



REPUBLIC OF KENYA

MINISTRY OF WATER DEVELOPMENT

THE STUDY

ON

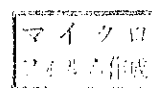
WATER SUPPLY AND DRAINAGE PLANS

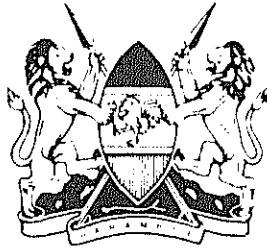
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REPUBLIC OF KENYA

MINISTRY OF WATER DEVELOPMENT

THE STUDY
ON
THE NATIONAL WATER MASTER PLAN

SECTORAL REPORT
(P)
LAWS AND INSTITUTIONS

JULY 1992

JAPAN INTERNATIONAL COOPERATION AGENCY

LIST OF REPORTS

EXECUTIVE SUMMARY

MAIN REPORT

1. Vol.1 Water Resources Development and Use Plan towards 2010
2. Vol.2 Master Action Plan towards 2000
Part 1 : National Water Master Action Plan
3. Vol.3 Master Action Plan towards 2000
Part 2 : Action Plan by Province/District

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2. B Hydrology
3. C Groundwater Resources
4. D Domestic and Industrial Water Supply
5. E Agriculture and Irrigation
6. F Livestock, Wildlife and Fishery
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PREFACE

Interpretation of Report

The original objective of this NWMP Study is to propose a nationwide framework for orderly planning and development of water resources in the country. The Study also deals with the formulation of individual development schemes. However, it should be noted that the plans formulated in this Study remain at a national level and do not provide complete details at local level. Further details should be examined in subsequent studies on each river basin, district, and project basis which are separately recommended in this Study.

Administrative Division of Districts

In this Study, the original 41 districts were considered and various statistical data, particularly socio-economic information, were collected for these districts. During the progress of the Study, six districts were detached from the original ones and established as new districts. In the report, the data on these new districts are grouped together with the corresponding original districts as shown below.

	<u>Original Districts</u>	<u>New Districts</u>	<u>Data included in:</u>
1.	Machakos	Makueni	Machakos/Makueni
2.	Kisii	Nyamira	Kisii/Nyamira
3.	Kakamega	Vihiga	Kakamega/Vihiga
4.	Meru	Tharaka-Nithi	Meru/Tharaka-Nithi
5.	Kericho	Bomet	Kericho/Bomet
6.	South Nyanza	Migori	South Nyanza/Migori

(Note: The last three Districts were established very recently.
The report refers only to the names of the original 41 districts.)

The administrative boundary map used in this Study is the latest complete map set covering the whole country (41 Districts, 233 Divisions and 976 Locations), prepared in 1986 by the Survey of Kenya, Ministry of Land, Housing and Physical Planning.

Data and Information

The data and information contained in the report represent those collected in the 1990-1991 period from various documents and reports made available mostly from central government offices in Nairobi and/or those analyzed in this Study based on the collected data. Some of them may be different from those kept in files at some agencies and regional offices. Such discrepancies if any should be collated and adjusted as required in further detailed studies of the relevant development projects.

Development Cost

The cost and benefit estimate was based on the 1991 price level, and expressed in US\$ equivalent according to the exchange rate of US\$1 = KShs25.2 prevailing at that time. The same exchange rate was used in calculating the development cost in K£/KShs currency.

THE STUDY ON THE NATIONAL WATER MASTER PLAN

SECTORAL REPORT (P) LAWS AND INSTITUTION

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P1. INTRODUCTION

1.1 Objective and Approach

In conjunction with the formulation of the national water master plan, the Study attempted to look into the legal and institutional aspects relevant to water development, covering the aspects of (i) legislation organization, (ii) institutional coordination and (iii) water resources and use management.

The basic approach assumed in this sectoral study is to examine the issues, particularly placing emphasis on the items closely related to the implementation of the water development plans. Therefore, it was not the intent of this study to examine in detail the whole of legal and institutional issues, leaving it to a separate study. Further, the study dealt mainly with the issues related to the activities of the Ministry of Water Development. This approach was obliged due to the experts limited input to this study.

1.2 Acknowledgement

During the study period, the Study Team's expert visited various offices for collection of information and received kindest help from the officers, to which we wish to express many thanks.

P2. EXISTING WATER-RELATED LEGISLATIONS

2.1 General Framework of Laws Related to Water

The Kenya Government has many laws related to water (see Table P2.1). Needless to say, the most important law related to water is the Water Act with which the Minister of Water Development exercises control over every body of water. Other important laws of water development are the Irrigation Act and the Electric Power Act which are executed by the Minister for Regional Development and the Minister for Energy, respectively. The other important laws for water conservation are the Forest Act and the Agriculture Act concerned with soil conservation, which are executed by the Minister for Environment and Natural Resources, and the Minister for Agriculture, respectively.

The Kenya Railway Corporation Act is included in the table, because Section 18 in Part III of the Act defines power to take water and Part IV defines special provisions related to ports in inland waters.

The State Corporation Act is the basic law of the National Water Conservation and Pipeline Corporation stipulated by Legal Notice No. 270 of June 24, 1988.

2.2 Outline of Laws related to Water

(1) The Water Act

Since 1929 the Water Ordinance had been enforced. The Water Act was established in 1951. It is the supreme law on water. The Act, revised in 1972, consists of 17 parts and 183 sections.

The Section 3 declares water to be vested in the government as follows:

"The water of every body of water under or upon any land is vested in the government, subject to any rights of user in respect thereof which, by or under this act or any other written law, have been or are granted, or recognized as being vested, in any other person."

The Water Act covers most area related to water such as municipal water, irrigation, sewerage, drainage, flood control, reclamation, the protection of the source and course of water.

The most important institutions appearing in the Act are the Minister, the Water Resources Authority (now ceased to function, see below) and the Water Apportionment Board together with the Catchment Board. The Water Resources Authority had been assigned to execute planning and investigation of water resources of Kenya. The Minister executes construction works according to the plans recommended by the Water Resources Authority. The Water Apportionment

Board executes permission for water use and its construction works and watching water and riparian works. But, the Water Resources Authority and the attached Regional Water Committee defined in the Section 24 have not been functioned for long time. The duty of the Water Resources Authorities has actually been executed by the Ministry of Water Development.

The Minister has strong influence on local water bodies. By Section 27, the Minister may appoint any person or any number of persons to be Local Water Authorities for the management and use of water or the drainage or land reclamation except like the National Irrigation Board and the Lake Basin Development Authority which are defined by their special laws.

(2) The National Water Conservation and Pipeline Corporation Order, 1988

In exercise of power conferred by the State Corporation Act, the establishment of the National Water Conservation and Pipeline Corporation was officially declared by the Legal Notice No. 270 of June 24, 1988.

The Corporation is at the moment assigned as an implementing body responsible for relatively large scale water development projects:

The Corporation shall, in connection with the water projects specified in the schedule:

- (a) supply water in bulk to such water undertakers as the Minister may, after consultation with the Board, by notice in the Gazette, designate;
- (b) supply water, in bulk or otherwise, to such persons or class of persons as the Minister may, after consultation with the Board, by notice in the Gazette, designate;
- (c) do all such things as may be necessary or advantageous for the management and development of water projects and for securing an adequate supply of water; and
- (d) apply for and obtain all such licences, permits and other authorities required under any written law or as may be desirable.

Also, the Corporation shall assist the Government in the formulation and execution of a national water development policy.

(3) The Mombasa Pipeline Board Act

Part I of the Act provides for the establishment of the Board, its constitution and vesting of assets. Its powers and functions are set out in Part II and may be summarized as obtaining an adequate supply of water and supplying it in bulk or

otherwise to such water undertakers, persons or classes of persons as the Minister may designate. The prices charged by the Board for water must be authorized by the Minister (Section 8) but they need not be the same for all supplies. Indeed until recently their prices were higher than the rest in the Republic and they differed from place to place.

The Act is of less significance, since the Board was proscribed in the early 1980's.

(4) The Irrigation Act

This Act is mainly concerned with the establishment, constitution and functions of the National Irrigation Board which is responsible for the development, control and improvement of national irrigation schemes in the areas designated by the Minister. By Section 15 they must co-operate with the Water Resources Authority in formulating policy for national irrigation schemes.

(5) The Fish Industry Act

The Act provides for the reorganization, development and regulation of the fish industry, to make provision for the protection of fish.

(6) The Government Fisheries Protection Act

The purpose of this Act is to prevent the depletion of certain species, for example, pearls or mother of pearl shells, or shellfish containing or believed to contain pearls or mother of pearl; beche-de-mer; and ambergris.

(7) The Tana and Athi Rivers Development Authority Act

The Act provides for the establishment of an authority to advise on the institution and co-ordination of development projects in the basins.

(8) The Kerio Valley Development Authority Act and The Lake Basin Development Authority Act

These Acts provide for the establishment of an authority to plan and co-ordinate the implementation of development projects in each catchment area.

(9) The Electric Power Act

The Act facilitates and regulates the generation, transmission, distribution, supply and use of electric energy.

(10) The Agriculture Act

The Act is for promoting agricultural development and it stresses the need for conservation of soil and its fertility and the development of agricultural land in accordance with sound practices of good land management and good husbandry. In other words, the Act emphasizes the prevention of soil erosion and in such a way it prevents land degradation and, indirectly, the deterioration of the quality of surface waters (through increasing loads of clay and silt resulting from soil erosion).

(11) The Territorial Waters Act

The Act makes provision for the delimitation of the territorial waters on the sea.

(12) The Kenya Ports Authority Act

The Act provides for the establishment of the Kenya Ports Authority.

(13) The Lakes and Rivers Act

The Act regulates dredging and the use of steam vessels on certain lakes and rivers. This law may be extended to cover necessary provisions for future management of river courses and lakes (see Sub-section 7.1.4 hereinafter).

(14) The Wildlife (Conservation and Management) Act

The Act provides for the protection, conservation, and management of wildlife.

(15) The Mining Act

The Act sets forth the provisions for mining activities licensed by the Act, including those related to soil conservation and water management.

(16) The Forest Act

This Act provides for the establishment, control and regulation of central forests, other forests and forest areas in Nairobi area and on unalienated Government land. The main objective is to encourage conservation and maintenance of vegetative cover in all lands. However, the administration of the Act faces some problems created by economic reasons, rapid growth of population and increasing demand for fuelwood; all these factors have accelerated encroachment on forest areas.

(17) The Public Health Act

The Act makes provisions for securing and maintaining health and it recognizes the importance of water from the health point of view, particularly in the prevention of certain infectious diseases, by including many provisions relating to water and sewerage. The local authority is responsible for taking the necessary measures to

prevent any pollution dangerous to health of any supply of water which the public within its district has the right to use.

(18) The Malaria Prevention Act

The Act enables health authorities to take measures for the prevention of Malaria by drainage and by prohibition of discharge obstruction and planting trees.

(19) The Land Planning Act

The Act makes provision for planning the use and development of land.

