzed. This can result in significant data biases in areas where biomass burning is a significant source of atmospheric constituents, as burning tends to produce small particles.

70. Because of these factors, active air sampling will be undertaken at all network sites. As noted above, some precipitation collectors include a dry collection chamber that may be used if desired. If this collector is located at the same site as an airborne particle concentration system, the resulting data can be used to determine the feasibility of continuing with the dry-fall approach at minimal incremental cost. At sites chosen because of their proximity to lakes, the passive collectors will be run concurrently with the new standard method to evaluate the error possibly inherent in past studies, and the potential for using passive collectors at other sites.

71. The recommended standard method is deployment of a particle collection system using 47 mm filters (standard sizes for air sampling systems). The system is operated be means of controlled suction delivered by

a pumping system such as a diaphragm pump. A typical system consists of a filter holder loaded with appropriate filter media (for nutrients Teflon 1 or 2 μm pore size is adequate) deployed by means of a mast 10 m above the ground. The filter requires protection from the rain. The system design allows lowering of the mast for sample changes. The filter holder and filter are connected to a sampling valve to allow automatic changes of samples, a mass flow control meter (recording) to control and measure flow rates and a diaphragm pump operating at approximately 5 litres per minute by means of flexible tubing. The flow meter and pump are to be sheltered. The flow rate of 5 litres per minute is sufficiently low to allow powering with solar collectors and batteries. Also, 5 litres per minute of flow should provide sufficient sensitivity for laboratory analysis of samples for the target compounds. Moreover, sampling heads are already commercially available at this flow rate to allow adaptation of PM10 and PM2.5 sampling heads should this be desirable in the future (PM10 and PM2.5 heads are designed to collect particle sizes of 2.5 -10 um (coarse) and <2.5 um (fine), respectively). In addition the sampling system can be adapted for monitoring of other target compounds in the future should that be desirable. The air sampling system will be fitted with filter packs containing filters for particulate collection as well as impregnated filters for selective extraction of nitric acid (HNO_3), ammonia (NH_3), and nitrogen dioxide (NO_2).

72. In Europe and N. America these types of systems operate on 24 h, day/night or weekly sampling schedules. For purposes of data collection daily day and night samples are highly desirable. However the costs of such operation would be prohibitive from a field operational perspective as well as from an analysis perspective for the initial phase of establishing the EADN network and evaluating its capacity and data quality. Therefore samples will be collected so that daytime samples and nighttime samples are integrated over a 7-day period (i.e., each 7 days will result in one integrated daytime sample and one integrated nighttime sample). Once every 4 weeks a filter will be deployed to determine passive deposition to the filter that does not receive pumped air flow. This filter will serve as a "blank" for correction of nutrient measurements made with the active filter.

73. ***3C. Carbon dioxide monitoring***. Previous studies have highlighted the potential role of biomass burning as a source of atmospheric nutrients. Because biomass burning results in a significant increase in atmospheric CO_2 concentrations (Randerson et al. 1997), comparison of spatial and temporal patterns of atmospheric nutrient deposition with patterns of atmospheric CO_2 may allow for a more accurate assessment of the relative role of biomass burning as an atmospheric nutrient source, provided that other potential sources of CO_2, such as industries and urban centres, are accounted for. Continuous CO_2 monitoring systems will be installed at all sites, with CO_2 sample intakes located immediately adjacent to air intakes used for dry deposition measurements. Measurements will be made four times daily, providing day-time measurements and night-time measurements that can be directly compared with the integrated 7-day air samples collected for nutrient analyses.

74. ***3D. Meteorological parameters.*** Meteorological data are required both for the interpretation of deposition data (e.g. Bootsma et al. [1999] found that P deposition rates near the shores of Lake Malawi/Nyasa were greater when the monitoring station was downwind of land than when it was downwind of the lake) and for the modeling of deposition rates. Most of the propose EADN sites are within 10 km of an existing meteorological station, and therefore data from these stations may be used with the collected deposition data (see Section 4, Institutional Framework and Implementation Arrangements, for a description of proposed monitoring sites). However, several sites (Ghana, Mozambique, Tanzania) are not near existing meteorological stations, and therefore these sites will need to be equipped with automated stations for the measurement of rainfall, wind speed, wind direction, temperature, relative humidity, barometric pressure and solar radiation. All EADN sites will be equipped with manual rain gauges.

75. ***3E. Security requirements.*** Most of the proposed EADN sites have reasonably good levels of security, including fenced enclosures and/or security personnel (see Section 4 for site assessments). Sites at which significant security improvements will be required include Burundi and Tanzania. These improvements will include fencing and the hiring of security personnel. Minor improvements in security will likely be required at other sites.

76. ***3F. Using Remote Sensing to Monitor Biomass Burning.*** Two major hypotheses to be tested by the EADN are that biomass burning is a significant source of atmospheric nutrients, and that atmospheric particle deposition results from diffuse, widespread loads to the atmosphere. A valid test of these hypotheses will require that spatial and temporal patterns of deposition that are revealed by EADN measurements be compared with spatial and temporal patterns of burning and particle concentration. There are currently a number of satellite sensors that can be used for these purposes, including the Moderate Resolution Imaging Spectro-radiometer (MODIS), Along Track Scanning Radiometer (ATSR), Bi-spectral Infrared Detection (BIRD), Earth-Probe Total Ozone Mapping Spectrometer (EP/TOMS), the Global Ozone Monitoring Experiment (GOME) spectrometer, and Light Detection and Ranging (LIDAR) sensors. Atmospheric properties relevant to biomass burning and atmospheric nutrient deposition that can be measured include fine and coarse aerosols, which can be used to distinguish burning or industrial sources of fine particles from coarse dust particles (Kaufman et al. 2003), atmospheric NO2, which results from the emission of NO_x compounds (Jaeglé et al. 2005), and ozone, which is also linked to NO_x emissions and biomass burning (Thompson et al. 2001). Satellite sensors can also be used to determine the location, timing, and intensity of fires (e.g. Dwyer et al. 2000; Ahern et al. 2001; Duncan et al. 2003).

77. Data for these analyses, along with derived products such as low-resolution imagery of vegetation cover and fire distribution, are made available by various agencies. Therefore there will not be a need to install satellite receiving systems. The main tasks to be accomplished within this project component will be the collection of relevant satellite sensor data (with a focus on years 2 to 4 when the EADN monitoring network will be fully functional), and analyses of the data with the following objectives:

- To reveal spatial and seasonal trends of biomass burning and atmospheric properties that may relate to biomass burning and nutrient deposition, including aerosol concentration / size distribution and NO_2 concentration.
- To reveal inter-annual trends of the same variables.
- To provide spatial information regarding land use / land cover required for atmospheric / meteorological modeling (see Component 4, below).
- To collaborate with the atmospheric / meteorological modelers by providing remotely sensed atmospheric data required to calibrate / validate models.

78. These tasks will be performed by a specialist within the field of remote sensing, preferably located within Africa with experience working on African ecosystems.

COMPONENT 4: Database and Modelling

79. The network described in this proposal will return data on concentrations of nitrogen and phosphorus in wet deposition, in dry deposition (by passive sampling at lake sites only) and in total particle mass in air for *12 sites from daily (for wet deposition) to weekly (for particulates and gases in air) to biweekly time scales (for passive dry deposition sampling at lake sites). Sample collection of this frequency at all *12 sites will result in a steady stream of data and a large database. Therefore effective database management will be required at both the national level and the regional network level.

80. At the national level, data management demands will be relatively modest, consisting of the recording of rainfall, measurements of pH and conductivity in rain samples, and site operation records. This information will be recorded in manuals, as well as in digital data forms that will be standardized for all sites. Copies of data records will be provided to the Central Analytical Laboratory (CAL) on a monthly basis.

81. The CAL will maintain a master database, which will include data provided from each network site as well as the results of chemical analyses performed by the CAL. Initially this EADN database will be

accessible only to network participants via a secure website, through which data will be made accessed using Structured Query Language (SQL). Once initial data analyses have been completed and data quality has been confirmed, data will be made public accessible.

82. The regional database will be used to identify sub-regional differences in atmospheric chemical composition and to evaluate differences in wet and dry deposition across the EADN region. In order to analyze the data it will be necessary to use a sophisticated meteorological / atmospheric model. On the regional scale, up to 800 km, Lagrangian or Eulerian models such as CALPUFF for fine particulates or DEAD for coarse particulates can be used. On larger scales it may be necessary to use more sophisticated models such as those used in N. America (e.g. the Regional Acid Deposition Model - RADM) and Europe that deal with continental scale phenomena. Lagrangian models are generally easier to run and have lower computing requirements than Eulerian models. The primary challenge within the context of EADN is to establish an operating network that stores, manages and delivers reliable data. At the same time, appropriate models for estimating deposition fluxes and regional transport pathways will be explored with the assistance of experts in this field. For these models to be fully functional, input data on emissions, orography (e.g. digital elevation models), and vegetation distribution will be needed in addition to the precipitation, nutrient concentration, and meteorological information. These data for each participating country will be acquired by the site manager for that country, and data from all countries will be collated by the EADN Secretariat.

83. The results of this research project will assist in providing a clear vision of the relative importance and impact of agricultural production and natural resource conservation on large water bodies. It will supplement similar work already underway, or proposed, in the Lake Victoria Environmental Management Project I and II. Furthermore, although the project will be implemented in equatorial Africa, it is envisaged that many outputs will be generic and so applicable to the whole continent. The project will contribute to the objectives of the operational program of bilateral and multilateral development agencies in the following ways:

By identifying the regional nature and importance of the atmospheric deposition issue, raising it as being a "development" issue, and forming the basis for regional dialogue on how it might be addressed

84. The rural development agenda of countries across equatorial Africa rarely include assessment of regional impacts unless the resource being exploited is a "shared resource". If the targeted research described in this proposal proves a strong correlation between land use, land capability and eutrophication of very important and fragile African lakes, then rural development planning will require regional as well as national consideration. And if national rural development activities must accommodate regional aquatic impacts, then multilateral and bilateral assistance strategies will also need to adapt.

By providing information to guide sustainable land and water management, planning, and implementation

85. The project will determine linkages between land types, land-use patterns, and spatial deposition rates across the proposed study area (with correlation to other atmospheric deposition monitoring in the Lake Victoria Environmental Management Project and others). Should the results of this initial monitoring report so justify, one significant benefit would be to improve the overall effectiveness of World Bank assistance to its African member countries by taking regional impacts of its rural strategy and national, land-focused, development assistance into account.

By establishing a baseline and a monitoring network that will allow evaluation of the effectiveness of any regional approaches to mitigate this problem to be made

86. If strong correlation between regional mobilization of pollutants and atmospheric deposition rates into African lakes is indicated as a result of this proposed MSP, it is likely that a regional intervention by countries and their bilateral/multilateral development partners will be needed to begin mitigating these regional land impacts on water quality. Under this scenario, it will be essential to determine what impact any regional

initiative to stabilize and reduce mobilization of phosphorus into the atmosphere is having on water quality of important African lakes (such as the African Great Lakes). The proposed atmospheric monitoring network would need to continue indefinitely to measure changes to the baseline established by this GEF Project. The Project would therefore have three outcomes: (i) Establish a baseline for deposition rates across equatorial Africa; (ii) Build on and strengthen international links and cooperation between scientific institutions and government natural resource management agencies in Africa; (iii) Create the foundation for a regional cooperation that could be easily supported by other assistance agencies and by national governments, and evolve into a structure to advocate and facilitate regional cooperation to address this regional land use issue.

COMPONENT 5: Stakeholder Involvement, communication with policy/decision-makers and Information Dissemination

87. While EADN will primarily be a data gathering effort, ultimately the design and implementation of any management efforts that are informed by EADN will require collaboration among multiple sectors over a large geographic area. The transition from data collection to management planning to implementation will be most efficient if all parties involved in this series of actions are kept informed of the findings of EADN and are given the opportunity to participate in its implementation. These parties will include government agencies, donors, NGOs involved in agricultural and natural resource management at both the national and regional levels, and the global network of agencies conducting atmospheric monitoring and research.

88. ***Stakeholder involvement*** will be facilitated through four mechanisms:

(i) During project initiation the RES will contact agencies and organizations working within the fields of agriculture, natural resource management, atmospheric monitoring, and large lake management to inform them of EADN's objectives and plans and to determine facets of implementation and/or policy development in which EADN can collaborate with existing programs. In order to make the group of collaborators as comprehensive as possible, the RES will work with regional organizations that already oversee networks with good geographic and/or sectoral coverage. These will include TerrAfrica, LVEMP 2, ACCESS, IDAF, and GAW. Representatives of these agencies, along with Operating Agency representatives, will be invited to a Project Initiation Workshop in the first year, which will be organized by the RES.

(ii) Two of the proposed EADN site overlaps with existing large-scale monitoring programs. The site at Lamto, Côte d'Ivoire has been a part of the IDAF network for many years. Its inclusion within EADN will help to promote data exchange and the adoption of common sampling methods for the two networks. The Mt. Kenya site, which was initiated with support from the GEF, monitors greenhouse gases, aerosols and ozone, and serves as a link to the Global Atmospheric Watch program overseen by the World Meteorological Organization.

(iii) The RES will oversee the development of an EADN website which will provide a description of the objectives and methods of the project links to project reports and publications, and access to EADN data.

(iv) At end of year 2, a Regional Stakeholders Workshop will be held. The purpose of the workshop will be to promote interaction among EADN participants and other agencies, to present preliminary results of EADN, and to obtain feedback from stakeholders that may be used to revise EADN strategies for the final two years of the project. A second Regional Stakeholders Workshop will be held in the project's fourth (final) year to present final project data sets and model results to stakeholders and to discuss strategies for the continuation of atmospheric monitoring in equatorial Africa beyond EADN's lifespan.

89. ***Communication with policy and decision-makers*** - A communication strategy for the Project will be developed targeting similar regional and global deposition networks and policy forums to promote the project results and key recommendations. Outreach products will include web pages, briefing notes, podcasts, short

video and media advisories. Communication activities will include testing of new ways of presenting complex atmospheric deposition information and data, including visualization to various decision-makers and other stakeholders in the participating countries.

90. ***Dissemination of information and Data***. Dissemination of results to users will comprise of short workshops, briefing meetings, local forums, seminars and brainstorming sessions between decision-makers and researchers. Other stakeholders like farmers representatives, local government officers, NGOs will also be informed and empowered with knowledge that applies to the project results and innovations. US$ 48,000 (2.5 % of the total budget and 5% of the IW contribution) has been set aside for supporting IW LEARN activities. In addition to developing links with GEF IW LEARN activities for dissemination of information and awareness of the problem of atmospheric deposition in Africa amongst key policy makers and other stakeholders, EADN will collaborate with other networks with similar objectives and mission. For example, IDAF-Africa an atmospheric deposition network that exists in western and southern Africa regions, sponsored by IGBP/IGAC/DEBITS International Programmes to determine/monitor atmospheric deposition.

COMPONENT 6: Project Management

91. While EADN will include a number of participants spanning the African continent, project management will be streamlined by implementation through a single entity – the Regional Executive Secretariat (RES). The RES will serve as the primary liaison among the Operating Agencies in the participant countries, assuring uniform operating standards and overseeing network logistics. The RES will also serve as the liaison between Operating Agencies and UNEP/GEF. The RES will be guided in its management decisions by the EADN Regional Technical Committee, which will consist of 1 member from each of the network Operating Agencies, and technical experts from government agencies, NGOs, and universities not directly participating in EADN implementation. Specific details of the responsibilities of the RES are provided below in section 4.

3.4. Intervention logic and key assumptions

92. Most Africans live in a rural setting and depend directly or indirectly on agrarian economic activities. Land use in rural Africa is dominated by small scale farmers and pastoralists. Since the contribution of the agricultural sector to national economies is significant, there is an increasing awareness that more government and donor attention is needed to promote sustainable and more economically viable exploitation of rural lands. Multilateral and bilateral donors are therefore allocating more of their resources to development in rural areas. But work funded by the GEF and other research agencies and universities suggest that these rural, land-based, projects may have significant "off-site" impacts on the natural resources of inland water bodies, which significantly reduce any benefits that accrue locally through these investments.

93. Existing data and information from various sources suggest that failure to address the root sources of atmospheric mobilization and subsequent wet/dry-fall deposition of phosphorus into all of the African Great Lakes and particularly Lake Victoria will lead to continued eutrophication to a point likely to severely damage the ecological and productive value of these important water bodies. Even concerted and expensive solutions to urban sewage, drainage and sanitation, and other "catchment-oriented" works designed to minimize effluent runoff into the Lake will have only marginal and short-term impacts on the trophic status of these Lakes, buying time to identify sources of macronutrient mobilization into and transport through the atmosphere. There is no alternative. Without dealing with the largest source of nutrients driving enrichment of these Lakes, the devastating symptoms of eutrophication (fundamental changes in the microflora and fauna including a shift to algal species that produce toxins, reduced light penetration into the water column, increased algal blooms and associated fish kills, etc.) will continue and probably become worse.

94. UNEP is well positioned to utilize the information to come from the EADN. The most likely sources of macronutrients mobilized and transported to the African Great Lakes are regional, coming from within and from a wide area outside the lake basins. Addressing this issue will require that regional governments be made aware of the the issue and its causes, and that there be regional coordination of environmental policies.

Meeting both of these needs will be facilitated by UNEP's expertise in these areas. The objectives of the EADN are well aligned with four of UNEP's five priority areas – (1) environmental assessment and early warning; (2) Development of policy instruments; (3) Enhancement of coordination with environmental conventions; and 4) Support to Africa.

95. Since UNEP is one of three implementing agencies of the GEF, the linkage of the two organizations through the EADN helps the GEF to achieve its operational policy of addressing "degradation of the quality of transboundary water resources, caused mainly by pollution from land-based activities" while simultaneously providing information that will allow UENP to appropriately scope geographically and operationally any intervention needed to address offsite impacts associated with nutrient mobilization into, and movement through, the atmosphere.

96. If EADN is not implemented, atmospheric deposition sampling within the Lake Victoria Basin would probably continue with funding through the LVEMP2. The information from this network would very likely confirm that significant quantities of phosphorus are transported into the Basin from unidentified outside sources. In this case, the five countries that make up the Lake Victoria Basin would need to lobby neighboring countries to address this problem, but would not be able to identify specific rural activities or geographic locations on which to focus. Any transboundary interventions would need to be sectorally and geographically broad in scope, which would be much more costly than an approach that targets hotspots with a stratified effort that focuses on key nutrient mobilization mechanisms.

3.5. Risk analysis and risk management measures

97. Two potential primary risks may affect project implementation: political instability which may occur in some participating countries, and uneven performance among the participating countries. The project design has taken these risks into consideration.

98. The proposed risk reducing measures to address political instability include establishment of a network of cooperation among the participating countries. The network designed in the EADN project is to encourage active interaction and exchange among technical people in the region and thus mininizing eventual risks caused by political unstability. Under this network, the project will be implemented at both the national and regional levels, similarly project finances and cash flows will be managed at both levels. In addition, regional coordination of project implementation will be through a centralized agency representing all participating countries (the role of ACCESS). Implementation coordination at the regional level will involve two structures: a Regional Executive Secretariat (the participating countries have designated ACCESS to fill this role) which will manage the operational aspects of the project, and an EADN Technical Committee, comprised of the technical heads of the agencies responsible for operating and maintaining the monitoring sites in participating countries. The Technical Committee will provide technical oversight over the secretariat and the project. (See section 4 for a more complete description of organizational structure).

99. Uneven performance among the participating countries will be minimized through several mechanisms. Initial training will ensure that all participants have the necessary skills to operate monitoring sites, and that all sites follow a common regional protocol. Following training, the implementation of the QA/QC program will put in place a monitoring system that will catch and correct sub-standard performance at an early stage. Components of the QA/QC program will be implemented at both the individual site level and at the regional level, with oversight from the CAL and the Regional Executive Secretariat, providing two layers of quality assurance. In addition, uniform, high quality standards will be facilitated by having all chemical analyses (with the exception of on-site pH and conductivity measurements) performed at one Central Analytical Laboratory.

100. Secondary risks include the potential for vandalisms of monitoring stations, and the delay or loss of samples during shipment from monitoring stations to the CAL. Because atmospheric deposition monitoring is ideally conducted in sites that are not near large urban centres, most sites are in remote areas that may be more prone to vandalism. However, the majority of the proposed stations have already been operating in some capacity as monitoring or research stations, and so the level of risk is well known and security measures are in

place. At new sites, especially those in remote areas, there will be a need to ensure adequate security measures are in place, which will include fencing and staffing with security personnel.

101. Methods for shipping of samples from individual sites to the CAL may vary among countries, with postal service and courier service being the two most viable options. It is expected that the first half year of network operation will reveal which shipping options are most viable. Once suitable options have been identified for each country, it is expected that there will be a positive feedback, in that the likelihood of successful shipments will probably increase as a frequently used shipment track becomes well established. Nevertheless, it is almost certain that shipments will be delayed or lost from time to time throughout the project duration. To minimize the impact of these losses, monitoring sites will keep replicates of all wet and dry deposition samples (when volumes permit), which will be stored until receipt and analysis of samples has been confirmed by the CAL.

3.6. Consistency with national priorities or plans

102. As described above (Section 2.4), the need for an ecosystem approach to management of water supply, water quality, fisheries and biodiversity is acknowledged within the African Great Lakes region and much of the rest of sub-Saharan Africa. Attempts to address this need are reflected in the various regional agencies that address natural resource management issues, including the Lake Malawi/Niassa/Nyasa Basin Commission, the East African Community, the Nile Equatorial Lakes Subsidiary Action Plan, and a number of international structures that facilitate natural resource management, primarily related to water supply and desertification, in West Africa.

103. For all countries in the African Great Lakes region, local agriculture and fisheries are primary food sources and important economic drivers. This importance has been recognized by African governments who, through their endorsement of the Comprehensive Africa Agriculture Development Programme (CAADP), have committed to allocating at least 10% of their annual budgets to agriculture and to creating a policy environment with a target of 6% annual growth in agricultural production. At the same time, water quality in the African Great Lakes has been steadily declining, with negative consequences for the fish communities of these lakes, and agricultural soil fertility has deteriorated throughout much of sub-Saharan Africa. The available data suggests that atmospheric transport of nutrients is a significant contributor to both of these problems. In recognition of this, participants at the regional meeting of 12 equatorial African nations organized by the African Collaborative Center for Earth System Science (ACCESS) in Nairobi in May, 2005 strongly endorsed the need for EADN and committed to participate in the project implementation.

3.7. Incremental cost reasoning

104. The EADN is designed to integrate with existing and proposed GEF International Waters projects on African Great Lakes. These projects (and particularly the second phase of the Lake Victoria Environmental Management Project) will include establishment of atmospheric deposition monitoring sites within the various lake basins. Although these are also regional activities, they do not include support for monitoring outside the target basins. Without input from the EADN, it is unlikely these other regional activities specifically promoting sustainable and equitable use of shared water bodies would be able to properly identify and scope solutions to the problems posed by eutrophication.

105. The EADN will:

- Raise awareness amongst all African countries of the problems resulting from inappropriate land use practices and associated degradation of the value of the resources of African Great Lakes;

- Help identify types and locations of large scale land uses that are contributing to atmospheric loading of macronutrients that are subsequently deposited into African Great Lakes and other inland water bodies;

- Link countries that are regional sources of problematic land uses that contribute the largest part of the macronutrient loading into the atmosphere with those countries that are impacted by subsequent deposition of these macronutrients;

- Provide a regional assessment that, when integrated into other large-scale monitoring networks, will lead to an improved understanding of atmospheric nutrient transport at a global scale, and sub-Saharan Africa's role as a source and sink for those nutrients.

3.8. Sustainability

106. Establishment of a monitoring network covering a very large geographic region requires standardization of sampling and analytical methods, site location criteria, staff training, and organization of a comprehensive QA/QC program amongst all sites and agencies involved in the monitoring network. The EADN will likely start before the LVEMP2 becomes fully operational. The EADN will therefore support establishment and initial operation of all stations across equatorial Africa, including those in the Lake Victoria Basin. Once the LVEMP2 becomes operational, monitoring sites within the Lake Victoria Basin will be turned over to it for operation. If any expansion of monitoring sties is needed in the Basin, the LVEMP2 would provide the funding and management. Overall coordination of the EADN during preparation and implementation will be through ACCESS, which is based in Kenya, ensuring a strong focus on Lake Victoria and interaction with the LVEMP2.

107. The majority of the proposed EADN sites already function in some form as nationally supported research and/or monitoring sites, primarily related to natural resources management or meteorological monitoring. Therefore the equipment provided by EADN will augment existing facilities for which national governments have long-term commitments. Long-term atmospheric deposition monitoring following the completion of EADN will depend on the desire and ability of the national governmental institutions or universities to continue this work. Long-term monitoring at some stations will certainly be necessary to assess the efficacy of any interventions designed to mitigate atmospheric nutrient transport. However, even if monitoring is terminated at some stations following the EADN programme, the expected three to four years of data collected by the programme will be sufficient to determine spatial patterns and mechanisms of atmospheric nutrient transport. Therefore, the long-term operation of a subset of the original EADN sites may be a viable compromise between need for long-term data and the funding limitations of a large-scale network.

3.9. Replication

108. There is very wide interest globally in the EADN. Many global atmospheric monitoring networks are looking at linking to the network and taking advantage of the monitoring infrastructure (sites, manpower, security, QA/QC methodology, etc) within EADN to add new data points. As there are very few atmospheric monitoring stations within equatorial Africa, global networks monitoring atmospheric transport of persistent organic pollutants, greenhouse gases, particulates (PM_{10}/$PM_{2.5}$ etc), and more specialized networks collecting information on other related pollutants would be able to generate a more complete picture (including more reliable modeling) of the origin, transport and ultimate fate of these materials. While EADN does not propose to measure all the constituents that are measured in other large scale monitoring programmes, it will provide a logistic base that can be utilized by other organizations that may be interested in measuring constituents not routinely measured by EADN.

3.10. Public awareness, communications and mainstreaming strategy

109. The proposed EADN programme will be implemented through existing institutions in the participant countries, including universities and government agencies (Table 4). Many of these institutions have existing

extension programmes through which EADN findings can be disseminated at the national level. Because there are likely strong links between atmospheric nutrient loads and agricultural practices, it will be particularly important that EADN be closely aligned with agencies involved in agricultural research and extension. This will be facilitated by direct communication between the EADN Secretariat and these agencies. In some of the EADN partner countries, EADN is being implemented by agricultural agencies or by water resources agencies that are closely linked to agriculture (e.g. Ghana, Malawi). In the LVEMP countries (Kenya, Tanzania, Uganda), there are already strong ties to agricultural research and extension units that will foster communication and the translation of EADN results into policy and management strategies.

110. At the regional level, TerrAfrica is an ideal forum through which to disseminate EADN results and to coordinate a policy and management response. TerrAfrica uses the benefits that are achieved through regional collaboration to promote the implementation of soil loss management strategies at the national level, using existing national structures. Of particular benefit to EADN will be TerrAfrica's Consultative Forum, which promotes regional information exchange and discussion of policies related to soil loss management. Under the direction of the Regional Executive Secretariat, EADN (and any of its partners who so wish) will participate in TerrAfrica's Consultative Forum and, if deemed appropriate by the TerrAfrica Executive Committee, may suggest the formation of a Special Advisory Group to specifically evaluate the links between agriculture and atmospheric nutrient deposition, and to explore how TerrAfrica may support strategies to address high atmospheric nutrient deposition rates.

Table 4. Country agencies involved in the implementation of EADN.

Country	***Agency (ies)***		
Burundi	Institut National pour l'Environnement et le Conservation (INECN)		
Côte d'Ivoire	Lamto Geophyisical Research Station	Université de Cocody	IDAF
DRC / Rwanda	Centre de Recherche en Sciences Naturelles (DRC)		
Ghana	CSIR Water Research Institute	Water Resources Commission	
Kenya	University of Nairobi	Kenya Meteorology Department	ACCESS; LVEMP
Malawi	Fisheries Department (Ministry of Agriculture)		
Mozambique	Scientific Research Association of Mozambique (AICIMO)	Institute of Fisheries Research (IIP)	
Senegal	École Supérieure Polytechnique	Cheikh Anta Diop University, Dakar	
Tanzania	University of Dar es Salaam	Ministry of Water and Irrigation	LVEMP
Uganda	Makerere University	Directorate of Water Resources Management	LVEMP

111. Parallel with its efforts to communicate through TerrAfrica, the EADN Secretariat will organize two stakeholder workshops during the course of the project, one at the end of year 2, when it is expected that at least one year of data will be available for all monitoring stations, and one at the end of the project, when complete data sets and model results are available. The primary purpose of the first workshop will be to inform a broad range of stakeholders of the preliminary results of EADN and to acquire stakeholder input with regard to local environmental concerns potentially related to atmospheric nutrient and contaminant transport, availability of required model input data, and potential for collaborative efforts. The second workshop will provide final project results to all stakeholders, and will serve as a forum in which EADN and stakeholders can discuss steps by which EADN results can inform policy and management strategies. Workshop attendees will include a cross section of government and non-governmental agencies from each participant country, universities, and regional agencies (African Union, NEPAD, TerrAfrica), with a focus on agencies in the agricultural, fisheries, water quality and forestry sectors.

112. The EADN website will be used both as a data distribution mechanism and a public information resource. Website content will include a structured database with varying levels of access, (depending on data age and extent to which data have been quality assured), and links to EADN reports and publications.

3.11. Environmental and social safeguards

113. EADN is primarily a monitoring and research program designed to collect environmental data. The program will ultimately have social ramifications as a result of policy and management actions may result from the collected information, and human benefits that will results from these actions. However, there is a low probability that implementation of EADN will have any significant social impacts. Monitoring will be conducted at sites that are already used for research and monitoring purposes, and therefore there will be no issues related to displacement of people or interference with community activities. When EADN results are used to consider policy changes and management strategies, there will be some potential for spatial segregation between management actions and beneficial results. For example, improvements in water quality that may benefit one population may require changes in land use practices by another population. This underscores the need for a regional, multi-sectoral approach. To ensure that social and economic benefits are maximized regionally, EADN will work with other stakeholders, especially within the agriculture, forestry and fisheries sectors, to assess the costs and benefits of any proposed management actions.

114. Data collection within EADN will include no activities that are disruptive to the environment. All data will result from passive measurements and collections of air and rain samples that will have no impact on normal environmental conditions. The most probable source of environmental impact within the project is handling and disposal of chemical reagents used for sample analyses. At individual monitoring stations, the only chemical measurements made will be conductivity and pH. These measurements both require reagents for instrument calibration that are relatively benign and can be safely disposed of through water drainage systems. At the Central Analytical Laboratory (CAL), a number of hazardous reagents will be used, including strong acids and bases and toxic material. Once the CAL has been selected, it will be necessary to determine if the facility has a chemical safety plan in place. If it does, the plan will need to be evaluated to determine if it meets international standards. If no plan is in place, one will need to be developed as part of the QA/QC protocol. The plan will include procedures for handling of hazardous materials within the laboratory, and for disposal of hazardous waste. This task will fall under the terms of reference for the QA/QC Program Development contract.

