(5) Need for flow augmentation measures

Due to development in upstream areas, it is possible that downstream areas may fall into water shortage. Although WAB's effort for controlling water use and preserving the river maintenance discharges is exercised, there may arise such cases where the downstream water users experience water shortage. People's dependence on river and livestock watering should be secured even in the downstream areas. From the long-term viewpoint, therefore, MOWD will have to plan the construction of dams/reservoirs for augmentation of flows in the downstream reaches.

5.3.2 Groundwater Management

(1) Water permit for groundwater development

The Water Act states that a water permit is required for groundwater development of an area which is situated within 92m (100 yards) of any body of surface water or within 805m (a half mile) of another existing borehole. Boreholes not falling in this category will require only the drilling permission (not water permit). To keep an equitable water management and a uniform basis of water development, all boreholes and wells should be subject to the acquisition of water permit. The only exception may be for shallow hand-dug wells (say, less than 10m in depth) excavated on private lands. The Water Act requires that drilling contractors should submit to WAB within 30 days a completed drilling completion record when they did the works. This regulation should be strictly enforced in view of the importance of the record.

(2) Defective wells

According to the Water Act, the "defective wells" deals only with the ingress of salt water. The Act shall also apply to all polluted water (e.g. fluoride). Nevertheless, there may be exceptional cases where the boreholes/wells would be kept in use for livestock and/or animal watering.

(3) Monitoring of water use

Monitoring of water use is necessary for groundwater, in the same way as for surface water. It may be almost impractical and unnecessary to require water use recording of all boreholes/wells. The obligation may be limited to major water users such as public water undertakers and major enterprises undertaking bulk abstraction.

(4) Groundwater data management

Borehole completion records are currently filed in the Groundwater Section of MOWD. The database of the following records should be managed properly and the quality upgraded further.

(a) Inventory of borehole completed
(b) Water quality data
(c) Aquifer test data

(5) Groundwater resources/quality assessment

In the long run, the following attempts should be made to assess the country's groundwater resources in detail:-

(a) Groundwater balance analysis through computer simulation models (including groundwater modeling in major area)
(b) Accumulation and evaluation of water quality data to establish practical groundwater quality guidelines applicable to each region

A practical approach to (a) above would be to handle the groundwater balance analysis in regional water resources studies such as the river basin study and the District water resources study as proposed in Chapter 6.

With regard to groundwater quality guidelines described in (b), accumulation of actual water quality data is essential. Noteworthy aspects are that the water quality data of groundwater are available only for 15% of all the boreholes in the country and that most of the boreholes have not been observed and monitored since the completion. In particular, the data in semi-arid and arid areas are still scarce, while the water quality there is suspected to be not always good. This situation should be rectified by more intensive monitoring of boreholes for public water supply, observation and exploration, which are equivalent to about 24% of all boreholes in the country, at a regular interval, for example twice a year, each in the dry and rainy season. Groundwater quality monitoring is indispensable in order to make clear the various conditions of water quality and to define specific levels of drinking water standards, especially for the small-community water supply.

The internationally recognized and authorized guidelines for drinking water quality are those recommended by the World Health Organization (1985) and these guidelines have been adopted by many countries including Kenya. These guidelines should be recognized as means to an ultimate goal. It will be appropriate to establish the intermediate guidelines more practically applicable to each region, taking into account the variety of geographical, socioeconomic, dietary, and industrial conditions. In fact, poor water is often better than no water.

Water laboratories for water quality analysis are necessary at the district level because water samples should be analyzed as soon as possible after sampling of the water. The laboratory could also be used for water pollution control purpose.

(6) Proper pumping tests

Pumping tests should be conducted to determine the performance characteristics of a well and the hydrogeological parameters of the aquifer.

The first purpose of the tests is to have information as to the production capacity of the completed well and/or provide information needed for the determination of pump capacity to be installed for a new well. The data can be obtained from step-drawdown tests, in which the well is pumped at successively greater discharges for relatively short periods.

The second purpose of the tests is to provide drawdown and recovery tests' data, from which the principal parameters of the aquifer, transmissivity and storage coefficient, can be calculated. This type of test is called an aquifer test. The aquifer test consists of pumping a well at a constant rate (constant-pumping test) and recording the drawdown in the pumping well and in nearby observation wells observed at specific times. The test is also called a constant-pumping test.

(7) Monitoring wells network

Observation wells for monitoring groundwater are indispensable for clarifying mechanisms of recharge of groundwater from precipitation or of drawdown due to over-pumping and movement of groundwater and contaminants. The data obtained from regular monitoring should be stored into the database for groundwater management.

The purpose of monitoring wells is to (1) determine the static water levels or potentiometric surfaces of all aquifers, (2) permit access for the collection of water samples to detect contaminants, (3) monitor the movement of groundwater and contaminants, and (4) calculate and estimate groundwater abstraction rates.

There are 66 observation boreholes in the country, mainly in the Nairobi conservation area according to the borehole database. Observation records have seldom been obtained except for the Nairobi conservation area. Even in the Nairobi conservation area, observations have not been continued due to financial constraints, lack of transport, lack of suitable equipment, lack of provision for servicing and maintenance of the equipment, shortage of staff with adequate levels of training, and lack of understanding of boreholes' owners.

(8) Installations of airlines and abstraction meters

It should be made mandatory for future boreholes to be equipped with airlines and groundwater abstraction meters to monitor rest water levels and evaluate groundwater abstraction rates.

(9) Equipment for groundwater surveys, development and monitoring

Each district should have groundwater exploration equipment such as terrameters or resistivity meters, water level instrument such as dippers, portable water quality meters such as PH meters and electric conductivity meters, and simple surveying equipment such as altimeters and compass.

5.3.3 Water Pollution Control

(1) Water quality monitoring programme

The Water Quality and Pollution Control Section of MOWD is responsible for implementation of the nationwide water quality monitoring programme. This network covers 120 sampling points. At present, the major constraint of the programme is scant of financial resources. MOWD should allocate the maximum possible budget for the programme. In the long run, it should be kept in mind that the benefits brought about through conservation of clean water will certainly offset the costs of the programme.

Once the expenses for the programme cannot be procured, it is worth proposing a grant aid survey covering the following as an initial step to the accumulation of nationwide data.

(a) Surface water quality sampling at all reference/impact stations; minimum 4 times/year
(b) Groundwater quality sampling at selected public boreholes/wells; minimum 2 times/year

(2) Water pollution control

(a) Standards for effluent quality and receiving water quality

The Pollution Control Unit of MOWD has set forth a generalized effluent quality standard and some specific standards for industrial sources (e.g. paper mill, sugar factory). It is recommended that more specific standards for discharges from other types of industrial sources be established. In addition, there should be standards for control of the quality of the receiving waters such as river and lake.

(b) Strengthening the imposition of penalties

As mentioned in the previous Section on Surface Water Management, it would be important for Water Pollution Control Section to exercise strict enforcement of the penalties. The cancellation of water abstraction permits or the suspension of production operations may be the most effective way of penalizing the violators. To support the Chemists and Water Bailiffs in the Province/District Water Engineers' Offices, it would be necessary to provide a *small water quality laboratory in respective Districts.*

(c) Power for remedial measures

Water (General) Rules empowers WAB to make a holder of water permit submit a plan of process description to purify the effluent. This power is limited to the case of pollution associated with water abstraction. This provision should be extended to cover all water users. Also there should be an explicit provision that WAB has the power to order remedial work.

5.3.4 Shared Water Resources in International Rivers

There are 18 international drainage basins relevant to Kenya as shown in Figure 5.1. Water use in these basins should conform to the principles of "the Helsinki Rules on the Use of Waters of International Rivers (1966)" (Ref. 11). Since the water resources development in these 18 basins is foreseen to be enforced in the future, the following actions should be exercised as the initial step to long-range development:

Proposed Activities in International Drainage Basins

No. in Figure 5.1	International Drainage Basin	Name of River in Kenya	Action Recommended
(1)	Malaba	Malaba	- Hydrological measurement
(2)	Lake Victoria	13 river basins	- Agreement of lake water use in case of bulk water transfer
(3)	Mara	Mara	- Hydrological Assessment on aspects of wildlife conservation
(5)	Lake Natron	Ewaso Ngiro South	- Lake Natron environmental study
(8)	Lake Jipe	Lumi	- Lake Jipe environmental study
(10)	Umba	Umba	- Hydrological measurement
(12)	Lake Turkana	Lake Turkana	- Lake Turkana environmental study
(16)	Juba (Somalia)	Daua	- Hydrological measurement

5.3.5 Watershed Protection

(1) Protection of Catchment Area

According to the Water Act, the Minister for Water Development can designate any part of a catchment area where special measures are necessary for the protection of water resources. Important areas for protection are forest areas, particularly indigenous forest lands. In fact, there are in most cases many springs around the forest lands, which indicate the forests form natural water reservoirs. They are shown in Figure 5.2, together with the locations of major forest lands.

These important areas (springs and forest lands functioning as sources of springs) should be designated as watershed protection areas. MOWD is urged to take the following actions:

(a) Preparation of spring lists covering the whole country, which include location and expected volume in accordance with the local information
(b) Identification of forest lands functioning as sources of the springs

According to the Forest Act, the Minister for Environment and Natural Resources may declare a forest area to be a natural reserve for the purpose of preserving the natural amenities. In this regard, MOWD and MOENR should exchange information and exercise mutually coordinated regulations from aspects of both water resources conservation and natural amenity conservation.

It appears that no much budget is allotted for the sector of watershed conservation. Both MOWD and MOENR should be provided with sufficient budget so that they could fulfill the assigned duties properly.

(2) *Preservation of Soil*

Excessive soil erosion is found in many rivers in the country. The notable problems are a functional disorder due to sedimentation in small reservoirs and devastation of river courses. MOWD should put the following construction works into action - sand arresting dams (sabo dams), sand pockets, and river training works - in areas where the problem is significant.

The soil conservation works being undertaken by MOA for agricultural development should remain active as the intensification of land use expands in the future.

6. FURTHER STUDY PROGRAMMES

The implementation of development programmes will require pre-construction studies and designs relevant to the proposed projects as well as various supporting activities. This chapter describes essential items of those study programmes.

6.1 Studies and Design of Individual Projects

Implementation of the projects usually requires the pre-investment studies and detailed design thereof to be carried out on an individual project basis. These studies/design will be carried out for all the schemes proposed in Chapter 3. The estimation of these costs are based on the following simple assumptions:

- Pre-investment study : 2.5% of the implementation cost
- Design : 5% of the implementation cost

The estimated cost is shown by development sector in Table 6.1 and the proposed study programmes in tables contained in Chapter 3.

6.2 River Basin Study

Of paramount importance is to formulate a comprehensive and integrated water resources development plan for each major river basin. This river basin study shall cover all water-related sectors and delineate the integrated water development and use of the whole basin area. The study shall be updated periodically, say every ten years. The river basin development authorities, already established under umbrella of MORD or MOE, will be the executing agencies for this study.

One of the important objectives of the river basin study is to examine the potential of multipurpose projects through formulation of optimum water uses and also to examine the necessity and possibility of major water transfer schemes through water balance assessment. The studies shall also investigate the present water use and assess the required river maintenance flow at key stations as a part of the study programme described in Subsection 6.5.1 below.

Note that the studies will not be just at a desk study level based on existing data but will include intensive field surveys and investigations for collection of the substantial baseline data. The surveys and investigations will include (i) aerophotogrammetric mapping of important parts of the basin area, (ii) preliminary geological investigation at potential damsites, (iii) exploratory drilling for groundwater exploitation, (iv) inventory surveys of present water use and facilities, (v) year-round water quantity and quality measurements, and (vi) survey for the determination of river maintenance.

The major river basins needing integrated water development plans are listed below together with some important points to be examined, and the proposed programme is shown in Table 6.2.

Lake Victoria Drainage Area

(1) Sio and Malaba River Basin Study

These two river basins are situated in a relatively dry area, and hence the equitable use of surface water in conjunction with the exploitation of groundwater will be important. Particular aspects to be examined are:

(a) Long-term planning of water source for Busia urban water supply

(b) Evaluation of small scale irrigation development potential

(c) Evaluation of groundwater development potential for rural water supply

(2) Nzoia/Yala River Basins Study

The relatively rich water resources available in the Nzoia river basin is believed to play a very important role not only for local development but also potentially contributing to water development in the Rift Valley area with provision of water transfer schemes (Ref. 12). Since land and water resources covering both areas should be developed most effectively, an integrated river basin study with multi-sectoral objectives is particularly important for this river basin. The study shall examine the following:

(a) Possibility of water transfer to Rift Valley area (NB: This NWMP Study presumed that a maximum of 15 m^3/s would be transferrable. However, this should be confirmed by further detailed studies).

(b) Source development plan for long-term urban water supplies, particularly for Kitale, Kapenguria, Iten/Tambach, Eldoret, Bungoma and Kakamega.

(c) Maximum development of irrigation schemes in the basin including two major schemes; Upper Nzoia and Lower Nzoia schemes.

(d) Development potential of mini hydropower schemes, particularly in Bungoma and Trans Nzoia Districts.

(e) Long-term flood control plans

Yala river is another important river in the Lake Victoria basin. The water resources should be exploited and used most effectively. The basin includes several urban centres such as Kapsabet, Nandi Hills, Maseno, and Vihiga - which are not

necessarily assured of plentiful water sources for future water supply. The Nandi Hill Dam-Kano Plain water transfer scheme for power and irrigation, although not proposed as an immediate scheme in this NWMP Study, has relative merit making it worthy of further examination in the integrated river basin study.

Although a regional development study covering these basins was conducted in 1987 (Ref. 13), a more detailed study specific to the water resources sector is proposed. In view of possible integration of water uses in both basins, it is proposed that the two basins be studied simultaneously under one study programme.

(3) Nyando River Basin Study

Nyando river basin accommodates a large population and has vast fertile land prospective for intensive agricultural development in the lower reaches. But, flood is an inherent problem there. Further, this basin may have a potential for water transfer to the Rift Valley area as envisaged in a preliminary study of the Great Rift Water Transfer Scheme (Ref. 14). A comprehensive river basin study is proposed to delineate the features of long-term water resources development in the basin and also the extent of water transfer to other areas.

Rift Valley Drainage Area

(4) Kerio River Basin Study

The basin development plans have been formulated through several studies (Ref.15, 16 and 17). The updating of previous studies may be required towards year 2000. Re-formulation of the plans will become necessary once the water transfer plan from the Lake Victoria basin is introduced.

(5) Nakuru and Environs Integrated Water Use Study

Nakuru water transfer plan is being promoted as an urgent scheme to settle the water shortage problem in Nakuru city. The water is supplied from Malewa dam, Chemususu dam, and Itare dam (Ref. 18, 19 and 20). A water transfer plan is indispensable for Nakuru city which is faced with a serious water shortage problem. On the other hand, it is also imperative to promote countermeasures to pollution of Lake Nakuru by transferred water. The following countermeasures are foreseen:

(i) Regulation of water utilization amount (Non-structural measure)

- Regulation of regional development within Nakuru basin by a local act. At the same time, provision of regional plans in outlying areas of Nakuru basin for transposition of development activities

- Introduction of special water tariff in Nakuru basin primarily to control water use and secondarily to generate the funds for the structural countermeasures for pollution control.

(ii) Structural measures

- To furnish an urban sewerage system to prevent water pollution.
- To transfer water after treatment of sewerage water outside of Nakuru basin by pumping it for irrigation there.
- To divert or retain the runoff during rainy season and to transfer it outside of Nakuru basin. For this purpose, it will be necessary to provide diversion drainage facilities and flood retention dams. The water will be used for irrigation in outlying areas.

To establish these programmes, a regional water use study should be carried out on an urgent basis. An important element in the proposed study is to formulate an integrated regional development plan aiming at diversification of development activities in outlying areas of Nakuru basin. The study area shall cover three lake basins - Nakuru, Elementeita, and Naivasha.

(6) Ewaso Ngiro South River Basin Study

Ewaso Ngiro South River Development Authority (herein referred as ENSRDA) is responsible for overall development of the Ewaso Ngiro South river basin. Before initiating their activities, the preparation of a comprehensive river basin study is required. Water resources in the basin are apparently scarce compared with the potential demands, and hence the planning of integrated water use is indispensable. An important item of planning will be the conservation of hydrological environment in the lower reaches including Shompole swamp at the outlet to Lake Natron.

Athi River Drainage Area

(7) Athi River Basin Study

Athi river basin seems to be the most critical river basin in terms of the balance between future water demand and available water resources. Although TARDA has formulated various development plans (eg. Ref. 21), it appears to be time to launch the updating of framework plan of the river basin development in collaboration with other agencies involved in various development activities in the basin (NWCPC, NIB, NCC, etc.).

It is noted that almost all the water resources available in the basin would have to be exploited effectively to meet the increasing water demands. Thus, the establishment of a long-term framework plan is essential.

Scarcity of hydrological information in the lower reach, particularly information with regard to water losses in the reach between Athi/Tsavo confluence and Baricho, makes the water balance analysis of the whole basin somewhat difficult. Accumulation of this information is essential. In this context, the updated river basin study is proposed to be carried out in two stages:

Stage 1 : Hydrological and water use studies (3 years)
- Reinstatement of hydrological observation facilities
- Hydrological measurement
- Inventory survey of existing water use and facilities
- Establishment of runoff models

Stage 2 : Formulation of development plans (2 years)

Important aspects to be examined in the study will include (i) delineation of water sources for meeting the future demands of urban centers in Nairobi-Kiambu and Machakos areas (water transfer from Tana basin should be minimized), (ii) necessity of flow regulation/augmentation at Munyu, Yatta and Baricho dams in consideration of overall water balance, (iii) determination of maximum allowable irrigation development and (iv) determination of exploitable water for supply to Mombasa and coast areas. Conservation of water sources for livestock and wildlife is also important in this basin.

Tana River Drainage Area

(8) Tana River Basin Study

Tana River is the largest river basin in Kenya occupying a variety of land environments from semi-humid to arid. The water uses are wide-spread and vary by area. Tana River is quite an important river since its perennial water flow is available in the arid land in its lower reaches. The water resources should be used most effectively.

TARDA has already prepared various development studies (eg. Ref. 22), but time has passed since then. MOE/KPC examined a number of hydropower schemes on the Tana mainstream in its National Power Development Study (Ref. 3), but they were primarily for hydropower single purpose objective. A thorough review and updating of previous studies is proposed for implementation towards year 2000. The study shall draw up a framework plan of long-term development plans particularly paying attention to the following:

(a) Development of the lower basin, including agriculture/irrigation development and the rectification of river meandering and bank erosion.

(b) Multipurpose development of a number of potential dam schemes including Low Grand Falls or High Grand Falls, Mutonga, Adamson's Falls and Kora dams.

(c) Necessity and possibilities of water transfer to urban centres in adjacent dry areas: for example, Lamu, Malindi, Isiolo, and Kitui.

(d) Water source allocation for long-term water supply to Nairobi city.

(e) Livestock husbandry and wildlife conservation in arid land.

