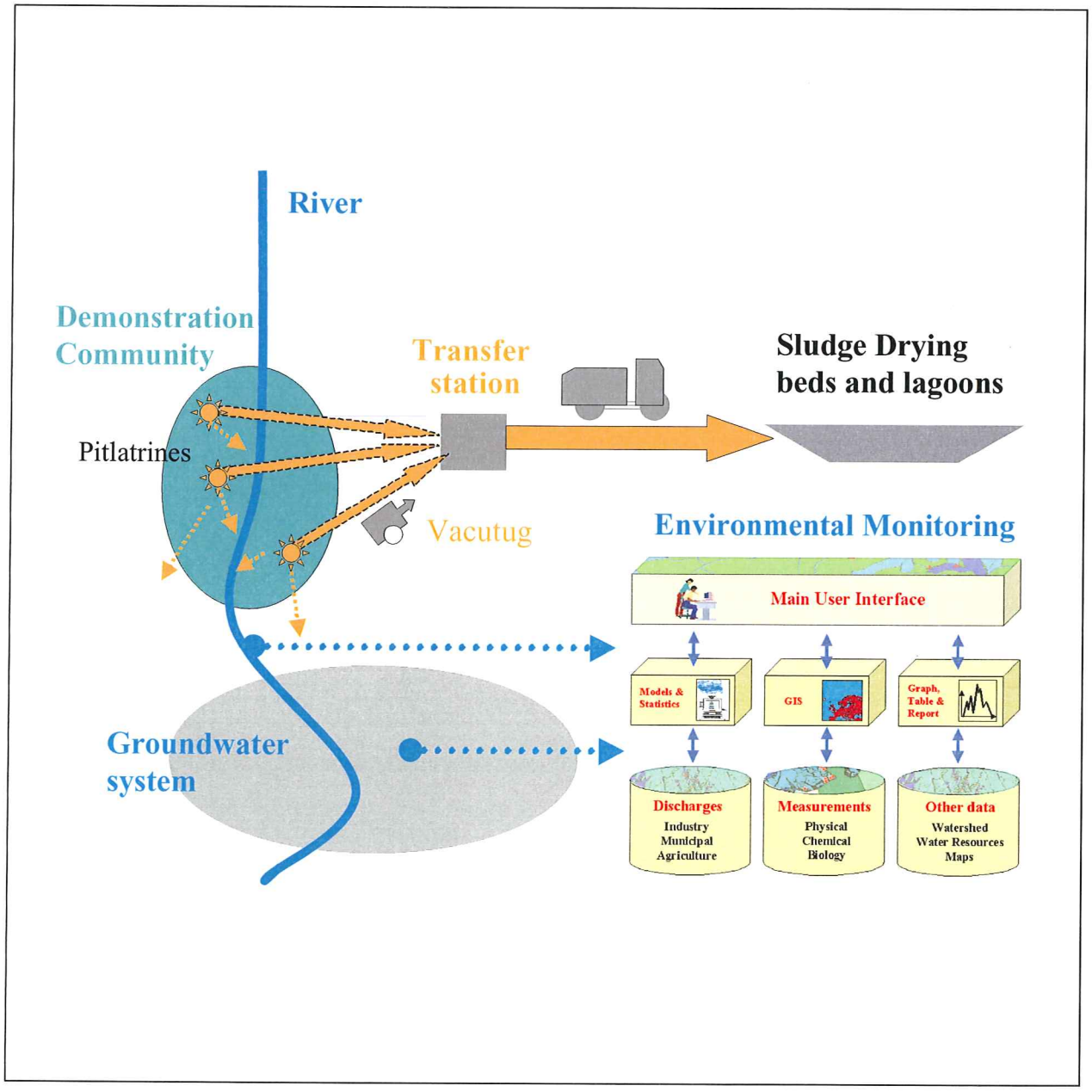
REPORT SNO 4280-2000

Managing Water for African Cities
Addis Ababa City Implementation Plan
Environmental Component

Appraisal Report



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Abstract

This is an appraisal of the environmental component of the Addis Ababa City Implementation Plan under the Habitat guided programme “Managing Water for African Cities”. The objective of this appraisal was to ensure the conformity of the plan with the objectives of the Regional Project and Ethiopia’s needs and to explore the availability of domestic resources (human, institutional, and financial) required for efficient project implementation. The appraisal provides findings and recommendations regarding the implementation of the City Plan. One key intervention is a community-based sanitation and wastewater management project to demonstrate results on the ground in urban communities. Moreover, the Addis Ababa City Plan comprises the monitoring and management of essential groundwater resources and strengthening of the water resources information systems.

4 keywords, Norwegian	4 keywords, English
1. Habitat 2. Vannressursforvaltning 3. Urbane områder 4. Ethiopia	1. Habitat 2. Water Resource Management 3. Urban settlements 4. Ethiopia

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Preface

The Cape Town declaration adopted by African Ministers in 1997 recognises that increasing population and rapid urbanisation in Africa pose a serious threat of depletion, pollution and degradation of freshwater supplies, especially in the high-density areas. Since the cities are important driving forces in the political and socio-economic development, special emphasis is needed for the protection and management of local water resources and catchment areas, and equitable sharing of water between urban needs. The "Managing Water for African Cities" is implemented and promoted jointly by Habitat and UNEP within the framework of the United Nations Systems-wide Initiative for Africa and is responding directly to the Cape Town Declaration. The aim of the project is to promote integrated urban water resource management and building capacity in key local and regional institutions paying attention to the links between water, urban development and the environment in seven selected cities. These are Abidjan, Accra, Addis Ababa, Dakar, Johannesburg, Lusaka, and Nairobi. These cities have prepared individual City Implementation Plans addressing effective water demand management (WDM) and actions to mitigate the environmental impact of urbanisation on freshwater resources and aquatic systems. The environmental components of these plans are being reviewed with the aim to assist the cities in pursuing the implementation of the city plans.

The City Implementation Plan for Addis Ababa has been reviewed by the undersigned in close collaboration with the key Ethiopian partner institution Addis Ababa Water and Sewage Authority by the City Plan Manager Mr. Abebe Bellete and his staff. Dr. André Dzikus, Programme Manager of Habitat Nairobi and his colleague Mr. Robert Bechtloff have actively participated in the appraisal. I would like to express my thanks to all people met for their kind support and valuable contributions during the review mission. The depth of this appraisal is at reconnaissance level, which means that the accuracy and detail are within the limits of a desk study with incomplete verification and fieldwork. The report solely reflects the views of the undersigned, which do not necessarily correspond to either those of the Government of Ethiopia or those of HABITAT or other institutions mentioned herein.