(20) The Local Government Regulations

These Regulations provides that local councils (municipal, urban and area councils) may establish and maintain sewerage and drainage system and water supply systems. It is noted that these local councils' power shall be exercised in conjunction with the Water Act (see Sub-section 7.1.5 hereinafter).

2.3 Legislation on Water Use and Management

Many of the descriptions in this Section were derived from the observations given in Ref. P.1.

2.3.1 Ownership of water

The Water Act designates that "the water of every body of water under or upon any land is vested in the Government (Water Act : Section 3). The control of the waters is exercised by the Ministers for Water Development (Water Act ; Section 4)".

The Kenyan law has a ground in the English common law on one hand, in which the basic spirit is that the water is public and common to anyone having a right to access. Under the customary law, on the other hand, water sources and watering points belong to community and can be used by everybody.

2.3.2 Water use permit

(1) Requirement of permit acquisition

Under the present law, a right to use water can only be acquired under the Water Act, by way of permit issued by the Water Apportionment Board (WAB). The WAB is authorized to issue the permit on behalf of the Minister.

There are, however, three exceptional cases that will not require permits:

- (a) Use of water for domestic purposes by a person having lawful access thereto and without application of "works" (Water Act : Section 38).**

- (b) Development of groundwater not situated within 92m (100 yards) of any body of surface water or 805m (half mile) of another existing borehole and not situated within a "Conservation Area" (Water Act : Sections 50 and 74), where however the acquisition of an authority for development is still required.
- (c) Storage of water in or abstraction from a dam built in a channel or depression declared by WAB not to be a "watercourse" (Water Act : Section 38)

For any other case of water use, the permits must be acquired through application to WAB.

(2) Procedure for issue of water permits

An application is made to WAB through local Water Bailiff of the area. The Water Bailiff at first inspects the site of the applied work and verifies all information in the application, and then submits the findings/recommendations to the relevant Catchment Board with a copy to WAB enclosing copies of application to open file.

The application is advertised to call for any public inquiries or objections for 30 days. This public inquire is a good established system, which should continue to exist as a mandatory procedure.

If the application is approved, WAB conveys an authorization to commence the construction of works. The Water Bailiff inspects the completion of works, and then the water permit becomes effective in force.

(3) Conditionality of water permit issue.

Water permits are often issued subject to terms and conditions such that: (Water Act: section 28, 73, 91).

- (a) Installation of controlling and/or measuring devices at water intake.
- (b) Abstraction of 60% of the tested safe yield of groundwater.
- (c) Passing over of waste or surplus water.
- (d) Clearing of weeds in the canal to allow unobstructed passage of water.
- (e) Anti-pollution measures to be provided.
- (f) Used water not to be returned to the watercourse (in case of coffee factories).

However, it is reported that the monitoring of these terms and conditions is not in full enforcement due to occupation of the Water Bailiff for other duties. Financial constraint is another main reason.

(4) Revision/discontinuation of water permits

WAB has authority to revise and/or cancel any water permits when deemed to be necessary. Such cases include:

- (a) Shortage of water needed for domestic purposes or any other purposes accorded more priorities (Water Act: Section 98)
- (b) Water not used beneficially (Water Act: Section 99)
- (c) Irrigation water use within or close to township which endangers public health (Public Health Act: Section 157)
- (d) Non-compliance of the permit conditions by the permit-holder (Water Act: Section 99)
- (e) Water permit may be cancelled when works have been abandoned (Water Act: Section 106)
- (f) Water permit may be cancelled on public interest (Water Act: Section 101)

Enforcement of this provision could be achieved only if WAB is supported with strong monitoring of water uses. This again calls for the importance of Water Bailiff's responsibilities.

(5) Record of Water Use:

The Water Resources Authority (WRA ; now the function transferred to MOWD) may require any persons or WAB may require any holder of a water permit to keep a record of water abstraction, diversion and storage (Water Act : Section 21). However, this is practically not being enforced, and the record keeping is very scarce by most water users including public water supply undertakers.

2.3.3 Priorities of water use

(1) Priorities among water uses:

The Water Act gives precedence to domestic uses of water over any other uses, and entitles WAB to reserve such part of water sources as may be required for domestic purposes (Water Act : Section 82). This appears to be a quite logical provision in view of increasing fear for the scarcity of safe water sources for domestic uses.

(2) Share of waters between areas:

The Water Act entitles the Minister for Water Development to order that the excess domestic water in an area may be supplied to other areas threatened by shortage of water for essential domestic purposes (Water Act: Section 17). The basic principle of this provision reflects an equitable share or use of water resources. This provision allows the Minister to undertake water transfer scheme.

2.3.4 Domestic water supply

(1) Legal position of MOWD

Domestic water supplies are undertaken by public and local authorities or persons or bodies appointed as "Water Undertakers" by the Minister for Water Development after consultation with the Water Resources Authority (WRA). (Water Act: Section 124).

Here, a point to be noted is that the Ministry of Water Development (MOWD) and now the National Water Conservation and Pipeline Corporation (NWCP) inclusive, are the largest water undertakers. Further, MOWD took over all the functions of WRA in 1968. This implies that MOWD is discharging dual functions: as an authority of appointing water undertakers on one hand, and as the largest water undertaker on the other hand. This Study considers this to be acceptable from aspects of simplicity and efficiency of water supply undertakings and management.

Two legal aspects to be noted for future revisions are:

- (a) WRA ceased to function in 1968, but still exists in legal term.
- (b) MOWD is discharging the WRA's functions without legal delegation of powers.

(2) Connection and disconnection of water supplies:

The connection of water supply is made on an application basis to be submitted from user to water undertaker. After the approval of application, the water undertaker lays the necessary service pipes and makes the request for payments. Water undertakers can disconnect the supplies in such cases as:

- (a) Breach by the consumer of the provisions of laws or regulations
- (b) Non-payment of water charges

The water undertaker must install and maintain drains and necessary communication pipes (Water Undertakers Rules: Regulation 15). Also, the undertaker may provide for the prevention of pollution of water supplied by him (Water Act: Section 145).

These provisions are reasonable and logical. The remaining issue is how to promote the connections of supplies against increasing water demands; either by individual connection or communal points. A great constraint is that the cost of individual connection is still a burden especially to rural inhabitants.

(3) **Water charges:**

Right of imposing the charges for water and services is authorized in the regulations or by-laws to be made by each water undertaker. A point to note here is that the concept of pricing the charges is varying between water undertakers. Setting-up of an uniform concept is recommended as described in Sub-section 5.6.2 hereinafter.

2.3.5 Agricultural water use

(1) **Control of irrigation water use:**

Irrigation water use also requires a permit from WAB. The permit covers two categories; one is "minor irrigation" up to two acres (0.8 ha) and the other "general irrigation" over two acres (Water Act: Section 36). Hence, the use of irrigation water is subject to control by WAB. A specific case is the use of water on lands declared to be "national irrigation schemes" which was formally managed by the Ministry of Agriculture (MOA), but now transferred to the Ministry of Regional Development (MORD). (Irrigation Act: Section 27). Nevertheless, it is deemed that all irrigation water use is legally under control of WAB.

(2) **Irrigator's obligation for proper drainage:**

Irrigation must provide for an efficient drainage system of the land to return residual flow to a watercourse. The negligence of this leads to the cancellation of the water permit, whereon the irrigation is regarded to be guilty for practicing unauthorized works (Water Act: Section 35).

There is a regulation for public health aspect. The Minister for Health (MOH), after consultation with MOA, may prohibit the cultivation or irrigation in urban area if the practice is unhealthful or insanitary. In such case, MOH empowers to call on WAB to cancel the relevant water permit (Public Health Act: Section 157).

It is important to note that MOWD/WAB are assigned to have an important role in these monitoring and judgement works. The responsibility of Water Bailiff is again emphasized to be important.

2.3.6 Hydropower use

The use of water for hydropower generation also requires obtaining a water permit from WAB (Water (General) Rules: Regulation 56). While, a licence for generation and supply

of electric power including construction of the facilities is a separate issue to be authorized by the Ministry of Energy (MOE) under Electric Power Act.

Following the above demarcations of legal responsibilities, MOWD has not been involved much in the planning of hydropower schemes other than the issue of water permit by WAB. On one hand, some hydropower schemes, particularly schemes having a large reservoir or peak-power generating plant, have much relevance to change in the river flow regime. In a context of achieving the multi-disciplinary use of the river waters, MOWD and MOE as well as the River Basin Development Authorities will be encouraged to co-ordinate with each other when determining the seasonal distribution of water uses and also an allowable power-bore flood in the river channel. This is also encouraged from viewpoint of formulating the multi-use of water resources.

2.3.7 Industrial and mining use

Industrial and mining uses of water also requires the prior acquisition of a water permit (Water (General) Rules: Regulation 56).

A separate legal provision is with regard to disposal of the industrial waste waters. The waste water may be returned to the body of water sanctioned by WAB, provided that it is purified to a level acceptable to WAB and suitable for further water use by downstream users. WAB usually provided a condition in issuing water permits for industrial uses: "anti-pollution measures shall be taken to the satisfaction of WAB". A specific case is for coffee processing industries; wherein the water from coffee processing needs to be filtered in seepage pits so as not to discharge the waste water and coffee berries into the watercourse (Water (General) Rules: Regulation 72 and 74). There is also a further provision that a recirculation system shall be installed at the processing plant.

Effluents from mining industries are also subject to careful observation to avoid harmful accumulation of sand, stones, silt or drifts in any body of water (Water (General) Rules : Regulation 73).

What is lacking in enforcing the above regulations appears to be the incompleteness of standard specifications for effluent control and the limited resources available for monitoring duties.

2.3.8 Flood control and river protection

(1) Flood Control:

There are only scarce regulations related to flood control. Nevertheless, the Water Act designates MOWD to implement the work for disposal or control of flood water on advice of WRA. The work will be done if it is in the public interest (Water Act: Section 9).

There is a separate provision that it is a landholder's obligation to provide flood prevention measures if there is an obstruction to the natural flow of water in his land (Water Act: Section 13). The provision will be practically applicable to minor works not on the watercourses declared by WAB.

Overall, flood control comes to be an important duty for MOWD as the population increases and economic activity expands to low-lying lands where flood problem is foreseen. Strengthening of both legal and institutional set-up will be discussed in Section 4.9 hereinafter.

(2) River protection:

Bank erosion is observed in many rivers, though it has not been causing destructive hazards yet, except in the Tana lower reaches to which a special attention is to be addressed. There exist some legal provisions with regard to the protection of water courses, lands and beds. WAB, hence MOWD, is authorized to inspect any water resources including the water courses and take the necessary measures for protection of the banks and beds of a watercourse and also the prevention of pollution (Water Act: Section 166). Although MOWD's current activity in this field is still minor, a progressive provision for the undertaking is suggested particularly for rivers in urban areas.