Ewaso Ngiro North Drainage Area

(9) Ewaso Ngiro North River Basin Study

The river flows through semi-arid and arid lands serving various water uses. The dry season flow is completely used up as the river flow disappears in the Lorian Swamp just after being used for irrigation near Merti village. This indicates that any bulk water use in the upstream area will have significant impact upon the downstream water use so the establishment of a proper water use plan for the whole basin is important. The comprehensive river basin study shall study the following items:

(a) Determination of water sources for long-term urban water supply to Nanyuki, Nyahururu, Rumuruti, Maralal, and Isiolo.

(b) Conservation of dry season flow in the rivers to ensure that the areas would remain key production areas for the dry season livestock watering and pasturing.

(c) Necessity and justification of the implementation of flow augmentation dam(s) (e.g. Kihoto dam, Archers Post dam, Crocodile Jaw dam) in the future, with the concept of multipurpose development.

(d) Feasibility of water transfer schemes; (i) from the Ewaso N'giro North River to Wajir and (ii) from the Tana River to Loriam Swamp (Mbalambala dam scheme).

(e) Justification of irrigation water use (presumably, dry season irrigation should be minimum in this dry river basin).

Other River Basins

Water development plans in the river basins other than those listed above are proposed to be studied under other study programmes: i.e, water resources studies on District basis or on specific project basis.

6.3 Groundwater Resources Study for Urban Water Supply

The Study foresees that the main water source for water supply to some 20 urban centres in semi-arid and arid areas will remain groundwater resources. If all the future water demand is to be met from groundwater sources, groundwater exploitation should be made in quite a large area, almost an impractically large area for many towns, as indicated in Table 6.3. This may imply that most of the towns would require alternative water sources eventually.

Nevertheless, the first approach would be to investigate the maximum exploitable groundwater resources in and around the area. The area may have water-rich aquifers, which should be surveyed by intensive test drillings. The scope of study shall include the following:

(a) Drilling of exploration boreholes/shallow wells, which will be later used as production wells.

(b) Assessment of maximum exploitable groundwater resources within an economical range.

(c) Testing and evaluation of water quality.

(d) Study on alternative water sources to be exploited in the future (in case the groundwater resources are limited). The alternative water sources will include transfer of surface water, subsurface dam, small dam and other water harvesting measures.

(e) Provision of immediate water supply using the exploration boreholes/shallow wells.

The proposed study programme is shown in Table 6.4.

6.4 District Water Resources Study

The studies of Water Resources Assessment and Planning (WRAP) have been carried out for several Districts under a technical assistance programme of Netherland.

The WRAP has produced good study outputs and provided valuable information with regard to available water resources and proposed water use in the Districts.

The current status of the studies is as follows:

(a) Study completed : Laipikia (730), Baringo (810), West Pokot (860), Kerio Valley, Isiolo (420), Meru (460) and Samburu (840)

(b) Reconnaissance survey made : Lamu (330) and Machakos (440)

(c) Study underway : Tana River (360), Marsabit (450), Garissa (510), Wajir (530), Kajiado (710) and Kilifi (310) for partial area.

A similar study is proposed for all other Districts. The study may be carried out for the districts covered by the river basin study as well in view of the different scopes of the studies where however both studies should be consistent with each other. The proposed study programme is shown in Table 6.5.

The proposed District Water Resources Study is regarded to be the water development master plan for the District and shall formulate the District's long-term water development plans. The scope of work will include;

(a) Assessment of surface water resources including;
- hydrological measurements and analysis
- establishment of observation programmes to be continued in the future on the District basis

(b) Groundwater resources assessment including;
- assessment of groundwater potential with drilling of exploration boreholes/shallow wells
- provision of observation wells for long-term monitoring
- establishment of long-term data collection system, covering well water level, water use quantity, and water quality

(c) Inventory survey of existing water use and facilities and assessment of required river maintenance discharge

(d) Formulation of water supply plans (including preliminary design) for each urban centre and rural centre

(e) Assessment of development potential of other sectors, covering irrigation, livestock and mini-hydropower, and allocation of their water sources (chiefly for water balance analysis, leaving further details of the planning to subsequent project studies)

6.5 Programmes for Data Collection and Water Management

This Section describes several important activities for data collection and management which are requisite to support the implementation of schemes and programmes proposed in preceding Chapters 3 and 5. The proposed programmes and very preliminary cost estimates are shown in Table 6.6.

6.5.1 Surface water management

(1) Hydrological data

As proposed in Subsection 5.3.1, MOWD should continue to reinstate and expand the reliable hydrological observatory works henceforward. The Study recommends the following programmes towards year 2010:

(a) Reinstatement of river water level gauging stations

- Maintenance of priority-1 stations : approx. 40 key stations to be maintained in the first grade order
- Reinstatement : approx. 160 stations on the basis that 10 stations will be reinstated/renewed every year (Priority-1 to 4 stations; see Sectoral Report B)

(b) Reinforcement of MOWD database system

- Expansion of MOWD headquarters database system (hardware and software)
- Assignment of an expatriate database expert for complete acquaintance by MOWD users with the Vax-Macintosh database system newly installed under this NWMP Study (minimum a half year, preferably two years)

(c) Reinforcement of regional office activities

- Training of field hydrologists posted to Provincial and District offices
- Provision of vehicles, one each for Provincial/District offices to facilitate field recording and gauge maintenance activities
- Procurement of database system by desktop computer to provide baseline data

(2) Water abstraction permit data

Water permit data are the basic data for future water use management. As described in Subsection 5.3.1, the existing data contain many obsolescent and incomplete information which do not represent the actual water use conditions. Improvement and updating of the existing data are necessary.

The improvement and updating works will include the following scope of works:

(a) Renovation and updating the existing database

(b) Survey of actual water uses and their facilities

(c) Assessment of natural runoff and determination of allowable water abstraction quantity for each of major rivers

Of the above, (b) and (c) will be carried out under the river basin studies and the District water resources studies as proposed in preceding Subsections 6.2 and 6.4, respectively. On one hand, however, it is said that there are some rivers where the water abstractions have already been over-committed and/or very critical, and further some of the river basin/District water resources studies are not foreseen for several years. For those rivers, a separate study for this specific purpose may be carried out in advance of the river basin/District water resources studies. The following two river basins are listed for this specific study:

(i) Athi river upstream of the proposed Munyu damsite
(ii) Tana river upstream of the existing Kiambere dam

The two river basins cover most of Central Province where the water use is most intensive and complex. The work for (a) above will be carried out as a part of this study.

(3) Assessment of river maintenance discharge

This work will be carried out under the scope of the river basin/District water resource studies, same as for (2) above. The studies for the upper Athi and Tana river basins mentioned in (2) will be conducted as a part of studies for (2).

(4) Reinforcement of water use monitoring/control activities

This includes the following programmes:

(a) Training of water bailiffs posted to Provincial/District Offices

(b) Provision of vehicles, one each for all Provincial and District water offices for use specifically by water bailiffs

6.5.2 Groundwater resources management

(1) Groundwater data management

Similar to surface water data management, the Groundwater Section of MOWD will require the addition of database equipment (two computer terminals and a printer). At the same time, the reinforcement with at least two hydrogeologist will be required to handle the data management including the analysis of pumping/recovery test data.

(2) Assessment of groundwater potential

This will be conducted as a part of the river basin studies, urban water supply studies and District water resources studies as proposed in preceding Subsections 6.2 to 6.4. The results should be compiled on a systematic basis in a file appropriately prepared by the Groundwater Section of MOWD.

6.5.3 Water quality and pollution control

(1) Water quality monitoring programme

Existing data are not many nor comprehensive for assessing the country's water quality and pollution aspects. There is an urgent need to accumulate comprehensive data covering the whole country especially for the following:

- Collection of baseline data for future water quality monitoring and control
- Identification of polluting rivers and pollution sources
- Collection of groundwater quality data to establish water quality guidelines or standards applicable to each region
- Collection of data for future establishment of effluent quality standards and receiving water quality standards

Owing chiefly to budgetary constraint, the Water Quality and Pollution Control Section of MOWD finds it difficult to launch the above surveys. It is proposed that the survey will be taken up as a donor assisted survey programme. The surveys may be divided into two parts;

(a) Surface water quality monitoring survey

- year-round observation at 120 stations presently assigned as reference and impact stations
- Additional spot measurements at selected stations where water pollution is suspected

(b) Groundwater quality monitoring programme

- year-round sampling and test at selected wells (about 2000 wells)
- year-round measurement of water levels

This survey will provide the baseline data for establishment of a water quality database to be prepared by MOWD. Additional data can be obtained from the river basin studies, the District water resources studies and various project studies, all of which shall be accumulated in the database.

(2) Establishment of water quality standards

The preparation of standards (effluent quality standards and receiving water quality standards) shall take into account the climate, natural river/groundwater characteristics and other environmental requirements particular to Kenya, and the established standards must be of practical nature in the implementation. The work will require the input of highly qualified experts in this field.

(3) Enforcement of water pollution control

The work will basically be entrusted to water bailiffs and chemists based at the Provincial and District offices. The activities will need the provision of the following facilities:

(a) Water quality testing laboratory one each for all 47 Districts (including 6 districts recently established)

(b) Vehicles for inspection and sampling (common use of a vehicle provided to water bailiffs for water use inspection)

6.5.4 Domestic/industrial water supply

(1) Inventory list of water supply facilities

The MOWD has not accumulated all the information with regard to existing water supply facilities, in particular the information of self-help, settlement, NGO's and other community based small schemes. An inventory survey should be carried out on each district basis to accumulate the updated information. The inventory list shall contain the information of water sources, supply capacity, served population, list of facilities by type with information on present condition, capacity and year built, and drawings showing the location of facilities including supply mains and distribution pipes. With this information, MOWD could have accurate information as to the coverage of service area, population served/unserved, the seriousness of water supply shortage and the extent of required augmentation in detail.

This work could be achieved with the effort of existing institutions and no specific budget categorised into development expenditures seems to be required.

(2) Measurement of water supply

A great problem is that many water supply schemes do not have accurate record of water quantity supplied. This could be improved by installation of flow meters at the water supply plants. If required and appropriate, the flow measurement should preferably be made at strategic points within the delivery/distribution system to determine the areal distribution of water use. The Study made a rule-of-thumb estimate that, for this installation, about US$20,000 on an average would be required for some 1,000 schemes out of 1,500 existing schemes.

6.5.5 Irrigation inventory/water use survey

(1) Inventory list of irrigation schemes

It is proposed that MOA should have and maintain a complete inventory list of all irrigation schemes in the country. The inventory should be kept in the form of a database and updated periodically. The work could be done by existing institutional efforts.

(2) Irrigation water use records

This requires a great effort in view of seasonal variation of water use, varieties of type of water abstraction and manpower requirement. Yet, the effort for recording the actual water use should be made at as many schemes as possible, since irrigation is the largest water user and hence the water management is particularly important in this sector. The Study presumes that the work can be carried out within the existing facilities and institutions. For proper water management, on the other hand, the accurate assessment of water permit quantities for irrigation projects should be carried out by WAB.

6.5.6 Livestock and wildlife water facilities inventory

The Study presumes to be worthy of preparing the inventory of major water facilities (both natural water surfaces and manmade facilities) on which livestock and wildlife are dependent particularly in the dry period. The data could be the baseline data for further promotion of these two sectors. It is presumed that necessary information is already in the hand of MOLD and MOTW, and it only has to be compiled in the format of a database. The inventory can be supplemented with further information to be availed through the river basin studies and the District water resources studies proposed earlier.

Livestock and wildlife population survey as conducted by Department of Remote Sensing and Resources Survey (DRSRS) in 1988 should be carried out every five years preferably or ten years at the longest.

6.5.7 Hydropower resources survey

MOE/KPC carried out the study of National Power Development Plan (NPDP) in 1987 (Ref. 3) and its updating study (Ref. 4) in 1991. They intend to review and update the study at several years interval.

An aspect not examined fully in the NPDP is the multipurpose development aspect of hydropower dam schemes. However, this could be reviewed in the further studies of individual projects and/or the river basin studies to be conducted henceforth. The findings therefrom can then be incorporated in the updating study of NPDP for assessing the relative merit within the framework of power generation expansion plan. It is proposed that the NPDP update be carried out every five years at the longest.

Water use by hydropower (basically year-round constant use with hourly variation for peak power generation) is sometimes contradictory to that by other water users particularly irrigation. In principle, the water use should be to maximize the benefit of all sectors. Optimum use of water should be examined in each river basin study.

6.5.8 River and flood control works

(1) Inventory survey of rivers and river facilities

The scope of this survey is as given in Subsection 5.2.6(3). The preparation of inventory will not be an urgent requirement and may be carried out over the long term. The information will be collected through the river basin studies and the district water resources studies. MOWD could prepare a database for future river management through long-term accumulation of this information. No specific study programme on this subject is therefore proposed.

(2) Formulation of river improvement works

During field reconnaissance in this study, at many places bank erosion hazardous to neighbouring housing, accumulation of debris and siltation causing unhealthful stagnation of water flow, and narrowed channel seemingly causing flooding upstream were found. These should be remedied one by one. Identification of all those individual sites is beyond the capacity of this Study and hence will be left to be listed by the MOWD's regional offices. The identification could be done as one of the routine duties of the regional offices. The identified work will be subject to implementation under the programme of minor river improvement work described in Subsection 3.6.2 before.

(3) Urban drainage hydrological studies

Subsection 3.5.2 hereinbefore proposes the implementation of urban drainage works in the future. A particular aspect in Kenya is that the characteristics of rain storm (rainfall intensity, duration and probability) may be different from region to

region, particularly in semi-arid and arid areas. In order to prepare the most economical design of drainage facilities for each town, accumulation of hourly rainfall data is important. At present, hourly rainfall data are available only for 17 towns out of 47 towns for which the provision of drainage facilities is proposed. Taking of similar measurements at other towns is recommended. The work will be the task of Kenya Meteorological Department (KMD).

6.6 Environmental Studies

(1) Preparation of environmental impact assessment and management guidelines

As mentioned in paragraph (6) of Section 5.1.1, there are no comprehensive environmental guidelines in Kenya, other than a guideline included in the Environmental Management Report (NES, 1978). Since environmental conservation will be an increasingly important issue in the future, the preparation of comprehensive guidelines will be necessary. The guidelines shall cover both the principle rules of environmental impact assessment and environmental management plans.

The guidelines should represent the conditions prevailing in and particular to Kenya. Hence, the preparation of the guidelines will require a lot of data/information accumulation and will be a great task possibly needing several years or more. National Environmental Secretariat (NES) is the agency capable of handling this issue.

(2) Regional environmental studies

Water resources development usually requires proper consideration of the resultant environmental impacts or consequences due to the development activities. Most of the issues could be examined and solved in the studies of the proposed projects. Nevertheless, there may be such a case that a baseline environmental study should preferably be carried out in advance to provide a guideline direction for the formulation of water resources development plans. The following proposed studies may fall in this category:

Proposed Environmental Study	Objective/Remarks
(a) Mara river environmental study	- Assessment of ecological conservation requirement in the downstream reaches, particularly for wildlife - Assessment of water resources abstractable from Upper Mara rivers

(b) Lake Jipe environmental study (including Lake Chala)
- Assessment of environmental conservation requirements of the Lakes
- Assessment of water resources abstractable for water supply (e.g. irrigation in upstream area, water supply to Mombasa area)

(c) Lake Turkana environmental study
- Several surveys have been conducted. A further comprehensive study is proposed to assess the environmental conservation requirement of the Lake.
- The study must be collaborated by Ethiopia in form of supplying the relevant information.

The proposed study programmes are shown in Table 6.7. Environmental issues in other areas are proposed to be examined in the river basin studies and the District water resources studies proposed earlier (e.g. Lakes Nakuru/Naivasha/Elementeita, Lake Bogoria, Lake Baringo, lower reaches of the Tana, etc.).

6.7 Financial Requirement

Financial cost required to achieve the study programmes proposed in Sections 6.1 to 6.6 amounts to US$ 1,225 million or K£ 1,543 million. The estimated cost is summarized by study item as follows:

Further Study Programme - Estimated Cost

	Study Programme	Estimated Cost	
		US$ million	K£ million
1.	Studies and design of individual projects	751.9	947.4
2.	River basin study	25.5	32.1
3.	Groundwater resources study for urban water supply schemes	51.0	64.3
4.	District water resources study	59.0	74.3
5.	Data collection and water management	47.0	59.2
6.	Environmental studies	7.5	9.5
7.	Other miscellaneous studies (*)	282.6	356.1
	Total	1,224.5	1,542.9

Note: (*) 30% of the total of 1 thru 6

It is noted that the study programmes listed in this Chapter cover the major items, but presumably not all items. There would be other miscellaneous studies which may become

necessary in the course of the implementation of the proposed implementation programmes. Item 7 of the above table was listed to cover this expenditure.

A very preliminary annual budgetary schedule is shown in Table 6.8.

7. RECOMMENDATION

7.1 Achievement of Development Target

This Study examined four alternative development scenarios:

		Ref.
(a)	Full development meeting whole demands/targets	Chapter 3
(b)	Alternative budgetary scenario A (available budget: 50% of (a) above)	Section 4.2.1
(c)	Alternative budgetary scenario B (available budget: 75% of (a) above)	Section 4.2.1
(d)	Reduced development scenario for water supply sector (available budget: same as for (b) and (c) above)	Section 4.2.3

It is beyond the capability of the Study to recommend which development scenario among the above is the best for the future conditions in Kenya. Nevertheless, the Study would recommend that all possible arrangement should be made to achieve the target (a) above and that Kenya Government would distribute as much budget as possible to the water sector so as to satisfy the National Water Development Policy set forth in Chapter 2.

7.2 Source of Financial Procurement

The following financial sources could be considered as available funds for capital investment.

Availability of Financial Resources

	Financial Source	Urban Water Supply	Rural Water Supply	Sewerage Develop-ment (Urban)	Irrigation Develop-ment	Livestock Water Develop-ment	Hydro-power Develop-ment	River Flood Control Works
(a)	Grant							
	Government Subsidy	o	o	o	o	o	o	o
	External Donor	o	o	o	o	o	o	-
	NGO	-	o	-	o	o	-	-
(b)	Loan							
	Internal Lender	o	o*1	o*1	o	o	o	o
	External Lender	o	-	o	o	-	o	o
(c)	Fund							
	Revolving Fund	o	o	o	o	o	-	-
	Co-operative Society*2	o	o	o	o	o	-	-
	Private Entity*3	o	o	o	-	o	-	-
	Contribution of Beneficiary*4	o	o	o	-	o	-	-
(d)	Others							
	Voluntary Service*5	o	o	o	o	o	o	o

Remarks:
*1 Low interest personal loans for individual connection, rainwater harvesting facilities, septic tank, etc.
*2 In case that a existing community or a newly organized society is positively concerned in the scheme, it could provide or procure some financial resources for capital investment.
*3 A local leading entity could provide a water supply system for the people within the surrounding area of the entity.
*4 Some beneficiaries in service area of water supply systems could afford to contribute a part of capital costs of the systems.
*5 Labour force of beneficial people could be available (semi-)voluntarily, which might be effective for construction works of water systems.
Deemed to be not major source, but there may be the cases of financing from these sources.