Oslo, 31 August, 2000

Torbjørn Damhaug

Abbreviations

AACA	Addis Ababa City Administration
AAWSA	Addis Ababa Water and Sewage Authority
ADB	African Development Bank
AFD	Agence France de Développement
CBES	Community Based Environmental Sanitation
EBR14	Environmental Bureau Region 14
EC	European Commission
EIA	Environmental Impact Assessment
GIS	Geographical Information System
IAEA	International Atomic Energy Agency
LFA	Logical Framework Approach
MEDaC	Ministry of Economic Development and Co-operation
MILIEV	Dutch Development Co-operation
MWAC	Managing Water for African Cities
NGO	Non-Governmental Organisation
NIVA	Norwegian Institute for Water Research
UNEP	United Nations Environmental Programme
UNCHS/HABITAT	United Nations Centre for Human Settlements
UNFIP	United nations Foundation for International Partnership ("Turner Foundation")
UNV	United Nations Volunteers
WDM	Water Demand Management

Contents

SUMMARY

1. The Government of the Republic of Ethiopia and UNCHS/HABITAT have signed a Memorandum of Understanding under the auspices of the project “Managing Water for African Cities”. This report is an appraisal of the environmental component of the Addis Ababa City “Implementation Plan” as it appears in the proceedings of the Consultation and Co-ordination Meeting, September 1999.

2. The mission's findings and recommendations were presented and discussed at the wrap-up session with AAWSA and partners. The main findings and recommendations were presented in the Mission Report of April 14, and have been further elaborated in this appraisal report.

3. The "Implementation Plan is well written, logically structured, and by and large following the Logical Framework Approach (LFA).

4. The key outputs of the environmental component are: (i) Strategy for Environmental Monitoring of Water Sources in Addis Ababa; (ii) Development of groundwater management plan for early warning of environmental pollution of Akaki well field; (iii) Community-based pollution control by small scale de-sludging technology; (iv) Public awareness campaigns of the environmental component; and (v) Performance monitoring and participation in the MWAC co-operation.

5. The main recommendations of the appraisal are to:

- apply the integrated watershed approach as a strategic principle;
- use the Aba Samuel Lake as a collective indicator for supporting the monitoring the city's surface water resources, qualitatively as wells as quantitatively;
- establish an uniform environmental surveillance and information to systemise and process all groundwater and surface water data;
- undertake a joint rapid assessment of the city's water resources based on existing data to address information demands, importance of various pollution discharges, estimation of the effects of various mitigation measures such as the Vacutug initiative;
- make a systemic approach to conceptualise the environmental effects of the pitlatrine de-sludging interventions;
- establish a 4-year implementation plan.

6. Upon request from the AAWSA, the mission participated in the initial preparation of a strategy and implementation plan in co-operation with the national consultant appointed by AAWSA. The results were summarised in an overhead presentation and handout for further follow-up by the national consultant based on the input and recommendations of the appraisal mission.

7. The appraisal team also took part in a brainstorming session on the public awareness component in co-operation with AAWSA and its consultants on the Tariff Implementation Project, since these two projects are dealing with common issues that call for co-ordination. Based on the outcome of this session, AAWSA’s consultant (Ernst & Young) will prepare a project document for the joint public awareness components.

1. INTRODUCTION

This report is a summary of findings and recommendations from an appraisal mission to Addis Ababa, Ethiopia, from April 4 to 8, 2000. The appraisal was carried out by Torbjørn Damhaug, Technical Advisor from the Norwegian Institute for Water Research (NIVA) Oslo in co-operation with Robert Bechtloff and under the guidance of André Dzikus, both from HABITAT Nairobi. The mission met with the Deputy General Manager and other key staff of the Addis Ababa Water and Sewage Authority (AAWSA), and consultants involved in associated projects (Appendix A). A Mission Report summarising the major findings and conclusions was submitted on April 14. This appraisal report gives some supplementary information and assessments for the revision of the Addis Ababa City Plan prior to the forthcoming consultations under the auspices of this UNCHS (HABITAT) guided programme.

1.1 Managing Water for African Cities

This review is carried out under the auspices of the initiative "Managing Water for African Cities", which is implemented and promoted jointly by UNHCS (HABITAT), UNEP and the United Nations Foundation for International Partnerships within the framework of the United Nations Systems-wide Initiative for Africa. It responds directly to the Cape Town Declaration[1] (1997) adopted by African Ministers.

The aim of the Project is to promote integrated urban water resource management and building capacity in key local and regional institutions **paying attention to the links between water, urban development and the environment** in seven selected cities. These are Abidjan, Accra, Addis Ababa, Dakar, Johannesburg, Lusaka, and Nairobi. The objectives of the Project are to:

- promote integrated approaches to managing urban water resources;
- improve efficiency of water use in urban areas;
- improve knowledge base of the impact of urbanisation on freshwater resources;
- improve exchange of information and good practices on water resources management for urban areas.

The Project includes the preparation of individual city implementation plans addressing the following inter-connected components:

1. Develop an effective water demand management (WDM) strategy for efficient water by the consumers and in African Cities;
2. Mitigate the environmental impact of urbanisation on freshwater resources and aquatic systems by:
   - setting up early warning mechanisms for timely detection of "hot spots" where sustainability is likely to be threatened;
   - assessment of long-term environmental impacts of large cities' water resources.

[1] UNCHS (HABITAT) Partnership in the Water Sector for Cities in Africa. Report on the Cape Town Consultations 8-10 December 1997.

The city implementation plans are guided by the Project Implementation Strategy[2] and the associated Implementation Strategy for the Environmental Component[3] (currently under revision). The MWAC is claimed to be the first comprehensive initiative to support local and national governments and their partners to effectively cope with the growing urban water crisis and related environmental impacts.

1.2 Appraisal approach

The terms of reference for this external review of the environmental component of the Addis Ababa City Implementation Plan as it appears in the Implementation Plan[4] call for the following responsibilities of the Technical Adviser:

- assist in appraising the city implementation plan in the area of environmental assessment/pollution control to ensure broad conformity with the objectives of the Project: "Managing Water for African Cities" and compliance with Ethiopia's priorities and needs;
- initially assess the available institutional and human resources capacity required for efficient project implementation.

The depth of this appraisal is at reconnaissance level, which means that the accuracy and detail are not determinant in planning of the environmental component, as it is based on a desk study with limited verification in the field. It provides, however, some observations and recommendations as input to the implementation of the environmental component.

The review of the environmental component of the City Plan comprised meetings with AAWSA, the national consultant and consultants dealing with the Tariff Implementation Project. Moreover, the appraisal mission familiarised itself with essential reports, information systems, and recent initiatives towards improved management of the city's water resources.