SECTION 4: INSTITUTIONAL FRAMEWORK AND IMPLEMENTATION ARRANGEMENT

115. The proposed Equatorial Africa Deposition Network (EADN) will consist of five main entities:

- The EADN Regional Executive Secretariat within the African Collaborative Center for Earth System Science (ACCESS) in the University of Nairobi, Kenya
- The EADN Technical Committee
- The Operating Agencies (OAs), which oversee the operation of each monitoring station
- A Central Analytical Laboratory (CAL)
- EADN Regional Steering Committee (EADN RSC)

116. A diagrammatic representation of the EADN organizational structure is shown below:

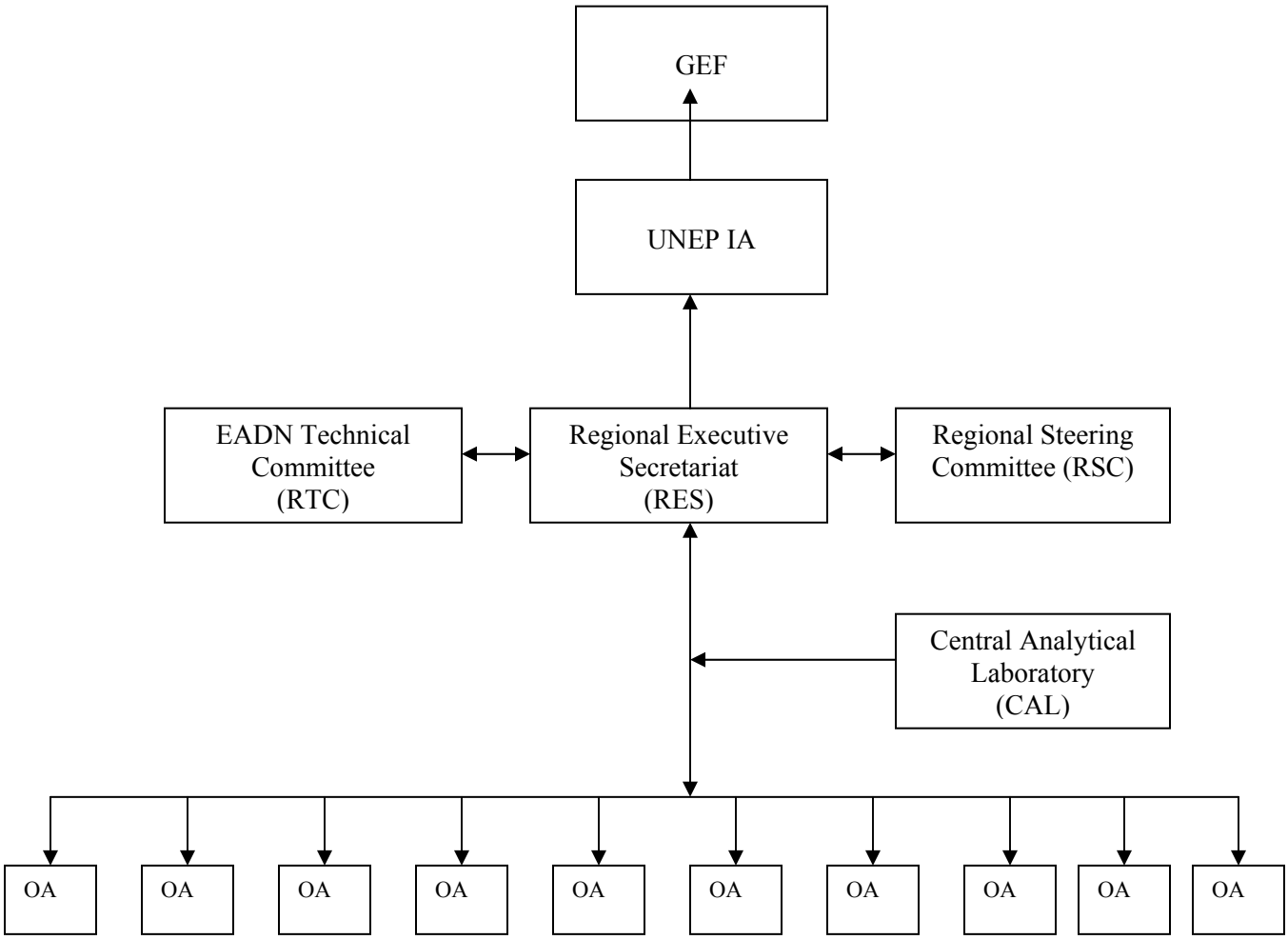


Figure 1: EADN Organizational Structure

The Regional Executive Secretariat (RES) plays a central role in facilitating financial management, procuring equipment for the CAL and Operating Agencies (OA's), overseeing the QA/QC program, overseeing site selection in collaboration with local OA's, and overseeing data management. The RES also serves as the primary link between EADN and outside agencies. All technical aspects of EADN are guided by the Technical Committee (TC), which advises the RES and the RSC. All site OA's are represented on the Technical Committee, as are other interested persons, including scientists, technicians, policy-makers, and managers. The Central Analytical Laboratory (CAL) interacts directly with OA's through receiving samples and data from the OA's, and providing analytical results and QA/QC results to OA's, with

copies to the RES. The CAL administers an internal QA/QC program, with oversight from the RES. The Regional Steering provides policy guidance and overall oversight of the project.

Regional Executive Secretariat Responsibilities

117. The EADN will be implemented at the national level, but coordinated regionally by the African Collaborative Center for Earth System Science (ACCESS) in the University of Nairobi, Kenya, which will serve as the EADN Regional Executive Secretariat (RES) responsible for running the EADN Project. ACCESS is an existing regional body of African scientists and institutions that is associated and housed in the University of Nairobi, but is financially independent from it. It has rights granted from the Government of Kenya to operate a USD account. EADN will not need to set up a separate, transitory, project implementation unit. Nor will EADN need to establish national Project implementation units, as national implementation will be through identified (based on mutually agreed terms) research institutions.

118. The EADN RES will provide overall management of the EADN by coordinating the network activities of the Operating Agencies, Site Supervisors, Site Operators and the CAL. It also manages the network quality assurance program by coordinating the quality assurance activities of the CAL, and the various training aspects. The Office receives quality-assured data from the CAL and stores and manages these data in the EADN database. Primary access to EADN data will be through the EADN website maintained by RES. The RES also issues data summaries, reports, and brochures, and is responsible for archiving network documents and making copies available on request. The RES manages the agreement that establishes the services provided by the CAL.

119. Implementation coordination at the regional level will involve two structures: the Regional Executive Secretariat, which will manage the regional administrative aspects of the project, and an EADN Technical Committee comprised of the technical heads of the agencies responsible for operating and maintaining the monitoring sites in participating countries. The Technical Committee will provide technical oversight over the secretariat and the project. The RES will act as the overall project management unit. Specific responsibilities of the RES will include:

- Financial mangement for EADN, including distribution of funds to the participating Operating agencies. GEF financing, along with other donor finances, will be routed through the RES.
- Procurement of equipment and materials for all of the monitoring stations.
- Ensure communication between the Operating Agencies and the Central Analytical Laboratory.
- Oversee monitoring site selection.
- Procurement of consultant services.
- Coordinate training programmes.
- Ensure adherence to the prescribed QA/QC programme by all Operating Agencies and the CAL.
- Foster communication among all EADN participants, including Operating Agencies and organizations peripherally involved in EADN, such as government departments, universities, and regional natural resource management agencies.
- Issue data summaries and reports via the internet.
- Develop alliances with other international networks.
- Coordination of annual meetings of the EADN Technical Committee.
- Coordination of stakeholder workshops.
- Develop and manage EADN website.
- Management of EADN database, in collaboration with the CAL.

120. The planned EADN webpage will contain information on past and upcoming meetings, regional QA/QC performance (as determined by audits), and environmental issues related to atmospheric deposition. The website will also include an EADN database, with restricted access based on data age and quality. Information may also be mailed to those Operating Agencies requesting hardcopy communications.

121. In general, the suggested procedures for EADN (as outlined in the Program Manual) are similar to those adopted by other networks, such as the Canadian Acid Precipitation Monitoring Network (CAPMoN), since these methods and procedures are well developed and tested. The level of detail in the standard operating procedures (SOPs) adopted by CAPMoN is particularly suitable for EADN since it is commensurate with a network of similar size.

122. The Project will support the operational travel and project-related expenses of the Director of ACCESS in his role as Regional Coordinator of the EADN, but not salary. The RES will also manage the Grant Special Account, disbursing funds from it to participating organizations and submitting claims to UNEP for replenishment of the Special Account according to UNEP procedures. The Regional Executive Secretariat will be supported by two full-time professionals: 1) a Project Data and Information Technology Manager, 2) a Regional Procurement and Financial Manager. An appropriate level of secretarial support staff will also be hired in the Secretariat.

Operating Agency Responsibilities

123. Operating Agencies (OAs, for example, local universities or government environmental departments) support and operate one or more sites and are members of the EADN Technical Committee. OAs will designate a Site Supervisor (SS) who oversees site operations and assists in solving operational or logistical problems. The OAs' responsibilities include:

124. The OAs will be responsible for ensuring that the sites are operated according to the EADN protocols and for general maintenance activities. Specific responsibilities of the local OA will include:

- providing a Site Supervisor (SS) and a Site Operator (SO) (in some cases, the SS and the SO may be the same person)
- maintenance of precipitation collector and a filter-pack air sampling system
- assurance of site security
- arrangements for any necessary land use (lease) agreements
- arranging for adequate electrical power supply to the sampling site and storage facilities
- maintenance of a sampling shed and/or storage facilities
- collection and storage of samples
- filtration of wet deposition samples
- measurement of pH and conductivity of wet deposition samples, and maintenance of pH / conductivity meters
- maintenance of sample and data log books
- shipment of samples and provision of data to the Central Analytical Laboratory
- recording of rainfall and, where applicable, other meteorological data
- following and documenting on-site quality control / quality assurance procedures.
- Maintenance of meteorological station (if on-site).
- Acquisition of meteorological data and provision to the CAL.
- communicating problems to the Regional Executive Secretariat
- Participating in the EADN Technical Committee.
- Assist in acquisition of auxiliary data required as input to regional atmospheric models.

125. In order to assess the capacity of each proposed EADN site, a questionnaire was circulated to all potential Operating Agencies. The questionnaire was designed to evaluate suitability of site location, logistic capacity of each site with regard to equipment and utilities such as water and electricity, expertise available at each site, and capacity for chemical analyses. Complete results of the survey, along with photos and maps of proposed monitoring sites, are presented in Appendix 14. A summary of the survey, highlighting the status of each site with regard to main operational requirements, is presented in Table 5. Most proposed sites are currently moderately equipped, and several are well equipped. At a minimum, all sites will require installation of wet and dry deposition collectors. While some sites are currently equipped with refrigerators and/or

freezers, this equipment is already dedicated to existing research and monitoring programmes, and therefore it is recommended that new units be provided for all site. Other requirements, depending on the site (see Table 5 and Appendix 13), include sampling equipment (e.g. sample storage containers), pH / conductivity meters, power supply (batteries and solar panels where reliable mains electricity is not available), improved security, and upgrading of sampling / storage buildings.

Central Analytical Laboratory (CAL) Responsibilities

126. A single Central Analysis Laboratory (CAL) is proposed for the network. The primary reason for establishing a CAL is quality control. While having samples from all sites analyzed at a singe CAL will result in significant shipping costs, these costs are more than offset by the costs that would be associated with operating multiple analytical laboratories, and there is a much greater probability of obtaining reliable data when all samples are analyzed at a single lab using a common set of analytical methods and a single QA/QC protocol.

127. With the exception of pH and conductivity, which will be measured at the monitoring sites by the Operating Agencies, chemical analyses of wet and dry deposition samples collected at all sites will be analyzed at the Central Analytical Laboratory (CAL). The CAL will:

- Manage the EADN equipment / materials depot.
- Ensure each monitoring site has adequate sampling materials for at least two months of operation. This includes filter packs, sample storage containers, and shipping containers.
- Provide distilled, de-ionized water to monitoring sites for cleaning of equipment.
- Provide technical guidance to Site Supervisors and Site Operators with regard to equipment operation and maintenance, sample collection, sample analyses, sample storage, and sample shipment.
- Implement a laboratory QA/QC programme.
- Inform the RES of equipment and material requirements in a timely manner, to ensure that the operation of monitoring sites is not disrupted by lack of materials.
- Provide analytical results to the RES and to the Operating Agencies in a timely manner. Each month SOs and SSs receive a preliminary data report from the CAL. These reports include notes and descriptions of errors that alert SOs and SSs of potential problems or inconsistencies requiring corrections or further checks to confirm data accuracy. In addition, CAL staff screen the data to flag samples that have been grossly mishandled, are contaminated, or are not viable samples.
- Manage data provided by the Operating Agencies, including QA/QC information, pH / conductivity data, and meteorological data.
- Collaborate with the RES to conduct annual audits of monitoring sites.
- Review copies of data logs and QA/QC logs provided by the Operating Agencies.

128. The CAL will be overseen by a Lab Supervisor, who will be assisted by three lab technicians.

Technical Committee Responsibilities

129. The EADN Technical Committee has the supreme power and authority over all matters relating to the overall technical operation of the EADN. The Technical Committee will be made up of one representative of each Operating Agency, the RES, and regional experts in the fields of agriculture, natural resource management (fisheries, forestry, water resources), meteorology, and environmental chemistry (including atmospheric chemistry, biogeochemistry, and persistent organic pollutants). The Technical Committee will physically meet once per year to review program progress and recommend any necessary revisions. All

Table 5. Assessment of operational requirements for each proposed site, based on the completed site survey questionnaire.

Site Requirement	Burundi	Cote d'Ivoire	DRC/ Rwanda	Ghana	Kenya Suba	Kenya GAW	Malawi	Mozambique	Senegal	Tanzania	Uganda
Secure Site	Uncertain. Potential theft or damage	✓	✓	✓	✓ Potential vandalism	✓	✓	✓	✓	Potential vandalism	✓ Potential theft
Qualified Personnel	✓	✓	✓	✓	✓	✓	✓	✓*	✓**	✓	✓
Close Proximity to Meteorological Station	✓	✓	✓	?	✓	✓	✓	110 km	✓ 7 km	✓ 15 km	✓
Storage Facilities											
Building	✓	✓	✓	✓	✓	✓ small	✓	✓	✓	✓	✓
Refrigeration	No	✓	✓	✓	No	✓	✓	✓	✓	✓	✓
Freezer	No	✓	No	✓	No	No	✓	✓	No	✓	✓
Running Water	✓	✓	✓	✓	No	✓	✓	✓	✓	✓	✓
Distilled Water***	No	✓	✓	✓	✓	✓	✓	No	No	✓	✓
Access to Postal Service	✓ 2 km	50 km	50 km	✓ 3 km	✓ 12 km	40 km	✓ .02 km	110 km	✓ 1.5 km	✓ 2 km	✓ 5 km
Electrical Power	No	✓	✓	✓	No	✓	✓	✓	✓	No	✓
Filtration Apparatus	No	✓	✓	No	No	No	✓	No	No	✓	✓
pH measurement	?	✓	✓	✓	✓	✓	No	✓	No	✓	No
Conductivity meas.	?	?	✓	✓	✓	✓	No	✓	No	✓	No
Computer	No	✓	✓	✓	No	✓	No	✓	✓	✓	✓

* Grade 12 technician. Some oversight may be required.

** Graduate students. May need to select staff who will be available for long-term operation of site.

*** In most cases, if distilled water is available it is purchased from a local source. The quality of the local sources is uncertain, and therefore it is recommended that each site be able to provide its own de-ionized water. Due to the difficulties in maintaining a water still, it is recommended that each site be provided with clean sample containers by the Central Analytical Laboratory (CAL). If necessary, the CAL can also provide each site with small amounts of distilled, de-ionized water.

Categories that are checked with a ✓ are deemed satisfactory. For categories that are not checked with a ✓, some intervention is required.

decisions taken regarding the operation of the EADN by the Technical Committee are binding on national Operating Agencies. The Regional Secretariat (ACCESS) will regularly submit QA/QC reports, semi-annual tables of raw data generated from the EADN, and current status of disbursement of funds to the Technical Committee for assessment, monitoring and evaluation. Recommendations sent to the Regional Secretariat by individual members of the Technical Committee will be compiled by the Regional Secretariat and sent back as a set of recommendations to the Technical Committee for consideration. Near the completion of EADN's first phase, an important role of the Technical Committee will be to agree on recommendations for continued operation of the EADN.

130. ***EADN Regional Steering Committee*** (EADN RSC) serves as overall-policy setting body for the project. The RSC will be composed of GEF Operational Focal Points of the participating countries, Director of ACCESS, Executive Secretary of LVEMP, Chair of EADN Technical Committee and representatives of UNEP/DGEF (Implementing Agency), and the STAP (Scientific and Technical Advisory Panel) of GEF. The RSC will be co-chaired by UNEP/DGEF and the Director of ACCESS and will meet annually. It will maintain regular communications and contacts by e-mails. The RSC will finalize and adopt its own terms of reference on the occasion of the first session but it will be responsible, *inter alia*, for the following matters:

- Reviewing and approving the project's annual work-plans and budgets
- Assessing progress in the implementation of the project and recommending necessary actions and measures to be taken towards smooth achievement of the project objectives
- Providing general guidance to the Regional Executive Secretariat in the African Collaborative Center for Earth System Science (ACCESS), University of Nairobi, Kenya
- Monitoring, as appropriate, project activities of the different components
- Coordinating linkages and synergies with other existing or future projects and programmes
- Monitoring inputs of all partners, ensuring that project obligations are fulfilled in a timely and coordinated fashion
- Over seeing and coordinating if necessary the co-financing initiatives for the project;
- Assisting in the mobilizing of co-financing (other donor and national support); and
- Approval of technical reports and financial audits.

131. ***UNEP***, as the ***GEF Implementing Agency*** for this project provides co-ordination of the activities of partners, technical and scientific expertise and enhancement of regional cooperation. More specifically, UNEP will be in charge of:

- Recruitment and mobilization of experts and technical assistants in consultation with the African Collaborative Center for Earth System Science (ACCESS) in the University of Nairobi, the executing agency for the project.
- Recruitment of the Project Coordinator
- Transfer of financial resources needed for execution of the project;
- Membership of the EADN Regional Steering Committee (EADN RSC) of the project; approval of expenditures on activities recommended by the EADN RES;
- Monitoring and evaluation of execution and output performance in consultation with the EADN Technical Committee (EADN TC); commissioning mid-term and final evaluations of the project;
- Ensuring co-management of funds.

Financial Management

132. A financial management manual will be developed within 3 months of project initiation for the overall financial management framework for the project and to facilitate the harmonization and uniformity of procedures used by each implementing country. At national/country level, reliance on existing countriy and/or EADN implementing agencies' existing accounting and financial management systems will be applied as far as possible. In cases were there are critical weaknesses, an agreed action plan will be developed to address

weaknesses before or during project implementations as deemed necessary, based on the individual country/implementing agency financial management capacity assessment.

133. Flow of funds will occur from the Grant Account in Washington to the Project GEF Grant dollar Special Account to be opened and maintained in a reputable commercial bank acceptable to UNEP by the Regional Secretariat, to be established in Nairobi, Kenya. Funds for the EADN will be apportioned on a universally developed and approved basis to various EADN member countries, reflecting each country's contractual obligations entered with IDA/GEF through the individual Project Grant Agreements (one for each country participating in the EADN) to support project components and sub components. Funds to support the coordination activities of the regional executive secretariat and pay for harmonization activities between two or more countries will be retained by the Regional Secretariat and released to the respective country as needed.

134. The Funds will flow from the IDA/GEF main dollar Special Account to the respective project accounts to be opened and maintained by the various implementing agencies by project effectiveness. Upon submission of individual quarterly disbursement requests and based on a yearly work plan approved by the PMC, the Regional Secretariat will transfer funds to EADN implementing agencies in each country. These funds will be used to pay for national operational costs, small procurement, and any other local expenses associated with operating and maintaining the monitoring stations and to pay for analyses of samples in Project-approved national laboratories. Replenishment of funds to the project account maintained by each agency will be made on the basis of new quarterly disbursement forecasts /work plan and Statement of Expenditure (SOEs), with attached supporting documentation accounting for expenditures incurred in the previous quarter to be submitted to the Regional Secretariat in Kenya.

135. Disbursements from IDA would initially be made on the basis of incurred eligible expenditures (transaction based disbursements). IDA would then make advance disbursement from the proceeds of the Credit by depositing into a Regional Secretariat -operated Special Account (SA) to expedite project implementation. The advance to a SA would be used to finance GEF's share of project expenditures under the proposed Grant. Upon credit effectiveness, the Regional Secretariat would be required to submit a withdrawal application for an initial deposit to the SA, drawn from the GEF Grant, in an amount to be agreed to in the Development Grant Agreement. Replenishment of funds from IDA to the SA will be made upon evidence of satisfactory utilization of the advance, reflected in SOEs and/or on full documentation for payments above SOE thresholds. Replenishment applications would be required to be submitted regularly. If ineligible expenditures are found to have been made from the SA, the Borrower will be obligated to refund the same. If the SA remains inactive for more than six months, the Borrower may be requested to refund to IDA amounts advanced to the SA.

136. Most procurement under the EADN will be for acquisition of monitoring equipment. The procurement of these goods will be undertaken in bulk for all monitoring stations by the Regional Executive Secretariat. The tender will specify delivery to and acceptance by the EADN implementing agency in each participating country. Procurement of simple works to secure the monitoring sites will be done by the Operating Agencies with help from the Regional Executive Secretary in preparation of bid documents.

Integration with LVEMP

137. The EADN will integrate with the second phase of the GEF-supported Lake Victoria Environmental Management Project. This will ensure that the data from the EADN is applied in a practical way within the five countries of the Lake Victoria Basin, and also provide the driving force needed to mobilize the Lake Victoria Basin governments to initiate regional efforts to address land use issues central to the mobilization of macronutrients that impact Lake Victoria and agriculture within the Lake Victoria basin.

138. Establishment of a monitoring network covering a very large geographic region requires standardization of sampling and analytical methods, site location criteria, staff training, and organization of a comprehensive QA/QC program amongst all sites and agencies involved in the monitoring network. The EADN will likely start before the LVEMP2 becomes fully operational. The EADN will therefore support establishment and initial operation of all stations across equatorial Africa, including those in the Lake Victoria Basin. Once

LVEMP2 becomes operational, Lake Basin monitoring sites will be turned over to it for operation. If any expansion of monitoring sites is needed in the Basin, LVEMP2 would provide the funding and management. Overall coordination of the EADN during preparation and implementation will be through ACCESS, which is based in Kenya. There will be an EADN monitoring site within each of the five Lake Victoria basin countries (Burundi, Kenya, Rwanda, Tanzania, Uganda), and some of these stations will be operated by agencies and staff that are part of LVEMP, ensuring a strong focus on Lake Victoria and interaction with the LVEMP2.

SECTION 5: STAKEHOLDER PARTICIPATION

139. The EADN will need to inform, lobby and coordinate at both the country and donor levels to ensure that the information produced is explained in plain language and disseminated to appropriate stakeholders. At the country level, Project budget will exist to allow the Operating Agency of the EADN in that country to hold workshops with relevant government organizations and to publish results of the EADN in local newspapers and journals.

140. At the regional and international level, funds from the Project will support EADN technical staff to attend international waters conferences and to present results at these meetings. At project inception, an immediate task of the RES will be to establish initial contacts with other potential collaborators in the areas of agriculture, aquatic resources, and atmospheric chemistry. These will include TerrAfrica, ACCESS, LVEMP, NEPAD CAADP, and various international atmospheric monitoring programmes.

141. Finally, at the donor level, the UNEP-GEF team will work with, and participate in, rural strategy meetings and any new CAS discussions to ensure that potential offsite impacts of proposed rural interventions on Lake Victoria and other African Great Lakes do not result in an overall reduction in expected project/policy benefits.

SECTION 6: MONITORING AND EVALUATION PLAN

142. The project will follow UNEP standard monitoring, reporting and evaluation processes and procedures. Substantive and financial project reporting requirements are summarized in Appendix 8. Reporting requirements and templates are an integral part of the UNEP legal instrument to be signed by the executing agency and UNEP.

143. The project M&E plan is consistent with the GEF Monitoring and Evaluation policy. The Project Results Framework presented in Appendix 4 includes SMART indicators for each expected outcome as well as mid-term and end-of-project targets. These indicators along with the key deliverables and benchmarks included in Appendix 6 will be the main tools for assessing project implementation progress and whether project results are being achieved. The means of verification and the costs associated with obtaining the information to track the indicators are summarized in Appendix 7. Other M&E related costs are also presented in the Costed M&E Plan and are fully integrated in the overall project budget.

144. The M&E plan will be reviewed and revised as necessary during the project inception workshop to ensure project stakeholders understand their roles and responsibilities vis-à-vis project monitoring and evaluation. Indicators and their means of verification may also be fine-tuned at the inception workshop. Day-to-day project monitoring is the responsibility of the project management team but other project partners will have responsibilities to collect specific information to track the indicators. It is the responsibility of the Project Manager to inform UNEP of any delays or difficulties faced during implementation so that the appropriate support or corrective measures can be adopted in a timely fashion.

145. The project Steering Committee will receive periodic reports on progress and will make recommendations to UNEP concerning the need to revise any aspects of the Results Framework or the M&E plan. Project oversight to ensure that the project meets UNEP and GEF policies and procedures is the responsibility to the Task Manager in UNEP-GEF. The Task Manager will also review the quality of draft project outputs, provide feedback to the project partners, and establish peer review procedures to ensure adequate quality of scientific and technical outputs and publications.

146. At the time of project approval 20 percent of baseline data is available. Baseline data gaps will be addressed during the first year of project implementation.

147. Project supervision will take an adaptive management approach. The Task Manager will develop a project supervision plan at the inception of the project which will be communicated to the project partners during the inception workshop. The emphasis of the Task Manager supervision will be on outcome monitoring but without neglecting project financial management and implementation monitoring. Progress vis-à-vis delivering the agreed project global environmental benefits will be assessed with the Steering Committee at agreed intervals. Project risks and assumptions will be regularly monitored both by project partners and UNEP. Risk assessment and rating is an integral part of the Project Implementation Review (PIR). The quality of project monitoring and evaluation will also be reviewed and rated as part of the PIR. Key financial parameters will be monitored quarterly to ensure cost-effective use of financial resources.

148. A mid-term management review or evaluation will take place September 2011 as indicated in the project milestones. The review will include all parameters recommended by the GEF Evaluation Office for terminal evaluations and will verify information gathered through the GEF tracking tools, as relevant. The review will be carried out using a participatory approach whereby parties that may benefit or be affected by the project will be consulted. Such parties were identified during the stakeholder analysis (see section 2.5 of the project document). The project Steering Committee will participate in the mid-term review and develop a management response to the evaluation recommendations along with an implementation plan. It is the responsibility of the UNEP Task Manager to monitor whether the agreed recommendations are being implemented.

149. An independent terminal evaluation will take place at the end of project implementation. The Evaluation and Oversight Unit (EOU) of UNEP will manage the terminal evaluation process. A review of the quality of the evaluation report will be done by EOU and submitted along with the report to the GEF Evaluation Office not later than 6 months after the completion of the evaluation. The standard terms of reference for the terminal evaluation are included in Appendix 9. These will be adjusted to the special needs of the project.

150. The IW GEF 4 Tracking Tools is attached as Appendix 14. This will be updated at mid-term and at the end of the project and will be made available to the GEF Secretariat along with the project PIR report. As mentioned above the mid-term and terminal evaluation will verify the information of the tracking tool.

SECTION 7: PROJECT FINANCING AND BUDGET

7.1 Budget by Project component and UNEP budget lines

151. The total cost of the GEF alternative over the 4-year implementation period is estimated to be US$117,808,746. The baseline/business-as-usual scenario, GEF Alternative and Incremental Costs are displayed in Table 6 below and the details are presented in the Incremental Cost Matrix (Appendix 3: Incremental Cost). The baseline is estimated to be US$112,700,000 and the GEF increment (the project cost) is US$ 5,108,746.

Table 6: Incremental Costs

Components	Baseline (US$)	Alternative (US$)	Incremental Cost (US$)
1. Quality Assurance (QA) and Quality Control (QC)	$500,000	$1,618,700	$1,118,700
2. Training	$22,000,000	$22,683,800	$683,800
3. Air and Precipitation Monitoring	$3,000,000	$4,670,500	$1,670,500
4. Database and Modelling	$20,000,000	$20,450,746	$450,746
5. Stakeholder Involvement and Information Dissemination	$55,000,000	$55,535,000	$535,000
6. Project Management	$12,200,000	$12,850,000	$650,000
Total	**$112,700,000**	**$117,808,746**	**$5,108,746**

7.2. Project co-financing

152. The total co-finance committed to the project is US $3,243,746 which represents 63% of the total cost of the project of US$ 5,108,746 (see table 7). The major sources and type of co-finance raised are indicated in the table 8.

Table 7: Component financing including co-financing

Components	GEF (US$)	Co-financing (US$)	Total (US$)
1. Quality Assurance (QA) and Quality Control (QC)	$373,500	$745,200	$1,118,700
2. Training	$364,000	$319,800	$683,800
3. Air and Precipitation Monitoring	$570,500	$1,100,000	$1,670,500
4. Database and Modelling	$147,000	$303,746	$450,746
5. Stakeholder Involvement and Information Dissemination	$260,000	$275,000	$535,000
6. Project Management	$150,000	$500,000	$650,000
Total	**$1,865,000**	**$3,243,746**	**$5,108,746**

Table 8: Sources and type of confirmed co-finance

Co-financing classification	**Cash (US$)**	**In-kind (US$)**	**Total**	**%**
Operating Agencies (countries)	412,920	939,800	1,352,720	41
DFID (through east African Great lakes Observatory, EAGLO)	791,026		791,026	24
UNU-INWEH	250,000	450,000	700,000	23
AGRA (Alliance for Green revolution in Africa)		400,000	400,000	12
Total co-financing	**1,453,946**	**1,839,800**	**3,243,746**	**100**

153. The budget breakdown per component by source of co-financing is shown in table 9.

Table 9: Budget Summary by source of co-financing

Components	**Operating Agencies** ($)	**DFID** ($)	**UNU-INWEH** ($)	**AGRA** ($)	**TOTAL**
1. Quality Assurance (QA) and Quality Control (QC)	300,000	345,200	100,000	-	$745,200
2. Training	89,800	-	80,000	150,000	$319,800
3. Air and Precipitation Monitoring	350,000	350,000	250,000	150,000	$1,100,000
4. Database and Modelling	62,920	40,826	150,000	50,000	$303,746
5. Stakeholder Involvement and Information Dissemination	200,000	-	25,000	50,000	$275,000
6. Project Management	350,000	55,000	95,000	-	$500,000
Total	**1,352,720**	**791,026**	**700,000**	**400,000**	**$3,243,746**

7.3 Project cost-effectiveness

154. All current data suggest that failure to address the root sources of atmospheric mobilization and subsequent wet/dry-fall deposition of phosphorus into all of the African Great Lakes and particularly Lake Victoria will lead to continued eutrophication to a point likely to severely damage the ecological and productive value of these important water bodies. Even concerted and expensive solutions to urban sewage, drainage and sanitation, and other "catchment-oriented" works designed to minimize effluent runoff into the Lake will have only marginal and short-term impacts on the trophic status of these Lakes, buying time to identify sources of macronutrient mobilization into and transport through the atmosphere.