Constraint of financial resources is foreseen to be most critical in the water supply sector. To increase the investment funds, core agencies concerned with water supply systems such as MOWD and NWCPC should positively exert themselves to propose viable projects. In addition, they should contrive to raise the funds by means of improving the payability of water supply undertakings through improvement of revenue collection and revision of water tariff and by means of compressing the government recurrent expenditure for supplementation of water undertakings. It is essential that these saved funds should be applied towards the investment funds. Similar efforts should be exercised by other agencies concerned, such as MOLG and local authorities.

7.3 Manpower Requirement

Annual development expenditure for water-related sectors has been approximately K£230 million during these years (see Table 4.1). This will increase to approximately K£850 million on an average for the period up to the year 2010 (see Table 3.15). As represented by these monetary figures, the volume of implementation works will increase by 3 to 4

times in the future. This may require the reinforcement of manpower of the implementing ministries and agencies.

The Study presumes that the Government will make a continuous effort to maintain the government body as small as possible and therefore a drastic increase of the government staff would not be likely. Instead, most of the implementing activities would be made through the use of private sectors; e.g. consultants and contractors. Nevertheless, the government staff should still handle various activities such as the policy making and administration, basic planning, supervisory tasks in the implementation, data management and water management in keeping with the increase in work volume. Here, an aspect taken into account is that each ministry or agency would seek the improvement of the efficiency of existing staff force through establishment of a well organized institutional training of individual staff to minimize any additional manpower requirement.

On these bases, the Study attempted a very preliminary estimate of additional manpower requirement for achieving the implementation and study programmes proposed in Chapter 3 and 5. The estimated manpower requirement is shown in Table 7.1.

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22 Pre-F/S on the Potential Development of the Tana River, E.K.Bank,1974

23 KPC, Sondu/Miriu Hydropower Project, Feasibility Study on Additional Power Station, Nippon Koei, April 1992

TABLES

Table 3.1 Selected Service Centres for Urban Water Supply Development (1/4)

Code	Location	Urban Name	City Code	Present Raw Water Source	Present Water Supply Capacity (m3/day)	Population (nos.)			Demand (m3/day)			Coverage in 1990 (%)
						1990	2000	2010	1990	2000	2010	
110.0	Nairobi	Nairobi	U- 1	Chaania R.+Sasumua Dam+Ruiru Dam+Kikuyu Spring	178,110	1,413,100	2,260,500	3,465,400	332,826	552,294	802,168	53.51
211.1	Kiambaa	Karuri	U- 2	Boreholes	0	16,200	31,700	46,400	2,554	5,070	7,557	0.00
211.4	Kiambu Municipality	Kiambu	U- 3	Bore holes + NCC P/L	550	4,500	10,400	16,600	1,589	3,212	4,803	34.60
212.1	Ngenda	Gatundu & Ngenda	U- 4	Boreholes	433	900	1,500	2,000	170	332	460	100.00
213.1	Limuru	Limuru	U- 5	Boreholes	206	1,600	3,200	4,600	931	1,699	2,337	22.12
214.1	Ruiru	Ruiru	U- 6	Ruiru River	393	14,300	28,000	40,900	2,602	5,076	7,456	15.10
214.4	Thika Municipality	Thika	U- 7	Chania River	11,400	59,000	135,500	217,500	11,134	24,737	39,416	100.00
215.1	Githunguri	Githunguri	U- 8	Boreholes	157	3,800	8,800	14,100	671	1,523	2,444	23.41
216.6	Kikuyu	Kikuyu	U- 9	Boreholes	1,270	6,100	14,100	22,500	4,561	8,081	10,567	27.85
221.1	Tebere	Wanguru	U- 10	N.I.B canal	208	700	1,100	1,500	181	341	490	100.00
222.2	Kiine	Sagana	U- 11	Ragati River	297	2,900	6,800	11,100	518	1,191	1,950	57.31
222.3	Inoi	Kerugoya	U- 12	Rutu River	1,085	8,900	20,700	34,100	1,395	3,263	5,443	77.75
223.2	Kabare	Kutus	U- 13	Thiba River	905	6,300	14,400	23,500	925	2,150	3,575	97.79
231.4	Muruka	Kandara	U- 14	Thika River	200	700	1,300	1,800	103	193	272	100.00
232.3	Nginda	Maragua	U- 15	Boreholes	66	35,500	64,200	91,200	5,183	9,545	13,813	1.27
233.4	Iyego	Kangema	U- 16	River (Local)	350	1,500	2,800	3,900	219	415	590	100.00
234.3	Mbiri	Murang'a	U- 17	River (Local)	3,000	21,700	45,300	70,100	3,841	7,992	12,449	78.10
235.1	Makuyu	Makuyu	U- 18	River (Local)	0	5,100	10,700	16,500	745	1,589	2,499	0.00
241.3	Ol Kalou	Ol Kalou	U- 19	Boreholes	1,215	9,700	24,800	37,900	1,740	4,316	6,662	69.84
254.2	Konyu	Karatina	U- 20	Ragati River	1,800	5,400	12,200	20,700	975	2,152	3,606	100.00
256.1	Karima	Othaya	U- 21	Gikira River	250	4,800	10,900	18,400	702	1,623	2,796	35.63
257.0	Nyeri Municipality	Nyeri	U- 22	Chania River	5,890	97,000	218,600	370,700	15,559	35,042	59,718	37.86
311.2	Mariakani	Mariakani	U- 23	Mzima pipeline	650	7,600	19,500	33,100	3,954	7,518	10,502	16.44
313.2	Tezo	Kilifi	U- 24	Sabaki pipeline	2,450	12,500	32,000	54,500	2,119	5,288	8,994	100.00
314.3	Gede	Watamu	U- 25		0	2,100	5,400	9,200	306	801	1,389	0.00
314.4	Malindi Town	Malindi	U- 26	Sabaki Pipeline	7,000	36,700	93,900	159,800	5,818	14,805	25,408	100.00
314.6	Magarini	Mambrui	U- 135	Borehole /small dam	0	3,200	6,900	14,400	466	1,024	2,092	0.00
321.1	Shimba North	Kwale	U- 27	Marere spring	470	3,700	9,700	15,200	547	1,455	2,325	85.87
323.1	Kinango South	Kinango	U- 28	Marere pipeline	300	2,500	4,400	5,800	310	660	885	96.87
324.1	Msambweni	Msambweni	U- 29	Boreholes	600	8,400	21,900	34,500	1,298	3,394	5,427	46.24
324.5	Lungalunga	Lungalunga	U- 136	Boreholes	300	2,600	5,700	8,200	441	959	1,404	68.02
331.0	Witu	Witu	U- 30	1 no shallow well	150	3,300	7,500	12,500	494	1,146	1,987	30.38
333.2	Lamu Town	Lamu	U- 31	20 shallow wells	500	9,000	20,400	34,000	1,691	3,751	6,317	29.57
340.0	Mombasa	Mombasa	U- 32	Mzima P/L /Sabaki P/L /Marere P/L	68,600	479,600	673,000	904,400	100,256	151,634	202,823	68.42
351.1	Taveta	Taveta	U- 137	Njoro sprig	350	12,100	20,600	28,900	2,254	3,890	5,449	15.53
352.4	Voi	Voi	U- 33	Mzima P/L	1,230	12,200	23,600	36,000	2,177	4,257	6,565	56.49
353.2	Werugha	Wundanyi	U- 34	Taita Hills streams	1,100	2,700	5,300	8,000	403	803	1,237	100.00
362.3	Bura	Bura & Madogo	U- 35	Tana River	120	1,200	2,100	2,800	149	334	450	80.73
363.3	Zabaki	Hola	U- 36	Tana River	500	8,100	21,600	34,800	1,374	3,615	5,862	36.38
364.1	Bilisa	Garsen	U- 37	Tana River	170	3,600	8,000	11,700	570	1,272	1,882	29.83

Table 3.1 Selected Service Centres for Urban Water Supply Development (2/4)

Code	Location	Urban Name	City Code	Present Raw Water Source	Present Water Supply Capacity (m3/day)	Population (nos.)			Demand (m3/day)			Coverage in 1990 (%)
						1990	2000	2010	1990	2000	2010	
411.8	Kangaari South	Runyenjes	U- 38	Ena River	135	2,000	4,100	6,100	407	821	1,228	33.19
412.1	Nthawa	Siakago	U- 39	Ena River	228	400	600	800	50	88	120	100.00
413.7	Embu Municipality	Embu	U- 40	Kapingazi River + Rupingazi River	3,200	18,400	44,400	72,900	3,010	7,201	11,899	100.00
421.1	Central	Isiolo	U- 41	Isiolo River	1,250	15,900	49,200	88,100	3,023	9,559	18,914	41.35
421.2	Oldonyonyiro	Ol Doinyo Ng'iro	U- 42	Sub-surface dam	0	4,400	11,000	17,600	788	2,064	3,681	0.00
422.1	Garbatula	Garbatula	U- 138	Boreholes	150	1,900	4,800	7,600	340	898	1,590	44.07
423.1	Merti	Merti	U- 139	Boreholes C3853	70	5,700	14,200	22,700	1,021	2,668	4,757	6.86
431.4	Changwithya	Kitui	U- 43	Boreholes	1,180	9,300	24,400	40,800	1,560	4,017	6,759	75.64
433.2	Mutomo	Mutomo	U- 44	Boreholes	310	700	1,200	1,600	87	178	242	100.00
434.4	Mwingi	Mwingi	U- 45	Shallow wells	50	7,300	19,200	32,000	1,076	2,879	4,888	4.65
441.1	Muvuti	Machakos	U- 46	Mamba Dam	2,660	91,100	214,500	356,400	14,309	33,750	56,631	18.59
441.2	Mitaboni	Mitaboni	U- 47	Spring, Self-help	0	29,400	68,800	114,000	4,288	10,248	17,296	0.00
442.3	Settlement Area	Athi River	U- 48	Nol-Turesh P/L	6,400	25,100	59,100	98,200	4,891	10,907	17,649	100.00
444.3	Kiteta	Uaani/Tawa	U- 49	Boreholes and Dam	4	300	500	700	37	74	105	10.76
445.1	Kangundo	Kangundo	U- 50	Boreholes	72	11,200	26,400	43,900	1,695	4,037	6,812	4.25
445.2	Matungulu	Tala	U- 140	Boreholes	50	2,100	4,200	6,400	667	1,299	1,951	7.49
447.4	Kilungu	Nunguni	U- 51	Spring	45	500	800	1,000	62	117	151	72.65
448.1	Makueni	Wote	U- 141	Boreholes	153	2,300	5,500	9,000	431	995	1,629	35.51
448.3	Nzaui	Emali	U- 52	Nol Tresh P/L	0	400	600	800	50	89	121	0.00
449.4	Mtito Andei	Mtito Andei&Kibwezi	U- 53	Nol-Turesh P/L + Umani springs	0	3,800	8,500	13,500	557	1,264	2,049	0.00
451.1	North Horr	North Horr	U- 142	Boreholes	28	2,100	4,400	6,300	374	795	1,244	7.48
452.2	Kargi	Kargi	U- 54	Boreholes	50	4,300	10,500	16,600	764	1,910	3,290	6.55
453.1	Korr	Korr	U- 143	Boreholes	400	5,800	11,900	17,200	1,030	2,166	3,411	38.82
454.1	Mountain	Marsabit	U- 55	Small river(Bakuli spring)	300	11,100	27,100	42,700	2,201	5,350	9,078	13.63
455.2	Sololo	Sololo	U- 56	Boreholes	20	3,700	9,100	14,300	658	1,652	2,832	3.04
456.1	Moyale	Moyale	U- 57	Moyale Dam	450	6,800	16,600	26,200	1,493	3,548	5,956	30.13
461.4	Ntima	Meru	U- 58	Kazita R.Gatobora St	2,980	78,900	192,900	319,900	13,209	31,863	53,093	22.56
463.1	Nkuene	Nkubu	U- 59	Thingithu River	300	5,000	12,300	20,300	737	1,843	3,102	40.68
464.1	Chogoria	Chogoria	U- 60	Mutonga River	0	1,300	2,200	2,900	161	329	443	0.00
464.3	Karingani	Chuka	U- 61	Tungu River	400	4,000	8,300	12,400	590	1,244	1,894	67.85
467.2	Maua	Maua	U- 62	Mboone Stream	170	4,000	8,300	12,400	590	1,244	1,894	28.84
513.1	Madogashe	Mudo Gashe	U- 63	Spring	69	2,200	4,700	6,700	359	773	1,141	19.25
515.2	Ijara	Ijara	U- 64	Boreholes	0	1,400	2,500	3,200	173	409	545	0.00
515.3	Kotile	Kotile	U- 65	Boreholes	0	1,400	2,500	3,200	173	409	545	0.00
515.4	Masalani	Masalani	U- 66	Tana river	60	1,400	2,500	3,200	173	409	545	34.60
519.1	Sankuri	Garissa	U- 67	Tana river	5,641	29,100	73,700	115,300	4,862	12,392	20,030	100.00
521.1	Mandera	Mandera	U- 68	Boreholes/Daua river	1,400	6,500	11,800	18,100	1,222	2,286	3,602	100.00
523.1	Elwak	Elwak	U- 69	Borehole	100	10,700	17,200	24,400	1,730	2,876	4,242	5.78
524.2	Rhamu	Rhamu	U- 70	River (Local)	500	4,500	7,200	10,200	727	1,202	1,772	68.73
532.4	Wajir Township	Wajir	U- 71	Borehole (C5267)	23	21,400	46,100	75,500	3,428	7,469	12,493	0.67

Table 3.1 Selected Service Centres for Urban Water Supply Development (3/4)

Code	Location	Urban Name	City Code	Present Raw Water Source	Present Water Supply Capacity (m3/day)	Population (nos.)			Demand (m3/day)			Coverage in 1990 (%)
						1990	2000	2010	1990	2000	2010	
536.2	Buna	Buna	U- 72	Boreholes	0	6,800	12,600	18,700	1,087	2,040	3,094	0.00
537.2	Bute	Bute	U- 73	Boreholes	12	2,200	4,100	6,100	353	664	1,008	3.40
611.2	Erange	Manga	U- 74	Gucha river	30	1,100	1,700	2,100	136	252	320	22.02
611.5	East Kitutu	Keroka	U- 75	Chirichiri river	145	2,500	4,400	6,100	596	1,079	1,537	24.34
612.2	East Mugirango	Nyamira + Kebirigo	U- 144	River (Local)	400	11,000	21,400	32,400	1,671	3,322	5,090	23.94
615.0	Kisii Municipality	Kisii	U- 76	Nyakobisaro	3,520	45,800	91,000	138,500	7,815	15,630	24,020	45.04
617.1	Majoge Chache	Ogembo	U- 77	Spring	0	1,100	2,000	2,700	162	298	412	0.00
622.1	West Kisumu	Maseno	U- 78	Kima river	2,400	16,000	32,200	50,600	7,413	13,794	19,934	32.38
622.3	East Kisumu	Kisumu + Kiboswa	U- 79	Lake Victoria	15,490	176,200	362,400	578,700	26,032	54,693	89,344	59.50
623.2	South East Kano	Ahero	U- 80	Boreholes	0	10,300	18,500	26,900	1,784	3,279	4,864	0.00
625.2	Muhoroni	Muhoroni	U- 81	Nyando River	96	8,100	16,700	26,700	1,422	2,937	4,720	6.75
632.4	West Sakwa	Bondo	U- 145	Yala River	160	3,600	6,100	8,600	703	1,231	1,771	22.76
633.2	East Gem	Yala	U- 82	Yala River	210	2,700	4,600	6,500	683	1,216	1,751	30.73
634.1	East Alego	Siaya	U- 83	Nyamawin River	1,200	19,400	37,100	57,200	3,245	6,283	9,778	36.98
635.4	North Agenya	Ukwala	U- 84	Boreholes	50	1,100	1,900	2,700	162	284	411	30.81
641.1	Kanyada West	Homa Bay	U- 85	L.Victoria .	1,200	23,000	48,600	73,900	3,945	8,308	12,741	30.42
644.3	Suna East	Migori	U- 86	Boreholes	130	7,500	15,900	24,100	1,321	2,781	4,253	9.84
646.3	Bukira East	Kehancha + Tarang'anya	U- 146	Orawe Dam	10	3,800	7,000	9,800	555	1,038	1,481	1.80
646.8	Bugembe West	Nyabikaye	U- 147	Stream	0	3,600	6,600	9,300	525	980	1,405	0.00
647.4	Central Kasipul	Oyugis	U- 148	Awachi River	200	3,800	7,000	9,800	624	1,155	1,629	32.07
648.1	Central Karachuonyo	Kendu Bay	U- 87	Awachi River	150	2,700	5,800	8,700	635	1,311	1,974	23.60
649.4	South Sakwa	Awendo/Sare	U- 149	Sare River	0	4,300	7,900	11,000	1,082	2,015	2,877	0.00
711.1	Odomongi	Oloitokitok	U- 88	Nol-Turesh Spring	150	4,300	12,900	24,500	698	2,098	4,034	21.50
712.1	Ngong	Ngong	U- 89	Boreholes	350	16,100	44,700	81,800	2,614	7,278	13,474	13.39
713.1	Ildamat	Kajiado	U- 90	Boreholes & Nol-Turesh	150	6,000	17,900	34,100	973	2,916	5,617	15.41
713.5	Namanga	Namanga	U- 91	Namanga Spring	100	4,800	14,400	27,300	779	2,342	4,496	12.84
714.1	Magadi	Magadi	U- 92	Oloibortoto River	400	2,800	8,400	16,000	524	1,484	2,781	76.36
723.1	Kepletudo	Sotik	U- 93		150	6,000	11,200	16,600	1,295	2,443	3,640	11.58
725.5	Kericho Township	Kericho	U- 94	River	2,850	41,200	88,700	145,000	8,034	16,974	27,497	35.48
726.1	Kipkelion	Kipkelion	U- 95	Kipkelion River	115	2,200	4,800	7,800	330	730	1,210	34.90
727.1	Londiani	Londiani	U- 96	Londiani River	120	3,200	6,900	11,300	504	1,098	1,816	23.79
731.5	Nanyuki	Nanyuki	U- 97	Nanyuki River	2,720	25,100	63,600	114,900	4,489	11,167	20,546	60.59
733.4	Rumuruti	Rumuruti	U- 150	Ewaso Narok River	90	2,400	5,100	8,200	485	1,015	1,651	18.55
733.9	Nyahururu Township	Nyahururu	U- 98	Nyahururu Stream /Equator Streams	2,490	14,200	36,000	60,000	2,642	6,505	11,055	94.25
743.2	Gilgil	Gilgil	U- 99	Molendat River	778	14,600	39,900	73,800	2,325	6,340	12,065	33.47
744.1	Naivasha	Naivasha	U- 100	Boreholes	2,100	38,500	105,000	194,500	6,151	16,752	31,924	34.14
746.1	Njoro	Njoro	U- 101	Boreholes	440	9,100	24,900	46,000	1,463	3,999	7,608	30.07
747.3	Elburgon	Elburgon	U- 102	Boreholes	410	12,400	33,900	62,700	1,953	5,363	10,239	20.99
747.5	Molo South	Molo	U- 103	Boreholes	400	10,900	29,800	55,100	1,813	4,892	9,259	22.06
749.0	Nakuru Municipality	Nakuru	U- 104	Borehole /Shallow Well(3nos.)	19,830	172,200	469,500	869,900	34,623	86,813	151,718	57.27