The appraisal mission noted that the environmental component of the City Plan is well designed and the AAWSA has made substantial progress in preparing for the implementation. Hence this appraisal report has more the character of providing advise on certain adjustments of the project plan in close co-operation with the executing agency. The appraisal mission also participated in drafting an outline implementation plan and in a brainstorming session for the public awareness and environmental education components.

[2] UNCHS (HABITAT) and UNEP: Managing Water for African Cities: Volume 1: Project Implementation Strategy. Expert Group Meeting Cape Town, South Africa, 26-28 April 1999.
[3] Managing Water for African Cities: Project Implementation Strategy - Mitigating the Impact of Urbanisation on Freshwater Resources (under revision).
[4] Government of the Republic of Ethiopia: MWAC - Addis Ababa City: "Implementation Plan". Attachment 2a to the Consultation and co-ordination Meeting , September 1999.

2. OVERVIEW OF THE ENVIRONMENTAL COMPONENT

2.1 Overall progress of the City Plan

According to the records from the City Managers meeting in The Hague in March 2000 the overall progress and plans for upcoming interventions are briefly as follows:

2.1.1 Progress

- institutional framework established and several meetings held;
- study tour to South Africa and Namibia;
- international experts assigned by UHCHS for one week;
- local consultant on WDM strategy hired for 6 months;
- local consultant pollution control hired for one month supported by UNHCS;
- co-ordination with associated projects i.e. groundwater model, established (inputs from the government of the Netherlands, ADB, and IAEA);
- internet connection with assistance of UNCHS ongoing;
- awareness campaign in WDM including tariff issues in co-operation with IDA-WB;
- consultation and co-ordination workshop held;
- budgets according to UNFIP guidelines submitted.

2.1.2 Plans for the next 6 months

- appraisal of the environmental component;
- draft WDM strategy and TOR for WDM Unit;
- draft report on training needs;
- start implementation of WDM strategy;
- inception Workshop, report and approval;
- development and launching of Pollution control strategy;
- proposal for public awareness campaigns;
- complete internet connection;
- contribution to regional initiatives.

2.1.3 Committed actions

Action	Responsibility	Deadline
Appraisal Environmental Component	UNCHS	30.05.00
Pollution inception strategy & action plan	CM	30.06.00
Proposal for WDM campaign	CM	31.05.00
WDM strategy and ToR for WDM Unit	CM	31.05.00
Start-up of WDM interventions	CM	31.08.00
Complete internet connection	CM	30.04.00
Participate in testing of the WACnet	CM	15.05.00
Training needs identified and submitted	CM	15.05.00
UNCHS funds made available	UNCHS	20.04.00

2.2 Basic Conditions

2.2.1 Description of the situation

The main water sources of the city of Addis Ababa are treated surface water regulated by three large dams located around the city that currently account for about 95% of the supply. The remaining 5% today's supply is covered by groundwater abstracted from local well fields. Groundwater will become a more important source of supply in the future as large groundwater development projects with substantial capacity requirements are under way.

Only 1.4% of the population is connected to the piped sewerage system where the sewage is treated at the Akaki conventional treatment plant. About ¾ of the population are using on-site sanitation, and vacuum trucks bringing the sludge to the treatment plant only serve a limited portion of the latrine and septic tank systems. The solid waste collection and deposit systems of the city are also inadequate, and so is the industrial pollution control.

There are severe negative environmental impacts on freshwater and aquatic ecosystems caused by overflowing septic tanks, leachate from informal disposal of garbage and septage from households and public facilities, industrial effluents, oil spills from vehicle repair sites that end up in the city's drains and watercourses. Thus, storm water drainage systems have become open sewers leading untreated water to streams and lakes, of which some are sources of water supplies for downstream communities. With rapid urbanisation, the already poor sanitation conditions will worsen if the authorities and communities do not take firm steps to cope with the situation. AAWSA is in charge of many initiatives to reverse the negative trend and the City Implementation Plan of the MWAC is one of these.

Urbanisation is a dominant threat to the water quality of the rivers in Addis Ababa. A visit to some of the rivers of the city clearly demonstrated the littering and pollution situation due numerous mismanaged latrines and informal refuse deposits along the riverbanks. In order to plan and implement sound mitigation actions, it is necessary to verify the water quality and hydrological situation in the rivers concerned as a baseline. It is also required to carry out surveys and monitoring of the urban and other sources of pollution, including their character and geographical distribution. The environmental component should place emphasise on city zones with significant water quality impacts and ensure that all project interventions efficiently contribute to pollution abatement. In response to the above, the appraisal suggests that the environmental component of the Plan include a "rapid situation assessment" to identify and prioritise actions during the pilot phase and later city-wide interventions.

2.2.2 City Plan in agreement with objectives of Water for African Cities and Ethiopian priorities

The tentative project description is in keeping with the overall MWAC objective of mitigating the environmental impacts of urbanisation on freshwater resources and to improve the health situation in the communities. The concept of the City Implementation Plan will also be generally in line with the Government's policy to reduce the incidence of poverty and improve the well being of the Ethiopian people. Moreover, the Addis Ababa City Implementation Plan is in agreement with the Government strategy to resolve the serious water resource deficiencies and inadequate sanitation services in the densely populated areas of the city as a priority issue.

2.2.3 Ethiopian commitment and co-ordinated actions in place

The success of the City Plan heavily depends on Ethiopia's commitment to, and ownership of, the City Implementation Plan. The mission noted that in the current project preparations are pursued by the AAWSA, and that the environmental sub-committee and stakeholder participation will be gradually developed when the conceptual framework of the environmental component has been duly developed.

It is, however, a prerequisite for the efficient implementation of the environmental component that sufficient staffing and funding resources are in place, which has to be confirmed as part of the final project implementation plan.

2.2.4 Associated projects and co-operation with external support agencies in place

AAWSA recognises the importance of having close links and co-ordination between the environmental component of the City Plan and related projects to achieve maximum mutual benefits and to avoid duplication of efforts. Ongoing projects will therefore be used to strengthen and promote the objectives of the City Plan in collaboration with ongoing projects in Ethiopia.

Some identified relevant projects and initiatives are as follows:

- leakage detection programme;
- groundwater development project including digital inventory of groundwater wells and monitoring network by AAWSA;
- sanitation improvement and rehabilitation project comprising Community Based Environmental Sanitation and Funding Mechanisms for the implementation of CBES projects[5];
- bathymetric and master plan studies in major water reservoirs;
- the tariff implementation project - Public Awareness campaigns;
- Master Plan for the Development of Wastewater Facilities (1994).