(3) Concept of river courses or river areas:

There is a provision that written authorization be required for the cultivation of soils, cutting down of vegetations and depasturing by livestock of any lands within a specified distance from a water course (Agriculture (Basic Land Usage) Rules : Regulation 6). This provision aims at preventing uncontrolled land use along river courses.

This provision is very suggestive for control of uses and/or conservation of the riverine lands, particularly from the following two aspects:

- (a) Conservation of natural riverine vegetations which are quite important for the conservancy of river course and as a source of dry season livestock feeding.
- (b) Preservation of riverine lands for provision for future river improvement and flood control works.

A more positive regulation is suggested for ASAL area (for (a) above) and for urban rivers (for (b) above).

(4) River dredging:

There is a provision that dredging operations in the river or lake must be conducted under the direction of a duly appointed inspector (Lakes and River Act : Section

10). The execution of dredging work needs to be licensed by the Minister for Transport and Communications. However, this provision is set forth aiming mainly at preventing hazards to navigation or navigability of the dredged rivers and lakes.

Separately from the above provisions, the control of river dredging regarding aspects of river morphology (control of sand/gravel extraction) and flood control (channel enlargement) may be required in the future. The necessary provisions shall be added in the Lakes and River Act or the Water Act; maybe the former is better.

2.3.9 Soil erosion and conservation

The provisions set forth the restriction of cultivation, destruction of vegetation, and despoiling of livestock on any lands having a gradient of over 12% (Agriculture (Basic Land Usage) Rules: Regulations 3 to 5). Improper use of ditches or channels provided for the purpose of erosion control is punishable. It is the landholders' duty to prevent erosion from water flowing into adjoining canals (Do : Regulation 7).

Soil conservation works are carried out by MOWD or in conjunction with the water undertakers (Water Act: Section 141). WAB requires the provision of soil conservation measures to water permit applicants as required, when approving the water permit. In case irrigation is involved, the water permit is approved on a prior assurance of the District Agriculture Officer's certificate stating that adequate measures would be provided.

With regard to siltation, provisions are set forth for dredging and mining operations not to accumulate dangerous silting in or discharge silt-loaded water into any body of water. There are no other direct legislations on siltation. Similar regulation shall be imposed on other types of silt-yielding operations such as road and other construction works.

2.3.10 Drainage and sewerage

(1) Drainage

Reclamation of swamp is allowed to be undertaken by a person or authority after acquisition of the permit from WAB (Water Act: Sections 27,37,40 to 42), where existing state schemes will take over other schemes (Do : Section 33).

The Minister for Water Development has a legal authority of directing a land owner to drain a swamp and remove obstructions to water flow which may cause reduction in water runoff (Water Act: Section 13). Drainage of swamp shall not jeopardise any existing water use rights, where the solutions may be monetary compensation or alternative supply of water (Water (General) Rules: Regulations 54).

The Malaria Prevention Act (Sections 3 and 7) authorizes a Local Authority to construct a system of drainage to prevent the outbreak of malaria.

(2) Sewerage

Public Health (Drainage and Latrines) Rules (Regulations 4, 6, 9, etc) requires proprietors/occupiers of buildings to provide adequate drains acceptable to the Local Authority. The work can only be undertaken by duly licensed plumbers and drain layers and other technical details are specified (Do: Regulations 28 to 62).

Drains must be made into public sewers, subject to the Social Authorities' prior approval, or into a suitable receptacle like a cesspool. Discharge of any objectionable matters into sewers is regarded as an offence (Do: Regulations 15 and 16). Drain of industrial sewerage into public sewers is dependent on the capacity of the latter (Do: Regulation 17). Any sewage shall not bring about pollution of water supplies (Water Act: Section 68).

As a part of control of water resources, WAB is empowered with tackling harmful water logging (Water Act: Section 166). Similarly, the Local Authority shall remove vegetations in drains for preventing malaria (Malaria Prevention Act: Section 6).

Local Government (Adoptive By-laws)(Building) Order sets out by-law provisions covering refuse disposal, drainage, sanitary conveniences, sewers, etc, and a model for adoption by municipal and/or county councils.

2.3.11 Water misuse, quality and pollution control

(1) Misuse of water

One of the government's important policy is to minimize the wastage and misuse of water. Non-compliance thereto is subject to penalties; cancellation of the water permit and/or imposition of a fine (Water Act: Section 157). Specific prohibitions are given to groundwater uses;

- (i) Prohibition of wastage of water from a well, and
- (ii) Wastage of more than 20% of groundwater led through conduits, which would be subject to sealing of the well and/or imposition of a fine (Water Act: Section 57).

In almost all water permits, a condition is endorsed by WAB that the permit holder shall install a controlling and measuring device at the water abstraction point (Water Act: Section 28). The problem left here is that no substantial monitoring of the actual water abstraction operation and the measurement work has been in enforcement.

Water Undertakers shall also provide necessary measuring devices for the supply system for measurement of water supplied and detection/prevention of waste. A consumer is required to be equipped with a measuring meter at his expense (usually charged on a rental basis) in case of individual connection (Water (Undertakers) Rules: Regulations 44 and 45). At present, however, the rate of individual connections with a meter is still low. Water use control by this system at communal supply points is not practical.

(2) Health protection

Legislations for health protection are made in two ways in respect to:

- (i) Human/domestic consumption of water, and
- (ii) Standing waters.

The impairing of water quality by both pollution and accumulation of standing water breeding mosquitoes/parasites is regarded as statutory nuisance (Public Health Act: Section 118, 136). The removal of such nuisances is the responsibility of a person who caused the nuisances.

The Water (Undertakers) Rules and Public Health (Drainage and Latrines) Rules set out a number of provisions with regard to structural measures for preventing the collection of standing waters and contaminations of water supplies.

(3) Water Pollution

In legislative terms, anti-pollution effort is made in two ways:

- (i) Precaution for possible pollution at stages of planning/construction, and
- (ii) Control/remedial measure during operation.

At first, when issuing a water permit, WAB scrutinizes any possibilities of water pollution due to the proposed water use. If required, WAB will direct the permit applicants to submit the details of water disposal and effluent purification (Water (General) Rules: Regulation 38, 48, and 80). The applicant's proposal should be subject to the WAB's approval (Do: Regulations 72 and 75). By this way, a precautionary control is being effected.

If the facilities are put in operation, anti-pollution measures may be taken by WAB and local health authority with regard to water supplies (Public Health Act: Section 166). If pollution to domestic and drinking water supplies is observed, local authority shall take remedial measures (Public Health Act: Sections 129 and 130). Effluents and drainage shall be treated so as not to impair any existing groundwater resources (Water Act: Section 68).

(4) Salinization

The Water Act stipulated several provisions in respect to protection of groundwater from salinization (Water Act: Sections 58 to 65). If a well encounters salt water, it is regarded as "defective well" and must be sealed off to prevent such water from causing polluting effects to the ground surface and other water-bearing strata.

2.3.12 Groundwater resources

(1) Exploration and exploitation of groundwater

Both the exploration and exploitation of groundwater resources require the acquisition of permits from WAB (Water Act: Sections 38, 50, 53 and 67). This aims to prevent the occurrences of unfavourable interference with existing water resources and/or water use rights, and applied to such cases that the exploration/exploitation is proposed within 100 yards (92m) of any body of surface water or within half a mile (805m) of another well. There is also a separate provision that the consent of the Director of Water Development is required when a well is drilled in the area of water supply by a water undertaker (Water Act: Section 66).

Notwithstanding the above, the construction of any borehole/well for groundwater exploitation and abstraction shall be reported to WAB which will inspect the work to check any defective well (eg. salt water) and instruct the dealings (Water Act: Sections 57 and 62).

(2) Drilling of borehole/well

All drilling constructions shall be carried out only by contractors duly licenced by WAB. This aims to ensure compliance with the provisions of the Water Act.

An exception is that land holders are allowed to drill their own hand-dug wells on their lands without a licence.

(3) Protection of groundwater resources

Provisions are set forth with regard to prevention of the depletion of groundwater aquifers. Groundwater operators must exercise precaution and measures for:

- (i) preventing water in higher aquifers from flowing into lower aquifers if such is detrimental to the groundwater resources of the area (Water Act: Section 69), and
- (ii) preventing any uncontrolled wastage of water from artesian wells (Do: Section 70).

2.3.13 Waterworks and structures

(1) Agency responsible for administration of water related works and structures

Water Act (Section 4) stipulates that all water is under the control of the Minister for Water Development. Under the present organization, the Minister exercises this authority through the WAB and the former WRA (now functioned by the Ministry of Water Development). All works related to the use of water are subject to WAB's authorization of the detailed technical plans. Further, WAB is empowered to inspect the works during construction and after completion. Dams and boreholes can be constructed only by contractors duly licenced by WAB (Water Act: Sections 89 and 71). These imply that most of the important responsibilities in respect to overall control and administration of water related works/structures are vested to WAB which is independent technically on the advice of the Director of Water Development.

On the other hand, the planning, designing, construction, operation, and maintenance of each facilities are the responsibility of the owner or operator thereof (Water Act: Sections 87,91,97 and 119, Water (General) Rules: Regulations 36 to 50).

Works for draining premises are subject to the approval of local health authority (Public Health (Drainage and Latrine) Rules: Regulations 64 to 69). The local health authorities are also empowered to approve waterworks related to anti-malaria measures (Do: Section 77).

(2) Protection of structures

There are only a few provisions with regard to protection and conservation of existing structures. A provision in the Mining Act is that the Minister concerned with the existing dam, reservoir or canal has the power of controlling prospecting and mining operations within 100 yards (92m) and 50 yards (46m), respectively, from the structure (Mining Act: Section 7).

(3) Technical provisions for planning

Water (General) Rules (Sections 36 to 50) include detailed technical provisions relevant to the preparation of plans for diversion, abstraction, storage and utilization of water resources.

2.3.14 Protection of specific areas

(1) Declaration of protected areas

There are two ways of land protection in exercise;

- (i) protection of a catchment area (protected catchment area), and
- (ii) conservation of groundwater resources (conservation area).

The power of declaring the protected area is vested in the Minister responsible for the water resources to be protected. The former Water Resources Authority (WRA) is involved to provide advice and consultation. (Water Act: Sections 14, 74, and 150). The declarations are made by a "Protected Catchment Area Order" and a "Conservation Area Order", with notices published in the Kenya gazette and a newspaper. Any objection will be examined by WRA.

(2) Enforcement of the protection

Once the area is protected, restrictions will be imposed on any activities affecting the water resources or water supplies in the area (Water Act: Sections 14 and 150). Water undertaker establishes necessary restrictions for protection of its water supplies from pollution in the area (Do: Section 145). All construction of wells and abstraction of groundwater by mechanical means will require the acquisition of permits from WAB (Do: Sections 75 and 76).

2.4 Legislations on Water Development and Water Rates

2.4.1 Government financing for water development

Needless to say, the government expenditures are disbursed for implementation of schemes/undertakings benefiting the public. The disbursement is made by the order of the Minister concerned within the limit authorized by the parliament (Water Act: Section 34).