155. The proposed EADN project is the most cost-effective to address the challenges of depostion of macronutrients into African Great Lakes. African countries and the GEF Implementing Agencies will be able to take advantage of and use the information to come from the EADN. The most likely sources of macronutrients mobilized and transported to Lake Victoria are regional, coming from within and a wide area outside the Lake basins.

APPENDICES

Appendix 1: Budget by project components and UNEP budget lines

Appendix 2: Co-financing by Source and UNEP Budget lines

Appendix 3: Incremental cost analysis

Appendix 4: Project Results Framework

Appendix 5: Work plan and timetable

Appendix 6: Key deliverables and benchmarks

Appendix 7: Costed M&E plan

Appendix 8: Summary of reporting requirements and responsibilities

Appendix 9: Standard Terminal Evaluation TOR

Appendix 10: Terms of Reference

Appendix 11: Co-financing commitment letters from project partners

Appendix 12: Endorsement letters of GEF National Focal Points

Appendix 13: Draft procurement plan

Appendix 14: Tracking tool

Appendix 15: Responses to site survey questionnaires, and maps / photographs of proposed monitoring sites

Appendix 1: Budget by project components and UNEP budget lines

GEF Budget

Project No: GLF/3401

Project Name: Equatorial Africa Atmospheric Deposition Network

			EXPENDITURE BY PROJECT COMPONENT/ACTIVITY *							EXPENDITURE BY YEAR				
			1	2	3	4	5	6	Total	Yr.1	Yr.2	Yr.3	Yr.4	Total
UNEP BUDGET LINE/OBJECT OF EXPENDITURE			US$	US$	US$	US$	US$	US$	US$	US$	US$	US$	US$	US$
10	PROJECT PERSONNEL COMPONENT													
	1100	**Project Personnel w/m**												
		(Show title/grade)												
	1101	IT Specialist, RES office						60,000	60,000	15,000	15,000	15,000	15,000	60,000
	1102	Financial Manager, RES office						75,000	75,000	18,750	18,750	18,750	18,750	75,000
	1103	Website / database manager (half time)							0					0
	1199	**Total**	**0**	**0**	**0**	**0**	**0**	**135,000**	**135,000**	**33,750**	**33,750**	**33,750**	**33,750**	**135,000**
	1200	**Consultants w/m**												
		(Give description of activity/service)												
	1201	CAL Auditor				80,000			80,000		25,000	27,000	28,000	80,000
	1202	Consultant to produce data report for entire network (with RES and Tech. Comm.) and collect auxiliary data and do modeling and scenario building		69,000			69,000		138,000			138,000		138,000
	1203	Consultants:capacity building activities (training, mentoring,etc. of national and regional experts				60,000			60,000		20,000	20,000	20,000	60,000
	1204	Development of Quality Assurance / Quality Control Program	150,000						150,000	75,000	75,000			150,000
	1299	**Total**	**150,000**	**69,000**	**0**	**140,000**	**69,000**	**0**	**428,000**	**75,000**	**120,000**	**185,000**	**48,000**	**428,000**
	1600	**Travel on official business (above staff)**												
	1601	Travel by RES Office						15,000	15,000	3,000	4,000	4,000	4,000	15,000
	1699	**Total**	**0**	**0**	**0**	**0**	**0**	**15,000**	**15,000**	**3,000**	**4,000**	**4,000**	**4,000**	**15,000**
	1999	**Component Total**	**150,000**	**69,000**	**0**	**140,000**	**69,000**	**150,000**	**578,000**	**111,750**	**157,750**	**222,750**	**85,750**	**578,000**
20	SUB-CONTRACT COMPONENT													0
	2201	Contracts with Operating Agencies to operate monitoring sites*			90,500				90,500	26,375	21,375	21,375	21,375	90,500
	2202	Contract to install sampling equipment (6 sites in year 1, 6 sites in	21,500						21,500	10,750	10,750			21,500
	2203	Contract for training in chemical analyses		21,000					21,000	6,000	5,000	5,000	5,000	21,000
	2204	Contract with Central Analytical Laboratory		7,000					7,000	1,500	1,500	1,500	2,500	7,000
	2205	Remote Sensing Contract					53,000		53,000	14,000	13,000	13,000	13,000	53,000
	2206	Contract for training in ISO 17025 auditing		6,000					6,000	1,500	1,500	1,500	1,500	6,000
	2207	Contract for training in atmospheric chemistry and physics		8,000					8,000	2,000	2,000	2,000	2,000	8,000
	2208	Contract for atmospheric modeling				7,000			7,000	2,000	1,500	1,500	2,000	7,000
	2299	**Total**	**21,500**	**42,000**	**90,500**	**7,000**	**53,000**	**0**	**214,000**	**64,125**	**56,625**	**45,875**	**47,375**	**214,000**
	2999	**Component Total**	**21,500**	**42,000**	**90,500**	**7,000**	**53,000**	**0**	**214,000**	**64,125**	**56,625**	**45,875**	**47,375**	**214,000**
30	TRAINING COMPONENT													
	3200	**Group training (study tours, field trips, workshops, seminars, etc) (give title)**												
	3201	Travel, accommodation and per diems for 28 attendees of QA/QC training program		90,000					90,000	90,000				90,000
	3202	Travel, accommodation and per diems for 12 attendees of ISO 17025 audit training program		35,000					35,000		35,000			35,000
	3203	Travel, accommodation and per diems for 14 attendees of atmospheric chemistry/physics training program		58,000					58,000		58,000			58,000
	3204	Travel, accommodation and per diems for 12 attendees of model training program		25,000					25,000			25,000		25,000
	3299	**Total**	**0**	**208,000**	**0**	**0**	**0**	**0**	**208,000**	**90,000**	**93,000**	**25,000**	**0**	**208,000**

GEF Budget

Project No: GLF/3401

Project Name: Equatorial Africa Atmospheric Deposition Network

			EXPENDITURE BY PROJECT COMPONENT/ACTIVITY *							EXPENDITURE BY YEAR				
			1	2	3	4	5	6	Total	Yr.1	Yr.2	Yr.3	Yr.4	Total
UNEP BUDGET LINE/OBJECT OF EXPENDITURE			US$	US$	US$	US$	US$	US$	US$	US$	US$	US$	US$	US$
	3300	**Meetings/conferences (give title)**												
	3301	Regional Project Initiation Workshop, travel, accommodation and per diems for attendees					30,000		30,000	30,000				30,000
	3302	Regional Stakeholders Workshop, travel, accommodation and per diems for attendees							0					0
	3303	Attendance of professional conference by 14 participants (1 from each the 12 Operating Agency, 1 member of CAL, and 1 member		45,000					45,000			45,000		45,000
	3399	**Total**	**0**	**45,000**	**0**	**0**	**30,000**	**0**	**75,000**	**30,000**	**0**	**45,000**	**0**	**75,000**
	3999	**Component Total**	**0**	**253,000**	**0**	**0**	**30,000**	**0**	**283,000**	**120,000**	**93,000**	**70,000**	**0**	**283,000**
40	**EQUIPMENT & PREMISES COMPONENT**													
	4100	**Expendable equipment (Items under $1,500 each)**												
	4101	Rain gauges (10)			3,000				3,000	3,000				3,000
	4102	Refrigerators (10)			10,000				10,000	10,000				10,000
	4103	Freezers (10)			12,000				12,000	12,000				12,000
	4104	Glassware (10)			12,000				12,000	12,000				12,000
	4105	Desiccators (10)			1,800				1,800	1,800				1,800
	4106	Refrigerator for CAL			1,000				1,000	1,000				1,000
	4107	Chemical reagents for CAL			10,000				10,000	10,000				10,000
	4108	Glassware for CAL			6,000				6,000	6,000				6,000
	4199	**Total**	**0**	**0**	**55,800**	**0**	**0**	**0**	**55,800**	**55,800**	**0**	**0**	**0**	**55,800**
	4200	**Non-expendable equipment (computers, office equip, etc)**												
	4201	Wet / dry deposition collectors (10)			60,000				60,000	60,000				60,000
	4202	Air samplers (10)			70,000				70,000	70,000				70,000
	4203	CO2 monitoring systems (10)			80,100				80,100	80,100				80,100
	4204	pH / conductivity meters (10)			16,000				16,000	16,000				16,000
	4205	Filtration apparatus (10)			24,000				24,000	24,000				24,000
	4206	Computers and peripheral hardware (10)			48,000				48,000	48,000				48,000
	4207	Batteries and solar panels (3)			22,500				22,500	22,500				22,500
	4208	Automated meteorology stations (3)			27,000				27,000	27,000				27,000
	4209	Computers and peripheral hardware for RES (3 systems)	12,000						12,000	12,000				12,000
	4210	Spectrophotometer for CAL			12,000				12,000	12,000				12,000
	4211	Microbalance for CAL			10,000				10,000	10,000				10,000
	4212	Ion chromatography system for CAL			10,000				10,000	10,000				10,000
	4213	Freezer for CAL			12,000				12,000	12,000				12,000
	4214	pH / conductivity meter for CAL			1,600				1,600	1,600				1,600
	4215	Photo-oxidizer for CAL			5,000				5,000	5,000				5,000
	4216	Muffle furnace for CAL			7,000				7,000	7,000				7,000
	4217	Reverse osmosis system for CAL			8,000				8,000	8,000				8,000
	4218	Filtration apparatus for CAL			4,500				4,500	4,500				4,500
	4219	Drying oven for CAL			2,500				2,500	2,500				2,500
	4220	Computer and peripheral hardware/software for CAL			4,000				4,000	4,000				4,000
	4299	**Total**	**12,000**	**0**	**424,200**	**0**	**0**	**0**	**436,200**	**436,200**	**0**	**0**	**0**	**436,200**
	4999	**Component Total**	**12,000**	**0**	**480,000**	**0**	**0**	**0**	**492,000**	**492,000**	**0**	**0**	**0**	**492,000**

GEF Budget

Project No: GLF/3401

Project Name: Equatorial Africa Atmospheric Deposition Network

			EXPENDITURE BY PROJECT COMPONENT/ACTIVITY *							EXPENDITURE BY YEAR				
			1	2	3	4	5	6	Total	Yr.1	Yr.2	Yr.3	Yr.4	Total
UNEP BUDGET LINE/OBJECT OF EXPENDITURE			US$	US$	US$	US$	US$	US$	US$	US$	US$	US$	US$	US$
50	**MISCELLANEOUS COMPONENT**													
	5100	**Operation and maintenance of equip. (example shown below)**												
	5101	Rental of meeting rooms & equip. for Technical Committee Meeting	20,000						20,000	5,000	5,000	5,000	5,000	20,000
	5102	Rental of meeting rooms & equip. for Regional Project Initiation Workshop							0					0
	5103	Rental of meeting rooms & equip. for Regional Stakeholders Workshop							0					0
	5199	**Total**	**20,000**	**0**	**0**	**0**	**0**	**0**	**20,000**	**5,000**	**5,000**	**5,000**	**5,000**	**20,000**
	5200	**Reporting costs (publications, maps, newsletters, printing, etc)**												
	5201	Reporting and dissemination					60,000		60,000		5,000	27,500	27,500	60,000
	5202	IW: LEARN Activities & Website					48,000		48,000	12,000	12,000	12,000	12,000	48,000
	5299	**Total**	**0**	**0**	**0**	**0**	**108,000**	**0**	**108,000**	**12,000**	**17,000**	**39,500**	**39,500**	**108,000**
	5300	**Sundry (communications, postage, freight, clearance charges, etc)**												
	5301	Communications for RES	40,000	0	0	0	0	0	40,000	10,000	10,000	10,000	10,000	40,000
	5399	**Total**	**40,000**	**0**	**0**	**0**	**0**	**0**	**40,000**	**10,000**	**10,000**	**10,000**	**10,000**	**40,000**
	5500	**Evaluation (consultants fees/travel/ DSA, admin support, etc. internal projects)**												
	5501	Travel, accommodation, per diems for Technical Committee Meeting	70,000						70,000	17,500	17,500	17,500	17,500	70,000
	5599	**Total**	**70,000**	**0**	**0**	**0**	**0**	**0**	**70,000**	**17,500**	**17,500**	**17,500**	**17,500**	**70,000**
	5999	**Component Total**	**130,000**	**0**	**0**	**0**	**108,000**	**0**	**238,000**	**44,500**	**49,500**	**72,000**	**72,000**	**238,000**
	TOTAL BEFORE UNEP PARTICIPATION COSTS		**313,500**	**364,000**	**570,500**	**147,000**	**260,000**	**150,000**	**1,805,000**	**832,375**	**356,875**	**410,625**	**205,125**	**1,805,000**
	UNEP PARTICIPATION COSTS													
50	**MISCELLANEOUS COMPONENT**													
	5500	**Evaluation (consultants fees/travel/ DSA, admin support, etc. internal projects)**												
	5581	Mid Term Review (to be paid directly by UNEP)	30,000						30,000		30,000			30,000
	5582	Final Evaluation (to be paid directly by UNEP)	30,000						30,000				30,000	30,000
	5599	**Total**	**60,000**	**0**	**0**	**0**	**0**	**0**	**60,000**	**0**	**30,000**	**0**	**30,000**	**60,000**
	5999	**Component Total**	**60,000**	**0**	**0**	**0**	**0**	**0**	**60,000**	**0**	**30,000**	**0**	**30,000**	**60,000**
	TOTAL COSTS		**373,500**	**364,000**	**570,500**	**147,000**	**260,000**	**150,000**	**1,865,000**	**832,375**	**386,875**	**410,625**	**235,125**	**1,865,000**

Appendix 2:Co-finance by Source and UNEP Budget lines

GEF Budget									
Project No:		GLF/3401							
Project Name:		Equatorial Africa Atmospheric Deposition Network							
			GEF	CO-FINANCING					TOTAL
			Budget	Operating Agencies	DFID	UNU-INWEH	AGRA	Total	BUDGET
UNEP BUDGET LINE/OBJECT OF EXPENDITURE			US$	US$	US$	US$	US$	US$	US$
10	PROJECT PERSONNEL COMPONENT								
	1100	**Project Personnel w/m**							
		(Show title/grade)							
	1101	IT Specialist, RES office	60,000			126,666		126,666	186,666
	1102	Financial Manager, RES office	75,000			126,667		126,667	201,667
	1103	Website / database manager (half time)	0			126,667		126,667	126,667
	1104	Principal Investigator			62,400			62,400	62,400
	1105	Principal Investigator			32,878			32,878	32,878
	1106	Investigator			36,864			36,864	36,864
	1107	Investigator			34,944			34,944	34,944
	1108	Investigator			38,400			38,400	38,400
	1199	**Total**	**135,000**	**0**	**205,486**	**380,000**	**0**	**585,486**	**720,486**
	1200	**Consultants w/m**							
		(Give description of activity/service)							
	1201	CAL Auditor	80,000					0	80,000
	1202	Consultant to produce data report for entire network (with RES and Tech. Comm.)	138,000			220,000		220,000	358,000
	1203	Consultant: collect auxiliary data for modeling	60,000			100,000		100,000	160,000
	1204	Development of Quality Assurance / Quality Control Program	150,000					0	150,000
	1299	**Total**	**428,000**	**0**	**0**	**320,000**	**0**	**320,000**	**748,000**
	1600	**Travel on official business (above staff)**							
	1601	Travel by RES Office	15,000		350,480			350,480	365,480
	1699	**Total**	**15,000**	**0**	**350,480**	**0**	**0**	**350,480**	**365,480**
	1999	**Component Total**	**578,000**	**0**	**555,966**	**700,000**	**0**	**1,255,966**	**1,833,966**
20	SUB-CONTRACT COMPONENT								
	2201	Contracts with Operating Agencies to operate monitoring sites*	90,500	1352720				1,352,720	1,443,220
	2202	Contract to install sampling equipment (6 sites in year 1, 6 sites in	21,500					0	21,500
	2203	Contract for training in chemical analyses	21,000					0	21,000
	2204	Contract with Central Analytical Laboratory	7,000					0	7,000
	2205	Remote Sensing Contract	53,000					0	53,000
	2206	Contract for training in ISO 17025 auditing	6,000					0	6,000
	2207	Contract for training in atmospheric chemistry and physics	8,000					0	8,000
	2208	Contract for atmospheric modeling	7,000					0	7,000
	2209	University Research costs			235,060		400,000	635,060	635,060
	2299	**Total**	**214,000**	**1,352,720**	**235,060**	**0**	**400,000**	**1,987,780**	**2,201,780**
	2999	**Component Total**	**214,000**	**1,352,720**	**235,060**	**0**	**400,000**	**1,987,780**	**2,201,780**
30	TRAINING COMPONENT								
	3200	**Group training (study tours, field trips, workshops, seminars, etc) (give title)**							
	3201	Travel, accommodation and per diems for 28 attendees of QA/QC training program	90,000					0	90,000
	3202	Travel, accommodation and per diems for 8 attendees of ISO 17025 audit training program	35,000					0	35,000
	3203	Travel, accommodation and per diems for 14 attendees of atmospheric chemistry/physics training program	58,000					0	58,000
	3204	Travel, accommodation and per diems for 6 attendees of model training program	25,000					0	25,000
	3299	**Total**	**208,000**	**0**	**0**	**0**	**0**	**0**	**208,000**

Project No:	GLF/3401							
Project Name:	Equatorial Africa Atmospheric Deposition Network							
			GEF	CO-FINANCING				TOTAL
			Budget	Operating Agencies	DFID	UNU-INWEH	AGRA	Total	BUDGET
UNEP BUDGET LINE/OBJECT OF EXPENDITURE			US$	US$	US$	US$	US$	US$	US$
	3300	**Meetings/conferences (give title)**							
	3301	Regional Project Initiation Workshop, travel, accommodation and per diems for attendees	30,000					0	30,000
	3302	Regional Stakeholders Workshop, travel, accommodation and per diems for attendees	0					0	0
	3303	Attendance of professional conference by 1 member of each Operating Agency, 1 member of CAL, and 1 member of RES.	45,000					0	45,000
	3399	**Total**	**75,000**	**0**	**0**	**0**	**0**	**0**	**75,000**
	3999	**Component Total**	**283,000**	**0**	**0**	**0**	**0**	**0**	**283,000**
40	**EQUIPMENT & PREMISES COMPONENT**								
	4100	**Expendable equipment (Items under $1,500 each)**							
	4101	Rain gauges (10)	3,000					0	3,000
	4102	Refrigerators (10)	10,000					0	10,000
	4103	Freezers (10)	12,000					0	12,000
	4104	Glassware (10)	12,000					0	12,000
	4105	Desiccators (10)	1,800					0	1,800
	4106	Refrigerator for CAL	1,000					0	1,000
	4107	Chemical reagents for CAL	10,000					0	10,000
	4108	Glassware for CAL	6,000					0	6,000
	4199	**Total**	**55,800**	**0**	**0**	**0**	**0**	**0**	**55,800**
	4200	**Non-expendable equipment (computers, office equip, etc)**							
	4201	Wet / dry deposition collectors (10)	60,000					0	60,000
	4202	Air samplers (10)	70,000					0	70,000
	4203	CO2 monitoring systems (10)	80,100					0	80,100
	4204	pH / conductivity meters (10)	16,000					0	16,000
	4205	Filtration apparatus (10)	24,000					0	24,000
	4206	Computers and peripheral hardware (10)	48,000					0	48,000
	4207	Batteries and solar panels (3)	22,500					0	22,500
	4208	Automated meteorology stations (3)	27,000					0	27,000
	4209	Computers and peripheral hardware for RES (3 systems)	12,000					0	12,000
	4210	Spectrophotometer for CAL	12,000					0	12,000
	4211	Microbalance for CAL	10,000					0	10,000
	4212	Ion chromatography system for CAL	10,000					0	10,000
	4213	Freezer for CAL	12,000					0	12,000
	4214	pH / conductivity meter for CAL	1,600					0	1,600
	4215	Photo-oxidizer for CAL	5,000					0	5,000
	4216	Muffle furnace for CAL	7,000					0	7,000
	4217	Reverse osmosis system for CAL	8,000					0	8,000
	4218	Filtration apparatus for CAL	4,500					0	4,500
	4219	Drying oven for CAL	2,500					0	2,500
	4220	Computer and peripheral hardware/software for CAL	4,000					0	4,000
	4299	**Total**	**436,200**	**0**	**0**	**0**	**0**	**0**	**436,200**
	4999	**Component Total**	**492,000**	**0**	**0**	**0**	**0**	**0**	**492,000**

GEF Budget

Project No: GLF/3401

Project Name: Equatorial Africa Atmospheric Deposition Network

			GEF	CO-FINANCING					TOTAL
			Budget	Operating Agencies	DFID	UNU-INWEH	AGRA	Total	BUDGET
UNEP BUDGET LINE/OBJECT OF EXPENDITURE			US$	US$	US$	US$	US$	US$	US$
50	MISCELLANEOUS COMPONENT								
	5100	**Operation and maintenance of equip. (example shown below)**							
	5101	Rental of meeting rooms & equip. for Technical Committee Meeting	20,000					0	20,000
	5102	Rental of meeting rooms & equip. for Regional Project Initiation Workshop	0					0	0
	5103	Rental of meeting rooms & equip. for Regional Stakeholders Workshop	0					0	0
	5199	**Total**	**20,000**	**0**	**0**	**0**	**0**	**0**	**20,000**
	5200	**Reporting costs (publications, maps, newsletters, printing, etc)**							
	5201	Reporting and dissemination	60,000					0	60,000
	5202	IW: LEARN Activities & Website	48,000						48,000
	5299	**Total**	**108,000**	**0**	**0**	**0**	**0**	**0**	**108,000**
	5300	**Sundry (communications, postage, freight, clearance charges, etc)**							
	5301	Communications for RES	40,000	0	0	0	0	0	40,000
	5399	**Total**	**40,000**	**0**	**0**	**0**	**0**	**0**	**40,000**
	5500	**Evaluation (consultants fees/travel/ DSA, admin support, etc. internal projects)**							
	5501	Travel, accommodation, per diems for Technical Committee Meeting	70,000					0	70,000
	5599	**Total**	**70,000**	**0**	**0**	**0**	**0**	**0**	**70,000**
	5999	**Component Total**	**238,000**	**0**	**0**	**0**	**0**	**0**	**238,000**
	TOTAL BEFORE UNEP PARTICIPATION COSTS		**1,805,000**	**1,352,720**	**791,026**	**700,000**	**400,000**	**3,243,746**	**5,048,746**
	UNEP PARTICIPATION COSTS								
50	MISCELLANEOUS COMPONENT								
	5500	**Evaluation (consultants fees/travel/ DSA, admin support, etc. internal projects)**							
	5581	Mid Term Review (to be paid directly by UNEP)	30,000					0	30,000
	5582	Final Evaluation (to be paid directly by UNEP)	30,000					0	30,000
	5599	**Total**	**60,000**	**0**	**0**	**0**	**0**	**0**	**60,000**
	5999	**Component Total**	**60,000**	**0**	**0**	**0**	**0**	**0**	**60,000**
	TOTAL COSTS		**1,865,000**	**1,352,720**	**791,026**	**700,000**	**400,000**	**3,243,746**	**5,108,746**

Appendix 3: Incremental cost analysis

The Baseline Scenario

A number of activities in the equatorial African region currently collect information that is relevant to atmospheric nutrient deposition. These include: 1) Meteorological monitoring, which is usually conducted by government agencies. 2) Remote sensing of various atmospheric and terrestrial properties, including vegetation indices, biomass burning, and atmospheric optical properties. This is rarely conducted by government agencies; rather it is usually carried out by a variety of research agencies operating within the context of specific development programmes or university research programmes. 3) Monitoring of atmospheric chemistry. The two main programmes operating within Africa are IDAF, which focuses on West Africa and does not include measurement of nutrients, and GAW, which has a very small number of functional stations on the continent that focus on measurement of greenhouse gases. 4) Water quality monitoring is conducted to varying degrees on each of the African Great Lakes, as well as other water bodies in Africa. This is generally performed by government agencies, which in some cases work within the context of prescribed development programmes, such as LVEMP. 5) A small number of studies have specifically focused on atmospheric nutrient deposition in the African Great Lakes region. Most of these were conducted as part of GEF-supported projects, but some of this work is being continued on a smaller scale by government agencies. For example, the Centre de Recherche en Sciences Naturelles in DRC occasionally measures wet deposition of phosphorus and nitrogen at several locations around Lake Kivu. 6) A large number of projects operating at spatial scales ranging from small communities to regional are focused on quantifying soil degradation processes and implementing Sustainable Land Management (SLM) practices. While virtually none of these projects have the objective of reducing atmospheric nutrient transport, the probable links between land use and atmospheric nutrient deposition mean that such activities have the potential to address the problem of excessive nutrient loading to aquatic systems via the atmosphere.

While most of the above efforts acquire data that may be useful in any effort to understand atmospheric transport of nutrients in equatorial Africa and its impact on aquatic ecosystems, it is impossible to use the collected information to provide a reliable estimate of atmospheric nutrient deposition rates or to understand the mechanisms driving atmospheric loading and deposition of nutrients. The few measurements of atmospheric nutrient deposition being made are too sparse in space and time, the quality of measurements being made is uncertain, and there is not the coordinated effort among disciplines (e.g. biogeochemistry, meteorology, agriculture) that is necessary to understand nutrient transport mechanisms, nor is there a coordinated effort within the region to determine spatial patterns of atmospheric nutrient transport, which would provide information on sources and sinks for atmospheric nutrients which is needed to guide policy and management decisions. Hence, under baseline conditions atmospheric nutrient deposition will continue to go unrecognized as an environmental problem in many sectors, and even where it is recognized as a potential problem there will be inadequate information with which to understand and address the problem, and no mechanism through which to address the problem at a regional scale. While it is possible that the issue may be addressed to some degree by existing SLM activities, these activities are currently designed from the agricultural perspective and focus on cause-effect relationships at national or smaller scales. Because the link between atmospheric nutrient deposition and water quality is likely influenced by land use activities occurring far distances from impacted water bodies, the baseline scenario will result in a continued disconnect between deteriorating water quality conditions in the African Great Lakes and the human activities that are ultimately responsible for these changes.

The GEF Alternative

Quantifying atmospheric nutrient transport at the equatorial Africa regional scale, and identifying atmospheric nutrient sources and sinks, requires a large scale effort with input from various sectors and disciplines, including meteorology, agriculture, and atmospheric and aquatic biogeochemistry. As outlined above, some of

this input (meteorological data, land use patterns) is already available, but it is disjunct, there are weak regional coordination mechanisms, and most importantly, there are critical information gaps with regard to nutrient deposition rates and their spatial distribution. Investment in EADN will catalyze a regional and inter-sector approach to air quality, nutrient transport, SLM, and water quality. The nutrient deposition collected by EADN will benefit multiple sectors. It will inform regional SLM strategies by providing information on a soil nutrient loss mechanism that is typically not accounted for, and it will help to identify areas where reduction of land-atmosphere nutrient transport will benefit agriculture. Management of aquatic ecosystems will benefit from having accurate estimates of the contribution of atmospheric deposition to lake nutrient budgets and information on the sources of these nutrients and mechanisms of transport, which will be used to guide inter-sectoral approaches to nutrient management at the ecosystem scale and the regional scale. For heavily impacted systems, such as Lake Victoria, this information is critical to understanding and managing the processes that have resulted in eutrophication. For less impacted systems such as Lake Malawi/Nyasa and Lake Tanganyika, this information will improve understanding of the nutrient supply processes that ultimately influence plankton and fish production, and will allow managers to determine to what extent atmospheric nutrient deposition needs to be controlled now to prevent long term impacts on these lakes, which respond slowly to increased nutrient loads but also to any mitigation efforts, due to their large volumes and long residence times.

Incremental Cost Tables

The incremental costs and benefits of the EADN project are presented in Table A1.1 below. The total incremental cost of the GEF Alternative amounts to an estimated US$5,108,746. **US 1,865,000** (37% of total costs) represent the amount requested from GEF to finance the EADN project. The 63% remaining, **US$ 3, 243746** will come from co-financing from project partners comprising of DFID through the East African Great Lakes Observatory, EAGLO project, ACCESS (University of Nairobi), Operating Agencies, OAs (countries) and Alliance for Green Revolution in Africa (AGRA).

Table A1.1. Incremental cost matrix.