Some major financing partners involved in associated projects are: The European Union, the World Bank, Agence France de Développement (AFD), the Government of the Netherlands (MILIEV-Programme), the International Atomic Energy Agency (IAEA), UNDP/World Bank Water Supply and Sanitation Group, European Commission (EC), United Nations Volunteers (UNV), and other multi-lateral and bi-lateral development agencies.

2.2.5 Funding of the environmental component and associated projects established

The core funding for the implementation of the environmental component seems secured through AASWA and AACA contributions for covering local salaries and inputs (370,000 Birr) in addition to UNCHS' contribution of US$80,000. Funding of project interventions by associated projects are also in place for the groundwater management initiative (US$ 10 million), the pitlatrine desludging components (US$ 15 million) and a number of other projects.

2.2.6 Institutional framework

The appraisal mission briefly addressed the institutional arrangements of the execution of the environmental component of the City Plan. The national counterpart institution and signatory to the agreement with UNCHS is the Ministry of Economic Development and Co-operation (MEDaC). The Addis Ababa Water and Sewage Authority (AAWSA) is the national executing agency for the City Implementation Plan. AAWSA is an autonomous government authority under the Addis Ababa City Administration (AACA). AAWSA is in charge of providing water and sanitation services for the 2.7 million inhabitants of Addis Ababa. Its role in the City Implementation Plan is to co-ordinate in-country activities. AACA is the local counterpart institution responsible for policy issues and ensuring participation of various stakeholders within the project area. It also has environmental and water resources departments that will play essential roles in the implementation of the City Plan. The Ministry of Health, Health Bureau and the Environmental Bureau at central and regional levels are also important contributors to the Plan, in particular, the Region 14 Environmental Bureau (the city of Addis Ababa) and Region 4 Environmental Bureau (downstream societies). NGOs are also important partners of the City Plan.

[5] "Study on Institutional Arrangements and Financing Mechanisms for the Implementation of CBES Projects" AACA - UNDP-WB Regional Water and Sanitation Group, February 1999

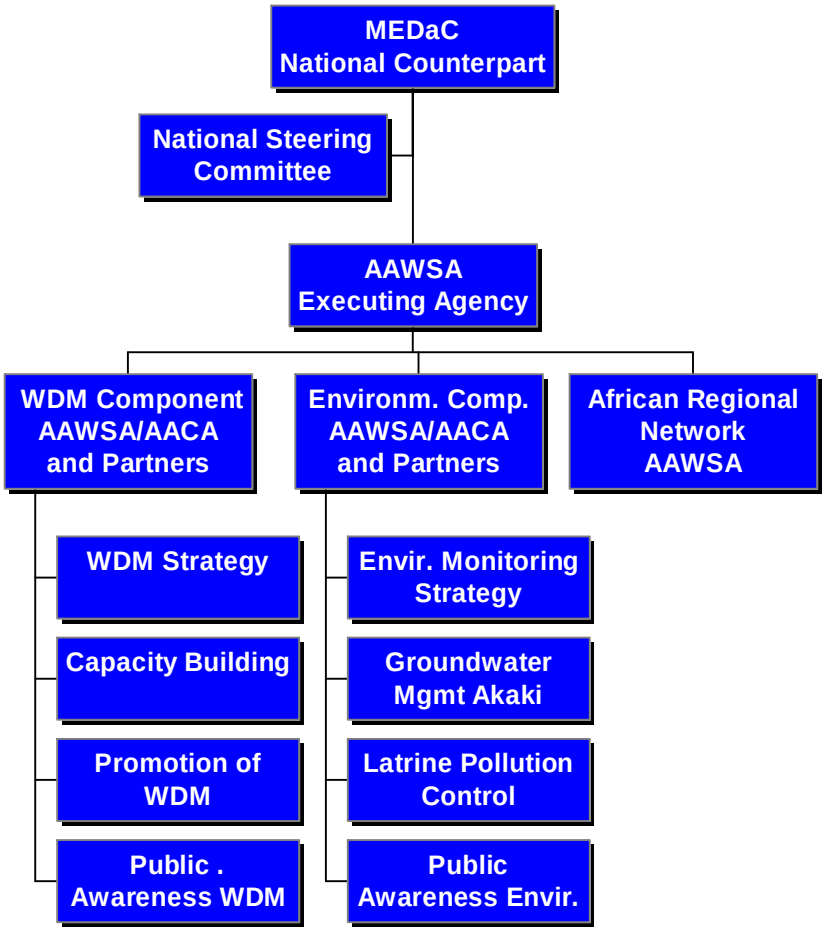

Figure 1. Addis Ababa City Implementation Plan – Institutional Framework and Outputs

3. ASSESSMENT OF THE IMPLEMENTATION PLAN

3.1 General Comments on the Document

The City Plan for Addis has a joint "Implementation Plan" for the WDM and Environmental components, as it appears in the annex 2a of the proceedings of the Consultation and co-ordination Meeting, September 1999. Basically, the Plan is well written and easy to follow as it is structured according to the Logical Framework Approach (LFA). Some observations and suggestions are given in the following chapters.

Concerning C: "Objectives"
The "General Objective" stated in Chapter C focuses on the pollution control and aquatic ecology aspects. Often the general objective (goals) also reflect the overarching development objectives of a project, and it is suggested to add:

"Contribute to sustainable urban development, reduced poverty and improved livelihood of the underprivileged inhabitants of Addis Ababa".

The "Immediate Objectives" for the environmental component should be more than just improving the knowledge base of the impacts, but also lead to improving the management and protection of water resources and aquatic ecosystems of the city.

Concerning D: "Implementation Strategy and Arrangements"
This section is valuable directions for the Plan. The only question is to the envisaged length of the mentioned Phase I.

Concerning E2: "Environmental Impact Assessment (Pollution Control)"
The selected title "Environmental Impact Assessment" (EIA) does not fully reflect the content of the environmental component of the City Plan, since the expression EIA is basically used in connection with environmental clearance of new projects and do not necessarily include improved water resources management, water resources monitoring etc. A better title would be "The Environmental Component"

Concerning the "Background"
The list of environmental monitoring and investigations planned by AAWSA should also include the following important factors:

- hydrological observations and strategic hydrometric stations for measuring river flows;
- pollution from agriculture.

3.2 Output 2.1: Strategy for Environmental Monitoring of Water Sources in Addis Ababa

3.2.1 Improved monitoring is an important challenge

Although there is a wealth of information about the city's water resources, a lot of the information is not consistent in terms of sampling stations, analytical methods, sampling frequency (lack of long time series), and the information is scattered between different institutions and databases. Hence, the design of a relevant and practical system for integrated environmental monitoring and information services and related institutional co-operation is an essential challenge for the City Plan.