Table 3.1 Selected Service Centres for Urban Water Supply Development (4/4)

Code	Location	Urban Name	City Code	Present Raw Water Source	Present Water Supply Capacity (m3/day)	Population (nos.) 1990	2000	2010	Demand (m3/day) 1990	2000	2010	Coverage in 1990 (%)
752.1	Lower Melili	Narok	U- 105	Engare Narok River	1,050	12,000	42,800	85,700	2,084	7,240	14,516	50.40
752.5	Keekonyoike	Nairagie Ngare	U- 106	Lolongo Stream/Dam	50	500	1,400	2,500	82	230	413	61.02
754.4	Uasin Gishu East	Kilgoris	U- 151	Poroko River	130	3,300	9,300	16,200	541	1,526	2,686	24.04
755.1	Siria East	Lolkorian	U- 152	Spring	70	1,700	4,800	8,400	279	788	1,391	25.13
762.3	Kitale	Kitale	U- 107	Koitobos river	5,610	56,400	142,300	249,200	9,391	23,346	40,986	59.74
762.4	Kiminini	Kiminini/Saboti+Spr.Kita	U- 108	River (Local)	0	1,700	3,000	4,200	211	450	642	0.00
763.5	Endebess	Endebess/Kwanza	U- 109	River (Local)	0	2,800	4,800	6,700	348	723	1,029	0.00
771.2	Moi's Bridge	Moi's Bridge	U- 153	River	26	3,100	6,400	10,100	464	975	1,577	5.60
772.4	Turbo West	Turbo	U- 154	River	150	4,300	8,800	14,000	644	1,342	2,185	23.30
772.5	Eldoret Municipality	Eldoret	U- 110	Twin Rivers Dam, Ellgirini Dam, Boreholes	16,250	112,900	272,500	486,800	20,374	47,755	84,415	79.76
774.6	Olare	Burnt Forest	U- 111	Boreholes	65	2,200	4,500	7,200	330	687	1,124	19.73
812.5	Kabarnet Mosop	Kabarnet	U- 112	Boreholes (C4722,3506)	1,312	9,400	20,500	34,700	1,475	3,249	5,558	88.92
814.3	Maji Mazuri	Maji Mazuri	U- 113	Maji Mazuri River	96	5,200	11,400	19,200	785	1,745	2,991	12.23
814.5	Eldama Ravine	Eldama Ravine	U- 114	Chemususu River	522	5,600	12,300	20,700	902	1,985	3,372	57.89
815.1	Lembus Soi	Mogotio	U- 115	Molo River	442	2,900	6,400	10,700	436	975	1,662	100.00
816.2	Marigat	Marigat	U- 155	Parkerra River/ Chemeron dam	173	3,000	5,700	8,600	452	871	1,340	38.31
822.4	Kipsilong	Iten+Tambach	U- 116	Kamariny Spring	550	6,300	13,000	19,700	952	2,035	3,194	57.75
831.3	Chemelil	Nandi Hills	U- 117	Taito River	200	1,300	2,800	4,200	877	1,687	2,467	22.80
832.2	Chemundu	Kapsabet+Baraton	U- 118	Kabutie River	830	13,400	33,100	56,300	2,114	5,238	9,002	39.26
841.4	Maralal	Maralal	U- 119	Nundoto Dam	600	17,800	42,300	74,800	3,036	7,296	13,177	19.76
842.4	Wamba	Wamba	U- 120	Borehole (C4513)	100	3,700	8,800	15,600	593	1,449	2,651	16.85
843.6	Elbarta	Baragoi	U- 121	Boreholes (C4530)	50	3,200	7,700	13,500	512	1,265	2,294	9.76
853.5	Lodwar	Lodwar	U- 122	Boreholes	1,250	9,300	21,300	33,400	1,890	4,543	7,881	66.14
861.1	Kapenguria	Kapenguria/Makutano	U- 123	Kapenguria Stream	180	12,000	28,000	48,200	1,846	4,332	7,538	9.75
911.4	Malakisi	Mawalie + Malakisi	U- 156		0	3,200	7,100	10,700	627	1,376	2,084	0.00
912.4	Musikoma	Bungoma	U- 124	Kuywa River	2,500	29,500	83,100	142,700	5,098	13,776	23,561	49.04
913.1	Kimilili	Kimilili	U- 125	Kimilili River	152	6,500	18,300	31,500	955	2,735	4,795	15.91
914.2	Webuye	Webuye	U- 126	Nzoia River	1,250	26,600	74,900	128,700	4,054	11,472	19,991	30.83
916.1	Cheptais	Chaptais	U- 157		0	2,800	6,500	10,000	468	1,076	1,675	0.00
921.5	South Teso	Busia	U- 127	Sio River	2,000	13,300	41,500	70,200	2,105	6,489	11,113	95.03
922.2	Central Bukhayo	Nambale	U- 158	Boreholes	154	2,100	5,300	8,100	308	791	1,233	49.98
931.3	West Bunyore	Luanda	U- 128	Edzawa river	1,770	3,300	7,900	12,600	690	1,563	2,478	100.00
932.5	Central Maragoli	Vihiga+Majengo	U- 129	Spring	120	5,100	9,900	14,400	801	1,591	2,332	14.99
933.1	Shamakhokho	Kaimosi	U- 130	Dam	660	600	1,000	1,300	188	358	498	100.00
934.3	West Isukha	Khayega	U- 131		0	600	1,000	1,400	188	360	513	0.00
935.4	Kakamega Municipality	Kakamega	U- 132	Isiukhu River	2,760	49,200	116,700	187,500	7,884	18,648	30,259	35.01
939.2	Central Maragua	Butere	U- 133	Boreholes	170	2,500	5,100	7,400	366	758	1,121	46.49
93A.4	Central Wanga	Mumias	U- 134	Lusumu River	881	25,800	51,800	75,900	3,886	7,923	11,814	22.67
TOTAL					422,292	3,976,300	7,819,900	12,537,900	798,638	1,547,212	2,414,293	52.88

Table 3.2 On-going Water Supply Projects (1/2)

	On-Going Water Supply Projects				
Nairobi	Nairobi III				
Kiambu	Munyu RWS	Ruiru UWS	Bathi RWS	Ndeiya-Karai RWS	Thiririka RWS
	Gathanga RWS	Kiu South RWS	Takinya RWS	Juja UWS	Limuru Uplands UWS
	Gatundu UWS	Karimeru RWS	Ndarugu RWS		
Kirinyaga	Muratiri SH	Nyaru SH	Mutungara SH	Kutus-Kimbimbi-Wanguru RWS	
Murang'a	Kigumo RWS	Mathioya RWS	Gotango RWS	Murang'a UWS	Maragua UWS
	SabasabaUWS	Mitumbiri RWS	Gaturi RWS		
Nyandarua	Leshau Karagoine SH	Ndaragwa Phase 1 SH	Gatimu SH	Kangu/Nyakaringa SH	Kaimbaga SH
	Kipipiri SH	Njabini SH	Nyahururu SETT	Ngorika SH	Ruii/Ngwataniro SH
	Mugumo Borehole SH	Manunga SH	Kagaa Phase 1 SH	Kambaa RWS	
Nyeri	Waraza Lusoi-jet RWS	Mureru RWS	Garuamba Kalicheni RWS	Kandune RWS	Kabendere Irr. RWS
	Burgurent RWS	Chaka Kiganjo RWS	Thungari RWS	Kaharo RWS	Muthuthi/Karaba RWG
	Mbiuni/Gaikundo RWS	Endarasha RWS	Kabendera Nyaringi RWS	Waiuka RWS	Huku RWS
	Titie RWS	Kanjuri RWS	Kihuri RWS	Gatunganga DOMESTIC	Tumutumu DOMESTIC
	Sagana Irr. Irr.				
Kilifi	Mariakani Kaloleni MOWD	Bamba Nyayo MOWD	Chonyi South MOWD	Ruruma Mwawesa MOWD	Mitsajeni/Kambe MOWD
	Kilifi W/ & san. MOWD	Kayafungo MOWD	Vitengeni RDF	Dida Matano RDF	Uyombo Mkongani RDF
	Gongone Mjanaheri RDF	Maandani RDF	Chalani RDF	Mtwapa sett. sch. MOLS	Mwangea Ngunguni DONOR
	Rehab Dams Kalo. MOWD				
Kwale	Kikoneri MOWD	Wasini & Mwakiro MOWD	Kiteje Bombo RDF	Samburu Silaloni RDF	Kwale w/ & sanita MOWD
	Majimboni MOWD	Mkongani MOWD	Kinango RPTC PND		
Lamu	Lamu RWS	Mkokoni/Kiunga RWS	Lake Kenyatta RWS	Witu b/hole&Well RWS	Faza Kizingitini RWS
	Bargon Hindi RWS	Mkunumbi Mapenya RWS	Kisauni (Kiunga) RWS	Chalaluma Water RWS	
Mombasa	Mtongwe Mwenza UWS	Maweni UWS	Jomvu Miritini UWS	Flats Mirima UWS	Mwetasarefu Soweto UWS
	Timbwani Line UWS	Denyenye Line UWS			
Taita Taveta	Mwarekeronyi SH	Makwasinyi Buguta SH	Nyache SH	Kajire Mwashigati SH	Chongonyi SH
	Mwanata SH	Daku SH	Wanganga SH	Bungule/Tora SH	Kasigau Chala Chuvini SH
	Mwarovo S. Kishushe SH	Kishushe SH	Iridoshigaro SH	Kasigau Maungu MOWD	Wundanyi MOWD
	Oza MOWD	Paranga SH	TVT Shallow well SH	Gora Kambito SH	Tausa SH
	Mwakiki SH	Talio Nyaki Sagalla SH	Mgange Nyika TVT	Buguta Rock Catch. SH	Kichingima SH
	Mlegwa shallow well SH	Ndome TVT	Ghazi SH	Gimba GOK	Mwamsha SH
	Josa/Moda-mbogho SH	Bura SH	Mwalui SH	Ronge Nyika SH	Rukanga Institutional
	Mgondinyi SH	Mwanda Dispen. SH	Mwasoko MOWD	Mlunghi Sett. Sch.	Sagasa/Sangangenyi SH
	Mwamracha SH	Mbale SH	Mbambiti SH	Mata SH	Makitau Sh
	Chala SH				
Tana River	Kipini (wells) CW	Livestock Prog. MOWD	Oda MOWD	Bangale Earth pan MOWD	Zubaki W/Ext. MOWD
	Waldena (wells) MOWD	Wazini RDF	Daku RDF	Ndurani RDF	Mulanjo RDF
	Mbalambala RDF	Wenje RDF			
Embu	Gachoka RWS	Kievaru RWS	Nguthi RWS	Kyeni(South) RWS	Embu Rural Const. RWS
	Gathigagacheru RWS	Makima RWS	Kararitiri RWS	Rue RWS	Mirundi RWS
	Riandu RWS	Karabari Rock Catchment RWS			
Isiolo	Oldonyiro RWS	Ngarema RWS	Kulamwe RWS	Boji RWS	Duse RWS
	Madagashe RWS	Sericho RWS			
Kitui	Ilika phase 1 MOWD	Kamulu Muthongwe MOWD	Athi Yatta phse 1 MOWD	Kakeani RDF	Migwani MOWD
	Thua Kinakoni MOWD	Nzeeu Ungatu RDF	Nzeluni MOWD	Ithiiani Kavuta MOWD	Kisasi Mbitini MOWD
	Kiima MOWD	Kaiutu Ngunguni RDF	Mutha-Kalambani EEC		
Machakos	Kiongwani Kima B/H EEC	Kibauni RWS	Nunguni RWS	Kithioko EEC	Mulima EEC
	Muthetheni EEC	Lelanthi EEC	Manooni EEC	Muindi Mem Sec.Sche.RDF	Ithanga RDF
	Kiteta RDF	Kikambuani MOWD/RDF	Yondoni MOWD/RDF	Masinga MOWD	Kathiani RWS
	Machakos RWS	Kikumbulyu RWS			
Marsabit	Uran RWS	Livestock Prg. RWS	Kalacha RWS	Godoma RWS	Kargi RWS
	Dabel RWS	Sololo RWS	Moyale RWS		
Meru	Kaaga Sch RWS	Kairuni Kiraro RWS	Kanyekine RWS	Kiguru RWS	Kanya RWS
	Muguna Timau RWS	Tigania RWS	Nduruma Spr RWS	Antubetwe Sch.tank RWS	Mugechege RWS
	Nairiri RWS	Naari Kirua RWS	Gitari RWS	Amwari RWS	Magumoni RWS
	Ntumburi RWS	Meru T/ship UWS	Gakando RWS	Central Abuthuguchi RWS	Gaiua
	Karimba SH	Kieguchia Gatimbi SH	Kiamiogo SH	Kimuri SH	Ngonga Makandune SH
	Kiguru RWS	Katheri Nthimbiri SH	Giachuku SH	K.K.Mwethe SH	
Garissa	Bulagolol W/plan RWS	Kamuthi RWS	Raya RWS	Jara Jara RWS	Garissa Urban UWS
	Balich RWS	Garasueno RWS	Gamagala RWS	Hara RWS	
Mandera	Mandera RWS	Rhamu RWS	Elwak RWS	Kutulo RWS	Takaba RWS
	Banissa RWS	S/Fatuma RWS	L.W.P. RWS		

Table 3.2 On-going Water Supply Projects (2/2)

	On-Going Water Supply Projects				
Wajir RWS	Diff RWS	Korondille RWS	Tarbaj RWS	Wajir RWS	Giriftu RWS
	Wajir Urban UWS				
Kisii	Riokindo RWS	Birongo RWS	Sengera RWS	Natongo Iganga RWS	Gioseri RWS
	Mogocho RWS	Etago RWS	Nyamache RWS	Kiareni RWS	Gesusu/Geteri RWS
	Igare RWS	Kioge RWS	Getare RWS	Nyamarambe RWS	Rigena RWS
Kisumu	Korwenje RWS	Kisumu Rural Phs 1 RWS	West Kano RWS	Paga Beach RWS	Kibigori RWS
	Koru/Mnara RWS	Nyahera RWS	Kenasia RWS	Mahenya RWS	Vitendo RWS
	Songor Muhoroni RWS				
Siaya	North Sakwa RWS	South Sakwa RWS	Mauna Dam RWS	Bondo RWS	Sidindi Malanga Phs II R
	Sakwa RWS				
South Nyanza	Mbita RWS	Kanyaluo RWS	Wangchieng RWS	Ongocho RWS	Got Kojowi RWS
	Obera RWS	Nyandiwa RWS	Muto/Pe-Hill Ulabd RWS	Oyani RWS	
Kajiado	Namanga RWS	Bissel RWS	Looda-riak RWS	Oloosecs RWS	O/Rongai RWS
	Kajiado UWS	Kisaju RWS	Olkeri B/H UWS	Ewaso Kedong RWS	Olcho-Ronyori RWS
	Kiserian Nkoroi RWS	Kipeto RWS	Nkoile RWS	Ngatataek RWS	Kibiko RWS
	Livestock prog. RWS	Oldonyonyokie RWS	Lower-Matasia RWS	Olkiramatian RWS	
Kericho	Sigor-Longisa RWS	Cheptalal RWS	Fort-Teman RWS	Chemogoch RWS	Chesinende RWS
	Chebunyo RWS	Kenegut RWS	Ngeccherok RWS	Tegurot/Nyakinyua RWS	
Laikipia	Wiumiririe RWS	Rwathia RWS	OMC Lorian RWS	Sirimon RWS	Aljiro B/H C5140 RWS
	Alkinyei B/H C5197 RWS	Sweet Waters Dam RWS	Doldol dam RWS	Kapkures Dam RWS	Laikipia East RWS
	Water Jars RWS	Sub-Surface Dam RWS	Ndurumo/Minjore RWS	Muhonia RWS	Sweet Waters RWS
	Mutiriitha RWS	Nyakario RWS	Laikipia West RWS	Marmanet RWS	
Nakuru	Wanyoro SH	Kerisio SH	Kinoru SH	Kianyoro SH	Piave SH
	Kerma Viosi SH	Maraigusu SH	Mirera Suswa SH	Chemichemi Tyytich SH	Amos B/H SH
Narok	Ilmasharian RWS	Ololmasan RWS	Olkinyei RWS	Siyabei RWS	Mosiro RWS
	N/Nkare dam RWS	Enaibalel RWS	Enengetia RWS	N/Enkare RWS	Enosaen RWS
Trans-Nzoia	Kiminini NCP	Kwanza/Kolongolo POCP	Saboti WP	Kimondo WP	Sibanga WP
	Kimitu SH	Mogoiywet SH	Muna RWS	Bikeke RWS	Kaisagat REH.
Uasin Gishu	Moi's Bridge NEW	Kipkabus NEW	Burnt Forest NEW	Tarakwa NEW	Ainabkoi NEW
	Losoito Kapngetuny NEW	Yamumbi NEW	Timboroa NEW	Kamoi Ya Kabatu NEW	Kipdarren Dam NEW
	Makongi SH	Osorongai SH	Kemeliet SH		
Baringo	Maji Moto RWS	Radat RWS	Cheberen RWS	Kapchepkor RWS	Talai RWS
	Torongo RWS	Timboroa RWS	Turkubus (Pemwai) RWS	Arror/Saimo RWS	Kapcheluguny RWS
	Kiamose Livest pro RWS	Koriema Kimale RWS			
Elgeyo	Flax RDF	Sergoit MOWD	Jemunanda Kondabil RDF	Kapcherop MOWD	Kapcherop W/P RDF
-Marakwet	Metkei MOWD	Lekwa MOWD	Chepsigot Chepteb MOWD	Nyalil/Matany ASAL	Resim ASAL
	Chesongoch ASAL				
Nandi	Sarora RWS	Ketbarak RWS	Mosombor RWS	Meteitei RWS	Kaptel W/P RDF
	Kajigat RWS	Kemoloi/Kobujoi RWS	KapchorwaRWS	Samoei Sec. RWS	Lolmiringai Disp. RWS
	Olmentuny Catt/dip RWS				
Samburu	Losuk RWS	Kowop RWS	Wamba RWS	Baragoi pri. sch. RWS	Lesirikan RWS
	Opiroi RWS	Poro RWS	Marti RWS	Baragoi RWS	Kisima RWS
	Wamba Boys Un. Tank RWS	Baragoi Sec.Sch DWS	South Horr DWS	Suguta Marmar DWS	Archers post DOO
	Loikas DWS				
Turkana	Lorugum RWS	Lokori RWS	Kapedo SH RWS	Namadak RWS	Lokitaung Urban
	Kerio Fishing Vi. SH	Livestock Progra. CWC			
West Pokot	Ywarateke Morbus	Sigor	Chesegon SH	Arpollo Gravity	Sina
Bungoma	Malaba/Kocholia RWS	Little Nzoia West RWS	Chemego/Kapskwony RWS	Kibabii RWS	Kimobo RWS
	Ndalu RWS	Lukhuna RWS	Muchi/Milo Khalumli RWS	Sichei/Nalondo Lurembe RWS	
Busia	Angoromo East Phs 1 RWS	Angurai RWS	Nasewe Tr. Nurs. ph 1 RWS	Phase 2 RWS	
Kakamega	Soy RWS	Bumbo/Shamakhokho RWS	Esalwa INSITUTION	Chavavol/Mahanga RWS	Masco RWS

Note : Schemes are listed based on information collected from various sources in 1991.