Project Component	Baseline	Alternative (Baseline +Increment)	Increment
1. Quality Control (QA) and Quality Assurance (QC)	Surveys of EADN participants indicate several have QA/QC programs in place. Other programs providing support for QA/QC include LVEMP II, IDAF, and GAW. Some labs in individual countries follow QA/QC protocols set as part of country agencies (e.g. Bureau of Standards). But in general, there is little application of QA/QC protocols. **Total: US$ 500,000**	Build on existing programs to develop and implement a documented QA/QC program to be followed by Operating Agencies overseeing monitoring stations, and by the Central Analytical Laboratory. Result is a high quality database, with ongoing benefits for future research and monitoring. **Total: US$ 1,618,700**	GEF US$ 373,500 Co-finance US$745,200 Total: **US$ 1,118,700**
2. Training & Awareness	Training in the areas of sample collection and analysis, water chemistry analysis, and data analysis is provided within context of LVEMP II, IDAF, and GAW. NBI includes training component for water resource management specialists: Applied Training for Nile Basin Development ($19,690,000). **Total: US$ 22,000,000**	Provide training and skills for the tasks of deposition monitoring station operation, implementation of QA/QC protocols, atmospheric / aquatic biogeochemistry, remote sensing, and modelling as they specifically related to atmospheric nutrient deposition. **Total US$ 22,683,800**	GEFUS $364,000 Co-finance US$ 319,800 **Total: US683,800**
3. Air and Precipitation Monitoring	Current monitoring includes that carried out within IDAF (West Africa), GAW (greenhouse gases), and individual research / monitoring projects (e.g. wet deposition of nutrients near Lake Kivu, measured by CRNS in DRC). Water quality monitoring in lakes and tributaries is performed by a large number of government agencies, and within the context of some development projects, including LVEMP II. Budgets for all projects are not known, but typical atmospheric chemistry and water quality monitoring programmes cost a minimum of $50,000 per year. Assuming a minimum of 15 monitoring programmes within the region, cost is estimated for 4 years. **Total: US$ 3,000,000**	Augment existing monitoring activities to include various forms of the nutrients phosphorus and nitrogen, and to provide adequate spatial coverage of equatorial Africa, with a focus on the African Great Lakes region. **Total: US$ 4,670,500**	GEF US$570,500 Co-finance US$ 1,100,000 Total **US$ 1,670,500**
4. Database and Modeling	Current databases related to water quality, atmospheric chemistry, meteorology, land cover, and land use are maintained by a large number of government agencies and regional projects, including LVEMP, IDAF, GAW, TerrAfrica and NBI. Databases are relevant to	Construction of a novel dataset made accessible to EADN participants as well as collaborators and stakeholders via an internet database. Models specifically designed to simulate atmospheric	

	atmospheric nutrient transport, and some will be applied within EADN, but existing databases are insufficient to evaluate atmospheric nutrient transport and impact on aquatic systems. A conservative estimate of cost for management of existing relevant databases is $5,000,000 per year. **Total: US$ 20,000,000**	nutrient transport in equatorial Africa. Remote sensing data and analysis specific to the EADN time frame and geographic coverage. **Total: US$ 20,450,746**	GEF US$147,000 Co-finance US$ 303,746 Total **US$ 450,746**
5. Stakeholder Involvement, communication with policy/decision-makers and Information Dissemination	This objective is a high priority within LVEMP, NBI and TerrAfrica. LVEMP and TerrAfrica budgets for this component are uncertain, but NBI has allocated $39,000,000 for it Nile Transboundary Environmental Action Project (to set up a management framework), and $15,000,000 for its Confidence Building and Stakeholder Involvement Project. **Total: US$ 55,000,000**	Establish communication links between EADN and existing national and regional programs related to meteorological and atmospheric monitoring, SLM and water quality. Make information specifically related to atmospheric nutrient transport available via internet and published reports. **Total: US$ 55,535,000**	GEF US$260,000 Co-finance US$ 275,000 Total **US$ 535,000**
6. Project Management	All EADN Operating Agencies are currently managed within government or university structures. Estimated cost for management of existing resources that will be used within EADN for four years is $200,000 per site X 11 sites. Other relevant projects with significant management components include IDAF, GAW, LVEMP, NBI, and TerrAfrica. A conservative estimate for these projects over a 4 year period is $10,000,000. **Total: $12,200,000**	Coordinate the activities of EADN Operating Agencies to promote a regional monitoring network. Facilitate financial management, information management and dissemination, contracts and consultancies, links with collaborators and stakeholders. **Total: $ 12,850,000**	GEF US$150,000 Co-finance US$500,000 Total: **US$ 650,000**
TOTAL COST:	**Baseline: $ 112,700,000**	**Alternative: $ 117,808,746**	**Incremental Cost:** GEF: US$ 1,865,000 Co-financing US$ 3,243,746 Total: **US$ 5,108,746**

Appendix 4: Project Results Framework

Narrative Summary	Objectively Verifiable Indicators (OVIs)	Sources/Means of Verification (MOV)	Milestones	Assumptions
Objective: To establish a network for monitoring the atmospheric transport and deposition of nutrients (phosphorus and nitrogen) in sub-Saharan Africa, and to use the data collected by the network, along with model simulations driven by the data, to determine sources of atmospheric nutrients and their contribution to lake nutrient budgets. Information on nutrient sources and transport mechanisms will be used to inform Sustainable Land Management (SLM) programmes at the national and regional scales.	- Quantification of nutrient deposition rates at 11 sites in sub-Saharan Africa. Use of database and model outputs by managers, policy makers, researchers in the natural resource and agriculture sector	- Regional data reports, computer models, and analyses of data and model simulations. - Project Evaluation Commissioned reports	- Establishment of a network of specialists trained in atmospheric deposition monitoring and QA/QC methods. - Establishment of a functional monitoring network. - Quantification of annual P and N deposition rates at all monitoring stations. - Model simulation of P and N transport within the study region.	
Components, outputs and outcomes:				
Component 1: Quality Assurance (QA) and Quality Control (QC) Output: QA/QC Plan developed; Procedures documented. Outcomes: Standardized sampling processes across the network. Enhanced delivery of SIP IR 4 on generation and dissemination of targeted knowledge. Establishment and strengthening of monitoring and evaluation systems at all levels.	Production of data along with QA/QC metadata by monitoring sites (Operating Agencies) and the Central Analytical Laboratory.	- QA/QC programmes documented (hard copy and digital). - QA/QC assessment by auditors.	- Documented Quality Assurance and Quality Control Programmes (month 18). - QA/QC audits conducted annually.	- QA/QC contract initiated in timely manner.
Component 2: Training & Awareness Outpu: Training courses delivered on field instruments/ sample collection; lab. analysis; auditing; atmospheric chemistry/ physics; atmospheric modeling.	- Completion of training sessions. - No. of key decision makers and other stakeholders participating in the training workshops and conferences	- Capacity for all necessary nutrient analyses within network; -Implementation of QA/QC protocols; Capacity for independent	- Minimum of 6 auditors trained in application of the ISO 17025 Laboratory Accreditation standard (month 24) - 4 trained analytical technicians (month 18)	- Qualified personnel available for training.

Narrative Summary	Objectively Verifiable Indicators (OVIs)	Sources/Means of Verification (MOV)	Milestones	Assumptions
Outcomes: Network of specialists trained in QA/QC procedures, including QA/QC auditing specialists. Enhanced capacity for assessment and monitoring of atmospheric deposition. Information derived from EADN Project taken into account for the development and/or modification of rural development strategies of the World Bank, UNDP and other ODAs operating in Equatorial Africa. Enhanced delivery of SIP IR 4 as in the above.	on the use of atmospheric deposition data in Equatorial Africa. -	operation of atmospheric models within EADN network. - Commissioned surveys	- 6 specialists trained in basics of atmospheric chemistry, meteorology, and biogeochemistry (month 24). - 4 trained model operators (month 42) - Functional Central Analytical Laboratory (month 8).	
Component 3: Air and Precipitation Monitoring Output: Estimates available of nutrient transport from and deposition to areas due to precipitation and airborne concentrations of target nutrients. Collection of meteorological data necessary to run models. Outcomes: Network established to monitor air and precipitation; Enhanced delivery of SIP IR 4.	- Production of quality-assured meteorological data. - Provision of atmospheric deposition samples from Operating Agencies to Central Analytical Laboratory. - Production of quality-assured atmospheric deposition data by the CAL. - Percentages of new estimations of inputs of macronutrients(and particularly phosphorus) into African Lakes resulting from atmospheric deposition	- Development and publication (via internet) of a dynamic atmospheric nutrient deposition database.	- 6 functional monitoring stations by month 12; 12 functional stations by month 24.	- Operating Agencies provide logistic support as agreed. - Monitoring equipment installed on schedule. - Efficient flow of funds between RES Office, Operating Agencies and Monitoring Stations.
Component 4: Database and Modelling Output: Atmospheric deposition database set up; Fully operational models of regional meteorology and atmospheric transport of various forms of phosphorus and nitrogen. Outcomes: Spatial analysis of atmospheric		- All EADN data incorporated into functional models simulating atmospheric nutrient transport in EADN region.	- EADN website and database (month 24). - Remote sensing report (month 42). - Atmospheric transport model (month 42).	- Contractors meet terms of reference. - Adequate quantity and quality of data available for models.

Narrative Summary	Objectively Verifiable Indicators (OVIs)	Sources/Means of Verification (MOV)	Milestones	Assumptions
nutrient sources and sinks; Prediction of atmospheric nutrient deposition response to management scenarios.				
Component 5: Stakeholder Involvement, communication with policy/decision-makers and Information Dissemination Outputs: Workshops and training sessions held. Participation by technical staff in water conferences; EADN technical reports disseminated to stakeholders. Outcomes: Increased understanding of issues as well as impacts on project/ policy in rural areas along Lake Victoria and other African Great Lakes. Enhanced delivery of SIP IR 2 on promoting effective and inclusive dialogue and advocacy and enabling policy conditions for SLM scale up.	- Use of database and model output by managers, policy makers and researchers in the natural resource and agricultural sectors. - Modification of strategies for rural development in equatorial Africa taking into account the impacts of agricultural and pastoral activities on the lakes and other water bodies - Number of key stake holders (multilateral and bilateral donors, research agencies, universities) who understand that inflow of micronutrients in African Lakes might be related to rural development i.e. land use management, soil fertility, livestock and agriculture - A working dialogue between Equatorial African Governments is established that focuses on transboundary transport of polluting elements and compounds, particularly major macronutrients	- Data and information exchange between EADN and other stakeholders. - Commissioned surveys	- See above component for database development. - RES establishes communication links between EADN and other regional stakeholders (throughout project, with emphasis on year 1) - Stakeholder workshops (month 24 and month 48) Working dialogue between Governments established by end of Yr 2.	- Stakeholders understand the relevance of atmospheric nutrient deposition to land management and water quality.
Component 6: Project Management Outputs: A workable project management structure, effective M&E of the project, wide dissemination of the project tools.	Work program adhered to Objective met Outputs delivered Budget adhered to Partner disbursements made on time	Progress reports Annual reports Impact assessment Audits	- SSC and STAP meeting months 1, 12, 24 and 36 after project start. - Project website (month 6) and internet-accessible	Funding sources delivered on time. Good collaboration established

Narrative Summary	Objectively Verifiable Indicators (OVIs)	Sources/Means of Verification (MOV)	Milestones	Assumptions
EADN Project website and database. Outcomes: A successfully managed project, thorough evaluation, global awareness of the project tools.			database (month 24). - Consolidated progress and financial reports to UNEP months 6, 12, 18, 24, 30, 36 and 42. - Project mid term review completed end of year 2. - Financial audits completed and sent to UNEP months 15, 27, 39 and 45 days after the end of the project. - All in place for project terminal evaluation month 48.	

Appendix 5: Workplan and timetable

The project will cover a 4-year time span. In year 1, the focus will be on setting up the project infrastructure (Regional Executive Secretariat, Technical Committee, and monitoring stations), providing training to project participants, making half (6) of the monitoring sites operational, identifying contractors, putting a Quality Assurance / Quality Control Program in place, and establishing links with existing research and development programs in the areas of agriculture, atmospheric chemistry, and aquatic resources. In year 2 the remaining 6 sites will be made operational and contract work will begin. All sites will remain fully operational from year 2 through year 4. In years 3 and 4, modeling exercises will begin, using the data collected by EADN as well as supporting data (land use/cover, meteorology, physiography) acquired from other agencies.

Timetable for main tasks in Year 1

	Task	Responsible Agency	Month											
			1	2	3	4	5	6	7	8	9	10	11	12
1	Hire support staff for Regional Executive Secretariat	RES												
2	Selection of Central Analytical Laboratory	RES, Tech. Comm.												
3	Identify Lab Manager and Lab Technicians for CAL	RES, Tech. Comm.												
4	Establish memorandum of understanding (MOU) with CAL	RES												
5	Equip. CAL (upgrade lab facilities, procure lab equipment)	RES, CAL												
6	Set up EADN website and database	RES												
7	Establish MOUs with Operating Agencies	RES												
8	Solicit QA/QC proposals	RES												
9	Initiate QA/QC contract. Includes:	QA/QC Contractor, with oversight from RES												
	- Final siting of monitoring stations - Installation of monitoring equipment at 6 sites													
	- Development and provision of field and lab QA/QC manuals													
	- Provision of instrument manuals													
	- Development of data forms for monitoring stations and CAL													
	- Documentation of chemical analytical methods													
	- Development and documentation of sampling protocols													
	- Establishment and documentation of shipping protocols for each station and the CAL													
	- Provision of necessary software for QA/QC programs and database													
	- Provision of a training program for QA/QC auditors													
	- Oversight of CAL audit													

10	Solicit Chemical Analysis Training proposals	RES, Tech. Comm.	
11	Solicit QA/QC Auditing Training proposals	RES, Tech. Comm.	
12	Solicit Remote Sensing proposals	RES, Tech. Comm.	
13	Solicit Atmospheric Chemistry / Physics Training proposals	RES, Tech. Comm.	
14	Chemical Analysis Training Contract	Chem. Contractor	
15	Upgrade facilities at monitoring sites	RES, Operating Agencies	
16	Hire staff (Site Operator, security staff) at monitoring sites.	Operating Agencies	
17	Conduct atmospheric deposition monitoring at 6 sites	Operating Agencies	
18	Meeting of EADN Technical Committee	RES	
19	Project Initiation Workshop	RES, Tech. Comm.	
20	Meet with other agencies (e.g. LVEMP, IDAF, TerrAfrica, GAW) to establish collaborative memoranda of understanding.	RES	

Timetable for main tasks in Year 2

	Task	Responsible Agency	Month											
			1	2	3	4	5	6	7	8	9	10	11	12
1	QA/QC Contract	QA/QC Contractor, with oversight from RES												
2	Remote Sensing Contract	R.S. Contractor												
3	Upgrade facilities at monitoring sites	RES, Operating Agencies												
4	Install sampling equipment at final 6 monitoring stations	QA/QC Contractor, with oversight from RES												
5	Training in QA/QC auditing	Audit Contractor												
6	Training in Atmospheric Chemistry / Physics and Biogeochemistry	Chem. / Physics Contractor												
7	Collection of samples at monitoring stations	Operating Agencies												
	Analysis of samples by CAL	CAL												
8	Solicit Atmospheric Transport / Meteorological Modelling proposals	RES, Tech. Comm.												
9	QA/QC audit of CAL	External Auditor, project auditors												
10	QA/QC audits of monitoring stations	External Auditor, project auditors												

11	Collate data to date, produce annual data report	Consultant with RES												
12	Regional Stakeholders Workshop	RES												
13	Meeting of EADN Technical Committee	RES												

Timetable for main tasks in Year 3

	Task	Responsible Agency	Month											
			1	2	3	4	5	6	7	8	9	10	11	12
1	QA/QC Contract	QA/QC Contractor, with oversight from RES												
2	Remote Sensing Contract	R.S. Contractor												
3	Atmospheric Modelling Contract	Modelling Contractor												
4	Collection of samples at monitoring stations	Operating Agencies												
5	Analysis of samples by CAL	CAL												
6	QA/QC audit of CAL	Project auditors												
7	QA/QC audits of monitoring stations	Project auditors												
8	Collate data to date, produce annual data report	Consultant with RES												
9	Meeting of EADN Technical Committee	RES												

Timetable for main tasks in Year 4

	Task	Responsible Agency	Month											
			1	2	3	4	5	6	7	8	9	10	11	12
1	Remote Sensing Contract	R.S. Contractor												
2	Atmospheric Modelling Contract	Modelling Contractor												
3	Collection of samples at monitoring stations	Operating Agencies												
4	Analysis of samples by CAL	CAL												
5	QA/QC audit of CAL	Project auditors												
6	QA/QC audits of monitoring stations	Project auditors												
7	Collate data to date, produce final data report	Consultant with RES												
8	Regional Stakeholders Workshop	RES												
9	Transfer operation of stations to national agencies	RES, Operating Agencies												
10	Meeting of EADN Technical Committee	RES												
11	Project Evaluation	UNEP Evaluation Team												

Appendix 6: Key Deliverables and benchmarks

Deliverable	Target Date	Benchmark
6 Functional Monitoring Stations	Month 12	Stations staffed with a trained site manager and site operator. Stations provided with security. Stations equipped to collect wet and dry deposition samples to be used for the measurement of nitrogen and phosphorus in dissolved, particulate and gaseous form. This includes: (1) provision of electrical power; (2) installation of fully functional wet and dry deposition collectors; (3) proper storage facilities, including a refrigerator and a freezer; (4) a reliable sample shipping protocol; (5) possession of operational, calibrated pH and conductivity meters; (6) implementation of a documented QA/QC program.
Operational Quality Assurance / Quality Control Program	Month 18	A documented QC program that provides detailed instructions for the sampling, storage, shipping and analysis of atmospheric deposition samples. This will include details for testing, inspection and maintenance of instruments, instrument calibration, and inspection of supplies and consumables, and data management. It will also include specification for quality objectives and criteria. A documented QA program that defines procedures to be followed at sample collection sites and at that analytical laboratory to determine the quality of data produced. Procedures to be defined include data review, verification and validation, reporting of assessment results, and response actions.
12 Functional Monitoring Stations	Month 18	As described above.
Functional Central Analytical Laboratory	Month 8	A laboratory equipped with the instruments, expertise and infrastructure for the analyses of various nitrogen and phosphorus species, including dissolved nitrate, dissolved ammonium, total dissolved nitrogen, particulate nitrogen, soluble reactive phosphorus, total dissolved phosphorus, and particulate phosphorus. The lab will also be equipped to measure major ions, including calcium, magnesium, sodium, potassium, chloride, sulphate, bicarbonate, and carbonate, as well as pH and conductivity. Ideally, the lab will be ISO 17025 certified. However, it may adhere to the ISO 17025 QA/QC protocol without going through the formal certification process.
Trained QA/QC Auditors	Month 24	A minimum of 6 auditors trained in the application of the ISO 17025 Laboratory Accreditation standard.

Trained Analytical Technicians	Month 18	A minimum of 4 technicians trained in the analyses of nutrients and major ions. Technicians will be certified by an internationally recognized certification agency.
Trained Technicians in Atmospheric Chemistry / Physics, and Biogeochemistry	Month 24	A minimum of 6 technicians familiar with the basic tenets of atmospheric chemistry, meteorology, and biogeochemistry as would be taught in fourth-year undergraduate courses in these fields.
Trained Atmospheric Transport Model Operators	Month 42	A minimum of 4 model operators with the following capacity: 1) Understand basic principles of numerical modeling; 2) Understand structure of atmospheric model(s) used in EADN, including significance of various model parameters, model assumptions, and data input requirements; 3) Operate models after they have been set up for EADN, and update models with new data.
Trained policy and decision-makers in the use of results of EADN project	Month 36	New knowledge skills and attitudes developed among decision-makers and other stakeholders to use EADN Project results and innovation to advocate for changes in national and regional rural development programmes. 3 workshops and roundtable discussions with small focus groups of senior policy and decision-makers from the participating countries to investigate how information, evidence and tools from the EADN Project are used in real-world decision making.
EADN Website and database	Month 24	Website providing overview of the EADN project links to collaborators, and access to EADN data and products. Data will be made accessible through a Structured Query Language (SQL) and a Graphical User Interface (GUI), allowing retrieval of data for specified locations, time spans, and variables. The database will include metadata providing data quality parameters.
Remote Sensing Report	Month 42	A report documenting the spatio-temporal distribution of remotely sensed burning, aerosols, and vegetation for a minimum of two years, contemporaneous with atmospheric deposition measurements at EADN monitoring sites, covering the entire African continent. Spatial resolution will be 1 km, and temporal resolution will be 1 to 5 days. The report will include copies of all acquired imagery and data in digital format, along with the software necessary to view these files.

Atmospheric Transport Model	Month 42	A documented numerical Atmospheric Nutrient Dispersion Model encompassing the entire EADN area. This may require two or more models that cover different spatial scales. Documentation will include details of all model inputs: meteorology, land use/cover, vegetation phenology, emissions, and topography. All model assumptions and parameter values will also be described and quantified. Model simulations will be used to derive gaseous and particulate fluxes of phosphorus and nitrogen, which will be combined with wet deposition flux measurements to provide a spatio-temporal analysis of N and P deposition. To the extent possible, the model(s) will be validated with EADN data. The model(s) will be used to explore various case scenarios related to possible climate change and management impacts. The final model and report will be submitted to a third party expert in the field for peer review.

Appendix 7: Costed M&E plan

Monitoring and evaluation of the project will be conducted in accordance with established procedures laid out in the GEF's 'Minimum Requirements for Project M&E and will be provided by the EADN Regional Programme Office, EADN RPO (based in African Collaborative Center for Earth System Science, ACCESS in University of Nairobi) under the guidance of the EADN Regional Executive Secretariat (EADN-RES) serving as the project steering committee. The Project Results Framework (Appendix 3) will form the basis for the project's monitoring and evaluation system.

The detailed monitoring, evaluation and reporting plan, presented in Table G2, including indicators, tracking tools and needs for specific baseline information against which to monitor changes, will be refined and finalized at the project's inception workshop. An indicative M&E budget plan is presented.

The EADN Regional Programme Office (EADN RPO), the EADN Technical Committee (EADN TC) and the EADN Regional Executive Secretariat (EADN RES) are the three bodies with overall responsibility for monitoring and evaluating the project, and for reporting. Their roles and responsibilities in M&E and reporting are laid out in Table 10.

The project will be evaluated on the basis of: (i) execution performance, (ii) output delivery, and (iii) project impact

Execution performance

Execution monitoring will assess whether the management and supervision of project activities is efficient and seek to improve efficiencies when needed so as to improve overall effectiveness of project implementation. It is a continuous process, which will collect information about the execution of activities programmed in the annual work plans, advise on improvements in method and performance, and compare accomplished with programmed tasks. This activity will be the direct responsibility of the Project Management Unit (PMU), under the supervision of the Steering Committee. See Table 8 for the execution performance indicators. The UNEP Task Manager will, in collaboration with the PMU, track these indicators.

Delivered outputs

Ongoing monitoring will assess the project's success in producing each of the programmed outputs, both in quantity and quality. Internal assessment will be continuously provided by the PMU, and mid-term and final evaluations of outputs will be carried out by external consultants contracted by UNEP.

Project impact

Evaluation of the project's success in achieving its outcomes will be monitored continuously throughout the project through quarterly progress reports, annual summary progress reports, and a mid-term and final evaluation all of which will use the following framework:

Table 10: Indicators for Evaluating Whether EADN RPO and EADN REC are effectively operational.

Indicator	**Means of Verification**
Quarterly and annual activity and progress reports are prepared in a timely and satisfactory manner	Arrival of reports to UNEP
Quarterly disbursement plans and quarterly and annual financial reports are prepared in a timely and satisfactory manner.	Arrival of reports to UNEP
Performance targets, outputs, and outcomes are achieved as specified in the annual work plans.	Quarterly and annual progress reports
Deviations from annual work plans are corrected promptly and appropriately.	Work plans, minutes of SC meetings
Disbursements are made on a timely basis, and procurement is achieved according to the procurement plan.	IMIS system at UNEP and Bank Account statements of executing agency
Audit reports and other reviews show sound financial practices.	Audit statements
EADN RES is tracking implementation progress and project impact, and providing guidance on annual work plans and fulfilling TOR.	Minutes of EADN RES meetings
EADN RES is providing policy guidance, especially on achievement of project impact.	Minutes of EADN RES meetings

TABLE G1: MONITORING AND EVALUATION PLAN, WITH INDICATIVE COSTS

Type of M & E activity	Responsible Parties	Time-frame (3 years)	Indicative cost to GEF US$	Indicative cost to Executing Agency (CEAD)
Inception workshop	EADN Regional Programme Office/Project Coordinator (PC)	Within 2 months of project approval	30,000	20,000
Project inception report	Project Coordinator and UNEP/DGEF TM	Within first 3 months	0	500
Project implementation Review, PIR	EADN RPO/Project Coordinator	Yearly	0	1,000
Project Progress /Operational Reports to UNEP	EADN Regional Programme Office/Project Coordinator with inputs from Operating Agencies (OAs)	Half-yearly (as at 30 June & 31 December)	0	2,000
Half-yearly progress reports to GEF	EADN Regional Programme Office/Project Coordinator to UNEP/ DGEF TM	Half-yearly (as at 30 June & 31 December)	0	2,000
Meetings of EADN Regional Executive Secretariat (EADN RES) and EADN TC	EADN Regional Programme Office/Project Coordinator	3, Annually	30,000	20,000
Reports of EADN RES & EADN TC meetings	EADN RPO/PC	Annually	0	1,000
Monitoring visits (EADN RPO, EADN TC, etc.)	EADN RPO/PC + EADN TC + UNEP/DGEF TM	As appropriate	20,000	15,000
Field Surveys (to fill gaps in baseline information, refinement of indicator, etc.)	EADN RPO/PC, EADN TC with Operating Agencies (OAs)		20,000	10,000
Independent mid-term Review/ Evaluation	UNEP/DGEF Task Manager	End of Project Year-2	30,000	10,000
Independent final Evaluation	UNEP/DGEF Task Manager	3 months prior to the "terminal" review meeting	30,000	10,000
Project terminal report	EADN RPO/Project Coordinator, final clearance and processing by UNEP/DGEF TM	Within 60 days of project completion (PY-3)	0	1,000
		Total indicative cost	**160,000**	**92,500**

Table G2. Monitoring and evaluation reports

Administrative and financial reports to be produced are detailed in the table below. Standard UNEP format will be used.

Report	Content	Timing	Responsibility
Progress Reports (Using UNEP format)			
Describe the completion of planned activities and progress in relation to the EADN project plan Document any constraints and potential consequences for project performance Provide information and data for annual progress reports	Person reporting and date Activity name and accomplishments within each activity this half-year Targets for the next half-year Comment on performance on progress toward project goals, and problems/constraints Report on any unanticipated results and opportunities, and on any checks to project progress	Every 6 months	EADN Regional Executive Secretariat (EADN RES)
The Project Implementation Review (PIR) reports	Summary of Partner lead's reports and participating institutions (UNEP Format)	Yearly	UNEP Task Manager / UNEP GEF to GEF Secretariat
Financial reports Details project expenses and disbursements	Disbursements and expenses in categories and format as set out by the agreed budgets and sub-contracts together with supporting documents	Quarterly	EADN Regional Executive Secretariat (EADN RES)
Financial audits Annual audit by CSU/UNEP approved External Auditors	Audit of CSU accounts for project management and expenditures	Annual	African Collaborative Center for Earth System Science (ACCESS); Uiversity of Nairobi , Kenya

The supervision arrangements for the project are presented in Table 11 which summarizes the responsibilities of the project management entities regarding monitoring and reporting. Detailed descriptions of the terms of references for the various structures involved in the implementation of this project are given in Section 4.

Table 11: Supervision and M&E Roles

UNEP	**EADN Regional Executive Secretariat (EADN RES) based in African Collaborative Center for Earth System Science (ACCESS), University of Nairobi**	**EADN Technical Committee (EADN TC)**	**EADN Regional Steering Committee (EADN RSC)**
Monitor the overall project and provide link with the GEF Monitor the agreed M&E plan in accordance with the terms of agreement with GEFSEC Receive quarterly progress and annual summary progress reports, quarterly financial reports and copies of all substantive reports from Project Management Unit Task manager to attend and participate fully in meetings of the RSC Task Manager to conduct supervision missions with member(s) of the PMU to selected project sites: identifies implementation problems and suggests remedies to RSC meetings Engage and prepare terms of reference for independent M&E consultants to conduct the mid-term and final evaluations	Oversee the project both at regional and country levels with respect to adherence to the project proposal in terms of content and finances Establish reporting guidelines for all partners in the project and ensure that they meet reporting dates and provide reports of suitable quality Prepare quarterly progress reports and annual summary progress reports for UNEP, and forward substantive and quarterly financial reports, with supporting documentation as appropriate, in a timely manner to UNEP Carry out a programme of regular visits to project sites to supervise activities, and pay special attention to those sites with serious implementation problems	Provide technical and methodological expertise to the project: backstop the project at overall and national levels Receive quarterly progress reports, annual summary progress reports and all substantive reports and outputs and use them to annually review the progress of work in the project as a whole Advise Project Management Unit on implementation problems that emerge, and on desirable modifications to the work plan for the succeeding year Monitor progress in the capacity-building aspects of the project, and advise the Project Management Unit on steps to enhance this aspect of the project	Provide overall guidance for the project implementation Receive quarterly progress reports, annual summary progress reports, quarterly financial reports and all substantive reports, and provide policy guidance to the project on any matters arising from a reading of these reports Assist the Project Management Unit in developing linkages with other projects, thus ensuring the wider impact of project work

Appendix 8: Summary of reporting requirements

Reporting requirements	Due date	Format appended to legal instrument as	Responsibility of
Procurement plan (goods and services)	2 weeks before project inception meeting	N/A	EADN Regional Executive Secretariat (EADN RES)
Inception Report	1 month after project inception meeting	N/A	EADN Regional Executive Secretariat (EADN RES)
Financial report accompanied by explanatory notes	Quarterly on or before 30 April, 31 July, 31 October, 31 January	**Annex 11**	EADN Regional Executive Secretariat (EADN RES)
Cash Advance request and details of anticipated disbursements	Quarterly or when required	**Annex 7B**	EADN Regional Executive Secretariat (EADN RES)
Progress report	Half-yearly on or before 31 January	**Annex 8**	EADN Regional Executive Secretariat (EADN RES)
Audited report for expenditures for year ending 31 December	Yearly on or before 30 June	N/A	ACCESS, the Executing Agency to contract firm
Inventory of non-expendable equipment	Yearly on or before 31 January	**Annex 6A**	EADN Regional Executive Secretariat (EADN RES)
Co-financing report	Yearly on or before 31 July	**Annex 12**	EADN Regional Executive Secretariat (EADN RES)
Project implementation review (PIR) report	Yearly on or before 31 July	**Annex 9**	EADN Regional Executive Secretariat (EADN RES) UNEP GEF TM, UNEP GEF FMO

Minutes of steering committee meetings	Yearly (or as relevant)	N/A	EADN Regional Executive Secretariat (EADN RES)
Mission reports and "aide memoire" for executing agency	Within 2 weeks of return	N/A	TM, UNEP GEF FMO
Final report	2 months of project completion date	**Annex 10**	EADN Regional Executive Secretariat (EADN RES)
Final inventory of non-expendable equipment		**Annex 6B**	EADN Regional Executive Secretariat (EADN RES)
Equipment transfer letter		**Annex 6B**	EADN Regional Executive Secretariat (EADN RES)
Final expenditure statement	3 months of project completion date	**Annex 11**	EADN Regional Executive Secretariat (EADN RES)
Mid-term review or Mid-term evaluation	Midway though project	N/A	UNEP GEF TM or UNEP EOU (as relevant)
Final audited report for expenditures of project	6 months of project completion date	N/A	ACCESS, the Executing Agency to contract firm
Independent terminal evaluation report	6 months of project completion date	Appendix 12 to Annex 1	UNEP EOU

Appendix 9: Standard Terminal Evaluation Terms of Reference

Terminal Evaluation of the UNEP GEF project: Equatorial Africa Atmospheric Deposition Network

1. PROJECT BACKGROUND AND OVERVIEW

Project rationale

The objective was stated as:

The indicators given in the project document for this stated objective were:

Relevance to GEF Programmes
The project is in line with

Executing Arrangements
The implementing agency(ies)for this project was (were) UNEP and { }and the executing agencies were:

The local national agencies in the focal areas were:

Project Activities
The project comprised activities grouped in {number} components.

Budget

At project inception the following budget prepared:

GEF Co-funding
Project preparation funds:
GEF {Medium/Full} Size Grant

TOTAL (including project preparation funds)

Co-funding sources:

Anticipated:

APPENDIX 9: Terms of Reference for the Evaluation

1. Objective and Scope of the Evaluation

The objective of this terminal evaluation is to examine the extent and magnitude of any project impacts to date and determine the likelihood of future impacts. The evaluation will also assess project performance and the implementation of planned project activities and planned outputs against actual results. The evaluation will focus on the following main questions:

1. Did the project help to { } among key target audiences (international conventions and initiatives, national level policy-makers, regional and local policy-makers, resource managers and practitioners).
2. Did the outputs of the project articulate options and recommendations for { }? Were these options and recommendations used? If so by whom?
3. To what extent did the project outputs produced have the weight of scientific authority and credibility necessary to influence policy makers and other key audiences?

Methods

This terminal evaluation will be conducted as an in-depth evaluation using a participatory approach whereby the UNEP/DGEF Task Manager, key representatives of the executing agencies and other relevant staff are kept informed and consulted throughout the evaluation. The consultant will liaise with the UNEP/EOU and the UNEP/DGEF Task Manager on any logistic and/or methodological issues to properly conduct the review in as independent a way as possible, given the circumstances and resources offered. The draft report will be circulated to UNEP/DGEF Task Manager, key representatives of the executing agencies and the UNEP/EOU. Any comments or responses to the draft report will be sent to UNEP / EOU for collation and the consultant will be advised of any necessary or suggested revisions.