3.2.2 Many initiatives are underway

The mission was introduced to a number of associated projects and relevant initiatives under development by AAWSA, such as the digital map of the groundwater wells and related borehole inventory data base and water quality monitoring network. The AAWSA informed about plans for upgrading the water laboratory services and monitoring of surface waters under a national project. ***These initiatives, together with several associated projects, will be important complementary activities to the development of monitoring tools and strategies for water resources management under the City Plan.***

3.2.3 Apply an integrated watershed approach

It is strongly recommended that the water resources monitoring and pollution control strategies be based on a watershed or river basin approach. This principle should apply for surface water catchments as well as for the groundwater aquifer systems. The watershed approach is necessary in order to analyse and estimate all activities and discharges affecting water quality and quantity of an entire water system, and to combine these in well justified and prioritised actions. ***If the AAWSA accepts the above, the watershed approach should be laid down as a strategic principle in connection with Output 2.1.***

3.2.4 Use the artificial Aba Samuel Lake as a collective surface water indicator

Regarding a monitoring strategy for surface water, the mission suggests using the artificial Aba Samuel Lake as a key indicator system ("assay") for diagnosing the collective condition and trends of the main rivers draining to this lake. These are the Kebena, Akaki, and Tinishu Akaka Rivers. A monitoring programme should be established to undertake analysis of sediments as historic "footprints", and furthermore the lake would act as a bio-indicator through surveying the state of eutrophication, zoology, microbiological conditions, and water quality including toxic substances. In addition, the system should include hydrometric stations for monitoring gross stream flows passing the lake. In addition, strategic hydrometric stations and monitoring services should be established in each main river. ***It is worthwhile to further elaborate on the use of Aba Samuel Lake system as part of the environmental monitoring strategy***.

3.2.5 Establish an environmental surveillance and information system

It is logic to build the environmental monitoring strategy around a database and information framework for planning, management and decision support with special attention on water resources. Therefore, it is suggested that the City Plan includes the introduction of an integrated environmental surveillance, information and decision making system. Such system should serve as a management tool for planners and decision-makers, information services for the public and schools, and an expert system for researchers and specialists. It is necessary that the planned enhancement of environmental

monitoring systems and water related studies in Addis Ababa are attached to a common database offering the possibilities for storing, systematisation, retrieval, processing and presentation of aggregated environmental information. The use of a common database to store, process and present environmental-water monitoring data for planning and decision making ensures consistency and quality control of the data. The information products of such system should provide:

- geographical definition of watershed and watershed hierarchy;
- storing and presentation of watershed information;
- geographical definition of rivers, dams, and aquifers to be used as objects for storage and presentation of water resource data;
- creating inventories of discharges, consisting of both point and non-point sources, such as municipal wastewater, industrial effluents and agriculture run-off;
- data collection, storage and presentation of monitored data on physical, chemical, biological and sedimentological conditions;
- water quality and quantity modelling, integrated with the database and GIS interface.

Such surveillance and decision making system would allow:

- increased availability of diversified environmental information and thereby providing a better basis for decisions to be taken by planners and politicians;
- improved information access to the public and schools, and thereby increasing the awareness on environmental issues and stakeholder involvement in the planning processes;
- increased possibility for use of holistic environmental data;
- improved possibilities for long-term planning by using predictive models.

Figure 2 shows an example of the main features of an environmental surveillance and information system.

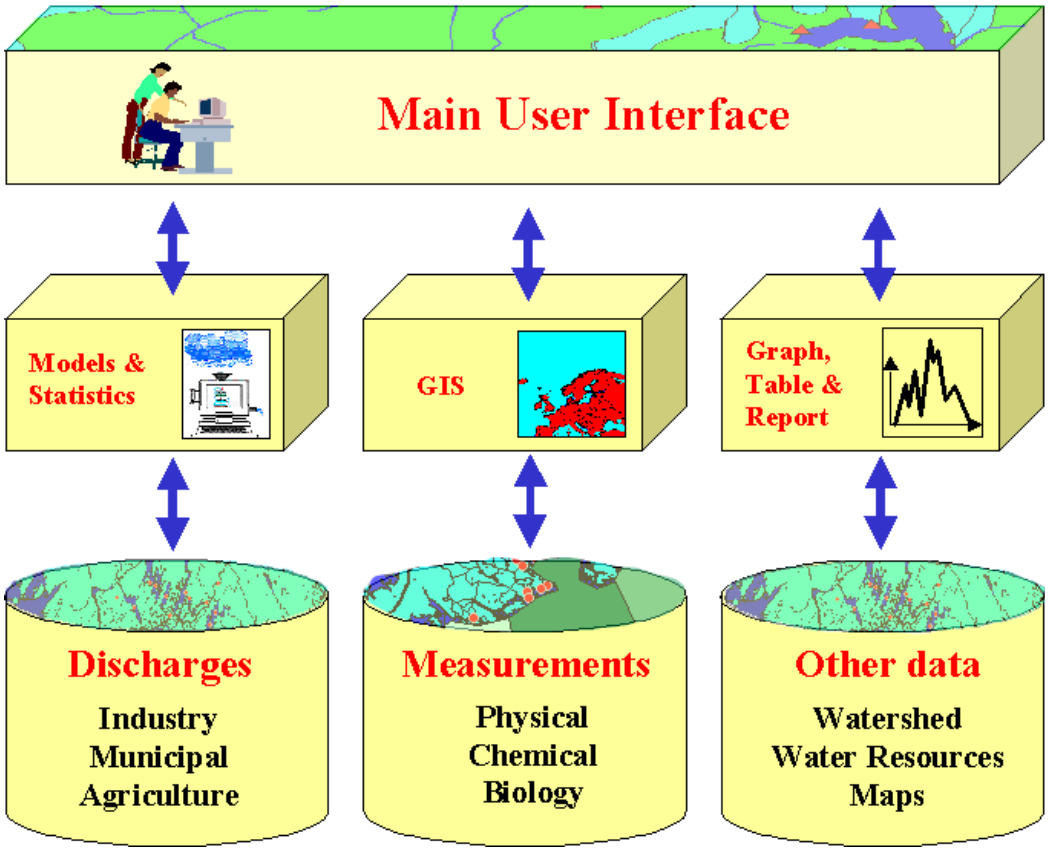

Figure 2. Schematic presentation of an environmental monitoring and information system (Ref.: ENSIS)

The project should preferably consider using an already developed environmental surveillance and information system and adapt it to the requirements of Addis Ababa. It is important to select a simple and well-proven system with the necessary flexibility to allow step-wise development in pace with emerging demands and institutional capacity. Training of personnel will be an important element of the proposed introduction of an environmental monitoring and decision making system.
The possible inclusion of an integrated environmental monitoring and information system should be raised as an activity under Output 2.1.