Table 3.3 Urban Water Supply Schemes -Proposed Implementation Programme (1/5)

District Code	Urban Name	City Code	Future Raw Water Source	Cost (million)		Implementation Schedule
				US$	K£	93 95 2000 2 4 6 8 10
110	Nairobi	U-1	Thika Dam, Ndarugu, Ruiru-A, Chania-B	1,061.6	1,337.7	● ● ● ● ● ● ● ●
210	Karuri	U-2	Kiambaa Dam (Rui Ruaka R.)	12.0	15.1	● ● ● ●
210	Kiambu	U-3	Kiambaa Dam (Rui Ruaka r.)	9.1	11.4	● ● ● ● ● ● ●
210	Gatundu & Ngenda	U-4	Thiririka River	0.3	0.4	● ●
210	Limuru	U-5	Chania P/L	14.2	17.9	● ● ● ●
210	Ruiru	U-6	Ruiru River	9.7	12.2	● ● ● ●
210	Thika	U-7	Chania River (Lower)	21.3	26.9	● ● ● ●
210	Githunguri	U-8	Ruiru River	5.0	6.3	● ● ● ●
210	Kikuyu	U-9	Kikuyu Dam	14.9	18.7	● ● ● ●
				86.4	108.8	
220	Wanguru	U-10	Thiba River	1.2	1.5	● ● ● ●
220	Sagana	U-11	Ragati River	3.6	4.5	● ● ● ●
220	Kerugoya	U-12	Kiringa River	8.3	10.5	● ● ● ● ● ●
220	Kutus	U-13	Thiba River	4.9	6.2	● ● ● ●
				18.0	22.7	
230	Kandara	U-14	Thika River	0.5	0.6	● ● ● ●
230	Maragua	U-15	Githanji River	15.1	19.0	● ● ● ● ●
230	Kangema	U-16	Mathioya River	1.2	1.5	● ● ● ●
230	Murang'a	U-17	Maragua River	11.4	14.3	● ● ● ● ● ●
230	Makuyu	U-18	Motoho River	4.8	6.0	● ● ● ● ●
				32.9	41.5	
240	Ol Kalou	U-19	Malewa River	10.7	13.5	● ● ● ●
250	Karatina	U-20	Ragati River	3.9	4.9	● ● ● ●
250	Othaya	U-21	Tuthi River	5.0	6.3	● ● ● ● ●
250	Nyeri	U-22	Chania River	50.3	63.4	● ● ● ● ● ●
				59.2	74.6	
310	Mariakani	U-23	2nd Mzima P/L	4.6	5.8	● ● ● ● ●
310	Kilifi	U-24	Rare reservoir	9.6	12.2	● ● ● ● ● ●
310	Watamu	U-25	Sabaki pipeline	5.2	6.5	● ● ● ●
310	Malindi	U-26	Sabaki Pipeline & Rare Dam	64.4	81.1	● ● ● ●
310	Mambrui	U-135	Sabaki River	4.5	5.6	● ● ● ●
				88.3	111.2	
320	Kwale	U-27	Marere pipeline	4.8	6.0	● ● ● ● ●
320	Kinango	U-28	Marere pipeline	4.8	6.0	● ● ● ● ●
320	Msambweni	U-29	Boreholes + Mkurumuji river	45.5	57.3	● ● ● ● ● ● ● ● ● ●
320	Lungalunga	U-136	Umba River	2.4	3.0	● ● ● ●
				57.4	72.3	
330	Witu	U-30	Mkondo wa Cambi river	5.4	6.8	● ● ● ●
330	Lamu	U-31	P/L from Tana River + B/H	37.5	47.3	● ● ● ● ●
				42.9	54.1	
340	Mombasa	U-32	2nd Mzima/Mwachi Dam, Pemba Dam	441.6	556.4	● ● ● ● ● ● ● ● ● ●

Note: ● Construction

Table 3.3 Urban Water Supply Schemes -Proposed Implementation Programme (2/5)

District Code	Urban Name	City Code	Future Raw Water Source	Cost (million) US$	Cost (million) K£	Implementation Schedule 93	95	2000	2	4	6	8	10
350	Taveta	U-137	Njoro Spring	7.2	9.1		●	●					● ●
350	Voi	U-33	2nd Mzim pipeline	7.7	9.7			● ●					● ●
350	Wundanyi	U-34	Sigaso/Manguri River	0.9	1.2						●	●	
				15.8	19.9								
360	Bura & Madogo	U-35	Tana River	0.9	1.2			● ●					● ●
360	Hola	U-36	Tana River	6.8	8.6			● ●				● ●	
360	Garsen	U-37	Tana River	3.0	3.8			● ●					● ●
				10.8	13.6								
410	Runyenjes	U-38	Ena River	2.3	2.9			● ●	● ●	● ●	● ●	● ●	● ●
410	Siakago	U-39	Ena River	0.0	0.0								
410	Embu	U-40	Lower Kapingazi River + Upper Rupingazi River	8.8	11.2			● ●				● ●	
				11.2	14.1								
420	Isiolo	U-41	Boreholes + Spring	152.6	192.2			● ● ● ●	● ●	● ●	● ●	● ●	● ●
420	Ol Doinyo Ng'iro	U-42	Ewaso Ngiro River	8.3	10.5	● ●							● ●
420	Garbatula	U-138	Boreholes	40.4	50.9		●	● ● ● ●					● ●
420	Merti	U-139	Ewaso Ngiro	5.5	6.9		●	●					● ●
				206.7	260.5								
430	Kitui	U-43	Masinga Dam	9.4	11.9	● ●						● ●	
430	Mutomo	U-44	Sub-Surface dam on Tiva River	0.0	0.0								
430	Mwingi	U-45	Kiambere Dam	16.1	20.3	● ●							● ●
				25.6	32.2								
440	Machakos	U-46	Athi River P/L	78.1	98.4		●	●			●	●	
440	Mitaboni	U-47	Kaathana River	20.3	25.6	● ●							● ●
440	Athi River	U-48	Upper Athi Dam	19.7	24.8			● ●					● ●
440	Uaani/Tawa	U-49	Tawa River	1.1	1.4		●	●					● ●
440	Kangundo	U-50	Pipeline from Athi River	19.5	24.6	● ●							● ●
440	Tala	U-140	Pipeline from Athi River	8.4	10.6		●	●					● ●
440	Nunguni	U-51	Kyangonyo River	1.5	1.9			● ●					● ●
440	Wote	U-141	Kaiti River + Nzuuni River	3.3	4.1			● ●					● ●
440	Emali	U-52	Nol Tresh P/L	1.7	2.1	● ●							● ●
440	Mtito Andei&Kibwezi	U-53	Pipeline from Athi River	19.5	24.6	● ●							● ●
				173.1	218.2								
450	North Horr	U-142	Boreholes	22.0	27.7		●	●			●	●	
450	Kargi	U-54	Boreholes + Subsurface Dam	66.8	84.1		●	● ● ● ● ●			●	●	● ●
450	Korr	U-143	Boreholes	56.8	71.6			● ● ● ●		● ●	●	●	
450	Marsabit	U-55	Boreholes +Small dams/Sub-surface dam/Spring	177.7	223.9		●	● ● ● ● ● ●	● ●	● ●	●	●	
450	Sololo	U-56	Boreholes	63.3	79.7		●	● ● ● ● ●			●	●	
450	Moyale	U-57	Boreholes + Small Dam	68.3	86.0			● ● ● ●			●	●	
				454.9	573.2								
460	Meru	U-58	Kathita River	43.5	54.9		●	●				●	
460	Nkubu	U-59	Thingithu River	4.6	5.8			● ●					● ●
460	Chogoria	U-60	North Mara River	1.7	2.2	● ●							● ●
460	Chuka	U-61	Tungu River	4.2	5.2			● ●					● ●
460	Maua	U-62	Ura River	3.8	4.8			● ●					● ●
				57.9	72.9								

Note: ● Construction

Table 3.3 Urban Water Supply Schemes -Proposed Implementation Programme (3/5)

District Code	Urban Name	City Code	Future Raw Water Source	Cost (million) US$	Cost (million) K£	Implementation Schedule 93 95 2000 2 4 6 8 10
510	Mudo Gashe	U-63	Boreholes + Subsurface Dam	19.6	24.7	
510	Ijara	U-64	Boreholes + Small dam	10.7	13.5	
510	Kotile	U-65	Boreholes/Subsurface Dam/Tana	15.6	19.7	
510	Masalani	U-66	Tana River	2.4	3.0	
510	Garissa	U-67	Tana River	12.9	16.3	
				61.2	77.1	
520	Mandera	U-68	Daua River	3.1	4.0	
520	Elwak	U-69	Borehores	75.5	95.1	
520	Rhamu	U-70	Daua River	2.9	3.6	
				81.5	102.7	
530	Wajir	U-71	Boreholes + Ewaso Ngiro River	172.3	217.1	
530	Buna	U-72	Boreholes(Lago Bor river)	94.8	119.4	
530	Bute	U-73	Boreholes + Small Dams	18.4	23.2	
				285.4	359.6	
610	Manga	U-74	Bunyunyu Dam	3.6	4.5	
610	Keroka	U-75	Bunyunyu Dam	5.2	6.6	
610	Nyamira + Kebirigo	U-144	Kuja River	11.6	14.6	
610	Kisii	U-76	Bunyunyu Dam	27.5	34.7	
610	Ogembo	U-77	Kuja River	1.7	2.2	
				49.7	62.6	
620	Maseno	U-78	Edzawa Dam	15.6	19.6	
620	Kisumu + Kiboswa	U-79	Kibos dam	104.8	132.1	
620	Ahero	U-80	Nyando River	5.9	7.4	
620	Muhoroni	U-81	Nyando River	7.6	9.6	
				133.9	168.7	
630	Bondo	U-145	Yala River	4.2	5.3	
630	Yala	U-82	Yala River	2.5	3.2	
630	Siaya	U-83	Yala River	16.0	20.1	
630	Ukwala	U-84	Nzoia River	1.9	2.4	
				24.6	31.0	
640	Homa Bay	U-85	Lake Victoria	12.5	15.8	
640	Migori	U-86	Migori River	5.4	6.9	
640	Kehancha + Tarang'anya	U-146	Migori River	4.8	6.0	
640	Nyabikaye	U-147	Boreholes	27.0	34.1	
640	Oyugis	U-148	Isanta River(Awach Tende)	4.9	6.2	
640	Kendu Bay	U-87	Lake Victoria	3.0	3.7	
640	Awendo/Sare	U-149	Sare River	5.3	6.6	
				62.9	79.3	
710	Oloitokitok	U-88	Nol-Turesh Spring	7.0	8.9	
710	Ngong	U-89	Kerarapon Spring	14.6	18.4	
710	Kajiado	U-90	Kiserian P/L	19.7	24.9	
710	Namanga	U-91	Namanga Spring	5.7	7.1	
710	Magadi	U-92	Oloibortoto River	10.7	13.5	
				57.7	72.7	

Note: ● Construction

Table 3.3 Urban Water Supply Schemes
-Proposed Implementation Programme (4/5)

District Code	Urban Name	City Code	Future Raw Water Source	Cost (million)		Implementation Schedule
				US$	K£	93 95 2000 2 4 6 8 10
720	Sotik	U-93	Kipsonoi River	4.5	5.6	● ● ● ●
720	Kericho	U-94	Dimlitch Dam, Kimugung Dam	24.2	30.5	● ● ● ● ●
720	Kipkelion	U-95	Nyando River	2.1	2.6	● ● ● ●
720	Londiani	U-96	Londiani dam	58.6	73.9	● ● ● ●
				89.4	112.7	
730	Nanyuki	U-97	Liki River	18.6	23.5	● ● ● ● ●
730	Rumuruti	U-150	Rumuruti Dam + Borehole	9.2	11.6	● ● ● ●
730	Nyahururu	U-98	Nyahururu dam + Borehole	23.1	29.0	● ● ● ● ●
				50.9	64.1	
740	Gilgil	U-99	Turasha P/L & Malewa Dam	43.3	54.5	● ● ● ● ●
740	Naivasha	U-100	Turasha P/L & Malewa Dam	49.0	61.7	● ● ● ● ●
740	Njoro	U-101	Itare Dam	27.3	34.4	● ● ● ● ● ●
740	Elburgon	U-102	Itare Dam	26.4	33.2	● ● ● ● ● ●
740	Molo	U-103	Itare Dam	21.4	27.0	● ● ● ● ● ●
740	Nakuru	U-104	Turasha P/L + Malewa Dam + Itare Dam	212.0	267.1	● ● ● ● ●
				379.3	478.0	
750	Narok	U-105	Upper Narok Dam	30.9	39.0	● ● ● ● ●
750	Nairagie Ngare	U-106	Nasampolai River	1.8	2.2	● ● ● ● ●
750	Kilgoris	U-151	Poroko River	4.3	5.4	● ● ● ● ●
750	Lolkorian	U-152	Migori River	3.7	4.7	● ● ● ● ●
				40.7	51.3	
760	Kitale	U-107	Koitobos River	34.8	43.8	● ● ● ● ● ●
760	*Kiminini/Saboti+Spr.Kita*	*U-108*	*Kabewyan River*	4.0	5.0	● ● ● ● ●
760	Endebess/Kwanza	U-109	Koitobos River	2.4	3.0	● ● ● ● ●
				41.1	51.8	
770	Moi's Bridge	U-153	Nzoia River	2.9	3.7	● ● ● ● ●
770	Turbo	U-154	Sosiani River	5.5	6.9	● ● ● ● ●
770	Eldoret	U-110	Moiben Dam + Nzoia River	135.9	171.2	● ● ● ● ●
770	Burnt Forest	U-111	Kipkarren River	2.1	2.6	● ● ● ● ●
				146.4	184.5	
810	Kabarnet	U-112	Kirandich Dam	27.3	34.4	● ● ● ● ●
810	Maji Mazuri	U-113	Maji Mazuri River	5.2	6.5	● ● ● ● ●
810	Eldama Ravine	U-114	Chemususu Dam	26.6	33.5	● ● ● ● ●
810	Mogotio	U-115	Molo river /Chemususu Dam	6.0	7.6	● ● ● ● ●
810	Marigat	U-155	Perkerra River	2.5	3.2	● ● ● ● ●
				67.6	85.2	
820	Iten+Tambach	U-116	Moiben Dam	12.7	16.0	● ● ● ● ● ●
830	Nandi Hills	U-117	Mokong River	4.0	5.0	● ● ● ● ●
830	Kapsabet+Baraton	U-118	Mokong River	11.8	14.9	● ● ● ● ●
				15.8	19.9	
840	Maralal	U-119	Loikas/Yamo River	16.0	20.2	● ● ● ● ●
840	Wamba	U-120	Boreholes	82.0	103.3	● ● ● ● ● ● ● ● ●
840	Baragoi	U-121	Boreholes + Sub-surface dam	123.7	155.8	● ● ● ● ● ● ● ● ●
				221.7	279.3	

Note: ● Construction

Table 3.3 Urban Water Supply Schemes -Proposed Implementation Programme (5/5)

District Code	Urban Name	City Code	Future Raw Water Source	Cost (million) US$	Cost (million) K£	Implementation Schedule 93 95 2000 2 4 6 8 10
850	Lodwar	U-122	Boreholes & sub-surface dam	132.6	167.1	● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●
860	Kapenguria/Makutano	U-123	Kapenguria River	8.9	11.2	● ● ● ● ● ● ●
910	Mawalie + Malakisi	U-156	Malikisi River	3.3	4.2	● ● ● ●
910	Bungoma	U-124	Kuywa River	26.8	33.7	● ● ● ● ● ● ●
910	Kimilili	U-125	Kimilili River	7.3	9.2	● ● ● ● ● ●
910	Webuye	U-126	Nzoia River	20.0	25.2	● ● ● ● ● ●
910	Chaptais	U-157	Sasuri River	2.7	3.4	● ● ● ● ● ●
				60.1	75.8	
920	Busia	U-127	Sio River	14.1	17.7	● ● ● ● ● ●
920	Nambale	U-158	Sio River	2.2	2.8	● ● ● ● ● ●
				16.3	20.5	
930	Luanda	U-128	Edzawa River	1.8	2.2	● ●
930	Vihiga+Majengo	U-129	Edzawa River (Kimondi River)	5.1	6.4	● ● ● ● ● ●
930	Kaimosi	U-130	Galagoli River	0.0	0.0	
930	Khayega	U-131	Yala River	1.8	2.2	● ● ● ● ● ●
930	Kakamega	U-132	Isiukhu River, Mukulusi Dam	29.2	36.7	● ● ● ● ● ●
930	Butere	U-133	Viratsi River	2.2	2.8	● ● ● ● ● ●
930	Mumias	U-134	Nzoia River	13.5	17.0	● ● ● ● ● ●
				53.5	67.4	
					0.0	
				4,949.2	6,236.0	

Note: ● Construction

Remarks : The above includes dam cost of US$ 577 million in total.
See Appendix 1.1 for breakdown of dam cost.