The findings of the evaluation will be based on the following:

1. A desk review of project documents including, but not limited to:
   (a) The project documents, outputs, monitoring reports (such as progress and financial reports to UNEP and GEF annual Project Implementation Review reports) and relevant correspondence.
   (b) Notes from the Steering Group meetings.
   (c) Other project-related material produced by the project staff or partners.
   (d) Relevant material published on the project web-site:{ }.

2. Interviews with project management and technical support including {NEED INPUT FROM TM HERE}

3. Interviews and Telephone interviews with intended users for the project outputs and other stakeholders involved with this project, including in the participating countries and international bodies. The Consultant shall determine whether to seek additional information and opinions from representatives of donor agencies and other organizations. As appropriate, these interviews could be combined with an email questionnaire.

4. Interviews with the UNEP/DGEF project task manager and Fund Management Officer, and other relevant staff in UNEP dealing with {relevant GEF focal area(s)}-related activities as necessary. The Consultant shall also gain broader perspectives from discussions with relevant GEF Secretariat staff.

5. Field visits[1] to project staff

[1] Evaluators should make a brief courtesy call to GEF Country Focal points during field visits if at all possible.

Key Evaluation principles

In attempting to evaluate any outcomes and impacts that the project may have achieved, evaluators should remember that the project's performance should be assessed by considering the difference between the answers to two simple questions ***"what happened?***" and ***"what would have happened anyway?"***. These questions imply that there should be consideration of the baseline conditions and trends in relation to the intended project outcomes and impacts. In addition it implies that there should be plausible evidence to **attribute** such outcomes and impacts **to the actions of the project**.

Sometimes, adequate information on baseline conditions and trends is lacking. In such cases this should be clearly highlighted by the evaluator, along with any simplifying assumptions that were taken to enable the evaluator to make informed judgements about project performance.

2. Project Ratings

The success of project implementation will be rated on a scale from 'highly unsatisfactory' to 'highly satisfactory'. In particular the evaluation shall **assess and rate** the project with respect to the eleven categories defined below:[2]

A. Attainment of objectives and planned results:

The evaluation should assess the extent to which the project's major relevant objectives were effectively and efficiently achieved or are expected to be achieved and their relevance.

- *Effectiveness:* Evaluate how, and to what extent, the stated project objectives have been met, taking into account the "achievement indicators". The analysis of outcomes achieved should include, *inter alia*, an assessment of the extent to which the project has directly or indirectly assisted policy and decision-makers to apply information supplied by biodiversity indicators in their national planning and decision-making. In particular:
  - Evaluate the immediate impact of the project on {relevant focal area} monitoring and in national planning and decision-making and international understanding and use of biodiversity indicators.
  - As far as possible, also assess the potential longer-term impacts considering that the evaluation is taking place upon completion of the project and that longer term impact is expected to be seen in a few years time. Frame recommendations to enhance future project impact in this context. Which will be the major 'channels' for longer term impact from the project at the national and international scales?
    - *Relevance*: In retrospect, were the project's outcomes consistent with the focal areas/operational program strategies? Ascertain the nature and significance of the contribution of the project outcomes to the {relevant Convention(s)} and the wider portfolio of the GEF.
    - *Efficiency*: Was the project cost effective? Was the project the least cost option? Was the project implementation delayed and if it was, then did that affect cost-effectiveness? Assess the contribution of cash and in-kind co-financing to project implementation and to what extent the project leveraged additional resources. Did the project build on earlier initiatives, did it make effective use of available scientific and / or technical information. Wherever possible, the evaluator should also compare the cost-time vs. outcomes relationship of the project with that of other similar projects.

B. Sustainability:

Sustainability is understood as the probability of continued long-term project-derived outcomes and impacts after the GEF project funding ends. The evaluation will identify and assess the key conditions or factors that are likely to contribute or undermine the persistence of benefits after the project ends. Some of these factors might be outcomes of the project, e.g. stronger institutional capacities or better informed

[2] However, the views and comments expressed by the evaluator need not be restricted to these items.

decision-making. Other factors will include contextual circumstances or developments that are not outcomes of the project but that are relevant to the sustainability of outcomes. The evaluation should ascertain to what extent follow-up work has been initiated and how project outcomes will be sustained and enhanced over time.

Five aspects of sustainability should be addressed: financial, socio-political, institutional frameworks and governance, environmental (if applicable). The following questions provide guidance on the assessment of these aspects:

- *Financial resources.* Are there any financial risks that may jeopardize sustenance of project outcomes? What is the likelihood that financial and economic resources will not be available once the GEF assistance ends (resources can be from multiple sources, such as the public and private sectors, income generating activities, and trends that may indicate that it is likely that in future there will be adequate financial resources for sustaining project's outcomes)? To what extent are the outcomes of the project dependent on continued financial support?
- *Socio-political:* Are there any social or political risks that may jeopardize sustenance of project outcomes? What is the risk that the level of stakeholder ownership will be insufficient to allow for the project outcomes to be sustained? Do the various key stakeholders see that it is in their interest that the project benefits continue to flow? Is there sufficient public / stakeholder awareness in support of the long term objectives of the project?
- *Institutional framework and governance.* To what extent is the sustenance of the outcomes of the project dependent on issues relating to institutional frameworks and governance? What is the likelihood that institutional and technical achievements, legal frameworks, policies and governance structures and processes will allow for, the project outcomes/benefits to be sustained? While responding to these questions consider if the required systems for accountability and transparency and the required technical know-how are in place.
- *Environmental.* Are there any environmental risks that can undermine the future flow of project environmental benefits? The TE should assess whether certain activities in the project area will pose a threat to the sustainability of the project outcomes. For example; construction of dam in a protected area could inundate a sizable area and thereby neutralize the biodiversity-related gains made by the project; or, a newly established pulp mill might jeopardise the viability of nearby protected forest areas by increasing logging pressures; or a vector control intervention may be made less effective by changes in climate and consequent alterations to the incidence and distribution of malarial mosquitoes.

C. Achievement of outputs and activities:

- Delivered outputs: Assessment of the project's success in producing each of the programmed outputs, both in quantity and quality as well as usefulness and timeliness.
- Assess the soundness and effectiveness of the methodologies used for developing the technical documents and related management options in the participating countries
- Assess to what extent the project outputs produced have the weight of scientific authority / credibility, necessary to influence policy and decision-makers, particularly at the national level.

D. Catalytic Role

Replication and catalysis. What examples are there of replication and catalytic outcomes? Replication approach, in the context of GEF projects, is defined as lessons and experiences coming out of the project that are replicated or scaled up in the design and implementation of other projects. Replication can have two aspects, replication proper (lessons and experiences are replicated in different geographic area) or scaling up (lessons and experiences are replicated within the same geographic area but funded by other sources). Specifically:

- Do the recommendations for management of {project} coming from the country studies have the potential for application in other countries and locations?

If no effects are identified, the evaluation will describe the catalytic or replication actions that the project carried out.

E. Assessment monitoring and evaluation systems.

The evaluation shall include an assessment of the quality, application and effectiveness of project monitoring and evaluation plans and tools, including an assessment of risk management based on the assumptions and risks identified in the project document. The Terminal Evaluation will assess whether the project met the minimum requirements for 'project design of M&E' and 'the application of the Project M&E plan' (see minimum requirements 1&2 in *Annex 4* to this Appendix). GEF projects must budget adequately for execution of the M&E plan, and provide adequate resources during implementation of the M&E plan. Project managers are also expected to use the information generated by the M&E system during project implementation to adapt and improve the project.

M&E during project implementation

- *M&E design.* Projects should have sound M&E plans to monitor results and track progress towards achieving project objectives. An M&E plan should include a baseline (including data, methodology, etc.), SMART indicators (see Annex 4) and data analysis systems, and evaluation studies at specific times to assess results. The time frame for various M&E activities and standards for outputs should have been specified.

- *M&E plan implementation.* A Terminal Evaluation should verify that: an M&E system was in place and facilitated timely tracking of results and progress towards projects objectives throughout the project implementation period (perhaps through use of a logframe or similar); annual project reports and Progress Implementation Review (PIR) reports were complete, accurate and with well justified ratings; that the information provided by the M&E system was used during the project to improve project performance and to adapt to changing needs; and that projects had an M&E system in place with proper training for parties responsible for M&E activities.

- *Budgeting and Funding for M&E activities.* The terminal evaluation should determine whether support for M&E was budgeted adequately and was funded in a timely fashion during implementation.

F. Preparation and Readiness

Were the project's objectives and components clear, practicable and feasible within its timeframe? Were the capacities of executing institution and counterparts properly considered when the project was designed? Were lessons from other relevant projects properly incorporated in the project design? Were the partnership arrangements properly identified and the roles and responsibilities negotiated prior to project implementation? Were counterpart resources (funding, staff, and facilities), enabling legislation, and adequate project management arrangements in place?

G. Country ownership / driveness:

This is the relevance of the project to national development and environmental agendas, recipient country commitment, and regional and international agreements. The evaluation will:

- Assess the level of country ownership. Specifically, the evaluator should assess whether the project was effective in providing and communicating biodiversity information that catalyzed action in participating countries to improve decisions relating to the conservation and management of the focal ecosystem in each country.
- Assess the level of country commitment to the generation and use of biodiversity indicators for decision-making during and after the project, including in regional and international fora.

H. Stakeholder participation / public awareness:

This consists of three related and often overlapping processes: information dissemination, consultation, and "stakeholder" participation. Stakeholders are the individuals, groups, institutions, or other bodies that have an interest or stake in the outcome of the GEF- financed project. The term also applies to those potentially adversely affected by a project. The evaluation will specifically:

- Assess the mechanisms put in place by the project for identification and engagement of stakeholders in each participating country and establish, in consultation with the stakeholders, whether this mechanism was successful, and identify its strengths and weaknesses.
- Assess the degree and effectiveness of collaboration/interactions between the various project partners and institutions during the course of implementation of the project.
- Assess the degree and effectiveness of any various public awareness activities that were undertaken during the course of implementation of the project.

I. Financial Planning

Evaluation of financial planning requires assessment of the quality and effectiveness of financial planning and control of financial resources throughout the project's lifetime. Evaluation includes actual project costs by activities compared to budget (variances), financial management (including disbursement issues), and co- financing. The evaluation should:

- Assess the strength and utility of financial controls, including reporting, and planning to allow the project management to make informed decisions regarding the budget and allow for a proper and timely flow of funds for the payment of satisfactory project deliverables.
- Present the major findings from the financial audit if one has been conducted.
- Identify and verify the sources of co- financing as well as leveraged and associated financing (in co-operation with the IA and EA).
- Assess whether the project has applied appropriate standards of due diligence in the management of funds and financial audits.
- The evaluation should also include a breakdown of final actual costs and co-financing for the project prepared in consultation with the relevant UNEP/DGEF Fund Management Officer of the project (table attached in *Annex 1* to this Appendix Co-financing and leveraged resources).

J. Implementation approach:

This includes an analysis of the project's management framework, adaptation to changing conditions (adaptive management), partnerships in implementation arrangements, changes in project design, and overall project management. The evaluation will:

- Ascertain to what extent the project implementation mechanisms outlined in the project document have been closely followed. In particular, assess the role of the various committees established and whether the project document was clear and realistic to enable effective and efficient implementation, whether the project was executed according to the plan and how well the management was able to adapt to changes during the life of the project to enable the implementation of the project.
- Evaluate the effectiveness and efficiency and adaptability of project management and the supervision of project activities / project execution arrangements at all levels (1) policy decisions: Steering Group; (2) day to day project management in each of the country executing agencies and {lead executing agency}.

K. UNEP Supervision and Backstopping

- Assess the effectiveness of supervision and administrative and financial support provided by UNEP/DGEF.
- Identify administrative, operational and/or technical problems and constraints that influenced the effective implementation of the project.

The ***ratings will be presented in the form of a table***. Each of the eleven categories should be rated separately with **brief justifications** based on the findings of the main analysis. An overall rating for the project should also be given. The following rating system is to be applied:

HS = Highly Satisfactory
S = Satisfactory
MS = Moderately Satisfactory

MU = Moderately Unsatisfactory
U = Unsatisfactory
HU = Highly Unsatisfactory

3. Evaluation report format and review procedures

The report should be brief, to the point and easy to understand. It must explain; the purpose of the evaluation, exactly what was evaluated and the methods used. The report must highlight any methodological limitations, identify key concerns and present evidence-based findings, consequent conclusions, recommendations and lessons. The report should be presented in a way that makes the information accessible and comprehensible and include an executive summary that encapsulates the essence of the information contained in the report to facilitate dissemination and distillation of lessons.

THE EVALUATION WILL RATE THE OVERALL IMPLEMENTATION SUCCESS OF THE PROJECT AND PROVIDE INDIVIDUAL RATINGS OF THE ELEVEN IMPLEMENTATION ASPECTS AS DESCRIBED IN SECTION 1 OF THIS TOR. ***THE RATINGS WILL BE PRESENTED IN THE FORMAT OF A TABLE*** WITH BRIEF JUSTIFICATIONS BASED ON THE FINDINGS OF THE MAIN ANALYSIS.

Evidence, findings, conclusions and recommendations should be presented in a complete and balanced manner. Any dissident views in response to evaluation findings will be appended in an annex. The evaluation report shall be written in English, be of no more than 50 pages (excluding annexes), use numbered paragraphs and include:

i) An **executive summary** (no more than 3 pages) providing a brief overview of the main conclusions and recommendations of the evaluation;

ii) **Introduction and background** giving a brief overview of the evaluated project, for example, the objective and status of activities; The GEF Monitoring and Evaluation Policy, 2006, requires that a TE report will provide summary information on when the evaluation took place; places visited; who was involved; the key questions; and, the methodology.

iii) **Scope, objective and methods** presenting the evaluation's purpose, the evaluation criteria used and questions to be addressed;

iv) **Project Performance and Impact** providing *factual evidence* relevant to the questions asked by the evaluator and interpretations of such evidence. This is the main substantive section of the report. The evaluator should provide a commentary and analysis on all eleven evaluation aspects (A − K above).

v) **Conclusions and rating** of project implementation success giving the evaluator's concluding assessments and ratings of the project against given evaluation criteria and standards of performance. The conclusions should provide answers to questions about whether the project is considered good or bad, and whether the results are considered positive or negative. The ratings should be provided with a brief narrative comment in a table (see *Annex 1* to this Appendix);

vi) **Lessons (to be) learned** presenting general conclusions from the standpoint of the design and implementation of the project, based on good practices and successes or problems and mistakes. Lessons should have the potential for wider application and use. All lessons should 'stand alone' and should:

- Briefly describe the context from which they are derived
- State or imply some prescriptive action;
- Specify the contexts in which they may be applied (if possible, who when and where)

vii) **Recommendations** suggesting *actionable* proposals for improvement of the current project. In general, Terminal Evaluations are likely to have very few (perhaps two or three) actionable recommendations.

Prior to each recommendation, the issue(s) or problem(s) to be addressed by the recommendation should be clearly stated.

A high quality recommendation is an actionable proposal that is:

1. Feasible to implement within the timeframe and resources available
2. Commensurate with the available capacities of project team and partners
3. Specific in terms of who would do what and when
4. Contains results-based language (i.e. a measurable performance target)
5. Includes a trade-off analysis, when its implementation may require utilizing significant resources that would otherwise be used for other project purposes.

viii) **Annexes** may include additional material deemed relevant by the evaluator but must include:

1. The Evaluation Terms of Reference,
2. A list of interviewees, and evaluation timeline
3. A list of documents reviewed / consulted
4. Summary co-finance information and a statement of project expenditure by activity
5. The expertise of the evaluation team. (brief CV).

TE reports will also include any response / comments from the project management team and/or the country focal point regarding the evaluation findings or conclusions as an annex to the report, however, such will be appended to the report by UNEP EOU.

Examples of UNEP GEF Terminal Evaluation Reports are available at www.unep.org/eou

Review of the Draft Evaluation Report

Draft reports submitted to UNEP EOU are shared with the corresponding Programme or Project Officer and his or her supervisor for initial review and consultation. The DGEF staff and senior Executing Agency staff are allowed to comment on the draft evaluation report. They may provide feedback on any errors of fact and may highlight the significance of such errors in any conclusions. The consultation also seeks feedback on the proposed recommendations. UNEP EOU collates all review comments and provides them to the evaluators for their consideration in preparing the final version of the report.

4. Submission of Final Terminal Evaluation Reports.

The final report shall be submitted in electronic form in MS Word format and should be sent to the following persons:

Segbedzi Norgbey, Chief,
UNEP Evaluation and Oversight Unit
P.O. Box 30552-00100
Nairobi, Kenya
Tel.: +(254-20)762-4181
Fax: +(254-20)762-3158
Email: Segbedzi.Norgbey@unep.org

With a copy to:

Maryam Niamir-Fuller,
Director,
GEF Coordination Office
UNEP
P.O. Box 30552-00100
Nairobi, Kenya
Tel: +(254-20)762-4166
Fax: +(254-20)762-4041/2
Email: Maryam.Niamir-Fuller@unep.org

Mohamed F. Sessay
Senior Task Manager, Land Degradation & Biodiversity
UNEP Division of Environmental Policy Implementation
P.O. Box 30552-00100
Nairobi, Kenya
Tel: +(254-20)762-4294
Fax: +(254-20)762-4041/2
Email: Mohamed.sessay@unep.org

The Final evaluation will also be copied to the following GEF National Focal Points.

{Insert contact details here}

The final evaluation report will be published on the Evaluation and Oversight Unit's web-site www.unep.org/eou and may be printed in hard copy. Subsequently, the report will be sent to the GEF Office of Evaluation for their review, appraisal and inclusion on the GEF website.

5. Resources and schedule of the evaluation

This final evaluation will be undertaken by an international evaluator contracted by the Evaluation and Oversight Unit, UNEP. The contract for the evaluator will begin on ddmmyyy and end on ddmmyyyy (# days) spread over # weeks (# days of travel, to {country(ies)}, and # days desk study). The evaluator will submit a draft report on ddmmyyyy to UNEP/EOU, the UNEP/DGEF Task Manager, and key representatives of the executing agencies. Any comments or responses to the draft report will be sent to UNEP / EOU for collation and the consultant will be advised of any necessary revisions. Comments to the final draft report will be sent to the consultant by ddmmyyyy after which, the consultant will submit the final report no later than ddmmyyyy.

The evaluator will after an initial telephone briefing with EOU and UNEP/GEF conduct initial desk review work and later travel to {country(ies)} and meet with project staff at the beginning of the evaluation. Furthermore, the evaluator is expected to travel to {country(ies)} and meet with representatives of the project executing agencies and the intended users of project's outputs.

In accordance with UNEP/GEF policy, all GEF projects are evaluated by independent evaluators contracted as consultants by the EOU. The evaluator should have the following qualifications:

The evaluator should not have been associated with the design and implementation of the project in a paid capacity. The evaluator will work under the overall supervision of the Chief, Evaluation and Oversight Unit, UNEP. The evaluator should be an international expert in { } with a sound understanding of { } issues. The consultant should have the following minimum qualifications: (i) experience in {} issues; (ii) experience with management and implementation of { } projects and in particular with { } targeted at policy-influence and decision-making; (iii) experience with project evaluation. Knowledge of UNEP programmes and GEF activities is desirable. Knowledge of {specify language(s)} is an advantage. Fluency in oral and written English is a must.

6. Schedule Of Payment

The consultant shall select one of the following two contract options:

Lump-Sum Option

The evaluator will receive an initial payment of 30% of the total amount due upon signature of the contract. A further 30% will be paid upon submission of the draft report. A final payment of 40% will be made upon satisfactory completion of work. The fee is payable under the individual Special Service Agreement (SSA) of the evaluator and **is inclusive** of all expenses such as travel, accommodation and incidental expenses.

Fee-only Option
The evaluator will receive an initial payment of 40% of the total amount due upon signature of the contract. Final payment of 60% will be made upon satisfactory completion of work. The fee is payable under the individual SSAs of the evaluator and is **NOT** inclusive of all expenses such as travel, accommodation and incidental expenses. Ticket and DSA will be paid separately.

In case, the evaluator cannot provide the products in accordance with the TORs, the timeframe agreed, or his products are substandard, the payment to the evaluator could be withheld, until such a time the products are modified to meet UNEP's standard. In case the evaluator fails to submit a satisfactory final product to UNEP, the product prepared by the evaluator may not constitute the evaluation report.

Annex 1 to Appendix 9: OVERALL RATINGS TABLE

CRITERION	EVALUATOR'S SUMMARY COMMENTS	EVALUATOR'S RATING
A. Attainment of project objectives and results (overall rating) **Sub criteria (below)**		
A. 1. Effectiveness		
A. 2. Relevance		
A. 3. Efficiency		
B. Sustainability of Project outcomes (overall rating) **Sub criteria (below)**		
B. 1. Financial		
B. 2. Socio Political		
B. 3. Institutional framework and governance		
B. 4. Ecological		
C. Achievement of outputs and activities		
D. Monitoring and Evaluation (overall rating) **Sub criteria (below)**		
D. 1. M&E Design		
D. 2. M&E Plan Implementation (use for adaptive management)		
D. 3. Budgeting and Funding for M&E activities		
E. Catalytic Role		
F. Preparation and readiness		
G. Country ownership / drivenness		
H. Stakeholders involvement		
I. Financial planning		
J. Implementation approach		
K. UNEP Supervision and backstopping		

RATING OF PROJECT OBJECTIVES AND RESULTS

Highly Satisfactory (HS): The project had no shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Satisfactory (S): The project had minor shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Moderately Satisfactory (MS): The project had moderate shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Moderately Unsatisfactory (MU): The project had significant shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Unsatisfactory (U) The project had major shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Highly Unsatisfactory (HU): The project had severe shortcomings in the achievement of its objectives, in terms of relevance, effectiveness or efficiency.

Please note: Relevance and effectiveness will be considered as critical criteria. The overall rating of the project for achievement of objectives and results **may not be higher** than the lowest rating on either of these

two criteria. Thus, to have an overall satisfactory rating for outcomes a project must have at least satisfactory ratings on both relevance and effectiveness.

RATINGS ON SUSTAINABILITY

A. Sustainability will be understood as the probability of continued long-term outcomes and impacts after the GEF project funding ends. The Terminal evaluation will identify and assess the key conditions or factors that are likely to contribute or undermine the persistence of benefits after the project ends. Some of these factors might be outcomes of the project, i.e. stronger institutional capacities, legal frameworks, socio-economic incentives /or public awareness. Other factors will include contextual circumstances or developments that are not outcomes of the project but that are relevant to the sustainability of outcomes.

Rating system for sustainability sub-criteria

On each of the dimensions of sustainability of the project outcomes will be rated as follows.

Likely (L): There are no risks affecting this dimension of sustainability.

Moderately Likely (ML). There are moderate risks that affect this dimension of sustainability.

Moderately Unlikely (MU): There are significant risks that affect this dimension of sustainability

Unlikely (U): There are severe risks that affect this dimension of sustainability.

According to the GEF Office of Evaluation, all the risk dimensions of sustainability are deemed critical. Therefore, overall rating for sustainability will not be higher than the rating of the dimension with lowest ratings. For example, if a project has an Unlikely rating in any of the dimensions then its overall rating cannot be higher than Unlikely, regardless of whether higher ratings in other dimensions of sustainability produce a higher average.

RATINGS OF PROJECT M&E

Monitoring is a continuing function that uses systematic collection of data on specified indicators to provide management and the main stakeholders of an ongoing project with indications of the extent of progress and achievement of objectives and progress in the use of allocated funds. Evaluation is the systematic and objective assessment of an on-going or completed project, its design, implementation and results. Project evaluation may involve the definition of appropriate standards, the examination of performance against those standards, and an assessment of actual and expected results.

The Project monitoring and evaluation system will be rated on 'M&E Design', 'M&E Plan Implementation' and 'Budgeting and Funding for M&E activities' as follows:

Highly Satisfactory (HS): There were no shortcomings in the project M&E system. Satisfactory(S): There were minor shortcomings in the project M&E system.

Moderately Satisfactory (MS): There were moderate shortcomings in the project M&E system.

Moderately Unsatisfactory (MU): There were significant shortcomings in the project M&E system.

Unsatisfactory (U): There were major shortcomings in the project M&E system.

Highly Unsatisfactory (HU): The Project had no M&E system.

"M&E plan implementation" will be considered a critical parameter for the overall assessment of the M&E system. The overall rating for the M&E systems will not be higher than the rating on "M&E plan implementation."

All other ratings will be on the GEF six point scale.

GEF Performance Description	Alternative description on the same scale

HS	= Highly Satisfactory	Excellent
S	= Satisfactory	Well above average
MS	= Moderately Satisfactory	Average
MU	= Moderately Unsatisfactory	Below Average
U	= Unsatisfactory	Poor
HU	= Highly Unsatisfactory	Very poor (Appalling)

Annex 2 to Appendix 9: Co-financing and Leveraged Resources

Co-financing (basic data to be supplied to the consultant for verification)

Co financing (Type/Source)	IA own Financing (mill US$)		Government (mill US$)		Other* (mill US$)		Total (mill US$)		Total Disbursement (mill US$)	
	Planned	**Actual**	**Planned**	**Actual**	**Planned**	**Actual**	**Planned**	**Actual**	**Planned**	**Actual**
– Grants										
– Loans/Concessional (compared to market rate)										
– Credits										
– Equity investments										
– In-kind support										
– Other (*) - -										
TOTALS										

* Other is referred to contributions mobilized for the project from other multilateral agencies, bilateral development cooperation agencies, NGOs, the private sector and beneficiaries.

Leveraged Resources

Leveraged resources are additional resources—beyond those committed to the project itself at the time of approval—that are mobilized later as a direct result of the project. Leveraged resources can be financial or in-kind and they may be from other donors, NGO's, foundations, governments, communities or the private sector. Please briefly describe the resources the project has leveraged since inception and indicate how these resources are contributing to the project's ultimate objective.

Table showing final actual project expenditure by activity to be supplied by the UNEP Fund management Officer.

Annex 3 to Appendix 9

Review of the Draft Report

Draft reports submitted to UNEP EOU are shared with the corresponding Programme or Project Officer and his or her supervisor for initial review and consultation. The DGEF staff and senior Executing Agency staff provide comments on the draft evaluation report. They may provide feedback on any errors of fact and may highlight the significance of such errors in any conclusions. The consultation also seeks agreement on the findings and recommendations. UNEP EOU collates the review comments and provides them to the evaluators for their consideration in preparing the final version of the report. General comments on the draft report with respect to compliance with these TOR are shared with the reviewer.

Quality Assessment of the Evaluation Report

All UNEP GEF Mid Term Reports are subject to quality assessments by UNEP EOU. These apply GEF Office of Evaluation quality assessment and are used as a tool for providing structured feedback to the evaluator.

The quality of the draft evaluation report is assessed and rated against the following criteria:

GEF Report Quality Criteria	**UNEP EOU Assessment**	**Rating**
A. Did the report present an assessment of relevant outcomes and achievement of project objectives in the context of the focal area program indicators if applicable?		
B. Was the report consistent and the evidence complete and convincing and were the ratings substantiated when used?		
C. Did the report present a sound assessment of sustainability of outcomes?		
D. Were the lessons and recommendations supported by the evidence presented?		
E. Did the report include the actual project costs (total and per activity) and actual co-financing used?		
F. Did the report include an assessment of the quality of the project M&E system and its use for project management?		
UNEP EOU additional Report Quality Criteria	**UNEP EOU Assessment**	**Rating**
G. Quality of the lessons: Were lessons readily applicable in other contexts? Did they suggest prescriptive action?		
H. Quality of the recommendations: Did recommendations specify the actions necessary to correct existing conditions or improve operations ('who?' 'what?' 'where?' 'when?)'. Can they be implemented? Did the recommendations specify a goal and an associated performance indicator?		
I. Was the report well written? (clear English language and grammar)		
J. Did the report structure follow EOU guidelines, were all requested Annexes included?		
K. Were all evaluation aspects specified in the TORs adequately addressed?		
L. Was the report delivered in a timely manner		

GEF Quality of the MTE report = 0.3*(A + B) + 0.1*(C+D+E+F)

EOU assessment of MTE report = 0.3*(G + H) + 0.1*(I+J+K+L)

Combined quality Rating = (2* 'GEF EO' rating + EOU rating)/3

The Totals are rounded and converted to the scale of HS to HU

Rating system for quality of terminal evaluation reports
A number rating 1-6 is used for each criterion: Highly Satisfactory = 6, Satisfactory = 5, Moderately Satisfactory = 4, Moderately Unsatisfactory = 3, Unsatisfactory = 2, Highly Unsatisfactory = 1, and unable to assess = 0.

Annex 4 to Appendix 9

GEF Minimum requirements for M&E

Minimum Requirement 1: Project Design of M&E[3]

All projects must include a concrete and fully budgeted monitoring and evaluation plan by the time of Work Program entry (full-sized projects) or CEO approval (medium-sized projects). This plan must contain at a minimum:

- SMART (see below) indicators for project implementation, or, if no indicators are identified, an alternative plan for monitoring that will deliver reliable and valid information to management
- SMART indicators for results (outcomes and, if applicable, impacts), and, where appropriate, corporate-level indicators
- A project baseline, with:
  - a description of the problem to address
  - indicator data
  - or, if major baseline indicators are not identified, an alternative plan for addressing this within one year of implementation
- An M&E Plan with identification of reviews and evaluations which will be undertaken, such as mid-term reviews or evaluations of activities
- An organizational setup and budgets for monitoring and evaluation.

Minimum Requirement 2: Application of Project M&E

- Project monitoring and supervision will include implementation of the M&E plan, comprising:
- Use of SMART indicators for implementation (or provision of a reasonable explanation if not used)
- Use of SMART indicators for results (or provision of a reasonable explanation if not used)
- Fully established baseline for the project and data compiled to review progress

[3] http://gefweb.org/MonitoringandEvaluation/MEPoliciesProcedures/MEPTools/meptstandards.html

- Evaluations are undertaken as planned
- Operational organizational setup for M&E and budgets spent as planned.

SMART INDICATORS GEF projects and programs should monitor using relevant performance indicators. The monitoring system should be "SMART":

1. **Specific**: The system captures the essence of the desired result by clearly and directly relating to achieving an objective, and only that objective.
2. **Measurable:** The monitoring system and its indicators are unambiguously specified so that all parties agree on what the system covers and there are practical ways to measure the indicators and results.
3. **Achievable and Attributable:** The system identifies what changes are anticipated as a result of the intervention and whether the result(s) are realistic. Attribution requires that changes in the targeted developmental issue can be linked to the intervention.
4. **Relevant and Realistic:** The system establishes levels of performance that are likely to be achieved in a practical manner, and that reflect the expectations of stakeholders.
5. **Time-bound, Timely, Trackable, and Targeted:** The system allows progress to be tracked in a cost-effective manner at desired frequency for a set period, with clear identification of the particular stakeholder group to be impacted by the project or program.