The government financial aid can also be extended to such schemes which have originally been raised on self-help basis, and further to cover expenses required by any existing water-related authorities, boards and committees, subject to the government/parliament's approval (Water Act: Section 34). The same would also apply to expenses for drainage and flood control works (Do: Sections 9 and 13).

2.4.2 Water rates and charges

As a general rule, the Minister concerned with respective water undertakings is empowered with charging a water rate to the beneficiaries through an appointed Water Undertaker (Water Act: Sections 10 to 12). The principle of charging a water rate is also applicable to schemes operated by a community or association of operators other than the appointed

Water Undertaker (Water Act: Section 98). A water rate is also applicable for the use of water on national irrigation schemes (Irrigation Act: Section 27).

There are charges of fees for:

- (i) services for issuing water permits (Water Act: Section 182).
- (ii) licences for navigation in inland waters, and
- (iii) licences for dredging (Lakes and Rivers Act: Section 12)

2.5 Implementation of Water Laws

2.5.1 Protection of existing rights

A basic principle is that any curtailing to existing water rights be compensated for the person who suffered from damage as the result of any legal action. Typical examples include:

- Adverse influence on to existing water uses due to drainage of swamp (Water Act: Section 13)
- Cancellation or amendment of water use permits on account of implementation of public schemes (Water Act: Section 98).
- Supply of water to persons or areas outside the territory under emergency cases (Water Act: Section 17)
- Influence due to restrictions imposed by a Water Undertaker for water pollution control (Water Act : Section 145)

Basically, the above issues are solved in the form of monetary compensation. Otherwise an alternative source of water supply is provided in case of the drainage of swamps.

2.5.2 Revision of existing rights

Water use permits are subject to modification and discontinuation by WAB as described in subsection 2.3.2.(4) before. Re-allocation of existing water rights is also allowed.

A particular provision is that WAB is authorized to impose restrictions of water use during droughts (or at any time in the case of small water course) to prevent any unfavourable reduction in the flow of the water course concerned (Water Act : Section 29).

2.5.3 Penalties to offences

The Water Act sets out penalty clauses for breaches of legal provisions relevant to the use of water resources. The penalties are effected in the form of;

- (i) fines and imprisonment
- (ii) compulsory carrying out of an act which the offender has failed
- (iii) recovery of costs from the offender, and
- (iv) cancellation or revision of terms of existing right.

Typical examples includes:

- In case of unauthorized diversion or abstraction of water: a fine or, on default of payment, imprisonment up to 12 months and, further, removal of works, plant and machinery relating to the offences (Water Act: Section 160)
- In case of unauthorized dredging or navigation (stream vessel) in waterways; a fine is imposed (Lakes and Rivers Act : Sections 5 & 10)
- In case of wasting water; a fine plus cancellation or revision of water use permit and other licences (Water Act: Section 157)
- In case of violation of land drainage orders; carrying out of the remedial work and recovery of the cost from the offender (Water Act: Section 13)
- In case of failure of discharging duties by a Water Undertaker; transfer of its functions to the Minister and, further, a fine or imprisonment (Water Act: Section 136).

There is also a general penalty clause in respect to any breach of legal provisions, rules and regulations on any water resources which are not expressly sanctioned (Water Act: Section 178 and relevant Water Rules).

2.5.4 Settlement of disputes

In case a dispute of water use is raised, it is first dealt with by WAB and, if not solved there, then by WRA (Water Act : Section 30)

A lawsuit or appeal can be raised to the High Court of Kenya (Act. No. 8 of 1975). This function had earlier been assigned to the Water Appeal Board (Water Act: Section 163) which had, however, ceased the function.

P3. EXISTING INSTITUTIONS RELATED TO WATER DEVELOPMENT

3.1 General Framework of Institutions Related to Water

By the Presidential Circular No.1/88 of ORGANIZATION OF THE GOVERNMENT, the Kenya Government has 35 ministries. The Ministry of Reclamation and Development of Arid, Semi-Arid and Wastelands was established in 1989. Recently the Ministry of Lands and Housing and the Ministry of Local Government and Physical Planning have been restructured into (1) the Ministry of Lands, Housing and Physical Planning and (2) the Ministry of Local Government.

Table P3.1 gives a summary of activities of the ministries closely related to water development, and Table P3.2 describes the roles and functions, covering items directly or indirectly related to water development of each ministry with some details of water development activity items.

The Ministry of Water Development is the most important ministry both on water development and water conservation. The other ministries involved deeply in water development are the Ministry of Agriculture, the Ministry of Regional Development, the Ministry of Local Government, the Ministry of Energy and the Office of the President which administers the District Development Committees.

3.2 History of the Ministry of Water Development

Before the creation of the Ministry of Water Development, the overall responsibility for water development had shifted between three Ministries.

Until 1964, the Hydraulic Branch of the Ministry of Public Works was responsible for water and sewerage development in the urban areas. Rural water development was one of the responsibilities of the African Land Development Organization (ALDEV) of the Ministry of Agriculture.

The two organizations were amalgamated under the Ministry of Natural Resources in 1964 as the Water Development Department. The Department was transferred to the Ministry of Agriculture in January 1968. Ten months later the Department was demoted and became the Water Development Division (WDD) of that Ministry. Responsibility for the provincial organizations of the Division was divided between the Director of Water Development Division at the Ministry Headquarters and the Provincial Directors of Agriculture. The distribution of authority and responsibility was only vaguely defined and caused considerable unease among the provincial organizations.

In 1972, the status of the Organization was restored to that of Department and the Director again became directly responsible for the provincial organizations. This responsibility covered both technical and administrative matters although, because of staff shortages

within the Water Department, the Provincial Directors of Agriculture continued to provide some non-controlling administrative assistance to the provincial water organizations.

Although the Water Department had overall responsibility for water development in Kenya, specialized agencies were responsible for certain sectors as they still are today; the National Irrigation Board handled and still handles all major irrigation developments, while the development of hydroelectric power was handled by the Ministry of Power and Communications and is now by the Ministry of Energy.

In 1974 the Water Development Department was upgraded to become the Ministry of Water Development. In essence the new Ministry took over the responsibility of the Water Resource Authority in addition to the other functions carried out by the Water Department.

The new Ministry ambitiously took off taking over not only the operation of Government constructed water schemes but also all County Council (Ministry of Local Government) and Settlement (Ministry of Lands and Settlement) schemes as well as several self-help water supplies.

3.3 Ministry of Water Development and Related Agencies

(1) Ministry of Water Development (MOWD)

The Ministry of Water Development exercises development, conservation and control of water. The construction works of the Ministry covers the whole country except Nairobi City and other major municipalities. Under the Minister, the Ministry consists of three assistant Ministers, the Permanent Secretary, the Director of Water Development, the Deputy Secretary of Development, the Deputy Secretary of Finance, and the Deputy Secretary of Administration, and other 13,000 staff in 1991. Figure P3.1 shows the organization of MOWD.

The Director of Water Development controls six Divisions, the Kenya Water Institute, the Provincial Water Engineers and District Water Engineers (see Figure P3.1). The Water Resources Division carries out observation, conservation and control of water, and registration of water right in co-operation with the Water Apportionment Board. The Planning and Design Division is in charge of studies, planning and design activities. The Implementation Division executes construction works of dam, pipeline, sewerage, agriculture, conservation and drilling. The Operation and Maintenance Division is responsible for operation and maintenance of works on water supply and waste water systems including the policy making thereof. The Research Division is responsible for formulation of water research policies and activities in water resources and waste water engineering. The Monitoring and Co-ordination Division coordinates all the other organizations under the Director and all the Engineers of Provinces and Districts. The Kenya Water Institute is responsible for training of employees in the Ministry and local authorities.

The functional description of the Ministry of Water Development is given in Appendix P.1.

(2) Water Apportionment Board (WAB)

The Water Apportionment Board is responsible to the Minister. The position of Chief Hydraulic Engineer of the Board is held by the Director of Water Development of the Ministry by the Water Act. The Board executes permission, surveillance and control of water use and hydraulic infrastructure with 460 staff including water bailiffs. Most of them belong to the offices of Provincial Water Engineers and District Water Engineers.

By the Water Act, the Kenya land is divided into six catchment areas consisting of the Tana Catchment Area, Rift Valley Catchment Area, Athi Catchment Area, Northern Ewaso Nyiro Catchment Area, Lake Victoria North Catchment Area, and the Lake Victoria South Catchment Area (see Figure P3.2), for each of which a Catchment Board is assigned under organization of the Water Apportionment Board. Each Catchment Board has the Secretary, District Water Bailiffs, Divisional Water Bailiffs, and Assistant Water Bailiffs and Water Guards in the Locations.

(3) Water Resources Authority (WRA)

The Water Resources Authority was established in 1951. The Authority, which had wide advisory duties on all aspects of water management, was made responsible to the Minister. The Authority consisted of a Chairman and eleven other members with the Director of the Water Department as Technical Advisor. The Authority had one executive function in which certain decisions of the Water Apportionment Board were subject to an appeal to the Authority. The Authority became dormant in 1968 and its functions were taken over by the Water Department in 1972, and later by the Ministry of Water Development in 1974 although the Water Act has not yet been amended accordingly. The main reasons for the failure of the Water Resources Authority were that it had no permanent staff, no financial resources and no real authority. However, currently the functions of the Authority are undertaken by the Ministry of Water Development which attempts to amend the Water Act.

(4) National Water Conservation and Pipeline Corporation (NWCP)

This Corporation was established in June 1988 with the object of attaining positive water development. On top of the tasks assigned in the gazette (see Section 3.3), the Corporation also intends to undertake the following responsibilities:

- (a) Plan, manage, and procure equipment for construction of dam and water supplies;
- (b) Promote efficiency in the operations for existing major water projects;

- (c) Ensure water projects that are financially viable do actually generate revenue

The Corporation is presently assigned to execute 42 large scale projects (gazetted as of 1991) of the Ministry of Water Development. The Corporation consists of the Board, the Managing Director, five departmental managers/secretary, and other 1,800 staff of which most people were transferred from the Ministry of Water Development. Figure P3.3 shows the organization of the Corporation.

(5) Mombasa Pipeline Board (MPB)

Mombasa Pipeline Board, which was created by the Mombasa Pipeline Act (of 1957) was charged with the responsibility of administering the bulk supply of water to Mombasa and its environs.

The major source of supply administered by the Board was the Mombasa Mzima Pipeline which conveys water 220 km from Mzima Springs in Tsavo National Park to the Mazeras reservoir some 20 km from Mombasa. In addition, there is the Marere Pipeline which delivers water from the Marere Springs in the Shimba Hills, 30 km south of Mombasa, to the Changamwe service reservoirs, where it is mixed with the Mzima water. The supply was augmented further by construction of the Sabaki Water Scheme. Construction of the project commenced around 1976 and was completed in 1981. This involved construction of an intake at Baricho and storage tanks at Nguutatu.. A distribution line to Malindi was completed in 1988 some 80 km from Baricho.