Table 3.4 Rural Water Supply Schemes (Stage 1 : Source Development) (1/4) - Proposed Implementation Programme

Code	District	Source Development Plan									Total	Implementation Program (%)	
		Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline		Up to 2000	2001-2010
	Nairobi Province											0	0
110	Nairobi												
	- Quantity (m3/d)	0	0	0	0	0	0	0	0	0	0		
	- No. of Facilities	0	0	0	0	0	0	0	0	0	0		
	- Cost (mill.US$)	0	0	0	0	0	0	0	0	0	0		
	(mill.K£)	0	0	0	0	0	0	0	0	0	0		
	Central Province												
210	Kiambu											32.3	67.7
	- Quantity (m3/d)	39,127	2,726	83	135	2,169	0	0	30	16,360	60,630		
	- No. of Facilities	0	93	17	3,718	25	0	0	3	0	3,856		
	- Cost (mill.US$)	0	10.54	0.08	2.24	1.87	0	0	0.05	0	14.77		
	(mill.K£)	0	13.28	0.1	2.82	2.35	0	0	0.06	0	18.63		
220	Kirinyaga											35.5	64.5
	- Quantity (m3/d)	23,036	758	76	40	973	0	0	0	977	25,860		
	- No. of Facilities	0	17	16	889	12	0	0	0	0	934		
	- Cost (mill.US$)	0	2.64	0.08	0.53	0.58	0	0	0	0	3.82		
	(mill.K£)	0	3.33	0.09	0.67	0.73	0	0	0	0	4.82		
230	Muranga											32.8	67.2
	- Quantity (m3/d)	52,242	1,031	474	82	2,819	0	0	0	458	57,106		
	- No. of Facilities	0	28	96	2,828	24	0	0	0	0	2,976		
	- Cost (mill.US$)	0	3.91	0.47	1.68	0.99	0	0	0	0	7.05		
	(mill.K£)	0	4.93	0.59	2.12	1.25	0	0	0	0	8.89		
240	Nyandarua											39.1	60.9
	- Quantity (m3/d)	16,155	6,917	255	545	1,160	0	0	164	380	25,576		
	- No. of Facilities	0	250	27	11,081	20	0	0	13	0	11,391		
	- Cost (mill.US$)	0	28.17	0.12	6.65	1.09	0	0	0.23	0	36.26		
	(mill.K£)	0	35.53	0.16	8.39	1.37	0	0	0.28	0	45.73		
250	Nyeri											24.8	75.2
	- Quantity (m3/d)	34,264	163	58	0	1,473	0	0	0	51	36,009		
	- No. of Facilities	0	6	12	0	28	0	0	0	0	46		
	- Cost (mill.US$)	0	0.58	0.06	0	0.87	0	0	0	0	1.5		
	(mill.K£)	0	0.73	0.07	0	1.09	0	0	0	0	1.89		
	Sub-total											32.5	67.5
	- Quantity (m3/d)	164,824	11,595	946	802	8,594	0	0	194	18,226	205,181		
	- No. of Facilities	0	394	168	18,516	109	0	0	16	0	19,203		
	- Cost (mill.US$)	0	45.84	0.81	11.1	5.4	0	0	0.28	0	63.4		
	(mill.K£)	0	57.8	1.01	14	6.79	0	0	0.34	0	79.96		
	Coast Province												
310	Kilifi											38.9	61.1
	- Quantity (m3/d)	765	3,957	6,123	3,195	30	51	55	0	9,449	23,625		
	- No. of Facilities	0	104	1,219	83,244	6	11	11	0	0	84,595		
	- Cost (mill.US$)	0	13.77	5.91	50.23	0.04	0.14	0.11	0	0	70.21		
	(mill.K£)	0	17.37	7.46	63.34	0.05	0.18	0.14	0	0	88.53		
320	Kwale											38.7	61.3
	- Quantity (m3/d)	1,566	5,038	4,775	2,720	101	49	133	0	3,071	17,453		
	- No. of Facilities	0	119	944	59,067	10	13	21	0	0	60,174		
	- Cost (mill.US$)	0	18.14	4.38	35.34	0.14	0.14	0.27	0	0	58.41		
	(mill.K£)	0	22.88	5.52	44.57	0.17	0.17	0.35	0	0	73.65		
330	Lamu											34.4	65.6
	- Quantity (m3/d)	0	652	777	259	0	0	0	0	299	1,987		
	- No. of Facilities	0	22	160	8,053	0	0	0	0	0	8,235		
	- Cost (mill.US$)	0	2.19	0.76	5.13	0	0	0	0	0	8.08		
	(mill.K£)	0	2.76	0.96	6.47	0	0	0	0	0	10.19		
340	Mombasa												
	- Quantity (m3/d)	0	0	0	0	0	0	0	0	0	0		
	- No. of Facilities	0	0	0	0	0	0	0	0	0	0		
	- Cost (mill.US$)	0	0	0	0	0	0	0	0	0	0		
	(mill.K£)	0	0	0	0	0	0	0	0	0	0		
350	Taita Tabeta											34.4	65.6
	- Quantity (m3/d)	1,971	1,310	1,481	551	74	25	25	174	838	6,449		
	- No. of Facilities	0	35	296	17,923	5	5	5	24	0	18,293		
	- Cost (mill.US$)	0	4.5	1.44	10.79	0.1	0.07	0.05	0.42	0	17.37		
	(mill.K£)	0	5.67	1.81	13.61	0.13	0.09	0.06	0.53	0	21.91		
360	Tana River											38.3	61.7
	- Quantity (m3/d)	948	918	1,906	541	21	15	15	40	97	4,501		
	- No. of Facilities	0	32	328	18,534	9	4	4	8	0	18,919		
	- Cost (mill.US$)	0	3.31	1.52	11.14	0.03	0.04	0.03	0.14	0	16.21		
	(mill.K£)	0	4.18	1.92	14.05	0.03	0.05	0.04	0.18	0	20.44		
	Sub-total											38.1	61.9
	- Quantity (m3/d)	5,250	11,875	15,062	7,266	226	140	228	214	13,754	54,015		
	- No. of Facilities	0	312	2,947	186,821	30	33	41	32	0	190,216		
	- Cost (mill.US$)	0	41.91	14.01	112.63	0.31	0.39	0.46	0.56	0	170.28		
	(mill.K£)	0	52.86	17.67	142.04	0.38	0.49	0.59	0.71	0	214.72		

Table 3.4 Rural Water Supply Schemes (Stage 1 : Source Development) (2/4) - Proposed Implementation Programme

Code	District	Source Development Plan									Total	Implementation Program (%)	
		Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline		Up to 2000	2001-2010
	Eastern Province												
410	Embu											37.0	63.0
	- Quantity (m3/d)	14,378	3,120	2,668	638	646	23	23	0	555	22,051		
	- No. of Facilities	0	83	537	18,126	18	6	6	0	0	18,776		
	- Cost (mill.US$)	0	11.19	2.64	10.96	0.51	0.06	0.05	0	0	25.41		
	(mill.K£)	0	14.11	3.33	13.82	0.64	0.08	0.06	0	0	32.04		
420	Isiolo											16.5	83.5
	- Quantity (m3/d)	301	545	673	155	2	8	25	61	12	1,782		
	- No. of Facilities	0	20	115	7,776	1	6	8	14	0	7,940		
	- Cost (mill.US$)	0	1.91	0.58	4.71	0	0.02	0.05	0.24	0	7.52		
	(mill.K£)	0	2.41	0.73	5.94	0	0.03	0.06	0.31	0	9.48		
430	Kitui											42.6	57.4
	- Quantity (m3/d)	846	5,506	10,782	3,029	104	325	292	539	2,622	24,045		
	- No. of Facilities	0	177	2,149	114,343	3	44	40	96	0	116,852		
	- Cost (mill.US$)	0	20.46	10.17	68.71	0.14	0.93	0.62	1.65	0	102.68		
	(mill.K£)	0	25.79	12.83	86.64	0.18	1.18	0.78	2.08	0	129.48		
440	Machakos											36.4	63.6
	- Quantity (m3/d)	12,589	10,501	19,777	3,746	1,234	496	332	50	5,344	54,069		
	- No. of Facilities	0	312	3,860	157,275	34	63	47	13	0	161,604		
	- Cost (mill.US$)	0	38.62	18.6	94.38	1.69	1.42	0.69	0.2	0	155.59		
	(mill.K£)	0	48.7	23.45	119.01	2.13	1.79	0.87	0.25	0	196.2		
450	Marsabit											28.7	71.3
	- Quantity (m3/d)	54	1,502	1,270	365	9	64	70	13	206	3,553		
	- No. of Facilities	0	55	238	18,436	3	11	11	3	0	18,757		
	- Cost (mill.US$)	0	6	1.14	11.05	0.01	0.18	0.14	0.05	0	18.58		
	(mill.K£)	0	7.56	1.44	13.94	0.02	0.23	0.18	0.06	0	23.43		
460	Meru											37.3	62.7
	- Quantity (m3/d)	34,311	16,661	4,596	2,199	1,882	174	47	21	2,147	62,038		
	- No. of Facilities	0	481	923	90,443	39	21	9	5	0	91,921		
	- Cost (mill.US$)	0	60.91	4.56	54.59	2.08	0.5	0.1	0.08	0	122.82		
	(mill.K£)	0	76.8	5.74	68.84	2.63	0.63	0.12	0.11	0	154.87		
	Sub-total											37.3	62.7
	- Quantity (m3/d)	62,479	37,835	39,766	10,132	3,877	1,090	789	684	10,886	167,538		
	- No. of Facilities	0	1,128	7,822	406,399	98	151	121	131	0	415,850		
	- Cost (mill.US$)	0	139.09	37.69	244.4	4.43	3.11	1.65	2.22	0	432.6		
	(mill.K£)	0	175.37	47.52	308.19	5.6	3.94	2.07	2.81	0	545.5		
	North Eastern Province												
510	Garissa											19.0	81.0
	- Quantity (m3/d)	35	847	1,770	353	0	20	9	0	2	3,036		
	- No. of Facilities	0	31	343	16,174	0	10	5	0	0	16,563		
	- Cost (mill.US$)	0	3.02	1.59	9.68	0	0.06	0.02	0	0	14.36		
	(mill.K£)	0	3.81	2.01	12.21	0	0.07	0.02	0	0	18.11		
520	Mandera											30.1	69.9
	- Quantity (m3/d)	191	606	2,159	303	0	51	99	0	1	3,410		
	- No. of Facilities	0	28	437	17,573	0	10	15	0	0	18,063		
	- Cost (mill.US$)	0	2.2	2.13	10.64	0	0.14	0.21	0	0	15.32		
	(mill.K£)	0	2.78	2.69	13.41	0	0.18	0.26	0	0	19.32		
530	Wajir											22.8	77.2
	- Quantity (m3/d)	0	744	1,899	318	0	28	75	0	0	3,064		
	- No. of Facilities	0	40	369	16,739	0	10	20	0	0	17,178		
	- Cost (mill.US$)	0	3.12	1.75	10.1	0	0.08	0.15	0	0	15.19		
	(mill.K£)	0	3.94	2.2	12.73	0	0.09	0.19	0	0	19.16		
	Sub-total											24.2	75.8
	- Quantity (m3/d)	226	2,197	5,828	974	0	99	183	0	3	9,510		
	- No. of Facilities	0	99	1,149	50,486	0	30	40	0	0	51,804		
	- Cost (mill.US$)	0	8.34	5.47	30.42	0	0.28	0.38	0	0	44.87		
	(mill.K£)	0	10.53	6.9	38.35	0	0.34	0.47	0	0	56.59		

Table 3.4 Rural Water Supply Schemes (Stage 1 : Source Development) (3/4) - Proposed Implementation Programme

Code	District	Source Development Plan									Total	Implementation Program (%)	
		Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline		Up to 2000	2001-2010
	Nyanza Province												
610	Kisii											31.8	68.2
	- Quantity (m3/d)	65,503	5,329	7,590	0	3,203	0	0	0	4,373	85,998		
	- No. of Facilities	0	137	1,525	0	26	0	0	0	0	1,688		
	- Cost (mill.US$)	0	19.78	7.43	0	1.68	0	0	0	0	28.9		
	(mill.K£)	0	24.95	9.37	0	2.12	0	0	0	0	36.44		
620	Kisumu											23.7	76.3
	- Quantity (m3/d)	14,808	4,350	8,238	2,629	593	0	0	116	0	30,734		
	- No. of Facilities	0	115	1,084	34,621	15	0	0	7	0	35,842		
	- Cost (mill.US$)	0	16.23	5.31	20.93	0.32	0	0	0.12	0	42.91		
	(mill.K£)	0	20.47	6.69	26.39	0.41	0	0	0.16	0	54.11		
630	Siaya											33.1	66.9
	- Quantity (m3/d)	18,041	6,380	15,369	1,827	1,134	0	0	98	1,041	43,890		
	- No. of Facilities	0	220	2,983	30,004	27	0	0	7	0	33,241		
	- Cost (mill.US$)	0	23.95	14.32	18.11	0.46	0	0	0.12	0	56.96		
	(mill.K£)	0	30.2	18.06	22.83	0.58	0	0	0.16	0	71.83		
640	South Nyanza											33.3	66.7
	- Quantity (m3/d)	24,460	11,171	17,346	7,043	1,924	176	176	0	292	62,588		
	- No. of Facilities	0	342	3,050	92,293	51	27	27	0	0	95,790		
	- Cost (mill.US$)	0	42.01	15.24	55.54	1.05	0.5	0.36	0	0	114.69		
	(mill.K£)	0	52.97	19.22	70.03	1.32	0.63	0.46	0	0	144.62		
	Sub-total											31.3	68.7
	- Quantity (m3/d)	122,812	27,230	48,543	11,499	6,854	176	176	214	5,706	223,210		
	- No. of Facilities	0	814	8,642	156,918	119	27	27	14	0	166,561		
	- Cost (mill.US$)	0	101.97	42.3	94.58	3.51	0.5	0.36	0.24	0	243.46		
	(mill.K£)	0	128.59	53.34	119.25	4.43	0.63	0.46	0.32	0	307		
	Rift Valley Province												
710	Kajiado											42.4	57.6
	- Quantity (m3/d)	2,381	3,312	2,501	995	125	56	58	43	2,357	11,828		
	- No. of Facilities	0	123	431	38,954	9	16	15	9	0	39,557		
	- Cost (mill.US$)	0	12.99	2.15	23.39	0.17	0.16	0.12	0.14	0	39.1		
	(mill.K£)	0	16.39	2.71	29.49	0.21	0.2	0.15	0.17	0	49.31		
720	Kericho											35.5	64.5
	- Quantity (m3/d)	60,499	2,605	1,641	0	2,678	0	0	0	1,189	68,612		
	- No. of Facilities	0	68	324	0	27	0	0	0	0	419		
	- Cost (mill.US$)	0	9.93	1.44	0	1.42	0	0	0	0	12.78		
	(mill.K£)	0	12.52	1.81	0	1.79	0	0	0	0	16.12		
730	Laikipia											37.9	62.1
	- Quantity (m3/d)	2,819	4,626	722	822	373	63	46	8	0	9,479		
	- No. of Facilities	0	156	145	22,725	19	18	14	1	0	23,078		
	- Cost (mill.US$)	0	17.73	0.69	13.71	0.48	0.17	0.09	0.02	0	32.89		
	(mill.K£)	0	22.35	0.88	17.29	0.6	0.22	0.12	0.02	0	41.47		
740	Nakuru											28.7	71.3
	- Quantity (m3/d)	18,557	14,086	298	2,629	1,547	166	98	72	11,058	48,511		
	- No. of Facilities	0	409	31	63,406	21	24	19	8	0	63,918		
	- Cost (mill.US$)	0	52.93	0.15	38.18	1.26	0.48	0.2	0.13	0	93.33		
	(mill.K£)	0	66.75	0.19	48.15	1.59	0.6	0.26	0.17	0	117.69		
750	Narok											41.3	58.7
	- Quantity (m3/d)	13,271	6,889	6,433	3,911	900	86	79	0	279	31,848		
	- No. of Facilities	0	245	1,128	60,853	28	13	13	0	0	62,280		
	- Cost (mill.US$)	0	26.44	5.47	36.62	0.72	0.24	0.16	0	0	69.66		
	(mill.K£)	0	33.34	6.9	46.18	0.91	0.31	0.2	0	0	87.84		
760	Trans Nzoia											35.3	64.7
	- Quantity (m3/d)	19,082	456	1,015	0	781	0	0	35	410	21,779		
	- No. of Facilities	0	31	205	0	15	0	0	3	0	254		
	- Cost (mill.US$)	0	1.87	0.93	0	0.5	0	0	0.05	0	3.35		
	(mill.K£)	0	2.36	1.17	0	0.63	0	0	0.07	0	4.23		
770	Uasin Gishu											21.9	78.1
	- Quantity (m3/d)	16,940	129	101	0	693	0	0	18	1,838	19,719		
	- No. of Facilities	0	4	21	0	20	0	0	2	0	47		
	- Cost (mill.US$)	0	0.4	0.1	0	0.42	0	0	0.04	0	0.95		
	(mill.K£)	0	0.5	0.12	0	0.53	0	0	0.04	0	1.2		
810	Baringo											37.8	62.2
	- Quantity (m3/d)	4,246	3,907	1,588	1,081	209	50	37	7	1,759	12,884		
	- No. of Facilities	0	119	173	27,659	29	26	17	1	0	28,024		
	- Cost (mill.US$)	0	14.21	0.85	16.64	0.18	0.13	0.07	0.02	0	32.09		
	(mill.K£)	0	17.91	1.07	20.99	0.23	0.17	0.09	0.02	0	40.47		
820	Elgey Marakwet											38.9	61.1
	- Quantity (m3/d)	6,769	1,751	3,475	503	272	15	0	9	1,193	13,987		
	- No. of Facilities	0	68	628	12,995	23	3	0	1	0	13,718		
	- Cost (mill.US$)	0	6.74	3.11	7.78	0.22	0.04	0	0.02	0	17.91		
	(mill.K£)	0	8.5	3.92	9.81	0.27	0.05	0	0.02	0	22.58		

Table 3.4 Rural Water Supply Schemes (Stage 1 : Source Development) (4/4) - Proposed Implementation Programme