Annex 5 to Appendix 9

2.1 List of intended additional recipients for the Terminal Evaluation (to be completed by the IA Task Manager)

Name	Affiliation	Email
Aaron Zazuetta	GEF Evaluation Office	azazueta@thegef.org
Government Officials		
GEF Focal Point(s)		
Executing Agency		
Implementing Agency		

Annex 10: Terms of Reference

(i) Project Coordinator
The Director of ACCESS will be the Executive Project Coordinator at the Regional Secretariat in Nairobi supported by a Data and Information Manager, and part-time procurement and Finance Manager. An appropriate level of support staff would also be hired in the Secretariat.

The Executive Project Coordinator will be responsible to the Regional Management Board for the overall project management activities. He will lead the QA/QC and the distance education/training components of the project. He will provide technical support required in the design, implementation and operationalizing nutrient deposition network in consultation with International and Regional consultants. He will be responsible for the preparation of workplan and terms of engagement by the participating countries in consultation with Technical Heads of Agencies responsible for operating and maintaining monitoring sites in these countries.

(iii) Regional Procurement and Financial Manager (RP &FM)
The Regional Finance and Procurement Manager will be stationed in the Regional Executive Secretariat (REC) at ACCESS, University of Nairobi and will be responsible for establishing a financial and procurement Management System that will be adequate to account and report for project resources and expenditure. S/He will also be responsible for preparation of financial management manual for the project and for facilitating harmonization and uniformity of procedures used by each participating country. H/She will work under the supervision of the Director of ACCESS and will coordinate with the other project personnel to ensure adequate project management.

Main duties and responsibilities:
- Procurement of goods and services, including preparation of bidding documents, specifications and contracts.
- Ensure adequate administrative and financial management in accordance with UNEP procedures.
- Hold regular meetings with the Director of ACCESS on administrative and financial issues.
- Draft correspondence related to administrative and financial issues.
- Provide assistance in preparing annual workplans and budgets.
- Monthly accounts and financial reports, and bookkeeping.
- Prepare disbursement requests and keep track of project disbursements.
- Management of administrative, accounting and financial files
- Provide support to project audits and external evaluations.

Profile: At least 5 years of experience in accounting and financial matters; experience in project administrative and financial management; acquaintance with UNEP procedures is highly desirable; computer skills; initiative and responsibility; teamwork ability, high flexibility and capacity to work under pressure.

(**iii) Project Data and Information Technology Manager**
The Data and Information Manager will be responsible for documentation requirement for data recording and storage as well as for development of database features including the computer platform and software required for its operation. He will also be responsible for the maintenance of the website and the database. H/She will work under the supervision of the Project manager (Director of ACCESS), and will coordinate with the other project personnel to ensure adequate project management.

ACCESS

African Collaborative Centre for Earth System Science (ACCESS)

ACCESS Secretariat
University of Nairobi, Department of Geology
Chiromo Campus, Riverside Drive
P O Box 30197-00100 Nairobi, Kenya.
Tel/Fax: +254-20-4447740
Email: africanness@uonbi.ac.ke
Website: http://africanness.uonbi.ac.ke

09/02/2011

Ms. Maryam Niamir-Fuller
Director, UNEP-GEF Division
United Nations Environment Programme
P.O. Box 30552 Nairobi
Kenya.

Dear Ms. Niamir-Fuller,

RE: ACCESS Contribution to the Equatorial Africa Deposition Network (EADN) Project, amounting to BP £ 494,391.696

I am pleased to offer the award detailed in the attached letter as co-financing towards the costs of implementation of the above project. The award amounting to BP £ 494,391.696 is a grant from DFID and NERC of the United Kingdom to ACCESS (under my direction as Principal Investigator) for the establishment of East African Great Lakes Observatory (EAGLO). The funds awarded to EAGLO will support the work of EADN as the two projects complement each other and will run concurrently for the period of the project.

With the additional support, and in-kind contributions from ACCESS in terms of over-seeing the full implementation of the EADN project with the UNU-INWEH Regional Centre for Water Research and Education at Nairobi University, we look forward to a fruitful partnership with UNEP-GEF in the implementation of this important project in Equatorial African region.

Yours Sincerely,

Prof. Eric Odada
Director, ACCESS &
EAGLO Principal Investigator

African Collaborative Centre for Earth System Science
Dept. of Geology, Chiromo Campus
University of Nairobi
P. O. Box 30197 – 00100
Nairobi, Kenya

NATURAL
ENVIRONMENT
RESEARCH COUNCIL

Polaris House
North Star Avenue
Swindon SN2 1EU
United Kingdom

Telephone +44 (01793) 411500
Central Fax +44 (01793) 411501
www.nerc.ac.uk

Grants Admin
University of Nairobi
P.O. Box 30197
A 104
Nairobi
Kenya

Our Ref NE/I003266/1
Your Ref EAGLO-ESPA
Date 08/09/2010

FEC RESEARCH GRANT ANNOUNCEMENT

Dear Sir/Madam

ESPA Programme Framework

PROJECT TITLE: East African Great Lake Observatory

I am directed by the Natural Environment Research Council to offer an award as detailed below, towards the cost of the above project, under the direction of the Principal Investigator. Details of the grant are shown in the attachments to this letter. This award has been indexed and is cash limited in accordance with cross Research Council policy.

Grant terms and conditions require that a grant starts within 6 months of the announced start date (as shown in this award letter). This policy has not changed. However, given the current pressure on public funds, it would be helpful to NERC if every effort can be made to start as close to the announced start date as possible. Thank you for your help.

Submission of the Starting Certificate will constitute acceptance of the grant.

Yours faithfully

Jan Rogers

Ian Rogers
Research Grants Team
Telephone: (01793) 411574
Local Fax: (01793) 411545
E-Mail: JROG@nerc.ac.uk

c

Professor E O Odada	University of Nairobi
Dr V T Langenberg	Deltares-Delft
Dr S A Loiselle	Centre for Colloid and Surface Science
Professor F Kansiime	Makerere University

Principal Investigator: Eric Odada - Univ. Nairobi

Principal Investigator: David Harper - Univ. Leicester

Project Title: East African Great Lakes Observatory

Research Organisation: University of Nairobi

Collaborating Organisations:

Deltares

CSGI/Univ. Siena

Univ. Makerere

Please Note:

Only costs incurred by non-UK organisations will be paid at 100%

Overseas costs incurred by UK Institutions will be paid at 80%

Section A

Note costs in this table are pulled from costs entered in Section B. Only UK Estates and Indirect costs should be entered directly into the white cells here.
Applicants must ensure that all the totals are correct.

Summary Fund Heading	Fund Heading	£ Full economic cost	£ NERC Contribution	% NERC Contribution
Directly Incurred	Staff (UK)			80%
	Staff (non-UK)	53940	53940	100%
	Total Staff	***53940***	***53940***	
	Travel & Subsistence (UK)	2250	1800	80%
	Travel & Subsistence (non-UK)	107500	107500	100%
	Total Travel & Subsistence	**109750**	**109300**	
	Equipment (UK)	0	0	80%
	Equipment (non-UK)	0	0	100%
	Total Equipment	***0***	***0***	
	Other costs (UK)	0	0	80%
	Other costs ((non-UK)	67514	67514	100%
	Total Other costs	***67514***	***67514***	
	Sub-total Directly Incurred	**231204**	**230754**	
Directly Allocated	Investigators (UK only)	10378	8302.4	80%
	Estates costs (UK only)	1038	830.4	80%
	Other Directly Allocated (UK Only)	0	0	80%
	Sub-total Directly Allocated	11416	9132.8	
Indirect Costs	Indirect costs (UK)	6602.72	5282.176	80%
	Total UK costs	20269	16215	80%
	Total non-UK costs	228954	228954	100%
	Total Project Costs	**249222.72**	**245168.976**	

SECTION B

Enter all costs into the white cells. Extra rows should be added as needed, ensuring that formulas in the grey cells are changed to include these added rows

UK COSTS

UK Directly Incurred costs:

UK Directly Incurred Staff

Role	Name	months on project	% time on project	£ Cost to project 100%	£ Cost to NERC 80%
					0
					0
					0
					0
Total UK DI staff costs				*0*	*0*

UK Travel & Subsistence

Destination and purpose	£ Cost to project 100%	£ Cost to NERC 80%
Travel to Scientific conference (1st year) Kenya	750	600
Travel to Working Group 2 workshop (2nd year) Uganda	750	600
Travel to Working Group 3 workshop (2nd year) Burundi	750	600
Total UK T&S	*2250*	*1800*

UK Equipment costs

Description	Basic price £	import duty £	VAT £	£ Total cost to project 100%	Cost to NERC 80%
					0
					0
					0
Total UK Equipment costs				*0*	*0*

UK Other Directly Incurred Costs

Description	£ Cost to project 100%	£ Cost to NERC 80%
		0
		0
		0
		0
Total UK Other DI costs	*0*	*0*

UK Directly Allocated costs:

UK Directly Allocated Staff (UK Principal Investigators and Co-Investigators)

Role	Name	Total hours charged to grant	Average hours charged to grant per week	£ Cost to project 100%	£ Cost to NERC 80%
Principal investigator	David Harper	350	7	10378	8302.4
					0
					0
					0
Total UK DA staff costs				*10378*	*8302.4*

UK Other Directly Allocated

Description	£ Cost to project 100%	£ Cost to NERC 80%
		0
		0
		0
		0
Total UK Other Directly Allocated costs	***0***	***0***

NON-UK COSTS:

Non-UK Staff (including PI's and CoI's))

Role	Name	months on project	% time on project	£ Cost to project 100%	£ Cost to NERC 100%
Principal Investigator	Eric Odada	5	20	19500	19500
Investigator	Steven Loiselle	4	70	11520	11520
Investigator	Frank Kansiime	4	20	10920	10920
Investigator	Victor Landenberg	2	20	12000	12000
Total non-UK staff costs				***53940***	***53940***

Non-UK Travel & Subsistence (NB this does NOT include overseas costs for UK researchers)

Destination and purpose	£ Cost to project 100%	£ Cost to NERC 100%
Scientific conference (1st year) Kenya (21 Non-UK participants)	30000	30000
Working Group 1 - workshop and training (2nd year) Tanzania (14 Non-UK participants)	20500	20500
Working Group 2 - workshop (2nd year) Uganda (14 Non-UK participants)	20500	20500
Working Group 3 workshop (2nd year) Burundi (14 Non-UK participants)	20500	20500
Short term scentific exchanges (PhD or post-Docs)	16000	16000
Total non-UK T&S	***107500***	***107500***

Non-UK Other Directly Incurred/Overhead Costs

Description Indirect/overhead costs should be charged at 50% of Direct Costs for Developing Countries and 20% for Developed Countries (see Annex 4)	£ Cost to project 100%	£ Cost to NERC 100%
University of Nairobi (PI Odada) overhead costs	43000	43000
CSGI - University of Siena (Co-PI Loiselle) overhead costs	6404	6404
University of Makerere (Co-I Kansiime) overhead costs	15710	15710
Deltares overhead costs	2400	2400
		0
Total non-UK overheads costs	***67514***	***67514***

Non-UK Equipment costs

Description	Basic price £	import duty £	VAT £	£ Total cost to project 100%	Cost to NERC 100%
					0
					0
					0
Total non-UK Equipment costs				***0***	***0***

Alliance
for a Green Revolution
in Africa

February 4, 2011

Ms. Maryam Niamir-Fuller
Director, UNEP-GEF Division
United Nations Environment Programme
P.O. Box 30552
Nairobi, Kenya

Dear Ms. Niamir-Fuller:

Subject: Letter of In-Kind and Cash Contributions to the Equatorial Africa Deposition Network (EADN) Project

I would like to register my support and commitment to the implementation of the EADN project which focuses on monitoring atmospheric deposition for nutrients and other contaminants in the waters in the equatorial region of Africa.

The EADN project fits within the areas of focus of the GEF SIP for upscaling sustainable land management in sub-Saharan Africa and the GEF Land Degradation and International Waters Strategy. It also falls under the shared AGRA strategy of combatting land degradation through the promotion of integrated soil fertility management in sub-Saharan Africa.

In view of the above, I would like to commit an in-kind contribution of US$0.4m. Students at the universities will be used to deliver some of the research needed for this endeavor. The support will also cover some of the required staff time.

We look forward to the approval of the EADN proposal for funding support by the GEF secretariat.

Sincerely,

Dr. Bashir Jama
Director, Soil Health Program

Eden Square
Block 1, 5th Floor
PO Box 66773
Westlands, 00800
Nairobi, Kenya
Tel: + 254 20 3750 627 / 3675 000
Fax: + 254 20 3750 653 / 3675 269
www.agra-alliance.org

UNITED NATIONS
UNIVERSITY

UNU-INWEH

Institute for Water, Environment and Health

175 Longwood Road S.
Suite 204
Hamilton, Ontario L8P 0A1
Canada

Telephone +1 905 667 5511
Fax +1 905 667 5510
E-mail contact@inweh.unu.edu
Web www.inweh.unu.edu

15 January 2011

Ms. Maryam Niamir-Fuller
Director, UNEP-GEF Division
United Nations Environment Programme
P. O Box 30552 Nairobi, Kenya

Subject: UNU-INWEH's Contributions to the Equatorial Africa Deposition Network (EADN) Project

Dear Ms. Niamir-Fuller,

This is to confirm that the United Nations University Institute for Water, Environment and Health (UNU-INWEH) supports the Equatorial Africa Deposition Network (EADN) Project and will contribute significant in-kind activities to the project. We are fully supportive of this initiative under the GEF SIP for up-scaling Sustainable Land Management (SLM) in Sub-Saharan Africa and the GEF Land Degradation and International Waters strategy for providing regional input into government interventions targeting rural development in equatorial Africa.

UNU-INWEH will provide several in-kind services that are valued at a minimum of US$ 175,000 per year giving a total contribution of US$ 700,000 over 4 years. The services will include contributions to these aspects of the project: help in the design, implementation and operations of a unique nutrient deposition network, overseeing technical installation, methodology selection, database construction, data management, QC/QA, modeling evaluation, scientific interpretation, and help with the dissemination of results to a variety of regional and international stakeholders.

Our specific in-kind contributions will be in the form of partial salary costs and benefits for up to three of the personnel engaged in the project (Prof. Colin Mayfield, Dr. Alex Bielak and Mr. Andrew Dansie with their time valued at a total of US$ 95,000 per year), and the costs of other scientific, administrative and technical staff time involved in the financial management of the project, technical installation, methodology selection, database construction, data management, QC/QA, modeling evaluation, and scientific interpretation (valued at US$ 55,000 K per year).

Additionally, UNU-INWEH will provide the initial design template for the database structure and methodology for project knowledge management, cooperation and knowledge sharing to regional and international stakeholders (valued at US$ 25,000 per year to a project total of US$ 100,000).

We appreciate the opportunity to be engaged in this important African initiative and look forward to a strong collaboration for its implementation.

Yours Sincerely,

Dr. Zafar Adeel
Director, UNU-INWEH

cc: African Collaborative Centre for Earth System Science (ACCESS)
Department of Geology, University of Nairobi, P. O Box 30197-00100 Nairobi, Kenya
Dr. Colin Mayfield, Dr. Alex Bielak, Mr. Andrew Dansie

REPUBLIQUE DU BURUNDI

MINISTERE DE L'EAU, DE L'ENVIRONNEMENT, DE L'AMENAGEMENT DU TERRITOIRE ET DE L'URBANISME

INECN

BURUNDI

INSTITUT NATIONAL POUR L'ENVIRONNEMENT ET LA CONSERVATION DE LA NATURE

Gitega, le [illegible]/02/2009

N. Réf. : [illegible]

V. Réf. : ....

Object : **Letter of IN-Kind and Cash Contributions to the Equatorial Africa Deposition Network (EADN) Project**

Ms. Maryam Niamir-Fuller
Director, UNEP-GEF Division
United Nations Environment Programme
P.O Box 30552 Nairobi, Kenya

Dear Ms. Niamir-Fuller,

This is to confirm my support and commitment to the implementation of the above mentioned project and will focus on monitoring atmospheric deposition for nutrients and other contaminants in the equatorial African waters.

I have noted that EADN Project falls under the GEF SIP for upscaling Sustainable Land Management (SLM) in Sub-Saharan Africa and the GEF Land Degradation and International Waters strategy for providing regional input into government interventions targeting rural development in equatorial Africa.

In view of the aforesaid, I wish to inform you that my institution is fully supportive of this initiative and will be ready to offer in-kind contributions (office space) amounting to US$ 10,000 and professional services (staff salaries) equivalent to US$ 12,000, will also be made available. I should, therefore, be most grateful if you would facilitate the approval of the EADN proposal for funding by GEF Secretariat.

Yours sincerely,

NTUNGUMBURANYE Adelin

Director General of INECN

Copy to :

- Minister of Water, Environment, Land Management and Town Planning
  Republic of Burundi
- GEF Focal Point
  Republic of Burundi
- African Collaborative Centre for Earth System Science (ACCESS)
  Department of Geology, University of Nairobi
  P.O Box 30197-00100 Nairobi, Kenya

B.P. 56.Gitega • Tél. (257) 22403031 • Tél. &Fax: (257) 22403032
B.P. 2757 Bujumbura • Tél. (257) 22 234304
Email: inecndg@yahoo.fr

MINISTERE DE L'ENSEIGNEMENT SUPERIEUR
ET DE LA RECHERCHE SCIENTIFIQUE

LE DIRECTEUR

Station Géophysique de Lamto
BP 31 N'DOUCI

REPUBLIQUE DE CÔTE D'IVOIRE

Union – Discipline – Travail

African Collaborative Centre for Earth System Science (ACCESS)
Department of Geology, University of Nairobi
P. O Box 30197-00100 Nairobi, Kenya

Ms. Maryam Niamir-Fuller
Director, UNEP-GEF Division
United Nations Environment Programme
P. O Box 30552 Nairobi, Kenya

Date: August, 21st 2009

Dear Ms. Niamir-Fuller,

Re: Letter of In-Kind and Cash Contributions to the Equatorial Africa Deposition Network (EADN) Project

This is to confirm my support and commitment to the implementation of the above mentioned project that will focus on monitoring atmospheric deposition for nutrients and other contaminants in the equatorial African waters.

I have noted that EADN Project falls under the GEF SIP for upscaling Sustainable Land Management (SLM) in Sub-Saharan Africa and the GEF Land Degradation and International Waters strategy for providing regional input into government interventions targeting rural development in equatorial Africa.

In view of the aforesaid, I wish to inform you that my institution is fully supportive of this initiative and will be ready to offer in-kind contributions (office space, basic equipment, vehicle use, etc) amounting to US$ _18000___ and professional services (staff salaries, benefits, etc) equivalent to US$__15000_ . will also be made available. I should, therefore, be most grateful if you would facilitate the approval of the EADN proposal for funding by GEF Secretariat.

Yours sincerely,

Name: Dr Adama DIAWARA

Title: __Director_

REPUBLIQUE DEMOCRATIQUE DU CONGO
Ministère de la Recherche Scientifique et Technologique
CENTRE DE RECHERCHE EN SCIENCES NATURELLES
«CRSN»
DIRECTION SCIENTIFIQUE LWIRO.
DS BUKAVU

Ms. Maryam Niamir-Fuller
Director, UNEP - GEF Division
United Nations Environment Programme
P.O Box 30552 Nairobo,Kenya

Date: August 7th 2009

Dear Ms. Niamir-Fuller,

Re: **Letter of In-Kind and Cash Contributions to the Equatorial Africa Deposition Network (EADN)Project**

This is to confirm my support and commitment to the implementation of the above mentioned project that will focus on monitoring atmospheric deposition for nutrients and other contaminants in the equatorial African waters.

I have noted that EADN Project falls under the GEF SIP for upscaling Sustainable Land Management (SLM) in Sub-Sahara, Africa and the GEF Land Degradation and International Water strategy for providing regional input into government interventions targeting rural development in equatorial Africa.

In view of the aforesaid, I wish to inform you that my institution is fully supportive of this initiative and will be ready to offer in-kind contributions (office space, basic equipment, vehicle use, etc) amounting to US $ 3000/year and professional services (staff salaries, benefits, etc) equivalent to US $ 7200/year, will also be made available. I should, therefore, be most grateful if you would facilitate the approval of the EADN proposal for funding by GEF Secretariat.

Yours sincerely,

Name : Dr Karume Katcho
Title: Scientific Director of CRSN/Lwiro

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH
WATER RESEARCH INSTITUTE

Our Ref: CSIR/WRI/OP/GEN/SF.6/47 28th August, 2009

African Collaborative Centre for Earth System Science (ACCESS)
Department of Geology, University of Nairobi
P. O Box 30197-00100 Nairobi, Kenya

Ms. Maryam Niamir-Fuller
Director, UNEP-GEF Division
United Nations Environment Programme
P. O Box 30552 Nairobi, Kenya

Date: 28th August, 2009

Dear Ms. Niamir-Fuller,

Re: <u>**Letter of In-Kind and Cash Contributions to the Equatorial Africa Deposition Network (EADN) Project**</u>

This is to confirm my support and commitment to the implementation of the above mentioned project that will focus on monitoring atmospheric deposition for nutrients and other contaminants in the equatorial African waters.

I have noted that EADN Project falls under the GEF SIP for upscaling Sustainable Land Management (SLM) in Sub-Saharan Africa and the GEF Land Degradation and International Waters strategy for providing regional input into government interventions targeting rural development in equatorial Africa.

In view of the aforesaid, I wish to inform you that my institution is fully supportive of this initiative and will be ready to offer in-kind contributions (office space, basic equipment, vehicle use, etc) amounting to US$20,000 professional services (staff salaries, benefits, etc) equivalent to US$36,000, will also be made available. I should, therefore, be most grateful if you would facilitate the approval of the EADN proposal for funding by GEF Secretariat.

Yours sincerely,

Name: Dr. Yaw Opoku-Ankomah

Title: Director

DIRECTOR
CSIR WATER RESEARCH INSTITUTE
P. O. BOX AH 38, ACHIMOTA
P. O. BOX M 32, ACCRA

Tel: (+233-21) 775351/52, 761031
Fax: (+233-21) 777170, 761030 Email: wri@ghana.com

Achimota Golden Tulip
Off 27 - Achimota Road

UNIVERSITY OF NAIROBI
COLLEGE OF BIOLOGICAL AND PHYSICAL SCIENCES
DEPARTMENT OF CHEMISTRY
UNEP Chemicals certified laboratory for the Analysis of POPs in Developing Countries

Telephone: 4442015/6 ext. 2160
Tel/Fax: 4446138
E-mail: wandigas@uonbi.ac.ke;sowandiga@iconnect.co.ke
Web site: *http://www.uonbi.ac.ke/acad_depts/chemistry/shem.html;*
http://www.uonbi.ac.ke/acad_assoc/tracelements;
http://www.unep.org/roa/Nairobi_River_Basin/Publications/?case=WQ

P. O. Box 30197
Nairobi, Kenya.

28th July 2009

Ms. Maryam Niamir-Fuller
Director, UNEP-GEF Division
United Nations Environment Programme
P. O Box 30552 Nairobi, Kenya

Dear Ms. Niamir-Fuller,

Re: Letter of In-Kind and Cash Contributions to the Equatorial Africa Deposition Network (EADN) Project

This is to confirm my support and commitment to the implementation of the above mentioned project that will focus on monitoring atmospheric deposition for nutrients and other contaminants in the equatorial African waters.

I have noted that EADN Project falls under the GEF SIP for up-scaling Sustainable Land Management (SLM) in Sub-Saharan Africa and the GEF Land Degradation and International Waters strategy for providing regional input into government interventions targeting rural development in equatorial Africa.

In view of the aforesaid, I wish to inform you that the University of Nairobi as the Central Analytical Laboratory will provide several additional in-kind services that are costed at US$125K per year giving a total contribution of US$500K for 4 years and am fully supportive of this initiative. The services will include these aspects of the project plus any other duties assigned to CAL: office space, basic equipment, electricity and IT facilities, Central Analytical Laboratory activities and support to other laboratories, data compilation and distribution, staff salaries, and benefits. I should, therefore, be most grateful if you would facilitate the approval of the EADN proposal for funding by GEF Secretariat.

Yours sincerely,

Name: Prof. Shem O. Wandiga FRSC

Title: Professor of Chemistry

CC. African Collaborative Centre for Earth System Science (ACCESS)
Department of Geology, University of Nairobi
P. O Box 30197-00100 Nairobi, Kenya

The Officer In-Charge,
Senga Bay Fisheries Research Centre
P.O. BOX 316, Salima.
Tel: (265) 1 263 151/432
E-mail : ngocheram@yahoo.com

Ms. Maryam Niamir-Fuller
Director, UNEP-GEF Division
United Nations Environment Programme
P. O Box 30552 Nairobi, Kenya

Date: 15/08/2009

Dear Ms. Niamir-Fuller,

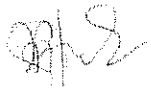
Re: Letter of In-Kind and Cash Contributions to the Equatorial Africa Deposition Network (EADN) Project

This is to confirm my support and commitment to the implementation of the above mentioned project that will focus on monitoring atmospheric deposition for nutrients and other contaminants in the equatorial African waters.

I have noted that EADN Project falls under the GEF SIP for up-scaling Sustainable Land Management (SLM) in Sub-Saharan Africa and the GEF Land Degradation and International Waters strategy for providing regional input into government interventions targeting rural development in equatorial Africa.

In view of the aforesaid, I wish to inform you that my institution is fully supportive of this initiative and will be ready to offer in-kind contributions (office space, basic equipment, vehicle use, etc) amounting to US$ **70,000** and professional services (staff salaries, benefits, etc) equivalent to US$ **10,000**, will also be made available. I should, therefore, be most grateful if you would facilitate the approval of the EADN proposal for funding by GEF Secretariat.

Yours sincerely,



Maxon Ngochera
OFFICER IN-CHARGE

THE SCIENTIFIC RESEARCH ASSOCIATION OF MOZAMBIQUE (AICIMO)

Head Office: 2115, Acordos de Lusaka Avenue (facilities of the Ministry of Environmental Affairs) * P. O. Box **4562**
MAPUTO * MOZAMBIQUE
NUIT: 700084493

PRESIDENT: **Eng. Patricio Sande**, Mobile: +258 82 4674910
e-mails: aicimo@tdm.co.mz, pasande@tdm.co.mz, patricio.sande@gmail.com

African Collaborative Centre for Earth System Science (ACCESS)
Department of Geology, University of Nairobi
P. O Box 30197-00100 Nairobi, Kenya

Ms. Maryam Niamir-Fuller
Director, UNEP-GEF Division
United Nations Environment Programme
P. O Box 30552 Nairobi, Kenya

Date: 25 August 2009

Dear Ms. Niamir-Fuller,

Re: Letter of In-Kind and Cash Contributions to the Equatorial Africa Deposition Network (EADN) Project

This is to confirm my support and commitment to the implementation of the above mentioned project that will focus on monitoring atmospheric deposition for nutrients and other contaminants in the equatorial African waters.

I have noted that EADN Project falls under the GEF SIP for upscaling Sustainable Land Management (SLM) in Sub-Saharan Africa and the GEF Land Degradation and International Waters strategy for providing regional input into government interventions targeting rural development in equatorial Africa.

In view of the aforesaid, I wish to inform you that my institution is fully supportive of this initiative and will be ready to offer in-kind contributions (office space, basic equipment, vehicle use, etc) amounting to US$ 10000 and professional services (staff salaries, benefits, etc) equivalent to US$8000, will also be made available. I should, therefore, be most grateful if you would facilitate the approval of the EADN proposal for funding by GEF Secretariat.

Yours sincerely,

Name: Patricio SANDE

Title: President

NB: The in-kind and professional services contribution is variable depending on each institution. Therefore, the figure should be different in each case.

UNIVERSITY OF LAGOS
FACULTY OF SCIENCE
CHEMISTRY DEPARTMENT

Head of Department
Professor B. I. Alo
B. Sc. (Chem.). Ph.D.(Ibadan)
FCSN, FICCON, FNES, FIPAN

Akoka, Yaba, Lagos, Nigeria
chemistry@unilag.edu.ng
014932660-1 ext 1710

31st August, 2009.

Ms Maryam Niamir-Fuller
Director, UNEP-GEF Division
United Nations Enviroment Programme
P.O.Box 30552 Nairobi, Kenya.

Dear Ms Maryam Niamir-Fuller

Re: Letter of In- Kind and cash Contribution to the Equatorial Africa Disposition Network (EADRN) Project

This is to confirm my support and commitment to the implementation of the above mentioned project that will focus on monitoring atmospheric deposition for nutrients and other contaminants in the equatorial African waters.

I have noted that EADN project falls under the GEF SIP for up-scaling Sustainable Land Management (SLM) in Sub- Saharan Africa and GEF Land Degradation and International Waters strategy for providing regional input into government interventions targeting rural development in equatorial Africa.

In view of the aforesaid, I wish to inform you that my institution is fully supportive of this initiative and will be ready to offer in- kind contributions (office space, basic equipment, land/water transport, etc) amounting to **US$ 25, 800** and professional services (staff salaries, benefits etc) equivalent to **US$ 30, 160** will also be made available. I should therefore be most grateful if you would facilitate the approval of the EADN proposal for funding by GEF Secretariat.

Yours sincerely

Prof. B. I. Alo
Head and Professor of Chemistry

Copy:
EADN LEAD SPECIALIST (Prof. Eric O. Odada)
African Collaborative Centre for Earth System Science (ACCESS)
Department of Geology, University of Nairobi
P.O.Box 30197-00100
Nairobi, Kenya

Université Cheikh Anta DIOP de Dakar / Ecole Supérieure Polytechnique
LABORATOIRE DE PHYSIQUE DE L'ATMOSPHERE ET DE L'OCEAN
Siméon FONGA NG

Dakar, 20 August 2009

To
Dr Maryam Niamir-Fuller
Director, UNEPGEF Division
United Nations Environment Programme
PO Box 30552 Nairobi, Kenya

Subject: contribution and support to the Equatorial Africa Deposition Network (EADN) project

Dear Dr Niamir-Fuller,

This letter is to confirm that LPAOSF will support and contribute to the implementation of the above mentioned project. We believe that our involvement will help to the objective of monitoring atmospheric deposition for nutrients and other contaminants in the Equatorial African waters.

The proposed project is also important when considering that it falls under the GEF SIP for scaling up Sustainable Land Management (SLM) in Sub-Saharan Africa, as well as the GEF Land Degradation and International Water issues.
LPAOSF will participate as a key implementation partner and ready to provide in-kind contributions and professional services respectively totalling US$15000 and US$15000 during the project.

I strongly support this project and look forward to an approval of the EADN proposal.
Sincerely

Dr Amadou Th. GAYE
Associate Professor, Director,
Laboratory of Atmospheric and Ocean Physics- Siméon Fongang (LPAO-SF)
Cheikh Anta Diop University, Dakar, SENEGAL

BP 5085 Dakar Fann Sénégal Tel (00 221) 33 825 93 64 Fax (00 221) 33 825 93 64 Email: atgaye@ucad.sn

MINISTRY OF WATER AND IRRIGATION

Telephone: +255-22-2450838/40
Facsimaile: +255-28-2502523
E-mail:
In reply please quote

P.O. Box 9153
Dar-es-Salaam.
Tanzania.