Following the recommendation of a Presidential Committee on Government Expenditure (more commonly known as the Philip Ndegwa Report), the Board was proscribed and all its functions taken over by the Ministry of Water Development. The Committee was of the view that the Board had outlived the purpose for which it was created.

Actual execution of the water supply undertakings in Mombasa and environs is presently entrusted to the National Water Conservation and Pipeline Corporation.

(6) District Water Board

Section 24 of the Water Act provides for the appointment of a Regional Water Committee for each Province. Its duties were to advise the Minister and the Water Resources Authority on water conservation and development matters and to act as a link between the local authorities and the Water Resources Authority. The Committees have, however, ceased to exist for a long period, same as the Water Resources Authority.

The Government recently directed (May 1991) MOWD to establish a District Water Board in each District. The main objective of establishment of the Board is to

ensure that there should be proper coordination and planning of water activities at the District level. The Board will be a Sub-committee of the District Development Committee.

The proposed District Water Board will have the following functions through coordination with the District Development Committee and other ministerial agencies:

- i) Protection, conservation and preservation of all catchment areas within the District.
- ii) Partitioning, allocations and authorization of all water bodies.
- iii) Water quality and pollution control activities. This will include the control and elimination of all agricultural and industrial pollutants.
- iv) Management and control of water use.
- v) Overseeing and coordinating all water related activities in the District.
- vi) Assisting in the enforcement of the Water Act.
- vii) The members of this Board will be heads of departments and other organizations related to and involved with water activities.

All issues to be discussed by the Board should be channelled through the office of the District Water Engineer who is the secretary to the Board. The District Water Engineer will also be the technical advisor to the Board and the implementor of the Board's decisions.

If this Board is established, there may arise a conflict between the roles of this new Board and the existing Catchment Board. The Study presumes that most of water management activities will be handled by the new District Water Board, while the Catchment Board will act as a consulting body when inter-District issues arise.

3.4 Other Institutions Related to Water

(1) Ministry of Local Government (MOLG)

The Water and Sewerage Department of Nairobi City Commission under the Ministry of Local government is independent of the Ministry of Water Development, and executes the municipal water supply and sewerage of Nairobi city which is the most populated area in Kenya. Other than Nairobi city, the Ministry of Local Government currently administers eight urban water supplies through the municipalities of Kisumu, Thika, Kitale, Nakuru, Eldoret, Nanyuki, Kericho and Nyahururu. Mombasa, the second largest city is supplied by the

National Water Conservation and Pipeline Corporation. All County Council water supplies were taken over by the Ministry of Water Development in 1974/75.

The Ministry of Local Government also administers urban sewerage schemes through local authorities.

The Ministry headquarters has limited technical staff. The Ministry of Water Development is responsible for assisting the Ministry of Local Government in the preparation of terms of reference for water supply and sewerage studies, in the selection of consultants and the review of their reports, and also during the construction phase.

(2) Ministry of Land, Housing and Physical Planning

This Ministry exercises the planning and construction of water supply on settlement schemes with technical assistance from the Ministry of Water Development. But the maintenance and operation of most settlement schemes is exercised by the Ministry of Water Development.

(3) Ministry of Culture and Social Services

This Ministry is responsible for the control of self-help schemes in the rural areas, in accordance with the government policy "to extend participation in the development of the country to the mass of the people". Self-help schemes include schools, dispensaries, markets and other facilities in addition to water supplies.

A proposed self-help scheme is registered with the District Development Committee, who gives permission for funds to be collected. Technical assistance is given by health inspectors and the Ministry of Water Development.

(4) Ministry of Regional Development (MORD)

This Ministry has been divided from the ex-Ministry of Energy and Regional Development. It is responsible for regional development, fishery development, and irrigation development. It administers the Lake Basin Development Authority and the National Irrigation Board, and it will further control the Ewaso Ngiro River Basin Development Authorities (North and South) and the Coast Development Authority.

(5) Ministry of Energy (MOE)

The Ministry administers national companies/agency such as the Kenya Power and Lighting Company, the Kenya Power Company, the Tana River Development Company, and the Tana and Athi Rivers Development Authority and the Kerio Valley Development Authority (in terms of budget appropriation), which are all involved in hydropower development.

(6) Ministry of Agriculture (MOA)

The Ministry is responsible for crop production and marketing, agricultural policy and services, land use and development, agricultural credit, soil conservation, irrigation development, agricultural research, and survey and control of locusts.

(7) Ministry of Tourism and Wildlife (MOTW)
Ministry of Livestock Development (MOLD)

Both Ministries have responsible for water supplies and sewerage works accompanied in their development projects.

(8) Ministry of Transport and Communications (MOTC)

This Ministry administers the Kenya Railways Corporation. The Corporation exercises the operation and maintenance of water supplies around railway stations. Some are being transferred to MOWD and NWCPC.

(9) Ministry of Environment and Natural Resources (MOENR)

The Ministry is responsible for forestry development, mineral resources development, geological survey and research, and national environmental protection excluding water pollution.

(10) Presidential Commission on Soil Conservation and Afforestation

The Commission coordinates the ministries concerned with prevention of soil erosion and forest devastation by inappropriate cultivation of steep slopes and river banks and by encroachment of forests and water catchment areas.

(11) Ministry of Planning and National Development (MOPND)

This Ministry makes the National Development Plan. The National Development Plan for the period 1989 to 1993 formulated plans related to water in the chapters of Spatial Dimensions of Development, Agriculture and Related Development, Resources and Environment, and Welfare Perspective.

(12) Office of the President; Development Co-ordination and Cabinet Office

The Office is responsible to facilitate implementation of the policy of District Focus for Rural Development. It constantly co-ordinates and shares information between ministries in the districts, and between the districts and the various ministry headquarters.

The responsibility for planning and implementing rural development was shifted from the headquarters of ministries to the districts. This strategy is the "District Focus for Rural Development".

(13) District Development Committee (DDC)

Under chairmanship of District Commissioner under administration of the Office of the President, the District Development Committees (D.D.C.) are established in each District. In principle, all district-oriented development projects are to be approved by the District Development Committee at the first step.

The D.D.C. covers many perspectives on the development needs of the district, and its approval of project proposals represents a strong mandate of local support. Its role is to establish local development priorities, monitor the technical work of its *Executive Committee and other sub-committees*, and monitor (with site visits if necessary) the progress of all rural development activity including projects of foreign donors and local authorities. The D.D.C. will meet at least four times per year to: (1) review ongoing progress; (2) consider new proposals submitted by the Divisional Development Committees; (3) establish priorities for future projects; and (4) endorse the district's annual submission of project proposals to the ministries.

(14) Non-Governmental Organizations

Activities by non-governmental organizations are noteworthy. For example, the Kenya Water for Health Organization (KWAHO) is deploying its activity for providing people with ready access to safe drinking water and basic sanitation to lessen the burden of water-carrying that women currently bear in large area of the country. Other active non-governmental organizations include CARE (Kenya), Catholic Relief Services, Oxfam, and Canadian Hunger Foundation. See also Sub-section 4.4.1(6).

P4. PLANNING AND IMPLEMENTATION ASPECTS

4.1 National Development Framework

The framework of present water development is set out in the National Development Plan encompassing the period from 1989 to 1993.

The Plan for the period 1989 to 1993 reconfirmed that during 1974 Government had promulgated the National Master Plan with the express aim of ensuring the availability of portable water to within 4 km of every household by the year 2000. By the first quarter of 1987, a 377 of water projects were operational, 350 projects under implementation and 200 at the planning stage. The objective prescribed in 1974 is now foreseen difficult to achieve by 2000.

According to the Plan, for the rural population, the Government will increase the proportion of people served by organized water points from the present 26% (4.91 million) to 50% (11.10 million) by 1993. In urban areas, the proportion to be covered will increase from the present 75% (3.08 million) to 95% (5.42 million) by the end of the Plan period.

The total installed hydro-power production capacity was 351.5 MW in 1987. By the end of the Plan period more 250 MW capacity will be added by the Kiambere hydro-project (144 MW) and the Turkwel Geoge hydro-project (106 MW).

In 1987 the area under irrigation covered 36,000 hectares. By the end of the Plan period, the total area under irrigation will have been expanded to 45,550 hectares.

Other important national and regional plans related to water are as follows:

- National Master Water Plan (1979 - 2008) studied by TAMS in 1979.
- National Power Development Plan (1987 - 2005) studied in 1987 and updated in 1991.
- Regional Development Plan for the Kerio Valley Basin studied in 1982.
- Tana and Athi Rivers Development Authority Forward Planning (1986 - 1996)
- Integrated Regional Development Master Plan for the Lake Basin Development Area studied by JICA in 1987.

4.2 Planning Procedure

(1) National Level

According to the provisions of Section 20 of the Water Act, all the planning related water resources in Kenya is one of the duties of the Water Resources Authority and the provisions of Section 24 in the Water Act prescribes that the Regional Water Committee is subordinate organization in each region to the Water Resources Authority. The Director of Water Development in the Ministry of Water Development corresponds to the Chief Hydraulic Engineer in charge of the technical adviser of the Water Resources Authority. The Water Resources Authority as well as the Regional Water Committee have been virtually proscribed. The Ministry of Water Development executes the major duties of the Water Resources Authority.

But all the planning related to water resources is not exercised by the Ministry. The Ministry plans on national water supply, sewerage, and small scale irrigation. Among others, the Ministry of Regional Development and the Ministry of Energy are very important ministries to be responsible for the planning of major schemes influencing the river discharge conditions.

The Ministry of Planning and National Development coordinates water planning among ministries and districts concerned through a national development plan and annual budget allocation. Responsibility for general policy, and the planning of multi-district and national programmes belongs to the ministers concerned. The ministries and districts are co-operating on rural development both through local projects, and through multi-district and national programmes.

(2) District Level

Each District has its District Development Committee (D.D.C.). The D.D.C. is responsible for rural development planning and implementation.

The district responsibility for planning and co-ordination covers projects sponsored by the Government, and projects supported by Harambee efforts, local authorities and foreign donors. It also includes review and endorsement of projects sponsored by non-governmental organizations including local self-help organizations.

Local authorities have a special relationship with the D.D.C.s. They are to vet their development projects through the D.D.C. before forwarding them to the Ministry of Local Government (MOLG) for funding. This process enables the D.D.C. to co-ordinate these projects with other development activity in the district. The D.D.C. endorsement of a project assures the Ministry of Local Government that the proposal has been reviewed, and is in accordance with district development priorities. The flow of information is illustrated in Figure P4.1.

4.3 Implementation Procedure

The fiscal year of the Kenya Government begins in July and ends in the following June. The Government formulates the budget for the coming year as a first year's budget of the Forward Development Budget for three years. Water resources development projects as well as other projects are implemented by the ministries concerned and the districts.

4.3.1 National programmes

Almost all the major projects are implemented by the central government agencies (ministries, boards, authorities and corporations) in charge of respective development fields. Design of the projects and preparation for the implementations including the financial procurement are the efforts to be exercised by each agency, though the budget allocation is subject to the approval of the Central Government and Parliament.