Code	District	Source Development Plan									Total	Implementation Program (%)	
		Surface Water	Borehole	Shallow Well	Roof Catch	Small Dam	Subsur-face Dam	Sand Dam	Rock Catch	Existing Pipeline		Up to 2000	2001-2010
830	Nandi											38.1	61.9
	- Quantity (m3/d)	31,085	481	1,679	0	1,130	0	0	0	375	34,750		
	- No. of Facilities	0	25	340	0	23	0	0	0	0	388		
	- Cost (mill.US$)	0	1.85	1.62	0	0.63	0	0	0	0	4.1		
	(mill.K£)	0	2.33	2.04	0	0.79	0	0	0	0	5.17		
840	Samburu											34.6	65.4
	- Quantity (m3/d)	240	1,174	1,607	529	15	17	18	375	6	3,981		
	- No. of Facilities	0	67	319	16,898	4	8	8	57	0	17,361		
	- Cost (mill.US$)	0	5.18	1.47	10.19	0.02	0.05	0.04	0.99	0	17.93		
	(mill.K£)	0	6.53	1.85	12.85	0.02	0.06	0.05	1.25	0	22.61		
850	Turkana											38.6	61.4
	- Quantity (m3/d)	289	1,871	2,956	690	3	102	127	16	6	6,060		
	- No. of Facilities	0	77	500	31,371	1	20	22	2	0	31,993		
	- Cost (mill.US$)	0	6.78	2.49	18.88	0	0.29	0.26	0.03	0	28.74		
	(mill.K£)	0	8.55	3.14	23.81	0.01	0.36	0.33	0.04	0	36.24		
860	West Pokot											40.2	59.8
	- Quantity (m3/d)	3,077	1,522	4,456	961	129	49	25	0	0	10,219		
	- No. of Facilities	0	79	882	28,553	14	11	9	0	0	29,548		
	- Cost (mill.US$)	0	6.46	4	17.18	0.12	0.14	0.05	0	0	27.95		
	(mill.K£)	0	8.15	5.05	21.66	0.15	0.17	0.06	0	0	35.24		
	Sub-total											35.8	64.2
	- Quantity (m3/d)	179,255	42,809	28,472	12,121	8,855	604	488	583	20,470	293,657		
	- No. of Facilities	0	1,471	5,127	303,414	233	139	117	84	0	310,585		
	- Cost (mill.US$)	0	164	24	183	6	2	1	1	0	381		
	(mill.K£)	0	206	31	230	8	2	1	2	0	480		
	Western Province												
910	Bungoma											36.4	63.6
	- Quantity (m3/d)	46,022	2,867	5,728	0	2,210	0	0	258	977	58,062		
	- No. of Facilities	0	75	1,150	0	18	0	0	15	0	1,258		
	- Cost (mill.US$)	0	9.71	5.68	0	1.19	0	0	0.25	0	16.83		
	(mill.K£)	0	12.24	7.16	0	1.51	0	0	0.31	0	21.22		
920	Busia											38.2	61.8
	- Quantity (m3/d)	18,134	4,956	10,319	1,082	899	62	53	0	1,420	36,925		
	- No. of Facilities	0	161	1,991	16,717	16	9	8	0	0	18,902		
	- Cost (mill.US$)	0	19.04	9.92	10.1	0.51	0.18	0.11	0	0	39.86		
	(mill.K£)	0	24.01	12.51	12.74	0.65	0.22	0.14	0	0	50.27		
930	Kakamega											34.6	65.4
	- Quantity (m3/d)	96,625	3,166	7,478	0	3,462	0	0	0	891	111,622		
	- No. of Facilities	0	122	1,514	0	41	0	0	0	0	1,677		
	- Cost (mill.US$)	0	11.24	9.42	0	1.47	0	0	0	0	22.12		
	(mill.K£)	0	14.17	11.87	0	1.85	0	0	0	0	27.89		
	Sub-total											35.8	64.2
	- Quantity (m3/d)	160,781	10,989	23,525	1,082	6,571	62	53	258	3,288	206,609		
	- No. of Facilities	0	358	4,655	16,717	75	9	8	15	0	21,837		
	- Cost (mill.US$)	0	39.99	25.02	10.1	3.17	0.18	0.11	0.25	0	78.81		
	(mill.K£)	0	50.42	31.54	12.74	4.01	0.22	0.14	0.31	0	99.38		
	Total											34.7	65.3
	- Quantity (m3/d)	695,627	144,530	162,142	43,876	34,977	2,171	1,917	2,147	72,333	1,159,720		
	- No. of Facilities	0	4,576	30,510	1,139,271	664	389	354	292	0	1,176,056		
	- Cost (mill.US$)	0	540.65	149.77	685.8	22.96	6.16	3.95	4.99	0	1414.2		
	(mill.K£)	0	681.75	188.83	864.8	28.94	7.76	4.99	6.29	0	1783.32		

Table 3.5 Rural Water Supply Schemes (Stage2 : Provision of Piped Water Supply System) - Proposed Implementation Programme

Code	District	Executing Agency	Cost (million)		Implementation Programme (%)	
			US$	K£	Up to 2000	2001 - 2010
110	Nairobi	MOWD	-	-	-	-
210	Kiambu	MOWD	65.7	82.8	-	100
220	Kirinyaga	MOWD	28.1	35.4	-	100
230	Muranga	MOWD	62.1	78.2	-	100
240	Nyandarua	MOWD	26.7	33.6	-	100
250	Nyeri	MOWD	39.3	49.5	-	100
310	Kilifi	MOWD	24.1	30.3	-	100
320	Kwale	MOWD	17.4	21.9	-	100
330	Lamu	MOWD	1.9	2.4	-	100
340	Mombasa	MOWD	-	-	-	-
350	Taita Tabeta	MOWD	6.6	8.3	-	100
360	Tana River	MOWD	4.4	5.6	-	100
410	Embu	MOWD	23.1	29.1	-	100
420	Isiolo	MOWD	1.7	2.2	-	100
430	Kitui	MOWD	23.5	29.6	-	100
440	Machakos	MOWD	53.8	67.8	-	100
450	Marsabit	MOWD	3.4	4.3	-	100
460	Meru	MOWD	64.1	80.7	-	100
510	Garissa	MOWD	2.9	3.6	-	100
520	Mandera	MOWD	3.3	4.1	-	100
530	Wajir	MOWD	2.9	3.6	-	100
610	Kisii	MOWD	91.6	115.5	-	100
620	Kisumu	MOWD	31.4	39.5	-	100
630	Siaya	MOWD	44.2	55.7	-	100
640	South Nyanza	MOWD	63.4	79.9	-	100
710	Kajiado	MOWD	11.9	15.0	-	100
720	Kericho	MOWD	74.2	93.4	-	100
730	Laikipia	MOWD	9.4	11.9	-	100
740	Nakuru	MOWD	50.5	63.6	-	100
750	Narok	MOWD	32.5	40.9	-	100
760	Trans Nzoia	MOWD	23.5	29.6	-	100
770	Uasin Gishu	MOWD	21.5	27.1	-	100
810	Baringo	MOWD	13.1	16.5	-	100
820	Elgeyo Marakwet	MOWD	14.4	18.1	-	100
830	Nandi	MOWD	37.6	47.3	-	100
840	Samburu	MOWD	3.9	4.9	-	100
850	Turkana	MOWD	5.8	7.3	-	100
860	West Pokot	MOWD	10.1	12.8	-	100
910	Bungoma	MOWD	61.9	78.0	-	100
920	Busia	MOWD	37.7	47.5	-	100
930	Kakamega	MOWD	120.0	151.2	-	100
	Total		1,213.2	1,528.6	-	100

Table 3.6 Sewerage Development -Proposed Implementation Programme (1/5)

District Code	Urban Name	City Code	Future Raw Water Source	Cost (million)		Implementation Schedule
				US$	K£	93 95 2000 2 4 6 8 10
110	Nairobi	U-1	Thika Dam, Ndarugu, Ruiru-A, Chania-B	214.81	270.66	● ● ● ● ● ● ● ● ● ●
210	Karuri	U-2	Kiambaa Dam (Rui Ruaka R.)	1.59	2.00	● ● ● ●
210	Kiambu	U-3	Kiambaa Dam (Rui Ruaka r.)	0.57	0.72	● ● ● ● ● ● ● ●
210	Gatundu & Ngenda	U-4	Thiririka River	0.07	0.09	● ● ● ●
210	Limuru	U-5	Chania P/L	0.16	0.20	● ● ● ●
210	Ruiru	U-6	Ruiru River	1.39	1.75	● ● ● ●
210	Thika	U-7	Chania River (Lower)	14.13	17.80	● ● ● ●
210	Githunguri	U-8	Ruiru River	0.49	0.61	● ● ● ●
210	Kikuyu	U-9	Kikuyu Dam	0.77	0.98	● ● ● ●
				19.16	24.15	
220	Wanguru	U-10	Thiba River	0.05	0.07	● ● ● ●
220	Sagana	U-11	Ragati River	0.38	0.48	● ● ● ●
220	Kerugoya	U-12	Kiringa River	1.17	1.48	● ● ● ● ● ●
220	Kutus	U-13	Thiba River	0.81	1.02	● ● ● ●
				2.42	3.04	
230	Kandara	U-14	Thika River	0.06	0.08	● ● ● ●
230	Maragua	U-15	Githanji River	3.08	3.88	● ● ● ● ● ●
230	Kangema	U-16	Mathioya River	0.13	0.17	● ● ● ●
230	Murang'a	U-17	Maragua River	2.38	3.00	● ● ● ● ● ●
230	Makuyu	U-18	Motoho River	0.57	0.72	● ● ● ● ● ●
				6.22	7.84	
240	Ol Kalou	U-19	Malewa River	1.31	1.65	● ● ● ●
250	Karatina	U-20	Ragati River	0.71	0.90	● ● ● ●
250	Othaya	U-21	Tuthi River	0.63	0.80	● ● ● ● ● ●
250	Nyeri	U-22	Chania River	23.74	29.91	● ● ● ● ● ●
				25.09	31.61	
310	Mariakani	U-23	2nd Mzima P/L	1.13	1.43	● ● ● ● ● ●
310	Kilifi	U-24	Rare reservoir	1.86	2.34	● ● ● ● ● ●
310	Watamu	U-25	Sabaki pipeline	0.32	0.40	● ● ● ● ● ●
310	Malindi	U-26	Sabaki Pipeline & Rare Dam	10.56	13.30	● ● ● ● ● ●
310	Mambrui	U-135	Sabaki River	0.49	0.62	● ● ● ● ● ●
				14.35	18.08	
320	Kwale	U-27	Marere pipeline	0.53	0.66	● ● ● ● ● ●
320	Kinango	U-28	Marere pipeline	0.20	0.25	● ● ● ● ● ●
320	Msambweni	U-29	Boreholes + Mkurumuji River	1.19	1.50	● ● ● ● ● ● ● ● ● ●
320	Lungalunga	U-136	Umba River	0.28	0.36	● ● ● ● ● ●
				2.20	2.77	
330	Witu	U-30	Mkondo wa Cambi River	0.44	0.56	● ● ● ● ● ●
330	Lamu	U-31	P/L from Tana River + B/H	1.19	1.50	● ● ● ● ● ●
				1.63	2.05	
340	Mombasa	U-32	2nd Mzima/Mwachi Dam, Pemba Dam	57.41	72.33	● ● ● ● ● ● ● ● ● ●

Note: ● Construction

Table 3.6 Sewerage Development -Proposed Implementation Programme (2/5)

District Code	Urban Name		Future Raw Water Source	Cost (million)		Implementation Schedule
				US$	K£	93 95 2000 2 4 6 8 10
350	Taveta	U-137	Njoro Spring	1.00	1.26	● ● ● ● ● ●
350	Voi	U-33	2nd Mzim pipeline	1.24	1.57	● ● ● ●
350	Wundanyi	U-34	Sigaso/Manguri River	0.28	0.35	● ● ● ●
				2.53	3.18	
360	Bura & Madogo	U-35	Tana River	0.10	0.13	● ● ● ●
360	Hola	U-36	Tana River	1.22	1.54	● ● ● ●
360	Garsen	U-37	Tana River	0.41	0.52	● ● ● ●
				1.74	2.19	
410	Runyenjes	U-38	Ena River	0.21	0.27	● ● ● ● ● ● ● ● ● ● ● ●
410	Siakago	U-39	Ena River	0.03	0.03	● ● ● ●
410	Embu	U-40	Lower Kapingazi River + Upper Rupingazi River	2.47	3.12	● ● ● ●
				2.71	3.42	
420	Isiolo	U-41	Boreholes + Spring	3.41	4.29	● ● ● ● ● ● ● ● ● ● ● ●
420	Ol Doinyo N'giro	U-42	Ewaso Ngiro River	0.70	0.89	● ● ● ●
420	Garbatula	U-138	Boreholes	0.31	0.38	● ● ● ● ● ● ● ●
420	Merti	U-139	Ewaso Ngiro	0.91	1.14	● ● ● ●
				5.32	6.71	
430	Kitui	U-43	Masinga Dam	1.40	1.77	● ● ● ●
430	Mutomo	U-44	Sub-Surface dam on Tiva River	0.06	0.07	● ● ● ●
430	Mwingi	U-45	Kiambere Dam	1.10	1.39	● ● ● ●
				2.56	3.22	
440	Machakos	U-46	Athi River P/L	22.81	28.74	● ● ● ● ● ●
440	Mitaboni	U-47	Kaathana River	7.64	9.63	● ● ● ●
440	Athi River	U-48	Upper Athi Dam	3.31	4.17	● ● ● ●
440	Uaani/Tawa	U-49	Tawa River	0.02	0.03	● ● ● ●
440	Kangundo	U-50	Pipeline from Athi River	1.50	1.89	● ● ● ●
440	Tala	U-140	Pipeline from Athi River	0.22	0.28	● ● ● ●
440	Nunguni	U-51	Kyangonyo River	0.03	0.04	● ● ● ●
440	Wote	U-141	Kaiti River + Nzuuni River	0.31	0.39	● ● ● ●
440	Emali	U-52	Nol Tresh P/L	0.03	0.03	● ● ● ●
440	Mtito Andei&Kibwezi	U-53	Pipeline from Athi River	0.47	0.59	● ● ● ●
				36.35	45.80	
450	North Horr	U-142	Boreholes	0.25	0.31	● ● ● ● ● ●
450	Kargi	U-54	Boreholes + Subsurface Dam	0.65	0.81	● ● ● ● ● ● ● ● ● ●
450	Korr	U-143	Boreholes	0.67	0.84	● ● ● ● ● ● ● ● ● ●
450	Marsabit	U-55	Boreholes +Small dams/Sub-surface dam/Spring	1.65	2.07	● ● ● ● ● ● ● ● ● ● ● ● ● ●
450	Sololo	U-56	Boreholes	0.56	0.70	● ● ● ● ● ● ● ● ● ●
450	Moyale	U-57	Boreholes + Small Dam	1.02	1.28	● ● ● ● ● ● ● ●
				4.78	6.03	
460	Meru	U-58	Kathita River	20.54	25.88	● ● ● ●
460	Nkubu	U-59	Thingithu River	0.70	0.88	● ● ● ●
460	Chogoria	U-60	North Mara River	0.10	0.13	● ● ● ●
460	Chuka	U-61	Tungu River	0.43	0.54	● ● ● ●
460	Maua	U-62	Ura River	0.43	0.54	● ● ● ●
				22.20	27.97	

Note: ● Construction

Table 3.6 Sewerage Development -Proposed Implementation Programme (3/5)

District Code	Urban Name		Future Raw Water Source	Cost (million)		Implementation Schedule
				US$	K£	93 95 2000 2 4 6 8 10
510	Mudo Gashe	U-63	Boreholes + Subsurface Dam	0.24	0.31	● ● ● ● ●
510	Ijara	U-64	Boreholes + Small dam	0.12	0.15	● ● ● ● ●
510	Kotile	U-65	Boreholes/Subsurface Dam/Tana	0.12	0.15	● ● ● ● ●
510	Masalani	U-66	Tana River	0.12	0.15	● ● ● ●
510	Garissa	U-67	Tana River	8.08	10.19	● ● ● ●
				8.68	10.93	
520	Mandera	U-68	Daua River	0.66	0.83	● ● ● ●
520	Elwak	U-69	Borehores	0.89	1.12	● ● ● ● ● ● ●
520	Rhamu	U-70	Daua River	0.37	0.47	● ● ● ●
				1.93	2.43	
530	Wajir	U-71	Boreholes + Ewaso Ngiro River	2.65	3.34	● ● ● ● ● ● ● ● ● ● ● ● ● ● ●
530	Buna	U-72	Boreholes(Lago Bor river)	0.67	0.84	● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●
530	Bute	U-73	Boreholes + Small Dams	0.22	0.28	● ● ● ● ● ● ●
				3.54	4.46	
610	Manga	U-74	Bunyunyu Dam	0.07	0.09	● ● ● ●
610	Keroka	U-75	Bunyunyu Dam	0.21	0.27	● ● ● ●
610	Nyamira + Kebirigo	U-144	Kuja River	1.12	1.41	● ● ● ●
610	Kisii	U-76	Bunyunyu Dam	9.24	11.64	● ● ● ● ● ●
610	Ogembo	U-77	Kuja River	0.09	0.12	● ● ● ●
				10.73	13.52	
620	Maseno	U-78	Edzawa Dam	1.74	2.19	● ● ● ●
620	Kisumu + Kiboswa	U-79	Kibos dam	37.19	46.85	● ● ● ● ● ●
620	Ahero	U-80	Nyando River	0.93	1.17	● ● ● ●
620	Muhoroni	U-81	Nyando River	0.92	1.16	● ● ● ●
				40.78	51.38	
630	Bondo	U-145	Yala River	0.30	0.38	● ● ● ●
630	Yala	U-82	Yala River	0.23	0.28	● ● ● ●
630	Siaya	U-83	Yala River	1.96	2.47	● ● ● ● ●
630	Ukwala	U-84	Nzoia River	0.09	0.12	● ● ● ●
				2.57	3.24	
640	Homa Bay	U-85	Lake Victoria	2.50	3.16	● ● ● ● ●
640	Migori	U-86	Migori River	0.83	1.04	● ● ● ● ●
640	Kehancha + Tarang'anya	U-146	Migori River	0.34	0.43	● ● ● ● ●
640	Nyabikaye	U-147	Boreholes	0.32	0.40	● ● ● ● ● ●
640	Oyugis	U-148	Isanta River(Awach Tende)	0.34	0.43	● ● ● ●
640	Kendu Bay	U-87	Lake Victoria	0.30	0.38	● ● ● ●
640	Awendo/Sare	U-149	Sare River	0.38	0.48	● ● ● ● ●
				5.01	6.31	
710	Oloitokitok	U-88	Nol-Turesh Spring	0.87	1.10	● ● ● ●
710	Ngong	U-89	Kerarapon Spring	2.86	3.61	● ● ● ● ●
710	Kajiado	U-90	Kiserian P/L	1.21	1.53	● ● ● ● ●
710	Namanga	U-91	Namanga Spring	0.97	1.23	● ● ● ● ●
710	Magadi	U-92	Oloibortoto River	0.57	0.72	● ● ● ●
				6.49	8.18	

Note: ● Construction

Table 3.6 Sewerage Development -Proposed Implementation Programme (4/5)

District Code	Urban Name		Future Raw Water Source	Cost (million)		Implementation Schedule
				US$	K£	93 95 2000 2 4 6 8 10
720	Sotik	U-93	Kipsonoi River	0.58	0.73	● ● ● ●
720	Kericho	U-94	Dimlitch Dam, Kimugung Dam	9.72	12.24	● ● ● ●
720	Kipkelion	U-95	Nyando River	0.27	0.34	● ● ● ●
720	Londiani	U-96	Londiani dam	0.39	0.50	● ● ● ●
				10.96	13.81	
730	Nanyuki	U-97	Liki River	7.94	10.01	● ● ● ●
730	Rumuruti	U-150	Rumuruti Dam + Borehole	0.29	0.37	● ● ● ●
730	Nyahururu	U-98	Nyahururu dam + Borehole	2.11	2.66	● ● ● ●
				10.35	13.04	
740	Gilgil	U-99	Turasha P/L & Malewa Dam	2.55	3.21	● ● ● ● ●
740	Naivasha	U-100	Turasha P/L & Malewa Dam	12.93	16.29	● ● ● ● ●
740	Njoro	U-101	Itare Dam	1.60	2.02	● ● ● ● ●
740	Elburgon	U-102	Itare Dam	2.17	2.74	● ● ● ● ●
740	Molo	U-103	Itare Dam	1.92	2.41	● ● ● ● ●
740	Nakuru	U-104	Turasha P/L + Malewa Dam + Itare Dam	55.47	69.89	● ● ● ●
				76.65	96.57	
750	Narok	U-105	Upper Narok Dam	3.00	3.78	● ● ● ●
750	Nairagie Ngare	U-106	Nasampolai River	0.09	0.11	● ● ● ●
750	Kilgoris	U-151	Poroko River	0.58	0.73	● ● ● ●
750	Lolkorian	U-152	Migori River	0.30	0.38	● ● ● ●
				3.97	5.01	
760	Kitale	U-107	Koitobos River	16.08	20.26	● ● ● ●
760	Kiminini/Saboti+Spr.Kitale	U-108	Kabewyan River	0.15	0.18	● ● ● ●
760	Endebess/Kwanza	U-109	Koitobos River	0.23	0.29	● ● ● ●
				16.46	20.74	
770	Moi's Bridge	U-153	Nzoia River	0.35	0.45	● ● ● ●
770	Turbo	U-154	Sosiani River	0.49	0.62	● ● ● ●
770	Eldoret	U-110	Moiben Dam + Nzoia River	31.47	39.65	● ● ● ●
770	Burnt Forest	U-111	Kipkaren River	0.25	0.32	● ● ● ●
				32.56	41.03	
810	Kabarnet	U-112	Kirandich Dam	1.20	1.52	● ● ● ●
810	Maji Mazuri	U-113	Maji Mazuri River	0.67	0.84	● ● ● ●
810	Eldama Ravine	U-114	Chemususu Dam	0.72	0.91	● ● ● ●
810	Mogotio	U-115	Molo River /Chemususu Dam	0.37	0.47	● ● ● ●
810	Marigat	U-155	Perkerra River	0.30	0.38	● ● ● ●
				3.27	4.11	
820	Iten+Tambach	U-116	Moiben Dam	0.70	0.88	● ● ● ●
830	Nandi Hills	U-117	Mokong River	0.15	0.18	● ● ● ●
830	Kapsabet+Baraton	U-118	Mokong River	1.93	2.44	● ● ● ●
				2.08	2.62	
840	Maralal	U-119	Loikas/Yamo River	2.66	3.35	● ● ● ●
840	Wamba	U-120	Boreholes	0.57	0.71	● ● ● ● ● ● ●
840	Baragoi	U-121	Boreholes + Sub-surface dam	0.49	0.62	● ● ● ● ● ● ●
				3.71	4.68	