3.2.6 Undertake a rapid assessment

Under Activities, it is proposed to undertake a rapid assessment of the three main rivers Kebena, Akaki, and Tinishu Akaka, and the related groundwater resources based on available data and information on water quality, flow regimes, ecology, pollution sources, pollution loads, etc. This should be aimed at obtaining an overall environmental status of the water resources including the vital causes and effects affecting the condition of these resources. This assessment will deal with common issues for Output 2.1, 2.1 and 2.3 and serve as a basis for considering the relative and absolute importance of the various impacts, including the pollution loads from the urban communities with on-site sanitation systems. The rapid assessment will also make initial predictions of the anticipated effects of various pollution mitigation measures. ***Provided the rapid assessment idea is acceptable to AAWSA, this element should be added to the list of activities under Output 2.1***

3.3 Output 2.2: Development of groundwater management plan for early warning of environment pollution of Akaki well field

3.3.1 Modelling and monitoring are in progress

Akaki well field groundwater management plan to be developed for early warning of possible pollution threats so that mitigation actions can be taken to protect this important water source. The main issues of this component are well captured in the environmental project document and associated projects. These projects addressing the groundwater modelling and monitoring issues are by and large in place. The investigation, modelling and building of knowledge about this aquifer are being firmly addressed by AAWSA in co-operation with the IAEA. This project is supplementary to hydrological and hydrogeological studies already carried out and will give a more realistic picture about the physical properties, capacity, recharge characteristics, groundwater dynamics, and yields of this important aquifer. Moreover, the efforts will lead to a groundwater model for simulation of pollution transport and associated early warning. ***This hydrogeological and pollution transport knowledge and monitoring systems will serve as a basis for an aquifer management plan***.

3.3.2 The aquifer management plan needs to address legal and institutional issues

The objectives and activities of the groundwater management plan for Akaki well field are listed under Output 2.2. Item 4 is about the development of a monitoring and management plan and strategy. The plan and strategy process should basically involve the following issues:

- examination of applicable environmental and natural resource management legislation including groundwater policies and regulations;
- institutional responsibilities and enforcement capacity for allocation and licensing of groundwater resources, including billing, collection and management of groundwater abstraction fees;
- hydrogeological and hydrological knowledge base, modelling, monitoring and information services (this element seems well addressed by the IAEA co-operation);
- the capacity of water quality laboratory services;
- environmental impact assessment of new groundwater abstraction schemes;
- pollution control authorities, regulating effluent discharge to sensitive infiltration areas, and their compliance control capabilities and enforcement capacity;
- groundwater resources development planning, investment programmes, and funding mechanisms;
- public awareness, training and involvement in groundwater development interventions.

It is recommended that the first step should be to establish the terms of reference for the aquifer management planning process.

3.4 Output 2.3: Community-based pollution control by promoting pitlatrine de-sludging technology provide several opportunities

3.4.1 Two-fold objectives

The objective of such community-oriented waste management project has two different dimensions namely human health & well being and environmental issues. The human oriented objective is to improve the pitlatrine sludge collection and creation of job opportunities. The environmental one is to mitigate the environmental impact of urbanisation on freshwater and aquatic ecosystems by reducing the human waste reaching the watercourses. It is necessary to develop a conceptual basis for demonstrating community-based wastewater management in peri-urban areas in Addis Ababa to as elaborated in the following sections.

3.4.2 See the role of the sanitation improvement interventions in a basin-wide pollution control context

A major purpose of the community-based pollution control interventions is to reduce urban pollution caused by poorly maintained and operated sanitation facilities, solid waste disposal and drainage systems. The sanitation and waste management solutions have to be based on affordable and appropriate technology that can be managed by the communities themselves. This issue was addressed by a technical mission[6] right after the appraisal mission. Outputs and recommendations from this technical mission have to be taken into consideration as part of an integrated system. The entire system with sludge collection tankers at household level, transfer stations, sludge treatment and final disposal will be regarded as a combined environmental mitigation system as illustrated in Figure 3.