In general, the principles of implementation procedures are not much different from the practices widely used in other countries.

4.3.2 District oriented programmes

This is a very unique program exercised in Kenya with placing a priority. The following are the extractions from the District Focus for Rural Development (Ref. P.6), which summarizes the procedures of implementation of the district oriented projects. The basic flow of budgetary process is illustrated in Figure P4.2.

(1) Identification of Projects

The identification of projects is a continuous process; going on all year around. The initial idea for a project typically comes from the area that will benefit its implementation (village, sub-location, or location). After being discussed and agreed upon locally, the project suggestion is to be forwarded to the Divisional Development Committee (Dv.D.C.). Divisional Development Committees meet from time to time to discuss the problems and opportunities of their areas, and to consider what should be done about them. Out of these meetings emerge a series of project proposals. The proposals are usually quite preliminary in nature, but they should be formalized, ranked according to the priorities of the division, and submitted to the D.D.C. with documentation for preliminary review and screening. The District Officer, District Development Officer, and Community Development Assistant will assist the D.D.C.s in preparing this documentation.

(2) Screening, Prioritization and Preliminary Costing of Proposals

Each July the Executive Committee of the D.D.C., particularly the District Planning Unit, will review the project proposals received up to that point. The first task will be to screen out those that are inconsistent with the District Development Plan or any of the ministry project guidelines. Next the Committee will assign priorities to

the remaining projects on the basis of the district priorities as specified in the D.D.P. Finally the Committee will prepare cost estimates for the more promising proposals. These estimates will be preliminary in nature, but will have to be sufficiently accurate ($\pm 10\%$) to be used by the ministries in preparation of the Forward Budget. It is anticipated that the estimates will be based largely on the cost characteristic of standardized projects.

The Executive Committee will present its work to the full D.D.C. by the end of July. The D.D.C. will review the initial priority ranking of the proposals, make any necessary changes, and then endorse the portfolio of projects to be submitted to each ministry.

(3) Preparation of Forward Budgets

During the months of August and September the ministries will prepare their forward budgets. At the end of this process, each ministry will establish an expenditure ceiling for district-specific projects in each district. Once these ceilings have been established, they will be considered as a fixed floor for district expenditures for the next year. The floor will be guaranteed even if, in subsequent negotiations with the Treasury, the ministry has to absorb budget cuts. The impact of these cuts will not be passed to the districts. If, however, additional funds become available to the ministry, they may be shared with the districts. The individual ceilings will be communicated to the districts by the end of October.

(4) Design and Final Costing of Projects

While the ministries are preparing their forward budgets and establishing district ceilings the D.D.C. Executive Committee will be proceeding with design work (and costing) on the high priority projects. District heads will be expected to take leadership in the design work for projects to be funded by their respective ministries. Technical assistance from province-level ministry offices will be used as needed. After the ceilings are announced, the Executive Committee will prepare the portfolio of proposals to be submitted to each ministry. These will be presented to the D.D.C. in January for final review and approval. The District heads will then forward the proposals, accompanied by a copy of the D.D.C. minutes (to document approval) and a certification that they are within the district ceiling and in compliance with ministry guidelines to their respective ministries.

(5) Finalization of Budget

During February and March each ministry will incorporate the district-specific project proposals into its budget for submission to the Ministry of Planning and National Development. When received from the districts, the projects will have been screened and endorsed (certified as being consistent with ministry guidelines and district ceilings) by the district heads of the ministries. These endorsements represent commitments by the ministries to fund the district-specific projects

proposed by the D.D.C. The ministries will not seek to change the proposals as this would be inconsistent with the District Focus strategy of delegating decision-making responsibility to the districts.

During the period April through June, the ministry budgets will be consolidated into the National Budget, for approval by Parliament.

(6) Implementation

With the beginning of the new fiscal year in July, the ministries will issue Authorities to Incur Expenditure (A.I.E.s) to their District heads (by 31st July), and project implementation can begin. The schedule of implementation activities will be organized in the Annual Work Program which will have been prepared in draft by the Executive Committee while the ministries were completing their budgets, and then finalized in July when the A.I.E.s are received.

As implementation gets underway in July, the Executive Committee will turn its attention to the beginning of the next budget cycle with the screening, prioritization, and costing of preliminary proposals received from the Divisional Development Committees.

Each ministry will be responsible for co-ordinating its recurrent budget with its development budget.

4.4 Domestic/Industrial Water Supply

4.4.1 Implementing agencies

(1) National Water Conservation and Pipeline Corporation

National Water Conservation and Pipeline Corporation (NWCPC), established in 1988, has taken over some functions of the Ministry of Water Development. The main functions assigned to the NWCPC are described in Section 3.3(3) hereinbefore. The NWCPC is deploying its ambitious effort to achieve these assignments.

Of the assigned tasks, the most important function of NWCPC is bulk water supply to water undertakers and persons or class of persons. The work will include the construction of source development works (e.g. dam, intake weir, boreholes/wells, spring exploitation), water treatment works, water conveyance facilities (pipeline, canal, tunnel) and storage facilities (service reservoir, storage reservoir). The works are in most cases large scale projects and inter-district schemes in view of maldistributions of water sources vis-a-vis demand areas. It is appropriate that such large and inter-district projects are implemented by a centralized implementing agency; i.e. the NWCPC in this case. This Study presumes that the NWCPC will

continue to hold this development role as the implementing body representing the MOWD.

NWCPC has also taken over the management of a number of urban and rural water supplies with the following objectives:

- (a) To upgrade operation and maintenance performance so that the schemes become self-financing
- (b) To collect water revenue
- (c) To provide the majority of the population in the scheme areas with improved water

This Study is of the opinion that the distribution system should ultimately be transferred to and managed by the local authority in the scheme area (see Sub-section 4.4.2) in the long future. Hence, the functions (a) to (c) above will eventually be the efforts to be exercised by the local authority. In the meantime until the operation/maintenance crews are trained and the skills teamed up for transfer to the local authority, the NWCPC's effort for the above functions should continue.

After the transfer of the distribution system to the local authority, the local authority will be the revenue collector, while the NWCPC will remain as the bulk water supplier responsible for operation and maintenance of the source facilities (intake, pipeline, service reservoir and water treatment as the case may be). NWCPC's staff posted there will provide technical back-up services to the local authority.

On a basis that NWCPC will gradually take over the implementing functions (design and construction) from MOWD, NWCPC should reinforce its implementing capacities in both modes of implementations i.e. (i) on contract basis (use of consultants and contractor) and (ii) on force account basis. The former will be applied to relatively large projects to be implemented using contractor and the latter required for implementation of force account projects, mostly small scale rural schemes which the use of contractor is not always economical.

NWCPC foresees formulation of the "Corporate Development Plan" under a study on Institutional Improvements/Capacity Building which will start in 1992 with the assistance of IBRD. The Study will define more definite details of tasks to be assigned to NWCPC.

(2) Ministry of Water Development

As is exercised presently, the Ministry of Water Development (MOWD) oversees the policy formulation with regard to water development and use of the whole country, covering mainly water supply, sewerage and water pollution control. This

Study proposed MOWD will also have the functions as the administrator for river management (see Sub-section 4.9.1 hereinafter) and for water resources allocation and management (see Sub-section 4.10.4).

In the water supply sector, MOWD will have to continue to provide implementation services for schemes (mostly small schemes in rural areas) other than those implemented and/or operated by NWCPC and other agencies or organizations. In the long future, however, it is proposed that the implementing functions will eventually be transferred to NWCPC and the operation/maintenance functions to local authorities, while MOWD will act as the administrator for water supply undertakings. It is noted that this attempt would require a long period to achieve, say 10 to 20 years.

(3) Other Ministries

Other than MOWD and NWCPC, several Ministries are also involved in implementation of water supply schemes; such as schemes for settlement, livestock, wildlife, community development, and ASAL projects. These other Ministries' development efforts should continue, since each Ministry is in the best position to identify the development need in that sector and formulate the plans meeting the demand.

(4) River Basin Development Authority

Six river basin development authorities have been established or being organized aiming at achieving the integrated multi-objective development of the river basins (Lake Victoria, Tana and Athi, Kerio Valley, Ewaso Ngiro South, Ewaso Ngiro North and Coast). In view of increasing need of water transfer for domestic/industrial demand, the water supply sector will become a more important development objective than the present to be planned on the basis of a basin development concept, which should be co-ordinated by the basin development authorities.

(5) Municipalities

Nine municipalities (Nairobi, Thika, Nyeri, Kisumu, Kericho, Nyahururu, Nanyuki, Kitale and Eldoret) are operating and maintaining their own facilities. It is presumed that some of them are willing to undertake their future water sources development by themselves. This attempt should be encouraged as far as they have technical capability (eg. Nairobi City Commission) or have water sources in the vicinity (eg. Kisumu, abstracting water from the Lake Victoria).

On the other hand, NWCPC is now functioning as the bulk water developing agency. In case the source development work involves inter-regional water transfer particularly, a more appropriate approach under the present institutional set-up

would be to entrust the source development work to NWCPC to utilize its technical capability and assigned function at the best, while the municipalities could concentrate their effort on the operation and maintenance of the distribution system and more importantly expansion of the service areas and revenue collection.

Water and Sewerage Department of the Nairobi City Commission:

A particular case is the Water and Sewerage Department of Nairobi city, which is operating the largest water supply system in the country. The Department currently functions as an integral part of the Nairobi City Commission. It comes indirectly under the Ministry of Local Government but has an autonomous position vis-a-vis the Ministry.

The Department has a large volume of important duties including water supply, sewerage, drainage and flood mitigation works for the giant city of Nairobi. In the water supply sector, a huge project of Thika-Nairobi Water Supply is presently under implementation. This Study foresees that the demand for water supply in Nairobi will continuously be increasing. Since Nairobi has not enough water resource in its own catchment, the water source in the next development stage would have to be further dependent on water transfer from other areas, possibly from the upper basin of the Tana river (e.g. Munyu dam or Ndarugu dam, or farther). Not only limited to the expansion of water supply facilities, the Department should handle further increasing volume of tasks for sewerage and drainage works so as the Nairobi city expands in future. This implies that the Department to expand its technical forces and capacities.

Viewing solely from technical aspect, an alternative approach to the future water supply augmentation will be to entrust new water source development to and receive bulk water supply from NWCPC. This may bring about the following merits:

- Small cost organization of the Department
- Avoidance of duplicated assignment of the works, where NWCPC is assigned by the gazette as a bulk water supply agency
- Efficiency of water use in a bulk water supply network covering not only Nairobi but also all the areas along pipelines from Upper Tana.

A previous report (SWECO 1975) raised a possibility of reforming the Department in to an autonomous body, e.g. Nairobi Water and Sewerage Authority, which appears to be an appropriate alternative solution in respect to creating a self-paying incentive organization. In this case, the Authority will be an agency under the umbrella of the Ministry of Water Development rather than under that of the Ministry of Local Government.