Ref.No.MA/246/544/01.E

24th August, 2009

UNEP-GEF
United Nations Environment Programme
P. O Box 30552 Nairobi,
Kenya.
(Att. Mohamed Sessay)

Dear Sir,

Re: Letter of In-Kind and Cash Contributions to the Equatorial Africa Deposition Network (EADN) Project

This is to confirm my support and commitment to the implementation of the above mentioned project that will focus on monitoring atmospheric deposition for nutrients and other contaminants in the equatorial African waters.

I have noted that EADN Project falls under the GEF SIP for up-scaling Sustainable Land Management (SLM) in Sub-Saharan Africa and the GEF Land Degradation and International Waters strategy for providing regional input into government interventions targeting rural development in equatorial Africa.

In view of the aforesaid, I wish to inform you that my institution is fully supportive of this initiative and will be ready to offer in-kind contributions (office space, basic equipment, land/water transport, etc) amounting to **US$ 19,800** and professional services (staff salaries, benefits, etc) equivalent to **US$ 25,160**, will also be made available. I should, therefore, be most grateful if you would facilitate the approval of the EADN proposal for funding by GEF Secretariat.

Yours sincerely,

Dr. Hassan J. Mjengera
For: PERMANENT SECRETARY

Copy:
EADN LEAD SPECIALIST (Prof. Eric O. Odada)
African Collaborative Centre for Earth System Science (ACCESS)
Department of Geology, University of Nairobi
P. O Box 30197-00100
Nairobi, Kenya

MAKERERE UNIVERSITY
P.O. Box 7062 Kampala Uganda
Fax: + 256-41-531061
Tel: + 256 - 41 - 540992
E-mail: Chemistry@Chemistry.mak.ac.ug

DEPARTMENT OF CHEMISTRY

Date: 4th August, 2009

Director, UNEP-GEF Division
United Nations Environment Programme
P. O Box 30552 Nairobi, Kenya

Dear Ms. Niamir-Fuller,

Re: Letter of In-Kind and Cash Contributions to the Equatorial Africa Deposition Network (EADN) Project

This is to confirm my support and commitment to the implementation of the above mentioned project that will focus on monitoring atmospheric deposition for nutrients and other contaminants in the equatorial African waters.

I have noted that EADN Project falls under the GEF SIP for up scaling Sustainable Land Management (SLM) in Sub-Saharan Africa and the GEF Land Degradation and International Waters strategy for providing regional input into government interventions targeting rural development in equatorial Africa.

In view of the aforesaid, I wish to inform you that my institution is fully supportive of this initiative and will be ready to offer in-kind contributions (office space, basic equipment, vehicle use, etc) amounting to **US$ 30,000 per year** and professional services (staff salaries, benefits, etc) equivalent to **US$ 43,200 per year**, will also be made available. I should, therefore, be most grateful if you would facilitate the approval of the EADN proposal for funding by GEF Secretariat.

Yours sincerely,

Dr. Ntale Muhammad
Head of Department

UNITED NATIONS
UNIVERSITY

UNU-INWEH

International Network on Water,
Environment and Health

175 Longwood Road S.
Suite 204
Hamilton, Ontario L8P 0A1
Canada

Telephone +1 905 667 5511
Fax +1 905 667 5510
E-mail contact@inweh.unu.edu
Web www.inweh.unu.edu

20 August 2009

Dr. Maryam Niamir-Fuller
Director, UNEP-GEF Division
United Nations Environment Programme
P. O Box 30552 Nairobi, Kenya

Subject: Contribution to the Equatorial Africa Deposition Network (EADN) Project

Dear Dr. Niamir-Fuller,

This is to confirm the support and commitment of UNU-INWEH to the implementation of the above mentioned project. Our support is based on the crucial role UNU-INWEH has played in conceptualization and formulation of this project. We consider this an important initiative which will address critical knowledge and information gaps regarding atmospheric deposition of nutrients and other contaminants in the equatorial African waters. Its outputs and recommendations will directly inform government interventions targeting rural development in equatorial Africa.

The significance of this project is also obvious when considering that it falls under the GEF SIP for scaling up Sustainable Land Management (SLM) in Sub-Saharan Africa, as well as the GEF Land Degradation and International Waters portfolios. Similarly, a broad spectrum of partners has aligned to undertake this project cooperatively, demonstrating its relevance.

I wish to inform you that UNU-INWEH will serve as a key implementation partner for this project together with ACCESS. We are ready to provide in-kind contributions totalling $50,000 during the project, primarily in the form of expertise and professional services related to the project tasks.

I appreciate the support provided by UNEP in preparation of this project and look forward to a favourable review of this proposal by the GEF Secretariat.

Sincerely,

Zafar Adeel, Ph.D.
Director, UNU-INWEH

République du Burundi

Bujumbura, le 27/06/2008

Ministère de l'Environnement, de l'Aménagement du Territoire et des Travaux Publics

770/cab/761/08

Point Focal Opérationnel FEM
B.P 1696 Bujumbura
Tél : + 257 22 22 49 79
Mobile : + 257 79 954 960
Fax : + 257 22 22 89 02
E-mail : nasalvator@yahoo.fr

To: Ms Monique Barbut
CEO and Chairperson of GEF

Subject: Endorsement for Project titled : **EADN Project (Projet de constitution réseau de surveillance de dépôts de macroélémnts en Afrique Equatoriale)**

In my capacity as GEF Operational Focal Point for **Burundi**, I confirm that the above project proposal (a) is in accordance with the government's national priorities and the commitments made by **Burundi** under the relevant global environmental conventions and (b) has been discussed with relevant stakeholders, including the global environmental convention focal points, in accordance with GEF's policy on public involvement.

Accordingly, I am pleased to endorse the preparation of the above project proposal with the support of **UNEP**. If approved, the proposal will be prepared and implemented **by National Institute for Environment and Nature Conservation (INECN)**. Further, I request the **UNEP** to provide a copy of the project document for review and comments before it is submitted to the GEF Secretariat for CEO endorsement.

I understand that the total GEF financing being requested for this report preparation is 3, 677, 500 US $.

I consent to the utilization of the following indicative allocations available to **Burundi** in GEF-4 under the GEF Resource Allocation Framework to cover its share in the GEF project preparation and implementation as well as the associated Agency fees for this project.

Sincerely,

Mr Salvator NDABIRORERE

Advisor of the Ministry for Environment, Land Planing and Publics Works and
Operational Focal Point

Copy to:

- Mr Anatole KANYENKIKO
  Minister for Environment, Land Planing and Publics Works
  and Political Focal Point

- UNEP Executive at Nairobi
- Mr Adelain NTUNGUMBURANYE, General Director of the National Institute for Environment and Nature Conservation and CDB Focal Point

Bujumbura - Burundi

B.P. 631 BUJUMBURA – BURUNDI Tél : (257) 22 49 79, (257) 22 40 42 27 Télécopieur : (257) 22 89 02

POINT FOCAL OPERATIONNEL
DU FONDS POUR L'ENVIRONNEMENT
MONDIAL (PFO/FEM)

119/08

REPUBLIQUE DE COTE D'IVOIRE
Union - Discipline - Travail

TRANSMISSION PAR TELECOPIE

EXPEDITEUR	:	**Koné-Bakayoko Alimata** Coordonnateur du Point Focal Opérationnel du FEM Côte D'Ivoire
Tél	:	(225) 20 20 98 30
FAX	:	*(225) 20 21 55 53*
DESTINATAIRES	:	**Mme Monique Barbut** Présidente Directrice Générale Secrétariat du FEM
FAX	:	*1(202) 522 32 40/3245*
CC	:	**Ms. Maryam Niamir-Fuller** **Director** UNEP Division of GEF, Coordinator
FAX	:	*254 20 762 4166*
	:	**M. Mohamed Sessay** **Project Contact Person** UNEP
FAX	:	*254 20 762 4166*
OBJET	:	***Lettre d'endossement du projet « Equatorial Africa Deposition Network (EADN) »***

UNEP
DIVISION OF GEF COORDINATION
RECEIVED
30 JUN 2008
WHO: MNF/CT/MS/EM
FILE IN:

MESSAGE :

J'ai l'honneur de vous transmettre ci-joint, un courrier relatif à l'objet susmentionné.

Cette correspondance vous sera transmise dans les meilleurs délais par DHL.

Considération distinguée.

POINT FOCAL OPERATIONNEL F.E.M

KONE-BAKAYOKO Alimata

Nombre de pages : 09 (y compris celle-ci).

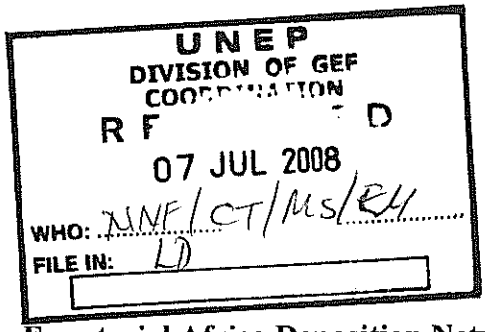
POINT FOCAL OPERATIONNEL
DU FONDS POUR L'ENVIRONNEMENT
MONDIAL (PFO/FEM)

119/08

REPUBLIQUE DE COTE D'IVOIRE
Union - Discipline - Travail

June 26th , 2008

To : Ms. Maryam Niamir –Fuller
Director
UNEP Division of GEF
Coordinator
Tel. + 254 20 762-4166



Objet : Endorsment for « Equatorial Africa Deposition Network (EADN) »

In my capacity as GEF Operational focal Point for Côte d'Ivoire, I confirm that the above project proposal (a) is in accordance with the government's national priorities and the commitments made by Côte d'Ivoire under the relevant global environmental conventions and (b) has been discussed with relevant stakeholders including the global environmental convention focal points in accordance with GEF's policy on public involvement.

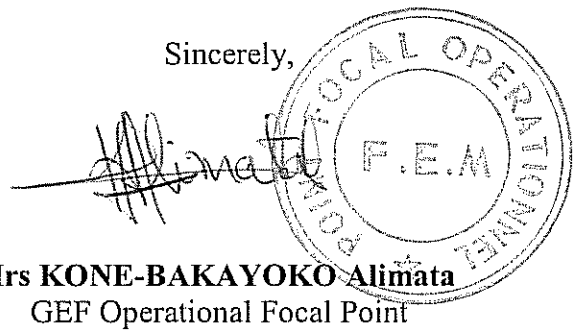
Accordingly I'm pleased to endorse the preparation of the above project proposal with the support for UNEP if approved the proposal will be prepared and implemented by the Ministry of Environment, Water and Forestry. Further, I request UNEP to provide a copy of the project Document for information before it is submitted to the GEF Secretariat for CEO endorsement.

I understand that the total GEF financing being requested for this project is $ 2,217,250, inclusive of project preparation grant (PPG), if any, and Agency fee (10%) to UNEP for project cycle management services associated with this project.

I thank you for your continued cooperation and support.

Land Degradation, International Water : $ 2,217,250

Sincerely,



Mrs KONE-BAKAYOKO Alimata
GEF Operational Focal Point

Copy to:
- CEO and Chairperson, GEF
- Minister of Environment, Waters and Forests, GEF Political Focal Point
- CEO of National Investment Bank
- Project Contact Person, UNEP
- Land Degradation Focal Point
- International Water Focal Point

REPUBLIQUE DEMOCRATIQUE DU CONGO Bukavu, le .18.../..05.../2011

N° .114../00/COOPROV/ECN/SK/2011

PROVINCE DU SUD KIVU
COORDINATION PROVINCIALE DE L'ENVIRONNEMENT
ET CONSERVATION DE LA NATURE
the coordinator

Point Focal Opérationnel du Fonds pour
L'Environnement Mondial (PFO/FEM)

To : Ms. Maryam Niamir-Fuller, Director
UNEP Division of GEF coordination
P.O. Box 30552, Nairobi
Tel. + 254 20 762 4166
Email: maryam.niamir-fuller@unep.org

SUBJECT: Endorsement for ' Equatorial Africa Deposition Network (EADN)'

Dear Madam,

In my capacity as GEF Operational Focal Point for the Democratic Republic of Congo, I am confirm that the above project proposal (a) is in accordance with the government's national priorities and the commitments made by the Democratic Republic of the Congo under the relevant global environmental conventions and (b) has been discussed with the relevant stakeholders including the global environmental conventions focal point, in accordance with GEF's policy on public involvement.

Accordingly, I am pleased to endorse the above project proposal with the support for UNEP if approved the proposal will be prepared and implement by the Ministry of Environment, Nature Conservation and Tourism (MECNT). Further, I request UNEP to provide a copy of the project Document for information before it is submitted to the GEF for CEO endorsement.

I understand that the GEF financing being requested for this project is US$ 2,217,250 inclusive of project preparation grant (PPG), if any and Agency fee (10%) to UNEP for project cycle management services associated with this project.

I thank you for your continued cooperation and support.

Sincerely,

Patrick MAMBO-LEO YA-PATHY
Chef de Division

Copy to :

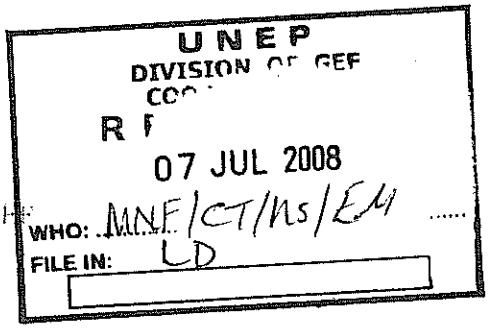
- Minister of Environment, Nature Conservation and Tourism
  Kinshasa, DR Congo
- General secretary of Environment and Nature Conservation
  Kinshasa, DR Congo
- Governor of Sud-Kivu's Province
  Bukavu, DR Congo
- Provincial Minister of Environment,
- CEO and Chairperson, GEF
- M. Mohamed Sessay, Projet contac Person, UNEP
  Email : Mohamed.sessay@unep.org
- Prof.Eric Odada, EADN Lead Coordinator
  Email:

120/08

Tel: (021) 664697 / 664695,
662465 / 667524
Fax: 233 (021) 662690

Email: support@epaghana.org

Environmental Protection Agency
P.O. Box M 326
Ministries Post Office
Accra, Ghana



Our Ref: EB:89/462/01/49

July 1, 200

Ms. Maryam Niamir-Fuller
Director, UNEP Division of GEF Coordination ,
P. O. Box 30552-00100
Nairobi Kenya

Dear Madam,

Endorsement for Proposed Equatorial African Deposition Network (EADN)

In my capacity as GEF Operational Focal Point for Ghana, I confirm that the above project proposal

(a) is in accordance with government's national priorities and the commitments made by Ghana under the relevant global environmental conventions and

(b) has been discussed with relevant stakeholders including the global environmental convention focal points, in accordance with GEF's policy on public involvement.

Accordingly, I am pleased to endorse the above project proposal.

Further, I request UNEP to provide a copy of the project document for our review before it is submitted to GEF secretariat for CEO endorsement.

I understand that the GEF financing being requested for this project is $2,217,250 inclusive of project preparation grant (PPG) and implementation and $192,250 for UNEP for project cycle management services, associated Agency fees for this project.

Yours Faithfully,

Jonathan A. Allotey
GEF Operational Focal Point, Ghana
EXECUTIVE DIRECTOR, EPA

Cc: Mr. Jonathan A. Allotey

UNCCD Focal Point
Environmental Protection Agency,
P.O. Box MB326, Accra

MINISTRY OF ENVIRONMENT & MINERAL RESOURCES

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

NEMA/ 10/7 Vol. XIII

18th April 2011

Maryam Niamir- Fuller
UNEP
Maryam.Niamir-Fuller@unep.org

472/11

Dear Madam

RE: ENDORSEMENT FOR 'EQUATORIAL AFRICA DEPOSITION NETWORK, EADN'

In my capacity as GEF Operational Focal Point for Kenya, I confirm that the above project proposal (a) is in accordance with the government's national priorities and the commitments made by Kenya under the relevant global environmental conventions and (b) has been discussed with the relevant stakeholders including the global environmental conventions focal point, in accordance with GEF's policy on public involvement.

Accordingly, I am pleased to endorse the above project proposal with the support from UNEP. If approved, the proposal will be implemented by University of Nairobi. Further, I request UNEP to provide a copy of the project Document for information before it is submitted to the GEF for CEO endorsement.

I understand that the GEF financing being requested for this project is US $ 2, 217, 250 inclusive of project preparation grant (PPG), if any, and Agency fee (10%) to UNEP for project cycle management services associated with this project.

I thank you for your continued cooperation and support.

Yours

DR. AYUB MACHARIA
DIRECTOR GENERAL, NEMA/ GEF OPERATIONAL FOCAL POINT

CC:
PERMANENT SECRETARY, MEMR
UNCCD FOCAL POINT, KENYA

The Permanent Secretary
Ministry of Environment and Natural Resources
NHIF Building, Ngong Road
P.O. Box 30126 00200
NAIROBI – KENYA
Tel:2730808
Fax No:2710015

Director General
National Environment Management Authority
Off Mombasa, Popo Road
P.O. Box 67839 00200
NAIROBI- KENYA
Tel: 6005522/7
Fax:6008997

Telephone:265 1 771111
Telefax No:265 1 773379

Our Reference No: EAD
Your Reference No: ....

Communications should be addressed to:
The Director of Environmental Affairs

ENVIRONMENTAL AFFAIRS DEPARTMENT
LINGADZI HOUSE
CITY CENTRE
PRIVATE BAG 394
LILONGWE 3
MALAWI

29th May, 2011

To: Ms. Maryam Niamir-Fuller
Director
UNEP Division of GEF Coordination
P.O. Box 30552, Nairobi
Tel. +254 20 762 4166
Email: Maryam.niamir-fuller@unep.org

Dear Madam,

Endorsement for 'equatorial Africa Deposition network, EADN'

In my capacity as GEF Operational Focal Point for Malawi I confirm that the above project proposal (a) is in accordance with the government's national priorities and the commitments made by Malawi under the relevant global environmental conventions and (b) has been discussed with the relevant stakeholders including the global environmental conventions focal point, in accordance with GEF's policy on public involvement.

Accordingly, I am pleased to endorse the above project proposal with the support for UNEP. If approved the proposal will be prepared and implemented by the University of Nairobi in collaboration with Senga Bay Fisheries Research Centre. Further, I request UNEP to provide a copy of the project Document for information before it is submitted to the GEF for CEO endorsement.

I understand that the GEF financing being requested for this project is US$2,217,50 inclusive of pmanagement services associated with this project.

I thank you for your continued cooperation and support.

Sincerely,

A.M. Kamperewera (PhD)
GEF Operational Focal Point
For: Director of Environmental Affairs

Copy to:
- CEO and Chairperson, GEF
- MOHAMED Sessay (Mohamed.sessay@unep.org) Project contact Person, UNEP
- UNCCD Focal Point

REPÚBLICA DE MOÇAMBIQUE

MINISTÉRIO PARA A COORDENAÇÃO DA ACÇÃO AMBIENTAL
DIRECÇÃO NACIONAL DE GESTÃO AMBIENTAL

To:

Executive Assistant Of CEO
GEF Secretariat

Maputo, 21th September 2006

Subject: **Endorsement of Project**

Dear Executive Assistant,

In my capacity of Mozambique GEF Operational Focal Point, I endorse the project to be presented to GEF Secretariat for funding:

Name of Project: Equatorial African deposition Network (EADN); **Focal Area**: Climate Change; **Duration**: 3 years; **Funding**: 7 millions Dólares for the all Countries.

REPÚBLICA DE MOÇAMBIQUE
MINISTÉRIO PARA A COORDENAÇÃO DA ACÇÃO AMBIENTAL
DIRECÇÃO NACIONAL DE GESTÃO AMBIENTAL

Horácio de Nagoia
GEF Operational Focal Point
National Director for Environment Management

FAX MESSAGE

TO: Prof Eric ODADA
Pan African START Secretariat (PASS)
University of Nairobi, Department of Geology
Chiromo Campus, Riverside Drive
P O Box 30197, **Nairobi, Kenya**

From: Manuel Chenene
(AICIMO)
2115 Acordos de Lusaka Avenue
Box 4562, Maputo
Mozambique

No of Pages: 2

Date: 22/September/2006

Dear Prof Odada,

Please find attached the letter of endorsement to the Project:

EQUATORIAL AFRICA DEPOSITION NETWORK (EADN), from Mozambican GEF focal Point.

Your sincerely

Manuel Chenene

Manuel Chenene

CC: Dr Bill Lane – World Bank

FEDERAL MINISTRY OF ENVIRONMENT

HEADQUARTERS, MABUSHI, ABUJA.

P.M.B. No.....

Telephone.....

Ref. No. FMEH/UD/PRS/IAE/002....

Date .....23rd June, 2011.....

Ms Maryam Niamir-Fuller
Director UNEP Division of GEF Coordination
P.O.Box 30552, Nairobi
+235 20 762 4166
Email: maryam.niamir-fuller@unep.org

Endorsement letter for the GEF UNEP Regional Project 'Equatorial Africa Deposition Network, EADN'

In my capacity as GEF Operational Focal Point for Nigeria, I confirm that the above project proposal related to UNEP supported activities (a) is in accordance with the government's national priorities and the commitments made by Nigeria under the relevant global environmental conventions and (b) has been discussed with the relevant stakeholders including the global environmental conventions focal point, in accordance with GEF's policy on public involvement.

Accordingly, I am pleased to endorse the above project proposal with the support of UNEP. If approved, the proposal will be prepared and implemented by the Federal Republic of Nigeria. Further, I request UNEP to provide a copy of the project document for information before it is submitted to the GEF for CEO endorsement.

I understand that the GEF financing being requested for this project is two million two hundred and seventeen thousand two hundred and fifty dollars (US$2,217,250) inclusive of project preparation grant (PPG), and Agency fee of (10%) to UNEP for project cycle management services associated with the project.

Sincerely,

O. B. Jaji (Mrs)
Director/ GEF Operational Focal Point
For: Honourable Minister

Copy to:

- CEO and Chairperson, GEF
- Mohamed Sessay (Mohamed.sessay@unep.org) project contact person, UNEP

République du Sénégal
Un Peuple - Un But - Une Foi

MINISTERE DE L'ENVIRONNEMENT
ET DE LA PROTECTION DE LA NATURE

DIRECTION DE L'ENVIRONNEMENT
ET DES ETABLISSEMENTS CLASSES

N°01663/MEPN/DEEC/DEC/ctk.can

Dakar, le 27 JUIN 2011

LE DIRECTEUR

To

Ms Maryam Niamir-Fuller
Director
UNEP Division of GEF Coordination
P.O. Box 30552, Nairobi
Tel. + 254 20 762 4166
Email: maryam.niamir-fuller@unep.org

Subject: Endorsement for 'Equatorial Africa Deposition Network, EADN'

In my capacity as GEF Operational Focal Point for Senegal, I confirm that the above project proposal (a) is in accordance with the government's national priorities and the commitments made by Senegal under the relevant global environmental conventions and (b) has been discussed with the relevant stakeholders including the global environmental conventions focal point, in accordance with GEF's policy on public involvement.

Accordingly, I am pleased to endorse the above project proposal with the support for UNEP if approved the proposal will be prepared and implemented by the Laboratoire de Physique de l'Atmosphère et de l'Océan Simon FONGANG (LPAOSF). Further, I request UNEP to provide a copy of the project Document for information before it is submitted to the GEF for CEO endorsement.

I understand that the GEF4 financing being requested for this project is US$1,865,000 inclusive of project preparation grant (PPG), if any, and Agency fee (10%) to UNEP for project cycle management services associated with this project.

I thank you for your continued cooperation and support.

Sincerely,

GEF Operational Focal Point

Le Directeur de l'Environnement et des Etablissements Classés

NDIAYE Cheikh SYLLA

Copy to:

- CEO and Chairperson, GEF
- Mohamed Sessay (Mohamed.sessay@unep.org) Project contact Person, UNEP
- UNCCD Focal Point

THE UNITED REPUBLIC OF TANZANIA

Telegrams: "MAKAMU"
Telephone: 213983/2118416
Fax: 2125297/2113856/2113082
E-mail: sotchair@africaonline.co.tz

VICE-PRESIDENT'S OFFICE
P. O. BOX 5380
DAR ES SALAAM
TANZANIA

Our RefBD.78/201/01

30th September 2008

Monique Barbut
Chief Executive Officer and Chairperson
GEF Secretariat
1818 H Street NW
Washington, DC 20433, **USA**

Maryam Niamir-Fuller
Director
Division of Global Environment Facility (GEF) Coordination
United Nations Environment Programme (UNEP)
P.O. Box 30552,
Nairobi, **Kenya**

RE: ENDORSEMENT FOR EQUATORIAL AFRICA DEPOSITION NETWORK (EADN) PROJECT

In my capacity as GEF Operational Focal Point for Tanzania, I confirm that the above project proposal (a) is in accordance with the government's national priorities and the commitments made by Tanzania under the relevant global environmental conventions and (b) has been discussed with relevant stakeholders, including the global environmental convention focal points, in accordance with GEF's policy on public involvement.

Accordingly, I am pleased to endorse the preparation of the above project proposal with the support of UNEP. If approved, the proposal will be prepared and implemented by African Collaborative Center for Earth System Science (ACCESS) and the University of Dar es Salaam (Tanzania). Further, I request UNEP to provide a copy of the project document for review and comments before it is submitted to the GEF Secretariat for CEO endorsement.

I understand that the total GEF financing being requested for this project is $2,087,350 inclusive of project preparation grant (PPG), if any, and Agency fee (10%) to UNEP for project cycle management services associated with this project.

I thank you for your continued cooperation and support.

Yours Sincerely,

pp Ruth H. Mollel
PERMANENT SECRETARY

C.C: Prof. Michael A. Kishimba
Secretary General, African Association of Pure and Applied Chemistry (AAPAC)
Executive Secretary, African Network for the Chemical Analysis of
Pesticdes (ANCAP)
Chemistry Department,
University of Dar es Salaam,
P.O. Box 35061,
Dar es Salaam

Telephone : 256 414 707000
Fax : 256 414 230 163
: 256 414 234 023
Email : finance@finance.go.ug
Website : www.finance.go.ug

In any correspondence on this subject please quote No. ALD 58/141/01

THE REPUBLIC OF UGANDA

Ministry of Finance, Planning and Economic Development
Finance Headquarters Building
Plot 2-12 Apollo Kaggwa Rd.
P.O. Box 8147,
Kampala.
Uganda.

7th June 2011

Maryam Niamir-Fuller
GEF Executive Coordinator and Director
Division of Global Environment Facility (GEF) Coordination UNEP
PO Box 30552 Nairobi, Kenya
Fax: (254 20) 762-4041
NAIROBI
Email: maryam.niamir-fuller@unep.org

Subject: Endorsement for 'Equatorial Africa Deposition Network, EADN'

In my capacity as GEF Operational Focal Point for Uganda, I am confirming that the above project proposal (a) is in accordance with the government's national priorities and the commitments made by Uganda under the relevant global environmental conventions and (b) has been discussed with the relevant stakeholders including the global environmental conventions focal point, in accordance with GEF's policy on public involvement.

Accordingly, I am pleased to endorse the above project proposal with the support for UNEP if approved the proposal will be prepared and implemented by the UNEP. Further, I request UNEP to provide a copy of the project Document for information before it is submitted to the GEF for CEO endorsement.

I understand that the GEF financing being requested for this project is US$2,217,250 inclusive of the project preparation grant (PPG), if any, and Agency fee (10%) to UNEP for project cycle management services associated with this project.

I thank you for your continued cooperation and support.