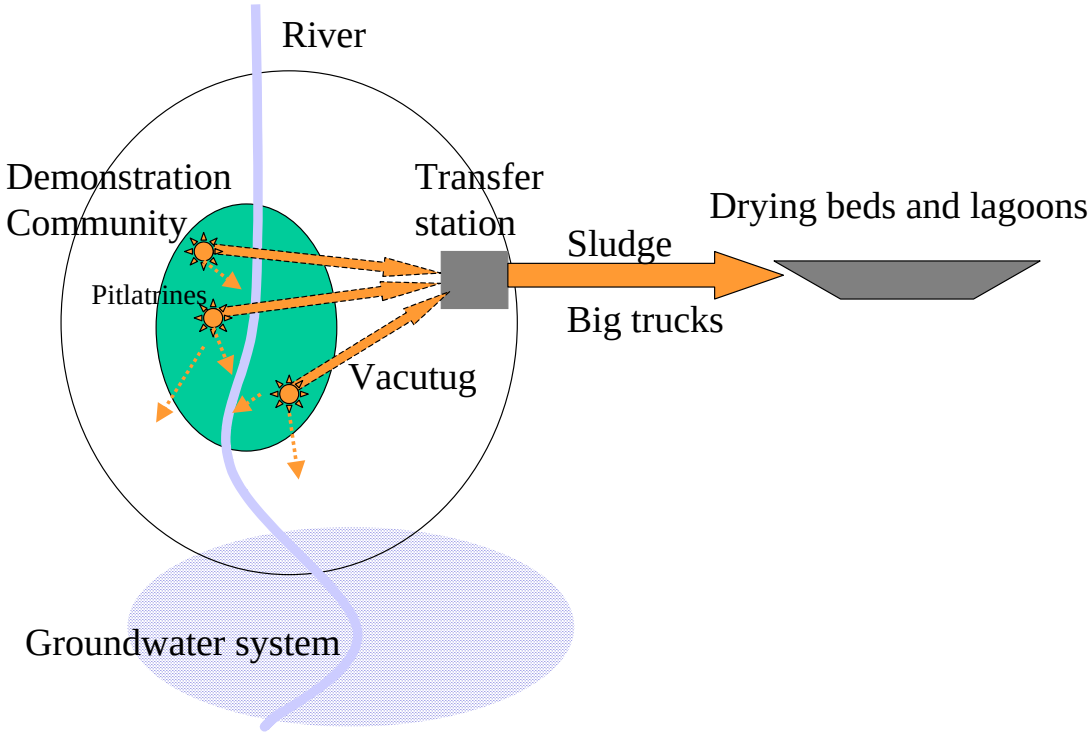

Figure 3. Pitlatrine sludge collection and treatment system Addis Ababa

The well organised emptying of pit-latrines will obviously have positive consequences in terms of improving peoples' living conditions and reducing discharges of pollution to the streams and groundwater resources. The analysis of the environmental effects of the community-based sanitation activities should take a catchment-wide approach taking into consideration all polluting activities and user interests linked to each water system including the downstream communities. This component should not only be limited to the latrine sludge collection issue, but also address solid waste management and other sources of water pollution, such as illegal sewerage connection to the storm water drainage systems. It is also important to document the effects of all pilot stage interventions and to predict the effects of future implementation, city-wide as well as in other cities, to direct the planning and to attract additional funding. ***The significance of pollution from the pitlatrine served areas and predicted effects of the sludge management initiative should be addressed by the proposed "Rapid Assessment".***

[6] Technical Mission by Mr. M. Coffey, Waste Consultant and Dr. G. Alabaster UNCHS

3.4.3 Institutional and participatory issues a major challenge

The most difficult part of creating sustainable sanitation and waste management services in the communities are the institutional issues. It is important to ensure local participation and partnership in the planning and development of sanitation systems and integrated waste management in densely populated areas. These critical issues are addressed in the study on institutional arrangements and financing mechanisms for community based environmental sanitation (CBES) as mentioned in section 2.2.4. This study is important basis for further building of community capacity assisted by NGOs with the aim to ensure long-term viability of the area-based organisations and help AAWSA and the City Administration enhance their supporting capacity.

3.5 Output 3: Public Awareness Campaigns of the Environmental Component

Upon request by the AAWSA, the appraisal team participated in a brainstorming session with key staff from AAWSA, the national consultant and the their consultant Ernst & Young. The purpose of this session was to discuss the preliminary proposal for the public awareness component with particular focus on joint issues and co-ordinated approaches between the two projects MWAC and the Tariff Implementation project. AAWSA and their consultant prepared a background illustration as a basis for the discussions as shown in Figure 4.

Some issues proposed by the HABITAT team were:

- involvement of schools in collection of data, environmental monitoring and early warning based on of water quality, bio-indicators, etc.;
- establishment of "Water Classrooms" and "Water Factories";
- develop awareness through art education and creative illustrations related to water resources and the "Water Day" idea;
- radio campaigns and T-shirt messages;
- encourage regional networking among schools in various districts or in different African countries, for instance to be facilitated by the WACnet – WACweb services;
- promote waste collection and clean-up campaigns along the city streams associated with cultural and religious traditions as well as creation of work opportunities;
- facilitate community-industry partnerships.

In response to this initial contact between the two programmes, AAWSA's consultant (Ernst & Young) will prepare a project document for the public awareness component using the LFA method.

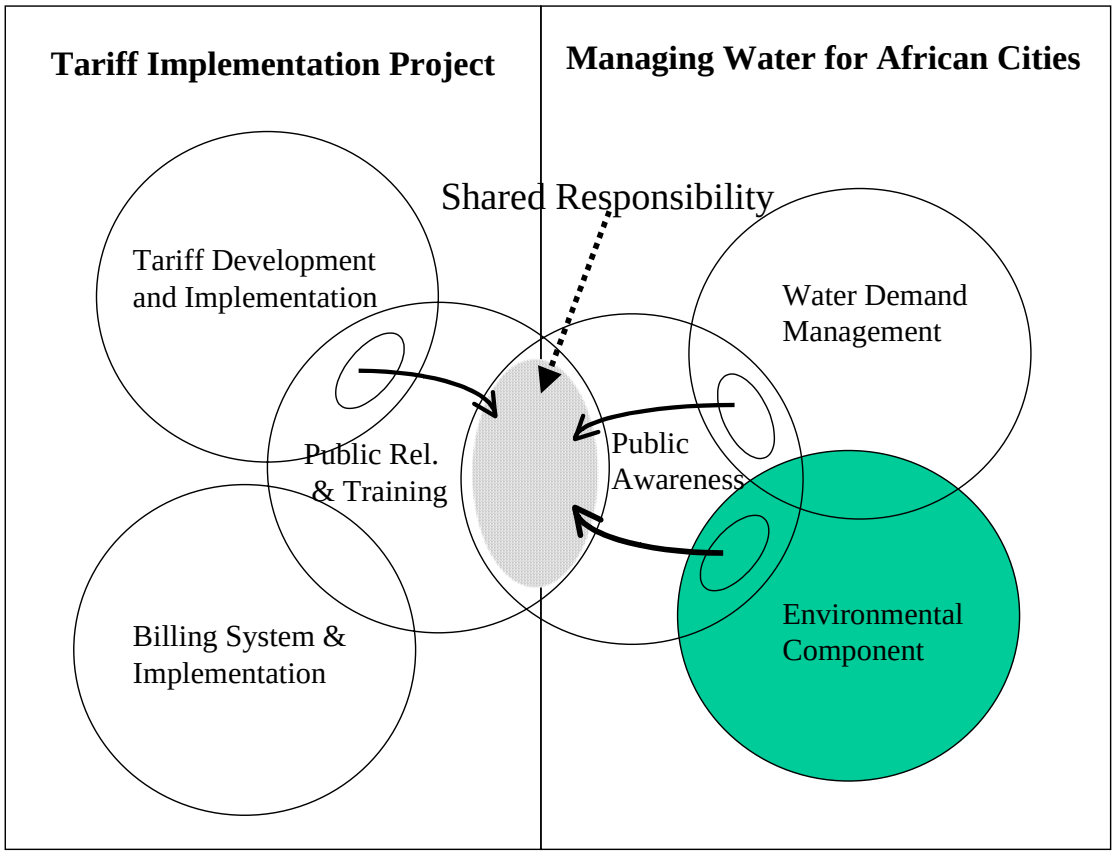

Figure 4. Illustration of Joint Public Awareness Components of the Tariff Implementation Project and the Addis Ababa City Implementation Plan (Ref.: AAWSA/Ernst & Young)

3.6 Implementation Plan and Strategy

3.6.1 An implementation plan framework was initiated during the appraisal mission

A national consultant has been assigned to assist AAWSA in developing the environmental strategy and action plan as a conceptual and operational framework for the environmental actions of the City Plan. AAWSA requested the appraisal team to work together with the national consultant in start preparing this plan. The deliberations between the appraisal team and the national consultant followed the Logical Framework Approach (LFA) structure and the results were summarised in an overhead presentation and hand-out that were used during the debriefing session with AAWSA. The outline framework focused mainly on principal issues, objectives, beneficiaries, outcomes and activities and time did not allow going in detail on the specific Akaki groundwater management and sanitation waste management projects as such. ***The national consultant will further deal with these issues in preparing the implementation plan, taking into consideration the recommendations of this appraisal mission.***

3.6.2 Institutional Arrangement of the Environmental Component

One of the unique attributes of the MWAC initiative is the principle of promoting integrated urban water resource management and building local and national capacity paying attention to the links between water, urban development and the environment in the cities. Based on input from AAWSA, figure 5 illustrates this triangular institutional arrangement among the executing partners of the environmental component.