(6) Non-governmental organizations

Besides the public sectors, the non-governmental organizations (NGOs) are promoting their water supply projects. NGOs' water works in Kenya are many in number and varied in nature. NGOs can be classified into two groups: those with direct affiliation with a religious organization and those operating independently.

According to Ref. P25, the former groups are (a) Catholic dioceses of Machakos, Nakuru and other Districts, (b) the Lutherans, (c) the Baptists, (d) the National Christian Council of Kenya (NCCCK), the African Inland Mission and the Anglicans. The latter groups are (a) Care International in Kenya (CARE), (b) Plan International, (c) Action Aid, (d) KWAHO, (e) African Medical Research foundation (AMREF), (f) Canadian Human foundation, and (f) Freedom from Hunger.

Indeed, NGOs' effort are contributing a lot to the development of water supply sector in the country, particularly in rural areas. MOWD should continue to provide more positive technical and administrative support to the NGOs' activities.

4.4.2 Operation and maintenance of water supply works

This Study is of the opinion that, ultimately over a long term, the operation and maintenance of water supplies (except for bulk supply source facilities to be operated by NWCPD or other agencies) should preferably be undertaken by local authorities including county councils. In fact, the majority of rural water supplies had once been operated by county councils. They were taken over by MOWD in 1974/75 when MOWD was established as a ministry. The reasons at that time were financial and operational difficulties on the part of county councils. Since then, however, the surrounding situations have much changed:

- (a) MOWD has already been involved in operation of more than 500 rural schemes. There will apparently be the limit of number of schemes which could be operated by a single central agency.
- (b) In principle, operation and maintenance should preferably be handled by an organization representing the beneficiaries, which is the county council in case of rural water supply schemes.

The transfer of duties will presumably take 10 to 20 years including training of caretakers/mechanics by MOWD, transfer of them to County Councils, and establishment of MOWD' back-up service systems. It is recommended to study in MOWD (possibly by the Research Division) how this would be achieved successfully.

In the meantime until this effort is achieved, some intermediate measures would have to be assumed.

Scheme	Ultimate Solution	Intermediate Measure
Urban scheme	Town authority	Gradual transfer to town authority with technical support from NWCPD
Rural scheme	County council	Gradual transfer to county council with technical support either from MOWD or NWCPD
Settlement scheme	County council	Cooperatives/beneficiaries with MOWD technical support
Self-help scheme	County council	Community/beneficiaries with MOWD technical support

Even in the ultimate stage, town authorities/county councils will require MOWD/NWCPD's technical back-up services such as operating crews/caretakers training, provision of workshops, supply of spare parts from central stores which should be organized at each District level.

It is noted that, in this case, local authorities should have a separate accounting system for water supply and sewerage revenues and should use the revenues solely for operation/maintenance and building up funds for future augmentation of the systems.

4.4.3 Encouragement of individual connections

As is already emphasized within MOWD and NWCPD, a target in urban water supplies and possibly in major rural water supplies is to increase the individual connections as much as possible. It is imperative that the individual connection be metered. The individual connection has the following advantages:

- (a) Reduction of water waste and mis-use
- (b) Increase of revenue earning
- (c) Upgrading of people's welfare

A great constraint is that the cost of individual connection is still a big burden to the people especially in rural areas. On one hand, however, it is impractical to provide the individual connections at the government cost. Grant aid will not be available for all schemes. The only possible method is to encourage the people to have the individual connection at their willingness.

At the same time, the government increases the opportunities of giving a special low-interest loan to the people (increase of budget allocation for District Development Fund, or otherwise the establishment of a new fund similar to the Rural Electrification Fund by MOE/KPLC).

4.4.4 Set-up of team for water leakage detection

Water leakage is one of the major issues which should be improved in most of the existing water supply systems. Detection of water leakage is a primary measure for reducing the leakage losses. Nevertheless, it appears that most of water supply systems have no specific effort for leakage detection, except for Nairobi City Commission.

The water leakage can be detected by using a sound-hearing lod which costs only about US\$10. The sound of leakage water is caught by a vibrator attached to a tip of the iron lod with another tip placed on a meter, valve or hydrant of water supply. In surveying the water leakages, service pipes are more important than distribution pipes. For example, in Tokyo, 95% of the leakage losses occur on service pipes.

It is recommended that each major water supply system should organize a team for water leakage detection with necessary equipment and financial resources.

4.5 Sewerage Development

Sewerage facilities are in almost all cases confined in the areas of respective municipalities and urban centres. The beneficiaries are also in those areas. In this context, it is appropriate that the implementing agency responsible for sewerage development will remain with the local authorities.

MOWD will act as the administrator responsible for policy formulation, technical advices and also financial assistance for sewerage development. Also, MOWD will contribute, through the Kenya Water Institute (KEWI, see Sub-section 7.2.2 hereinafter), to training of technical personnel which will be one of increasingly important factors for subsequent sewerage expansion programs.

In view of limited financial procurement capability of local authorities, the MOWD's role of financial assistance, either loan or grant, would be very important. In view of the sewerage being not a type of development producing direct revenue, this sector should be prioritized to receive foreign grant aid particularly for small towns.

It is important to note that the implementation of a bulk water supply project should in principle be associated with necessary expansion of the sewerage facilities in the area.

4.6 Agriculture/Irrigation Development

4.6.1 Implementing agencies

Ministry of Agriculture (MOA) is the administrator and also implementing agency for the country's overall agriculture and irrigation development. Another leading agencies are the National Irrigation Board (NIB) and the river basin authorities (LBDA, TARDA, etc.) who are developing major irrigation schemes assigned on an individual scheme basis. NIB is specifically responsible for the irrigation schemes on lands declared as "national irrigation

schemes". The MOA's regional offices are actively handling other small irrigation schemes and also providing agriculture extension services.

Although this Study has not looked into this issue much, the present implementation system appears to be functioning well, except a point that the share of undertaking large irrigation schemes between NIB and river basin development authority is somewhat vague.

MOWD is also involved in irrigation sector for a few projects. The Study is of the opinion that MOWD's main task in this sector will be to act as the overseer of water source allocation and use.

4.6.2 Overall administration of irrigation development and water use

It appears that irrigation development is being undertaken independently by each agency responsible for respective schemes. This Study found that a fairly good inventory list of irrigation schemes is maintained by each agency. On top of this, it is proposed that all the information of irrigation schemes and their water use is inventorized and recorded at a central administration which would be by MOA under the present institutional organizations. The inventory and water use (to be periodically updated) should be reported to the Water Apportionment Board. Since the irrigation sector is the largest user of waters, it will help MOWD a lot in achieving overall water management in the country.

An alternative idea may be that NIB would be assigned as the central administration body of irrigation development and water use. In this case, however, NIB should be under the umbrella of MOA, which will require the revision of existing law (Irrigation Act).

4.7 Livestock and Wildlife Sectors

4.7.1 Implementing agencies

Water development and conservation programs for livestock and wildlife are currently managed by the Ministry of Livestock Development (MOLD) and the Ministry of Tourism and Wildlife (MOTW) respectively, with technical support from MOWD. For livestock sector, the river basin authorities (LBDA, etc) and the Ministry of Reclamation and Development of Arid, Semi-arid and Wasteland are also involved in formulating their initiated projects, receiving coordination from MOLD.

The Study presumes that the present implementation system is appropriate and the effort of inter-ministerial coordination should continue.

4.7.2 Water facilities inventory list

The Study could not obtain information on existing water facilities in form of inventory list and map for both the livestock and wildlife, other than the information available in water abstraction permit and borehole completion records. It will not be necessary to list all the watering points (which is almost impracticable since livestock and wildlife are watered by

various sources), but it is still worth inventorizing the facilities built to date specifically for livestock and wildlife watering purposes.

It is said that the provision of new watering points, if built, may change in some cases the habitat area of wildlife and hence the ecology in the area. In this regard too, the preparation of inventory list seems important.

4.8 Hydropower Development

4.8.1 Organization of power sector

Until March 1988, the Ministry of Energy and Regional Development (MOERD) was responsible for the energy sector. Since then, the Ministry has been restructured into two Ministries; Ministry of Regional Development (MORD) and the Ministry of Energy (MOE). The MOE oversees policy formulation of energy sectors, including electric power, oil and other fossil fuels, wind, biogas, solar, geothermal, and woodfuel development.

The electricity industry of the country is composed of the following six entities:

- The Kenya Power Company Ltd. (KPC),
- The Kenya Power and Lighting Company Ltd. (KPLC), formerly East Africa Power and Lighting Company (EAP&L),
- The Tana River Development Company (TRDC),
- The Tana and Athi Rivers Development Authority (TARDA), formerly Tana River Development Authority (TRDA),
- The Kerio Valley Development Authority (KVDA), and
- The Lake Basin Development Authority (LBDA)

KPC was formed in 1954 to purchase bulk power from Uganda Electricity Board (UEB), and for this purpose it owns a 132 kV transmission line from the western border of Kenya to Nairobi. In addition to this, KPC owns both the Wanjii and Tana hydroelectric power stations, and the Olkaria geothermal power plant including associated transmission lines. KPC is also responsible for the development of geothermal and hydropower resources.

KPLC, which is a 60% government-owned entity, owns and operates all conventional thermal generating facilities, a number of small hydroelectric power stations and most of the power transmission facilities. KPLC purchases electric power in bulk from KPC, TRDC, TARDA and KVDA (LBDA does not yet have generating facilities in operation), imports energy from Uganda, and distributes power to their customers. KPLC also operates and manages all generating facilities under agreement with other companies and authorities.

TRDC was initiated in 1964 to coordinate hydroelectric development on the middle Tana River, and now owns the Kamburu, Gitaru and Kindaruma hydroelectric power stations and their associated transmission lines to Nairobi.

The other entities, TARDA, KVDA, and LBDA, were created to plan integrated development in each basin. They have responsibilities for planning, coordinating and monitoring development projects within the basins. TARDA owns the Masinga and Kiambere hydroelectric power stations on the Tana River which have a large reservoir capable of considerable regulation for the purposes of downstream irrigation and water supply as well as hydroelectric power generation. KVDA has recently developed the Turkwel multi-purpose project with hydropower installation.

4.8.2 Implementation of hydropower development

As noted above, all six agencies are involved in the development of hydropower projects. Among them, KPC plays the leading role in planning, design, and also implementation of the hydropower project in collaboration with the river basin development authority concerned with the basin where the hydropower development is proposed. There seems no major difficulties nor constraints in proceeding with the implementation with the present institutional set-up. Hence, KPC will continue to play the leading role in future development in the hydropower sector.

Major dams are owned by the river basin development authorities. This is favourable in a context that the water impounded in the reservoir is open to multi-sectoral uses when such need arises in future. (NB: But, this does not deny the beneficial use of waters for power generation).