Note: ● Construction

Table 3.6 Sewerage Development -Proposed Implementation Programme (5/5)

District Code	Urban Name		Future Raw Water Source	Cost (million)		Implementation Schedule
				US$	K£	93 95 2000 2 4 6 8 10
850	Lodwar	U-122	Boreholes & sub-surface dam	1.34	1.69	
860	Kapenguria/Makutano	U-123	Kapenguria River	1.65	2.08	
910	Mawalie + Malakisi	U-156	Malikisi River	0.37	0.47	
910	Bungoma	U-124	Kuywa River	9.50	11.97	
910	Kimilili	U-125	Kimilili River	1.08	1.37	
910	Webuye	U-126	Nzoia River	8.60	10.84	
910	Chaptais	U-157	Sasuri River	0.35	0.44	
				19.90	25.08	
920	Busia	U-127	Sio River	2.39	3.01	
920	Nambale	U-158	Sio River	0.28	0.35	
				2.67	3.36	
930	Luanda	U-128	Edzawa River	0.44	0.55	
930	Vihiga+Majengo	U-129	Edzawa River (Kimondi River)	0.50	0.63	
930	Kaimosi	U-130	Gulagoli River	0.04	0.06	
930	Khayega	U-131	Yala River	0.05	0.06	
930	Kakamega	U-132	Isiukhu River, Mukulusi Dam	12.30	15.49	
930	Butere	U-133	Viratsi River	0.26	0.32	
930	Mumias	U-134	Nzoia River	2.57	3.24	
				16.15	20.35	
				704.95	888.24	

Note: ● Construction

Table 3.7 Major Irrigation Projects - Proposed Implementation Programme

District Code	Project	Development Area (ha)	Executing Agency	Cost (million)		Implementation Schedule
				US$	K£	93 95 2000 2 4 6 8 10
220	Mwea extension	2,900	NIB	63.7	80.3	★ ★ ● ● ● ● ● ● ● ●
310	Sabaki Extension	3,000	TARDA	19.8	24.9	☆ ☆ ★ ★ ● ● ● ● ●
350	Taita Taveta	3,780	TARDA	11.9	15.0	☆ ☆ ★ ★ ● ● ● ● ●
360	Tana Delta	12,000	TARDA	141.4	178.2	● ● ● ● ●
410	Lower Rupingazi	1,800	TARDA	6.0	7.6	☆ ☆ ★ ★ ● ● ● ● ●
440	Kanzalu	4,055	TARDA	37.9	47.8	☆ ☆ ★ ★ ● ● ● ● ●
440	Kibwezi extension	13,200	TARDA	227.1	286.1	☆ ☆ ★ ★ ● ● ● ● ●
460	Kunati	1,050	TARDA	3.5	4.4	☆ ☆ ★ ★ ● ● ● ●
460	Thanantu	2,520	TARDA	17.3	21.8	☆ ☆ ★ ★ ● ● ● ● ●
620	Kano Plain	25,640	LBDA	232.5	293.0	★ ★ ● ● ● ● ● ● ● ● ● ●
630	Lower Nzoia/ Bunyala Extension	10,480	NIB	12.4	15.6	☆ ☆ ★ ★ ● ● ● ●
640	Lower Kuja	1,900	LBDA	5.6	7.1	☆ ☆ ★ ★ ● ● ● ● ● ● ● ●
640	Kimira	2,000	LBDA	18.1	22.8	☆ ☆ ★ ★ ● ● ● ● ●
710	Lower Ewaso N'giro	10,000	ENSDA	57.0	71.8	☆ ☆ ★ ★ ● ● ● ● ●
820	Arror	1,340	KVDA	6.3	7.9	☆ ☆ ★ ★ ● ● ● ● ●
850	Turkwel	600	KVDA	1.8	2.3	☆ ☆ ★ ★ ● ● ● ● ●
910	Upper Nzoia	7,550	LBDA	88.0	110.9	☆ ☆ ★ ★ ● ● ● ● ●
920	Yala Swamp	7,540	LBDA	65.0	81.9	☆ ★ ★ ● ● ● ● ● ● ●
	Total	111,355		1015.3	1279.3	

Note:

☆ Study
★ Design
● Construction

- Tana Delta : Commenced in 1992
- Lower Ewaso N'giro and Yala Swamp : Continue 2011 onward

Table 3.8 Small Scale Irrigation Schemes -Proposed Implementation Programme

District Code	Project	Area of Development	No. of Scheme	Executing Agency	Cost (million)		Implementaion of development area (ha)	
					US$	K£	up to 2000	2001-2010
		(ha)	(Nos)					
	Nairobi Province							
110	Nairobi	-	-	-				
	Central Province							
210	Kiambu	115	7	MOA	0.19	0.24	57.5	57.5
220	Kirinyaga	30	2	MOA	0.05	0.06	15	15
230	Muranga	500	9	MOA	0.81	1.03	250	250
240	Nyandarua	N.A	1	MOA				
250	Nyeri	77	6	MOA	0.13	0.16	38.5	38.5
	Coast Province							
310	Kilifi	330	9	MOA	0.54	0.68	165	165
320	Kwale	498	6	MOA	0.81	1.02	249	249
330	Lamu	N.A	5	MOA				
340	Mombasa	-	-	-				
350	Taita Taveta	360	4	MOA	0.59	0.74	180	180
360	Tana River	540	11	MOA	0.88	1.11	270	270
	Eastern Province							
410	Embu	1,509	22	MOA	2.46	3.09	754.5	754.5
420	Isiolo	50	1	MOA	0.08	0.10	25	25
430	Kitui	155	9	MOA	0.25	0.32	77.5	77.5
440	Machakos/Makueni	250	4	MOA	0.41	0.51	125	125
450	Marsabit	-	-	-				
460	Meru	1,000	10	MOA	1.63	2.05	500	500
	Northeastern Province							
510	Garissa	46	3	MOA	0.07	0.09	23	23
520	Mandera	-	-	-				
530	Wajir	-	-	-				
	Nyanza Province							
610	Kisii/Nyamira	-	-	-				
620	Kisumu	N.A	2	MOA				
630	Siaya	N.A	3	MOA				
640	South Nyanza	200	1	MOA	0.33	0.41	100	100
	Rift Valley Province							
710	Kajiado	N.A	2	MOA				
720	Kericho	-	-	-				
730	Laikipia	407	4	MOA	0.66	0.83	203.5	203.5
740	Nakuru	-	-	-				
750	Narok	-	-	-				
760	Trans Nzoia	-	-	-				
770	Uasin Gishu	335	2	MOA	0.55	0.69	167.5	167.5
810	Baringo	31	5	MOA	0.05	0.06	15.5	15.5
820	Elgeyo Marakwet	-	-	-				
830	Nandi	-	-	-				
840	Samburu	20	1	MOA	0.03	0.04	10	10
850	Turkana	N.A	1	MOA				
860	West Pokot	48	4	MOA	0.08	0.10	24	24
	Western Province							
910	Bungoma	155	2	MOA	0.25	0.32	77.5	77.5
920	Busia	353	5	MOA	0.57	0.72	176.5	176.5
930	Kakamega/Vihiga	3	1	MOA	0.00	0.01	1.25	1.25
	Total	7,012	142		11.41	14.37	3,506	3,506

Notes : (1) Schemes proposed above are based on information as of September 1991.
In actual implementation, due revision / addition should be made to incorporate the up-to-date schemes.
(2) N.A. : No information available, - : No schemes listed (as of Sept.1991)

Table 3.9 Livestock Water Development (1/4)
- Proposed Implementation Programme

Code	District	Source Development Plan							Total	Implementation Program (%)	
		Surface Water	Borehole	Shallow Well	Small Dam	Subsur-face Dam	Sand Dam	Existing Pipeline		Up to 2000	2001-2010
	Nairobi Province									0	0
110	Nairobi										
	- Quantity (m3/d)	0	0	0	0	0	0	0	0		
	- No. of Facilities	0	0	0	0	0	0	0	0		
	- Cost (mill.US$)	0	0	0	0	0	0	0	0		
	(mill.K£)	0	0	0	0	0	0	0	0		
	Central Province										
210	Kiambu									36.3	63.7
	- Quantity (m3/d)	5,949	286	8	333	0	0	21	6,597		
	- No. of Facilities	0	13	2	28	0	0	0	43		
	- Cost (mill.US$)	0	1.07	0.01	0.3	0	0	0	1.37		
	(mill.K£)	0	1.35	0.01	0.37	0	0	0	1.73		
220	Kirinyaga									42.6	57.4
	- Quantity (m3/d)	3,779	58	14	154	0	0	0	4,005		
	- No. of Facilities	0	2	3	12	0	0	0	17		
	- Cost (mill.US$)	0	0.22	0.01	0.08	0	0	0	0.32		
	(mill.K£)	0	0.28	0.02	0.11	0	0	0	0.4		
230	Muranga									36.4	63.6
	- Quantity (m3/d)	5,734	19	79	305	0	0	0	6,137		
	- No. of Facilities	0	1	16	23	0	0	0	40		
	- Cost (mill.US$)	0	0.07	0.08	0.11	0	0	0	0.26		
	(mill.K£)	0	0.09	0.1	0.14	0	0	0	0.33		
240	Nyandarua									49.1	50.9
	- Quantity (m3/d)	10,186	1,855	49	881	0	0	51	13,022		
	- No. of Facilities	0	71	7	21	0	0	0	99		
	- Cost (mill.US$)	0	7.43	0.02	0.86	0	0	0	8.31		
	(mill.K£)	0	9.36	0.03	1.09	0	0	0	10.48		
250	Nyeri									24.7	75.3
	- Quantity (m3/d)	4,969	0	0	200	0	0	0	5,169		
	- No. of Facilities	0	0	0	27	0	0	0	27		
	- Cost (mill.US$)	0	0	0	0.11	0	0	0	0.11		
	(mill.K£)	0	0	0	0.14	0	0	0	0.14		
	Sub-total									40.6	59.4
	- Quantity (m3/d)	30,617	2,218	150	1,873	0	0	72	34,930		
	- No. of Facilities	0	87	28	111	0	0	0	226		
	- Cost (mill.US$)	0	8.79	0.12	1.46	0	0	0	10.37		
	(mill.K£)	0	11.08	0.16	1.85	0	0	0	13.08		
	Coast Province										
310	Kilifi									42.8	57.2
	- Quantity (m3/d)	237	1,255	2,371	8	8	7	39	3,925		
	- No. of Facilities	0	47	482	4	5	5	0	543		
	- Cost (mill.US$)	0	4.39	2.26	0.01	0.02	0.01	0	6.7		
	(mill.K£)	0	5.54	2.85	0.01	0.03	0.02	0	8.44		
320	Kwale									46.8	53.2
	- Quantity (m3/d)	921	2,639	2,529	65	17	49	75	6,295		
	- No. of Facilities	0	68	504	12	10	15	0	609		
	- Cost (mill.US$)	0	9.57	2.29	0.08	0.04	0.1	0	12.07		
	(mill.K£)	0	12.06	2.88	0.1	0.05	0.12	0	15.23		
330	Lamu									19.7	80.3
	- Quantity (m3/d)	0	1,203	1,442	0	0	0	0	2,645		
	- No. of Facilities	0	32	293	0	0	0	0	325		
	- Cost (mill.US$)	0	4.04	1.41	0	0	0	0	5.44		
	(mill.K£)	0	5.09	1.77	0	0	0	0	6.86		
340	Mombasa										
	- Quantity (m3/d)	0	0	0	0	0	0	0	0		
	- No. of Facilities	0	0	0	0	0	0	0	0		
	- Cost (mill.US$)	0	0	0	0	0	0	0	0		
	(mill.K£)	0	0	0	0	0	0	0	0		
350	Taita Tabeta									35.2	64.8
	- Quantity (m3/d)	1,876	1,167	1,468	96	22	22	87	4,738		
	- No. of Facilities	0	33	295	7	9	9	0	353		
	- Cost (mill.US$)	0	4.06	1.43	0.13	0.06	0.04	0	5.72		
	(mill.K£)	0	5.11	1.8	0.17	0.08	0.06	0	7.22		
360	Tana River									43.2	56.8
	- Quantity (m3/d)	2,100	1,852	3,779	65	47	47	30	7,920		
	- No. of Facilities	0	56	649	10	9	9	0	733		
	- Cost (mill.US$)	0	6.64	3.02	0.09	0.13	0.1	0	9.98		
	(mill.K£)	0	8.37	3.81	0.11	0.17	0.12	0	12.58		
	Sub-total									36.6	63.4
	- Quantity (m3/d)	5,134	8,116	11,589	234	94	125	231	25,523		
	- No. of Facilities	0	236	2,223	33	33	38	0	2,563		
	- Cost (mill.US$)	0	28.7	10.41	0.31	0.25	0.25	0	39.91		
	(mill.K£)	0	36.17	13.11	0.39	0.33	0.32	0	50.33		

Table 3.9 Livestock Water Development (2/4) - Proposed Implementation Programme

Code	District	Source Development Plan							Total	Implementation Program (%)	
		Surface Water	Borehole	Shallow Well	Small Dam	Subsur-face Dam	Sand Dam	Existing Pipeline		Up to 2000	2001-2010
	Eastern Province										
410	Embu									44.8	55.2
	- Quantity (m3/d)	2,176	596	710	102	3	3	12	3,602		
	- No. of Facilities	0	20	146	17	3	3	0	189		
	- Cost (mill.US$)	0	2.13	0.7	0.08	0.01	0.01	0	2.92		
	(mill.K£)	0	2.68	0.88	0.1	0.01	0.01	0	3.68		
420	Isiolo									21.4	78.6
	- Quantity (m3/d)	3,736	5,949	7,507	46	113	332	10	17,693		
	- No. of Facilities	0	182	1,241	2	14	37	0	1,476		
	- Cost (mill.US$)	0	21.01	6.47	0.07	0.33	0.7	0	28.57		
	(mill.K£)	0	26.49	8.15	0.08	0.41	0.89	0	36.03		
430	Kitui									49.5	50.5
	- Quantity (m3/d)	542	3,111	6,236	74	224	197	84	10,468		
	- No. of Facilities	0	103	1,251	6	36	34	0	1,430		
	- Cost (mill.US$)	0	11.46	5.91	0.1	0.64	0.4	0	18.5		
	(mill.K£)	0	14.44	7.45	0.12	0.8	0.51	0	23.33		
440	Machakos									38.4	61.6
	- Quantity (m3/d)	3,927	2,726	5,032	444	95	65	154	12,443		
	- No. of Facilities	0	96	994	34	33	28	0	1,185		
	- Cost (mill.US$)	0	9.93	4.69	0.6	0.26	0.13	0	15.61		
	(mill.K£)	0	12.52	5.91	0.75	0.33	0.17	0	19.69		
450	Marsabit									21.0	79.0
	- Quantity (m3/d)	753	14,425	11,587	132	539	711	262	28,409		
	- No. of Facilities	0	471	2,128	3	59	77	0	2,738		
	- Cost (mill.US$)	0	57.43	10.48	0.19	1.56	1.51	0	71.17		
	(mill.K£)	0	72.42	13.21	0.24	1.97	1.91	0	89.75		
460	Meru									43.6	56.4
	- Quantity (m3/d)	10,891	5,417	1,622	624	61	13	2	18,630		
	- No. of Facilities	0	171	331	39	11	8	0	560		
	- Cost (mill.US$)	0	19.7	1.6	0.71	0.17	0.03	0	22.21		
	(mill.K£)	0	24.85	2.02	0.89	0.22	0.03	0	28.01		
	Sub-total									27.6	72.4
	- Quantity (m3/d)	22,025	32,224	32,694	1,422	1,035	1,321	524	91,245		
	- No. of Facilities	0	1,043	6,091	101	156	187	0	7,578		
	- Cost (mill.US$)	0	121.66	29.85	1.75	2.97	2.78	0	158.98		
	(mill.K£)	0	153.4	37.62	2.18	3.74	3.52	0	200.49		
	North Eastern Province										
510	Garissa									19.4	80.6
	- Quantity (m3/d)	150	3,246	6,781	0	79	48	1	10,305		
	- No. of Facilities	0	91	1,305	0	13	13	0	1,422		
	- Cost (mill.US$)	0	11.61	6.13	0	0.22	0.1	0	18.06		
	(mill.K£)	0	14.63	7.73	0	0.28	0.12	0	22.77		
520	Mandera									34.1	65.9
	- Quantity (m3/d)	951	2,620	9,342	0	216	400	0	13,529		
	- No. of Facilities	0	94	1,875	0	28	45	0	2,042		
	- Cost (mill.US$)	0	9.55	9.26	0	0.62	0.85	0	20.28		
	(mill.K£)	0	12.04	11.67	0	0.78	1.07	0	25.57		
530	Wajir									16.4	83.6
	- Quantity (m3/d)	0	2,138	5,427	0	87	205	0	7,857		
	- No. of Facilities	0	98	1,040	0	19	31	0	1,188		
	- Cost (mill.US$)	0	8.99	5.01	0	0.24	0.43	0	14.67		
	(mill.K£)	0	11.34	6.32	0	0.31	0.54	0	18.5		
	Sub-total									25.4	74.6
	- Quantity (m3/d)	1,101	8,004	21,550	0	382	653	1	31,691		
	- No. of Facilities	0	283	4,220	0	60	89	0	4,652		
	- Cost (mill.US$)	0	30.15	20.4	0	1.08	1.38	0	53.01		
	(mill.K£)	0	38.01	25.72	0	1.37	1.73	0	66.84		