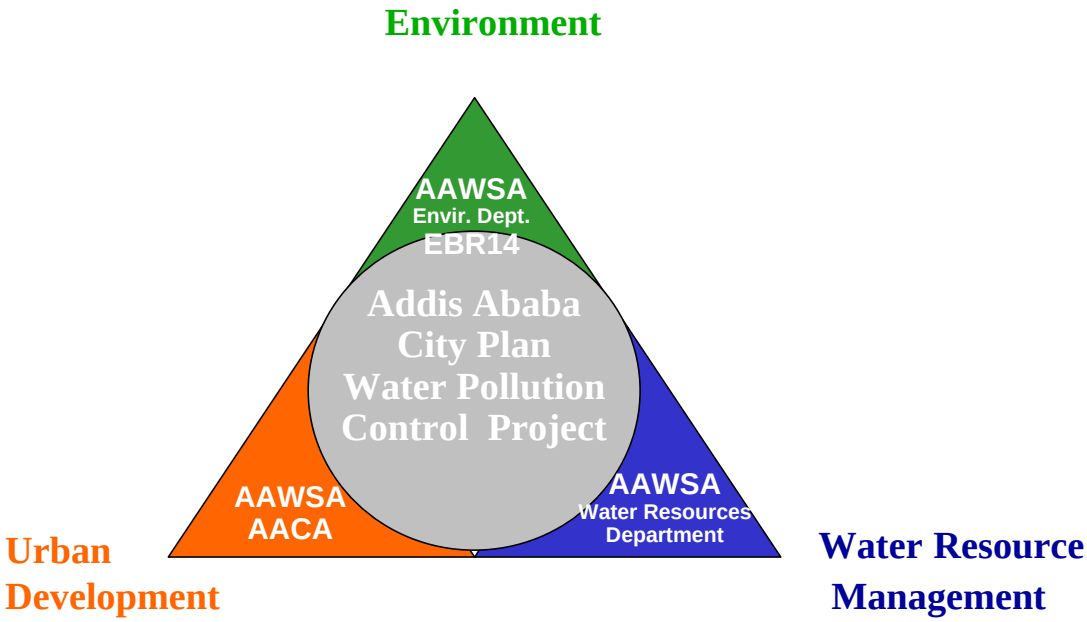

Figure 5. Co-operating institutions of the environmental component

3.6.3 Evaluation, performance monitoring and information exchange

The project interventions and their impacts will be monitored and reviewed regularly during the implementation of the environmental component of the City Plan. Monitoring entails checking and control of the achievements of the environmental component compared to the planned inputs, activities and outputs, using the developed indicators. It is recommended to establish a format for monitoring and reporting that will be used throughout the life of the Implementation Plan. The format should be such that inputs, activities and outputs are monitored with reference to the goals and objectives of the Plan and its sub-components. The factors essential for the sustainability of the Addis Ababa City Implementation Plan comprise (i) policy support measures and local ownership; (ii) institutional aspects; (iii) financial/economic conditions; (iv) technological factors; (v) socio-cultural factors; and (vi) environmental and ecological effects. A vital project activity will be the continued involvement and substantial contributions by Ethiopia to the Africa Regional Network of good practice exchange.

3.7 Time Schedule

The Implementation Plan will follow a step-wise approach in developing and implementing the demonstration projects on water resources monitoring and pollution control. Figure 5 suggests an overall schedule of the environmental interventions of the City Implementation Plan. The outcomes and lessons learned from the pilot projects will serve as a base for promoting the city-wide replication of the acquired practices under the City Implementation Plan.

Table 1. Tentative Implementation Schedule of the Environmental Component

Activity	Year			
	2000	2001	2002	2003
Appraisal				
1. Strategy for Environmental Monitoring of Water Resources in Addis Ababa				
1.1 a)Review of Studies and Initiatives b) *Rapid Assessment of situation and appropriate information systems in conjunction with 2.1 &3.1 (new)*				
1.2 Develop Draft Strategy				
1.3 Stakeholder Workshop				
1.4 Initiate Implementation				
1.5 Institutionalise Envir. Monitoring				
1.6 Share Findings and Lessons Learned of Environmental Monitoring				
2. Development of Groundwater Management Plan for Early Warning of Environmental Pollution of Akaki Well Field				
2.1 Reviewing of all Studies in Akaki *and Rapid Assessment with 1.1 & 3.1 (new)*				
2.2 Stakeholder Meeting				
2.3 Groundwater Simulation Model				
2.4 Environmental Monitoring and Mgmt Plan				
2.5 Workshop for all Contributors, Sharing of Experience and Implementation				
3. Community-based pollution Control by Small-scale De-sludging Technology for Pitlatrines				
3.1 *Rapid Assessment tin conjunction with 1.1& 2.1(new)*				
3.1 Provide one Vacutug to ASSWA				
3.2 Field Testing of Vacutug				
3.3 Performance Assessment and Adjustments				
3.4 Production and Full-scale Replication				
4. Public Awareness Campaigns on Environmental Issues				
5. Performance Monitoring and Information Exchange				
6. Regional City Managers meetings				

APPENDICES

Appendix A. People Met

Name	Position	Affiliation
Mr. Abebe Bellete	Deputy General Manager (Technical)	Addis Ababa Water and Sewage Authority
Mr. Tekalign Tsige	Deputy General Manager (Business)	Addis Ababa Water and Sewage Authority
Mr. Teame Hailu	Environmental Consultant	own company
Mr. Edward T. Jakins	Project Manager	Ernst & Young Management Consultants
Mr. Amha Mersie Hazen	Consultant	Ernst & Young Management Consultants
Mr. André Dzikus	Human Settlements Officer	HABITAT R&D Division
Mr. Robert Bechtloff	Environmental Consultant	HABITAT R&D Division

Appendix B. Mission Photos

B.1 Water collection near the Kotebe area

B.2 Polluted stream in Addis Ababa