Some of the major rivers, particularly the Tana, Sondu and Nzoia rivers, have great potential for hydropower development (*Nzoia-Kerio/Turkwel double transfer scheme in case of the Nzoia river*). The schemes should be formulated for a multi-purpose objective as far as the need is there.

4.9 River and Flood Control Works

4.9.1 Agencies to be responsible

(1) MOWD as river administrator

The management of water resources is undertaken by various agencies, and the responsibilities shared among the agencies are generally clear in the existing legal and institutional set-up. However, the organization responsible for the management of river course is not clearly defined. The river course described herein includes the river banks, river channel, flood plain and other areas designated specifically as a part of the river course. This Study proposes that the main agency responsible for this assignment will be the Ministry of Water Development (MOWD). With this

assignment, MOWD is regarded to be the administrator of rivers and also the implementor of river works.

The Water Act designates MOWD to implement the works for disposal and control of flood water on advice of the former Water Resources Authority.

(2) River basin authorities as implementing agency

As proposed in Sub-section 4.9.1 above, MOWD will be assigned as the administrator of the rivers in whole country. On other hand, six river basin development authorities have been established each for Lake Victoria, Tana and Athi, Kerio Valley, Ewaso Ngiro South, Ewaso Ngiro North and Coast basins. Actually, some of these authorities have been implementing flood control projects such as levee construction and canalization.

In this regard, share of the works may be conceived between MOWD and the authorities: that is, MOWD would entrust whole or part of the river works in the basin to the basin authority concerned. In this case, the basin authority will undertake the planning, design and implementation of the projects, while the MOWD's role will be to provide the general policy making, review/approval of the proposed projects and their prioritization as the river administrator.

(3) Local authorities as implementing agency

Urban drainage works will be undertaken by local authorities (municipal and urban councils) as is currently exercised. Furthermore, it is proposed that the works for urban rivers may also be entrusted to local authorities in view of interactions with urban drainage works.

4.9.2 Implementation of river related works

There is no established system of classifying the rivers. The Study is of the opinion that there is no specific need of classification of rivers from aspects of physical characteristics of the rivers (eg. size of river basin, importance of river, etc.).

From aspect of the share of the works (e.g. as proposed in Sub-section 4.9.1), an alternative approach may be to classify the rivers or river stretches into several categories on the basis of appointment of a responsible agency to each category of the river or river stretches. However, this will not always be appropriate in view of causing the complexity of the overall river management.

In view of a fact that some works are already under the implementation/management of the River Development Authorities/Local Authorities, the Study proposes the following principles:

- (i) Overall management of the rivers will be the responsibility of MOWD, while however MOWD can entrust some of river related works (e.g. river improvement works, flood control projects) to the River Development Authorities or Local Authorities on each project basis under the control of MOWD.
- (ii) Other river related works on project basis (eg. dam, intake, bridge, etc) can be implemented by any agencies, but subject to prior reporting to and consent of MOWD.

4.9.3 Inventory of present condition of rivers

MOWD shall exercise its effort to accumulate the inventory information with regard to present river conditions and the associated engineering structures. The information shall include;

Hydrological information:

- (a) Rainfall in the catchment area
- (b) River discharges (low flow and high flow) at key gauging stations
- (c) River water use, including the location of water abstraction points shown on up-to-date map
- (d) Flood record, including flood area maps
- (e) River water quality

Structural information:

- (a) Plan, longitudinal profile and cross sections of the river channel
- (b) Land use condition in riverine area and flood-prone area
- (c) Engineering features of major river facilities such as dam, weir, levee, revetment and bridge

The preparation of a complete inventory will require many years. Nevertheless, the immediate information can be collected from various existing studies on the rivers and also from reconnaissance surveys by the staff of the District Water Offices.

4.9.4 River conservation/improvement work

River conservation work is required in order to provide, maintain, and regain the stable regime of rivers. The work includes, but not limited to, the following physical works:

- (a) Conservation of river course, including the protection of bank erosions and stabilization of river bed
- (b) Removal of excessively accumulated siltation
- (c) Clearing of interfering vegetations in the channel
- (d) Arresting of sediment yield
- (e) Canalization and/or levee construction for augmenting the channel capacity

Not many works of the above have been undertaken, though (c) is exercised in many small rivers and some works of (e) have been carried out in the Lake Victoria basin.

Rivers should be periodically inspected by overseers to be appointed in each region with a specific purpose of identifying the needs for the required conservation works. This Study assumes that the responsibilities for these inspection and undertaking of river conservation work should be assigned to MOWD or the agencies entrusted by MOWD.

4.9.5 Safety of river structures

Part XI of the Water Act designates the licensing of dam contractor and the obligation for the reporting of failure or damage of the dams. On top of these provisions, there should be strict provisions that the design of all dam structures impounding bulk water (say, more than 1,000 m³) be subject to the WAB's approval when the builders submit the water permit. MOWD should assist the WAB in reviewing the designs.

Similar regulations would also apply to other river structures such as bridges and intake weirs to check whether they have enough clearance for flood flow and/or whether they do not bring about adverse effects to the river morphology.

4.9.6 Operation and maintenance of river facilities

River facilities shall be properly operated and/or maintained after their completion to fully utilize their purposes. Of the various types of river facilities, levees, revetments, bedsills, fixed weirs and bridges will require only maintenance, while dams, barrages, movable weirs and sluices require both maintenance and proper operation for full realization of their purposes.

The basic principle in the Water Act is that the responsibilities for operation and maintenance of the facilities lie on the operators. This is appropriate.

The Act empowers the Water Apportionment Board (WAB) to inspect the work and require the necessary remedial measures, and also provides for the reporting of dam failure or damage. These powers assigned to the WAB could be extended to all types of facilities irrespective of whether they are related to water permit or not; that is, the WAB is fully empowered to inspect the facilities, order the remedy of defective operation/maintenance and further request the operators to submit operation (water use)/maintenance records. However, the main objective of the WAB's shall be limited to the proper use of waters and the preservation of structures safety. Operation of the facilities shall remain in such a way as benefiting the operator.

There is virtually no comprehensive guidelines and/or criteria with regards to protection, conservation, and operation of river-related facilities. They should be established in the future.

4.9.7 Flood area management

As is widely known, flood disasters cannot be abated economically only by structural measures. Non-structural measures such as land use control, flood forecasting, flood fighting and evacuation should also be exercised as appropriate in each basin where the flood problem is eminent.

(1) Land use control

It is clear that flood losses may increase if the areas subject to flooding are developed and utilized indiscriminately. Hence, it is imperative that the planning of settlement and land use should take this factor into account to minimize the extent of damage potential and other adverse effects likely to occur in the event of flooding.

The first approach to this effect is the preparation of flood area map and the zoning of flood prone area in which the concept of settlement and land use control would be introduced. To this end, MOWD shall start the accumulation of flood records.

The flood prone areas needing this consideration are the Yala/Nzoia swamp area, Nzoia lower reaches, Kuja lower reaches, Lumi lower reaches and also the Lower Tana area where the flood prone area is wide-spread (see Sectoral Report G).

(2) Flood forecasting and warning

Establishment of this system provides with pre-information of flood occurrence and gives people extra time for evacuating themselves, livestock, and household properties. Under the present condition, a practical approach is to have the system using a stage correlation method, which will be upgraded to a more sophisticated method in the future (e.g. telemetering system, rainfall radar).

In view of relatively small to moderate flood damage potential and rare cases of loss of lives in most rivers, there appears no very urgent need of installing the sophisticated system at the present condition. Nevertheless, MOWD should launch the preparation for establishing the system; firstly the designation of observatory stations (rainfall and flood stage) and then observation of flood events to obtain a correlation model. Some of the rivers requiring an early establishment of the correlation model are Nzoia, Yala, Nyando, Athi and Tana rivers.

(3) Flood fighting

In areas or river stretches protected by levee, the establishment of a flood fighting team is recommended. The team is responsible for inspecting the safety of river structures (especially levees) and also emergency repair of damage on the structures during flood time.

The flood fighting team is organized under the umbrella of the District Commissioner's office. The District Water Engineer will act as chief technical advisor to the team and advise on the judgement of structural safety and the method of urgent repair.

(4) Evacuation system

A well organized evacuation system is required in the case of a large flood causing wide-spread inundation. Although there may be alternative methods of tackling this objective, a plan is proposed herein to establish a Disaster Relief Committee in each District where relatively large flood disaster is likely. The Committee will formulate the evacuation and rescue plans particular to each area and organize their undertakings.

The evacuation and rescue operation will be formulated to make use of existing resources available at the government agencies and voluntary organizations. The contribution therefrom will include;

- (a) Operation for evacuation of victims, including provision of land, water and air transportation and communication network (possibly by Armed Force, Police and Civil Defense corps)
- (b) Distribution of essential food supplies (possibly by Ministry of Supplies and Marketing)
- (c) supply of emergency stock of drug, vaccines and medicines, and provision of preventive and curative medical/health services (possibly by Ministry of Health)
- (d) Provision of evacuation centers, preparation for distribution of foods, clothes and other supplies, and care for rehabilitation of victims (possibly by Ministry of Local Government/Ministry of Culture and Social Services).

District Water Engineer will act as an advisor to the Committee in respect of dissemination of flood forecast and warning.

4.10 Multipurpose Development Approach

Currently, there is no proper or positive coordination in the implementation of multipurpose development schemes. The Study presumes that the following are noteworthy:

4.10.1 Concept of integrated river basin development

In general, water resources in Kenya cannot be said to be abundant. Although this Study found that the water resources could meet the demands for the next 20 years towards year

2010, the demands will continue to increase and ultimately all available water resources should be in use most effectively.

To this end, a concept of "integrated river basin development and management" should be undertaken by all water-related agencies and water users. This covers both surface water and groundwater sources. A practical approach will be to prepare a comprehensive river basin development study covering all water-related sectors. Several studies covering the Tana river, Athi river, Lake Victoria basin, and Kerio Valley have been completed. However, these should be updated as and when the revision of plans is deemed necessary; say, once every 10 years.

A particular aspect in Kenya is that there will be many inter-basin water transfer schemes, all of which cannot be examined by the river basin study. Such schemes will be proposed in separate studies and be incorporated in the basin study.

Six river basin development authorities are already established. These authorities will be the agency to carry out and update the study in their respective basins.

The outputs of this NWMP Study could be a framework for the preparation of river basin plans.

4.10.2 Formulation of multipurpose projects

Some of the water source development projects recommended in this Study are multipurpose projects. A multipurpose development project is often more economical than a single purpose development project because of the merit of scale and the joint use of the facilities. Further, the multipurpose project is usually formulated to achieve the optimum use of available resources.

There are as yet no rules established for cost sharing of multipurpose development projects among the water use sectors or the agencies representing the sectors concerned. As an approach in the near future, it is necessary to introduce a system of cost allocation in implementing multipurpose development projects. A concept included in the "separable cost-remaining benefit method" can be used as a basis of calculating the cost sharing.

It is noteworthy that multipurpose projects often attain more than economic development objectives; i.e. social and/or environmental benefits. The examples include;