Keith Muhakanizi
DEPUTY SECRETARY TO THE TREASURY/GEF OPERATIONAL FOCAL POINT

c.c. The CEO and Chairperson, GEF
c.c. Mohamed Sessay (Mohamed.sessay@unep.org) Project contact Person, UNEP

Appendix 13: Draft Procurement plan

To be finalized at inception

Appendix 14: IW GEF 4 Tracking Tool

The IW GEF 4 Tracking Tool will be used to report annually

Appendix 15: Responses to site survey questionnaire, and maps / photographs of proposed monitoring sites

Country	Burundi	Cote d'Ivoire	Ghana	Kenya Suba	Kenya GAW	Malawi	Mozambique	DRC	Rwanda	Tanzania	Uganda
Region	Gitega	Région des Lacs	Greater Accra Region	Nairobi	Nairobi	Central	Maputo	South Kivu			
City / Town	Gitega	Tiassalé	Accra	Nairobi	Nairobi	Salima	Maputo	Bukavu		Dar es Salaam	Kampala
Institution	INECN	Geophysical and Ecological research stations, Lamto	CSIR Water Research Institute	University of Nairobi	University of Nairobi	Senga Bay Fisheries Research Centre	The Scientific Research Association of Mozambique (AICIMO)	Centre de Recherche en Sciences Naturelles		University of Dar-es-Salaam	Makerere U
Contact 1	Mr. Adelin Ntugnumburanye ; Director General of INECN. inecndg@yahoo. fr . (257 22 40 30 32; (257) 22 23 83 51; Mobile: (257) 79 97 37 88.	Abdourahamane Konare	Dr. Y. Opoku-Ankomah. Director. P.O. Box M. 32. Tel: +233-21-775351/2, +233-21-779614/5. Fax: +231-21-777170	Professor Shem Wandiga, Dept. of Chemistry, U. of Nairobi, P.O. Box 30197, Nairobi. sowandiga@iconnect.co.ke. Tel: 254-020-4446138, 0722816153; Fax: 254-020-4446138	Professor Shem Wandiga, Dept. of Chemistry, U. of Nairobi, P.O. Box 30197, Nairobi. sowandiga@iconnect.co.ke. Tel: 254-020-4446138, 0722816153; Fax: 254-020-4446138		Patricio Sande, President, AICIMO. 2115, Acordos de Lusaka Avenue, Maputo, Mozambique. pasande@tdm.co.mz, aicimo@tdm.co.mz. Phone: +258 82 4674910			Dr. M.A. Kishimba, Professor of Chemistry.	Kiremire B Professor, C Department 7062, Kamp kiremire@c mak.ac.ug. 772 589 31
Contact 2	Mr Jérôme Karimumuryango; National Expert in POPs; karirome07@yahoo.fr; Mobile: (257) 79 93 58 01. BP 56 Gitega										
Site Supervisor	Ms. Aline Irimbere		Dr. I.O. Ahodgson	Jared Ooko	Peter M Bundi	Maxon Ngochera	António Pegado	J.-J. Bagalwa		Mr. Dickson K. Rutagemwa	Bernard T.
Supervisor Position (Title)	Official in charge of INECN Laboratory	Associate Researcher; Associate Prof University Cocody, coordinator of RIPIECSA project, and Atmospheric chemistry and climate research group	Senior Research Scientist	Senior Meteorological Assistant	Assistant Director, Climate and Pollution	Principal Fisheries Research Officer	Delegate of the Fisheries Research Institute in Niassa	Researcher		Task Leader, LVEMP Water Quality and Ecosystem Management Component	

Country	Burundi	Cote d'Ivoire	Ghana	Kenya Suba	Kenya GAW	Malawi	Mozambique	DRC	Rwanda	Tanzania	Uganda
Supervisor Highest academic degree	BS Chemistry	Ph.D.	Ph.D.	WMO Class II (Diploma)	M.Sc.	M.Sc.	Master's			Masters of Engineering	Ph.D.
Supervisor Field of expertise	Chemical analysis		Chemical Engineering	Meteorological Technician	Pollution Monitoring	Limnology	Geography and Remote Sensing (GIS)	Water Quality		Water and Environmental Resources Management	Chemistry
Supervisor Email						ngocheram@yahoo.com		mashibagalwa@yahoo.fr			
Supervisor Phone											
Site Operator 1	Mr Onésphore MASABO	Danko Raphael	Mrs. Patience Atsakpo	Oduor Kosogo	Kennedy Thiong'o	Titus Phiri	Paulo Marcos	Mushayuma		Mr. Omari Iddi Myanza	Arinaitwe K
Operator Position (Title)	Official in charge of biodiversity monitoring in Rusizi Natural Reserve	Technician	Principal Technologist	Observer	Principal Meteorologist, Mt. Kenya GAW Station	Fisheries Research Officer	Technician	Researcher		Senior Scientist, LVEMP Water Quality Management Component	Assistant L Chemistry I Makerere U
Operator Highest academic degree	BS Biology	Diploma	HND	WMO Class III	M.Sc.	B.Sc.	Grade 12			Masters of Engineering	Master's
Operator Field of expertise	Biodiversity Monitoring	Measurements of meteorological and atmospheric chemistry parameters	Environmental Chemistry	Meteorological Technician	Pollution Monitoring	Aquaculture & Fisheries Science	Fish and water sampling.	Malacology		Water and Environmental Resources Management	Chemistry
Site Operator 2	Mr. Alphonse Polisi										
Operator Position (Title)	Chief of Rusizi Natural Reserve										
Operator Highest academic degree	Agricultural Engineer										
Operator Field of expertise	Biodiversity monitoring										
Operator Email											
Operator Phone											

Country	Burundi	Cote d'Ivoire	Ghana	Kenya Suba	Kenya GAW	Malawi	Mozambique	DRC	Rwanda	Tanzania	Uganda
Address		22BP287 Abidjan 22				P.O. Box 316, Salima				P.O. Box 35061, Dar es Salaam, Tanzania	
E-mail		konarea@yahoo.com				ngocheram@yahoo.com				kishimba@chem.udsm.ac.tz	
Phone		(225) 09752125				M: (265) 9 943 238; (265) 1 263 432/151				+255 787 110388	
FAX		(225) 20323276				N/A				+255 22 2410078	
Altitude (m above sea level)	774		30	1250	3678	483	474	1750		1130	11
Latitude (degrees)	-3.34	6	6	0	0	-13	-12	-2		-2	0
Latitude (minutes)		130	16.923	-25	-3	44.267	41.167	***		31.443	2.9
Longitude (degrees)	29.7	5	0	34	37	34	34	28		32	3
Longitude (minutes)		20	3.498	8	17	36.878	48.05	***		52.427	28.3
Distance to nearest residence (m)	120	0	500	100	10000	<50	10	500		50	5
Distance to nearest town (1,000-10,000) (km)		9			40	25	0	3			3
Distance to nearest town (10,000-25,000) (km)	0.5			12	40	<200					3
Distance to nearest city (25,000-100,000) (km)				100	100	120	110				4
Distance to nearest city >100,000 (km)	2	140	3	100	100	120		40		2	4

Country	Burundi	Cote d'Ivoire	Ghana	Kenya Suba	Kenya GAW	Malawi	Mozambique	DRC	Rwanda	Tanzania	Uganda
Are there any major industrial complexes within 50 km of the proposed site?	No	Yes	Yes	Yes	No	Yes	No	No		No	Ye
Industrial Complex Description		Industrial pineapple plantation	Textile Factory	THE NEAREST INDUSTRIAL COMPLEX IS SONY SUGER, WHICH IS AN AGROCHEMICAL INDUSTRY DEALING WITH PRODUCTION OF SUGAR FROM SUGARCANE. IT IS A SMALL SIZED INDUSTRY PRODUCING 70,000 TONS OF SUGAR PER YEAR		Cotton milling; Oil refinery					Batte manufactu and coo manufa plastic pharma industries, aluminium manufactur
Distance to nearest building (m)	120	0		100	3000	<20	10	500		50	5
Distance to nearest trees (m)	120	0		5 to 10	6000	<20	10	200		10	50
Distance to nearest road (including dirt) (m)	100	15000		500	3000	<500	100	20		no roads	20
Distance to nearest cultivated field (m)	800	7000		1000	9000	<200	2000	100		no fields	30

Country	Burundi	Cote d'Ivoire	Ghana	Kenya Suba	Kenya GAW	Malawi	Mozambique	DRC	Rwanda	Tanzania	Uganda
Distance to nearest cattle tending (m)	150	7000		100 (very few cattle)	9000	2000	1500	1000		no cattle	100
Topography within a 1 km radius	Flat	Hilly	Hilly. Monitoring site is in a valley.	Hilly	Mountainous	flat; hilly	hilly	Hilly		hilly / rocky	Fl
Average annual rainfall (mm)	806	1200	1300	1020	1800 - 2200	1235	1235	150		960	26
Rainfall months	Nov-Dec; Jan-May	Mar - Nov. Short dry season in August	5 months	March - June	Apr.-May, Sep.-Nov.	Nov - March	Nov. - Apr.	***		March-May; Nov-Jan	March,
Prevailing direction wind is from	afternoon = S; night = N; morning = N		SW	East	East	SE	N and S	East		SE-NW, E-W	S, SW, W
Distance to nearest meteorological station (km)	3	0		0 (located at met station)	0 (located at met station)	<2 km	110	0		15	0.0
Distance from lakeshore (if applicable) (m)	1000	300	120	10 (Lake Victoria)	300000 (Lake Nakuru)	20	50	5000		5	25
Eco-region	2. Tropical / Subtropical Grasslands, Savannas and Shrublands	2. Tropical / Subtropical Grasslands, Savannas and Shrublands	4. Montane Grasslands and Shrublands	2. Tropical / Subtropical Grasslands, Savannas and Shrublands	4. Montane Grasslands and Shrublands	2. Tropical / Subtropical Grasslands, Savannas and Shrublands	2. Tropical / Subtropical Grasslands, Savannas and Shrublands	Albertine Rift montane forest		2. Tropical / Subtropical Grasslands, Savannas and Shrublands	2. Trop Subtro Grasslands and Shru
Active volcanoes within 100 km?	No	No	No	No	No	No	No	No		No	N
Site surrounded by fence?	No	Yes	No	Yes	No	Yes	Yes	No		No	Ye
Active security personnel on the site?	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes		No	Ye
Description of any security risks	Equipment theft; damage by domestic or wild animals.		Yes	Potential vandalism	Poachers	Local, but minimal				Vandalization of equipment	Theft of e
Is site accessible in rainy season?	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes		Yes	Ye

Country	Burundi	Cote d'Ivoire	Ghana	Kenya Suba	Kenya GAW	Malawi	Mozambique	DRC	Rwanda	Tanzania	Uganda
Electrical power supply?	No	Yes	Yes	No	Yes	Yes	Yes	Yes		No	Ye
Frequent electrical power losses?	Yes	No	Yes	NA	No	Yes	No	Yes			N
If so, which months	Jan - Dec		Intermittent			Nov - March					
Country map provided?	Yes	?			Yes		Yes				Ye
Local map provided?	Yes	?		2 maps. First is for GAW background site, second is for proposed site.			Yes				Ye
Description of sample storage facilities	The proposed site is located in the Rusizi Natural Reserve. So, 1 or 2 rooms of the Reserve Office will be used for sample storage. The Reserve Office is at 300 metres from the Site identified. The Office has no electricity.	There are buildings for housing, laboratories, eating rooms, kitchen, etc.	The building condition is good. The ventilation is good. However the working space is limited	There is a small meteorological office with a small store of about 3X3 metres and a round 2 m radius store that are being used by the meteorological station.	The equipment is housed in a "trailer container" facility which is limited in space.	a. The Senga Bay Fisheries Research Center is a fully operational laboratory. It has sufficient office space, residential houses, and several laboratory equipment. The equipment was left by the two previous projects i.e. the UK/SADC and the SADC/GEF projects.	The Fisheries Research station in Metangula – Lake Niassa, has a wet laboratory that allows some basic work with fish samples. The water and electricity run for 24 hours a day, refrigeration facilities are in place as well as some space to keep stationary and bottles containing water samples. Basic equipment such as a compound microscopic, electronic balance, CTD, research boat, is also available in the station.			The samples will be stored in a cool box containing ice and transported immediately to the laboratory located about 4km form the site.	Samples are one refriger freezer in a (Sample pre room) of ab 30 feet.
Distance between monitoring site and sample storage facilities (m)	300	0	200			10	50	50		4000	50000

Country	Burundi	Cote d'Ivoire	Ghana	Kenya Suba	Kenya GAW	Malawi	Mozambique	DRC	Rwanda	Tanzania	Uganda
Running water available?	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes		Yes	Yes
Distilled water available?	No	Yes	Yes	Yes	Yes	Yes	No	Yes		Yes	Yes
Source of distilled water		Purchased locally	Purchased locally	Purchased locally	Purchased locally	Ion exchange and activated carbon columns		Ion exchange and activated carbon columns		Still	Purchased l
Filtration apparatus available?	No	Yes	No	No	?	Yes	No	Yes		Yes	Yes
Sample storage facilities available?	No	Yes	Yes	No	Yes	Yes	Yes	Yes		Yes	Yes
Refrigeration available?	No	Yes	Yes	No	Yes	Yes	Yes	Yes		Yes	Yes
Freezing facilities available?	No	Yes	Yes	No	No	Yes	Yes	No		Yes	Yes
Electricity at monitoring station?	No	Yes	Yes	No	Yes	Yes	Yes	Yes		No	Yes
Air conditioning?	No	Yes	Yes	No	No	No	Yes	No		No	No
Any QA/QC protocols in place?	No	No	Yes	No	Yes	Yes	No	No		Yes	Yes
Computer facilities available?	No	Yes	Yes	No	Yes	No	Yes	Yes		Yes	Yes
Computer OS		Windows 2000 / XP	Windows XP; Windows Vista		Windows XP		Windows XP, Vista	Windows XP, Vista		Windows XP	Windows 2
Internet access on site?	No	Yes	Yes	No	Yes	Yes	No	Yes		Yes	Yes
Telephone?	No	Yes	Yes	Yes (mobile)	Yes	Yes	Yes	Yes		Yes	Yes
FAX?	No	Yes	Yes	No	No		No	No		Yes	Yes

Country	Burundi	Cote d'Ivoire	Ghana	Kenya Suba	Kenya GAW	Malawi	Mozambique	DRC	Rwanda	Tanzania	Uganda
Photocopier?	No		Yes	No	No	Yes	Yes	No		Yes	Yes
Distance to nearest post office (km)	2	50	3	12	40	0.02	110	50		2	5
Institution overseeing EADN station	INECN (Institut National pour l-Environnement et la Conservation de la Nature)	Lamto geophysical research station	CSIR Water Research Institute	Kenya Meteorological Department jointly with the Department ofr Chemistry, U. of Nairobi.		Fisheries Department	Department of Aquatic Environment	Centre de Recherche en Sciences Naturelles		Mwanza Zonal Water Laboratory / LVEMP, under Water Laboratory Services Division of Ministry of Water and Irrigation	Pesticide R Laboratory, Chemistry Faculty of S Makerere U
Current research and monitoring at site	None	a. Savanna and fire ecology, status of biodiversity, meteorology, seismic detection, emission and deposition of particulate and gaseous species (IDAF).	Fisheries and Aquaculture	Normal meteorological station with about 7 years of met data.		Monitoring of water quality in major lakes and rivers. Monitoring the impact of cage culture development in Lake Malawi. Monitoring pond aquaculture. Assessment and monitoring of fish stocks in major water bodies	Fisheries research for commercial fish species	Physico-chemical analyses of water		Water Quality monitoring in Lake Victoria under LVEMP	Active and sampling ar precipitatio for analysis persistent o pollutants.
Overall institutional mandate	Environmental protection; wildlife protection; nature conservation		Research and Development in Water Resources			To provide the information necessary for sustainable exploitation, management, conservation of biodiversity and investment in the fisheries sector through appropriate biological, technological, sociological and environmental research programs	To monitor exploitation of fisheries resources and its relationship to the aquatic environment in order to recommend to the Fisheries Administration sustainable management measures.	Research in natural sciences		Authority in water quality issues in Lake Victoria region	Maintenanc sampling eq procuremer deployment sampling m sample prep analysis and processing.

Country	Burundi	Cote d'Ivoire	Ghana	Kenya Suba	Kenya GAW	Malawi	Mozambique	DRC	Rwanda	Tanzania	Uganda
Other related research / monitoring programs in country	Lake Victoria Environment Management Project	IDAF / AMMA; Lamto Geophysics / MESRS; Permanent	Climate change effects on water resources; CSIR WRI; 2009	Assessment of the atmospheric levels of fine particulate matter in Nairobi City and its environs. U. of Nairobi. 1 year	Assessment of the atmospheric levels of fine particulate matter in Nairobi City and its environs. U. of Nairobi. 1 year	Water Quality Monitoring	Water purification and treatment. Limpers Lda.	Water quality of Lake Kivu tributaries. Biological assessment using macroinvertebrate assemblage, diatoms index and physicochemical parameters.		Water Quality Monitoring (LVEMP) (6 years)	Water quali Directorate Resources Managemer Continuous National Fi Resources I Institute (co
	Updating the national chemicals management profile and developing a national chemicals database in Burundi	RIPIECSA. Lamto Geophysics / MESRS. 3 years (ends 2011).	Water Resources Information System II; Water Resources Commission; 2003-2008	Monitoring of the water quality of the Nairobi, Ngong and Mathare Rivers, within the Nairobi City and its environs. UNEP. 1.5 years.	Monitoring of the water quality of the Nairobi, Ngong and Mathare Rivers, within the Nairobi City and its environs. UNEP. 1.5 years.		National Laboratory of Food and Water Hygiene. Ministry of Health.	CRNS		Water Sector Development Program; Ministry of Water And Irrigation (15 years)	
		BIOTA. Lamto Ecology / Univ. Abobo-Adjame. 3 years (ends 2011)	Survey of Polluted Coastal Water Bodies in Ghana; CSIR-WRI/UNIDO; 2006-2010.	Application of passive sampler for monitoring POPs in ambient air. UNEP. 1.5 years.			Water National Directorate. Ministry for Public Works and Construction.				
Overseeing Agency	Direction Génélale de l'Aménagement du Territoire (Ministry of Environment) INECN					Fisheries Department					
Analytical Capacity											

Country	Burundi	Cote d'Ivoire	Ghana	Kenya Suba	Kenya GAW	Malawi	Mozambique	DRC	Rwanda	Tanzania	Uganda
Microbalance available		Yes	Yes	Yes	Yes	Yes	Yes	No		Yes	Yes
If yes, accurate to (mg)			0.001	0.1	0.1	0.001	0.01			0.1	0.1
Spectrophotometer available			Yes	Yes	Yes	Yes	No	Yes		Yes	No
Spec. Max. path length (cm)			1	1	1	100	No	1 cm		10 (needs 10 cm adapter)	
Desiccator		Yes	Yes	Yes	Yes	Yes	No	Yes		Yes	Yes
Drying oven		Yes	Yes	Yes	Yes	Yes	No	No		Yes	Yes
Muffle furnace		Yes	Yes	Yes	Yes	Yes	No	No		Yes	No
Water still		Yes	Yes	Yes	Yes	No	No	No		Yes	Yes
Atomic absorption spectrophotometer (AAS)			Yes	Yes	Yes	No	No	No		No (but possible at other labs in area, with additional glassware	Yes
Ion chromatography system		Yes	Yes (but faulty)	No	No	No	No	No		No (but possible at other labs in area, with additional glassware	Yes
Filtration apparatus		Yes	Yes	Yes	Yes	Yes	No	Yes		Yes	Yes
Photo-oxidizer		Yes	No	No	No	Yes	No	No		No	No
Glassware							No				
Erlenmeyer flasks		Yes	Yes	Yes	Yes	Yes	No	Yes		Yes	Yes
Beakers		Yes	Yes	Yes	Yes	Yes	No	Yes		Yes	Yes
Graduate cylinders		Yes	Yes	Yes	Yes	Yes	No	Yes		Yes	Yes
Volumetric flasks		Yes	Yes	Yes	Yes	Yes	No	Yes		Yes	Yes
Test tubes		Yes	Yes	Yes	Yes	Yes	No	Yes		Yes	Yes
Pipettes (specify volumes)		Yes	Yes, 1, 10, 25 ml	Yes, 0.1, 1.0, 5, 10, 25 ml	Yes, 0.1, 1.0, 5, 10, 25 ml	No	No	Yes. 100, 5000 ul		Yes (1, 5, 10, 25 ml)	Yes, 50 ul,
Acid bath		Yes	Yes	Yes	Yes	Yes	No	No		Yes	No

Country	Burundi	Cote d'Ivoire	Ghana	Kenya Suba	Kenya GAW	Malawi	Mozambique	DRC	Rwanda	Tanzania	Uganda
Fume hood		No	Yes	Yes	Yes	Yes	No	No		Yes	
Other		Centrifuge (2000 rpm)		HPLC; GC	HPLC; GC						GPC systen pump; wate system; rota evaporator sprctroscop UV/Visible Spectropho GC-ECD, N MS.
Analyses											
Dissolved phosphate (soluble reactive phosphorus)			Yes	Yes	Yes	Yes		Yes		Yes	Have capac
Total dissolved P		Have capacity	Yes	Yes	Yes	Yes		Yes		Yes	Have capac
Particulate P		Have capacity	Have capacity	Yes	Yes	Yes		No		Yes	Have capac
Nitrate		Have capacity	Yes	Yes	Yes	Yes		Yes		Yes	Have capac
Ammonium		No	Yes	Yes	Yes	Yes		Yes		Yes	Have capac
Total dissolved nitrogen		Yes	Yes	Yes	Yes	Yes		Yes		Yes	Have capac
Kjeldahl nitrogen		Yes	No	Yes	Yes	No		No		No, but have capacity	Have capac
Particulate nitrogen		Yes	Have capacity	Yes	Yes	No		No		Yes	Have capac
Dissolved calcium		Have capacity	Yes	Yes	Yes	No		No		Yes	Have capac
Dissolved potassium		Have capacity	Yes	Yes	Yes	No		No		No, but have capacity	Have capac
Dissolved sodium		Have capacity	Yes	Yes	Yes	No		No		No, but have capacity	Have capac
Dissolved chloride		Have capacity	Yes	Yes	Yes	No		No		Yes	Have capac
Dissolved sulphate		Have capacity	Yes	Yes	Yes	No		No		Yes	Have capac
Alkalinity		Yes	Yes	Yes	Yes	No		Yes		Yes	No
pH		Yes	Yes	Yes	Yes	No	Yes	Yes		Yes	No
Conductivity		Have capacity	Yes	Yes	Yes	No	Yes	Yes		Yes	Have capac

Country	Burundi	Cote d'Ivoire	Ghana	Kenya Suba	Kenya GAW	Malawi	Mozambique	DRC	Rwanda	Tanzania	Uganda
Metals (specify)		Not in Lamto; capacity exists at Yamoussoukro.	Ni, As, Zn, Cu, Cd, Pb, Mn, Fe, Hg	Fe, Mn, Cu, Pb, Cd, Hg, Co, As, Ni, W, Mo	Various heavy metals.					No, but plan to acquire AAS and/or GLC during LVEMP-2)	Hg, Pb, Zn, others when available
Organic pollutants (specify)		Not in Lamto; capacity exists at Abidjan.	Organochlorines	POPs, PCB, Pesticides, PAHs, VOCs, Petroleum Hydrocarbons.	POPs, PCB, Pesticides, PAHs, VOCs, Petroleum Hydrocarbons.					No, but have capacity	Organochlo organophos pesticides, brominated retardants,

Fig. 1: Map of Africa, showing proposed EADN monitoring sites.

Fig. 2. Site locations in Côte d'Ivoire and Ghana.
Côte d'Ivoire coordinates : 6° 13' N, 5° 02' W. Alt. = 105 m.
Ghana coordinates: 6° 19.923' N, 0° 3.498' E. Alt. = 30 m.

Fig. 2. Site locations in Burundi, Tanzania, Uganda and Kenya.
Burundi coordinates : 3.34 ^{o} S, 29.7^{o} E. Alt. = 774 m.
Tanzania coordinates: 2^{o} 31.443’ S, 32^{o} 52.427’ E. Alt. = 1,130 m.
Uganda coordinates: 0^{o} 2.917’ N, 32^{o} 28.317’ E. Alt. = 1,132 m.
Kenya Suba (Lake Victoria) coordinates: 0^{o} 25’ N, 34^{o} 8’ E. Alt. = 1,250 m.
Kenya GAW (Mt. Kenya) coordinates: 0^{o} 3’ N, 32^{o} 17’ E. Alt. = 3,678 m.

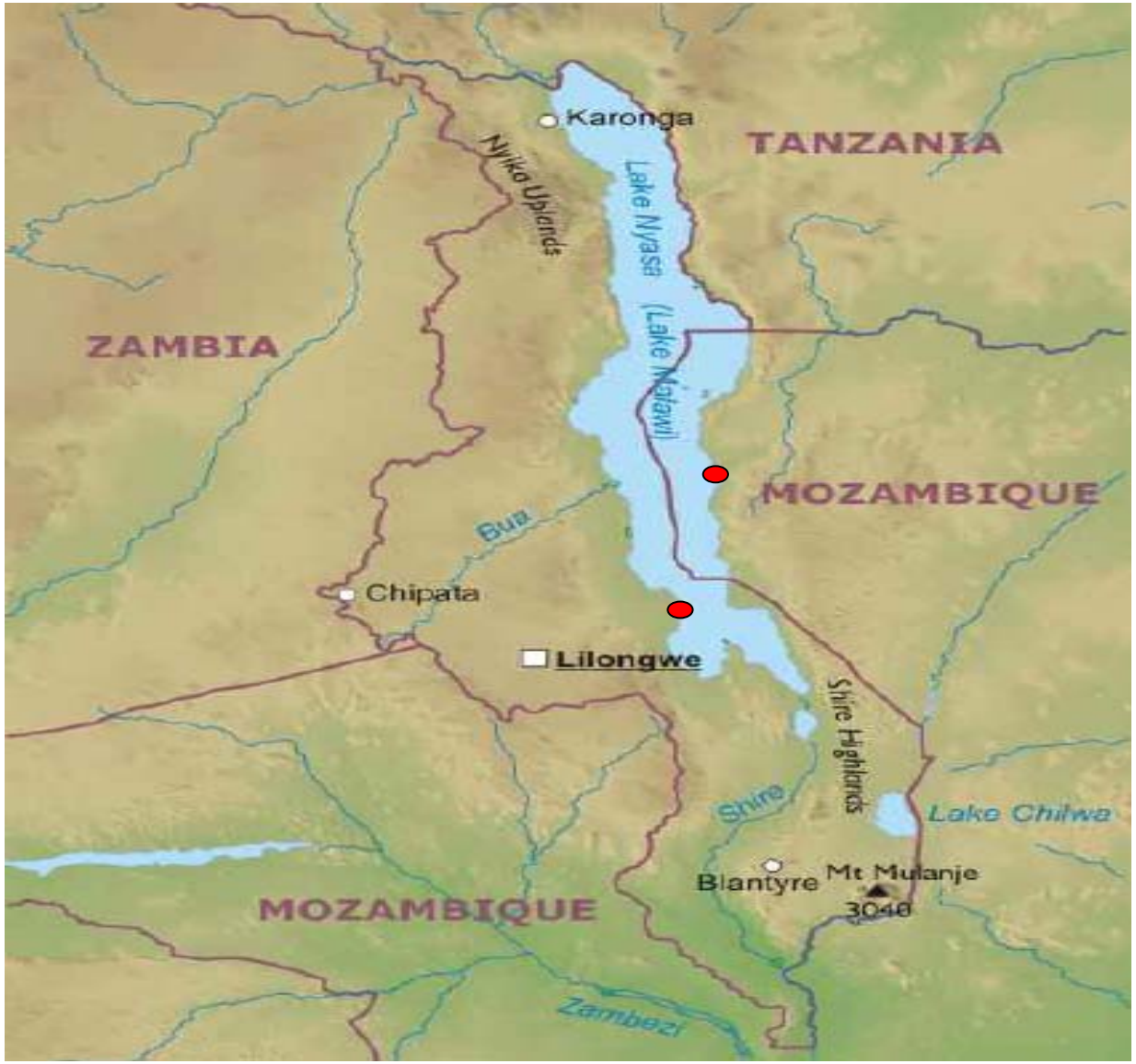


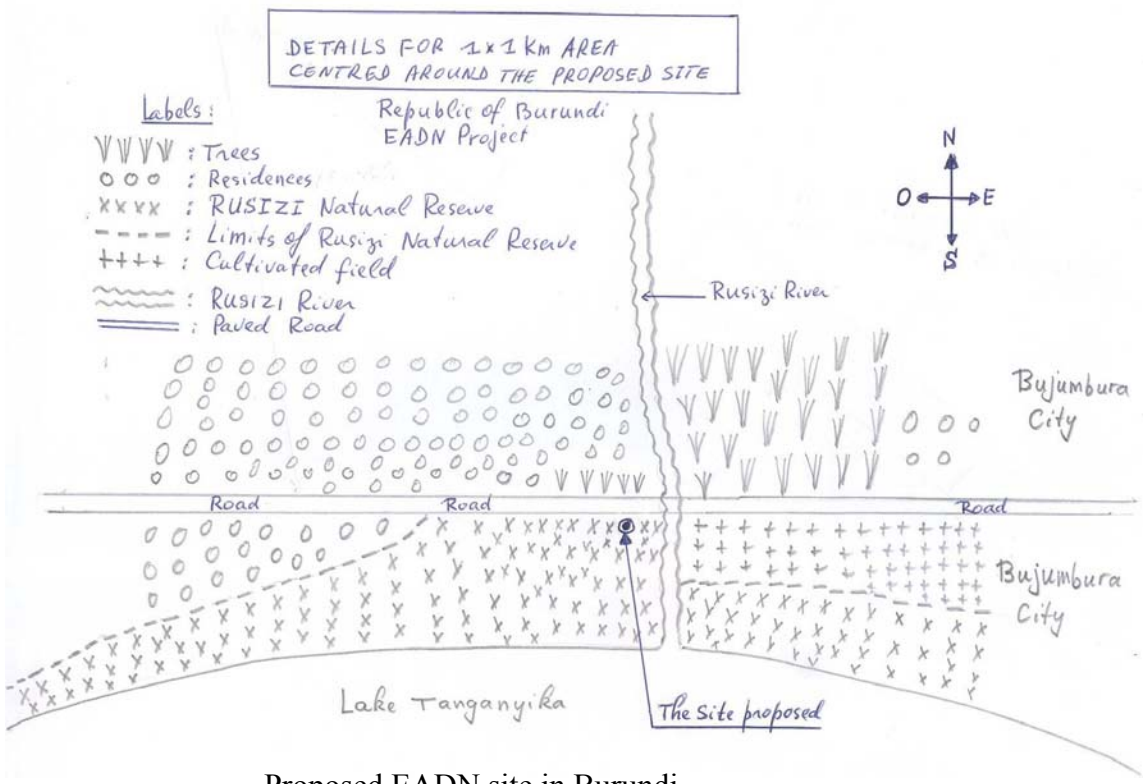
Fig. 2. Site locations in Malawi and Mozambique..
Malawi coordinates : 13^{o} 44.267’ S, 34^{o} 36.878’ W. Alt. = 483 m.
Mozambique coordinates: 12^{o} 41.167’ S, 34^{o} 48.05’ E. Alt. = 474 m.


NIGER
CHAD
Sahara Desert
Lake Chad
Kano
Maiduguri
BENIN
Kainji Reservoir
Jos Plateau
Mandara Mts
Niger
Abuja
NIGERIA
Benue
Mambila Mts
Ibadan
Chappal Waddi
2419
Lagos
Udi Hills
CAMEROON
Gulf of Guinea
Niger Delta
Port Harcourt

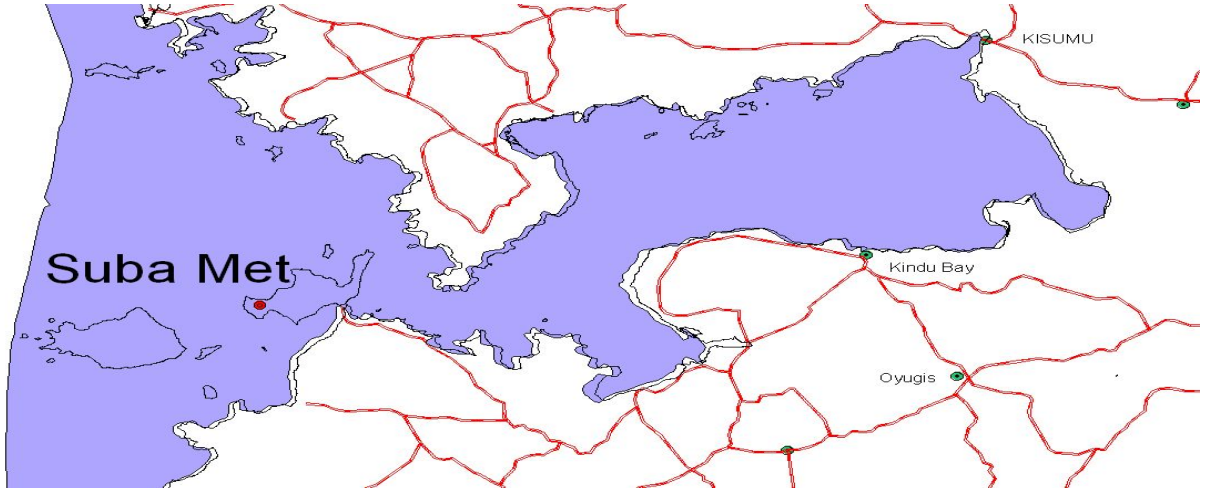

MAURITANIA
Dagana
Senegal
St. Louis
Ferlo
Matam
Linguere
Atlantic Ocean
Dakar
Bakel
SENEGAL
Kidira
Saloum
Sahel
Falème
Kaolack
Tambacounda
MALI
GAMBIA
Bignona
Casamance
Gambia
Kedougou
Ziguinchor
GUINEA-BISSAU
GUINEA

Proposed EADN site in Ghana.

Proposed EADN site in Uganda.



Proposed EADN site in Burundi.



Proposed EADN location on Rusinga Island (Lake Victoria), Kenya

Proposed EADN site in Kenya (Mt. Kenya)

Proposed EADN site in Tanzania. Photo of northern tip of island, taken from western side of the island

Proposed EADN site in Malawi

Proposed EADN site in Mozambique. Upper photo is the Fisheries Research Institute at Metangula. Lower photo is a view of Seli Bay at Metangula

Proposed EADN site at Lamto, Côte d'Ivoire

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