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**United Nations Economic Commission for Africa
Multidisciplinary Regional Advisor Group**

**MISSION REPORT ON ADVISORY SERVICES TO THE GOVERNMENT
OF MAURITIUS
FOR
REVIEWING THE WATER ACT.**

By

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Table of Contents

	Page
I. Introduction	1
II. Background	2
III. Objectives and T.O.R. of Mission	3
IV. General Remarks on the Status of Existing Water Acts	4
V. Summary of Meetings with Officials	4
VI. Conclusion and Recommendations	7
VII. Advisory Services Provided	11
VIII. Other Mission Activities	12
IX. Mission Outcome and Impact	13

ANNEX:

1. List of People Met
2. Draft Bill for Water Resources Authority Act and its Explanatory Memorandum
3. Data for Large Scale Irrigation Schemes in Mauritius
4. Maps and Figures
 - 4.1. Map for Drainage Areas of Mauritius
 - 4.2. Map for Irrigated Areas of Mauritius
 - 4.3. Water Demand and Scenario in Mauritius
 - 4.4. Set of Pictures for Colouring and Comments Competition

I. INTRODUCTION

1. The Republic of Mauritius is a small volcanic island about ten million years old with an area of 1865 square kilometres inhabited by about 1.2 million people woven from multi-cultured threads: Indian, African, Chinese and European. Mauritius is situated on the western side of the Indian Ocean within the tropic of capricorn and lies between latitudes 19 degrees, 50 minutes and 20 degrees 31 minutes south and longitudes 57 degrees 18 minutes and 57 degrees and 48 minutes. It is approximately 855 kilometres off the east coast of the Malagasy Republic (Madagascar). The nearest point of the African continent is at Mombasa at a distance of 1800 kilometres.

2. The majority of rivers in Mauritius spring from the central plateau and flow radially to the ocean. Most of them are perennial except those linked to aquifers; which drain the rivers considerably and thus cause temporary drying during the dry season. There also exists a large number of springs and streams starting near the coast and provide substantial flows. The island has been divided into 25 main river basins and 22 minor river basins and coastal zones drained by several streams and rivulets. The catchment areas vary from 3 to 164 km² and the total surface run off is 2340 million m³.

3. There are approximately 300 rainguage stations in Mauritius. The average annual precipitation countrywide is estimated at 3900 million m³. According to present estimates about 30% is lost as evapotranspiration, about 60% flows as surface water and the rest (about 10%) is recharged as ground water which is estimated at 390 million m³.

4. Presently surface water use is estimated at 760 million m³ which accounts for about 32% of the estimated surface flow and the rest finds its way to the ocean. The same applies to ground water. The present ground water use is in the order of 90 million m³ which represents about 23% of the estimated annual groundwater recharge.

5. At the moment there are ten man-made reservoirs in Mauritius with a combined total gross storage capacity of 70.2 million m³ and a regulated annual yield of 265 million m³. Thirteen sites have been identified for new storage dams with a total storage capacity of 90 million m³ and a likely regulated yield of 330 million m³.

6. At present there is a total area of 17000 hectares of land irrigated by overhead, surface and drip irrigation in Mauritius and it is the government's aim to increase it to 34,000 hectares by the year 2040.

7. From the above facts, it is very clear that the potential for the development of water resources is very great in Mauritius. There is a need for well managed and well equipped institutions dealing in all aspects of water resources so as to develop, manage and conserve this vital source of life in a sustainable manner.

II. BACKGROUND

8. The major beneficiaries of the Water Resources Development Programme are the Irrigation Authority, the Central Electricity Board, the Central Water Authority and the cane farmers. Sugar cane farming represents the backbone of the Mauritius economy. Besides irrigation, water resources are vital for the production of electrical power as well as all domestic and commercial uses.
9. The main bodies dealing with water in Mauritius are the Central Water Authority (CWA) Irrigation Authority (IA), Central Electricity Board (CEB) and the Waste Water Department (WWD).
10. The River and Canal Act of Mauritius was established in 1863 after several amendments to previous rules and regulations pertaining to buildings and factories already erected or to be erected near rivers and canals. For many generations this was the main ordinance dealing with the water sector in Mauritius.
11. The Port Louis Sewage Act was passed in 1906. Its aim was to establish and manage the sewage works for Port Louis and the Act was amended at a later date.
12. Similarly the Plains Willems Sewage Act was passed in 1958 for the construction, operation and management of the sewage disposal works for the district of Plains Wilhems.
13. In 1964 the Central Electricity Board Act was passed so as to constitute a board responsible for the development and management of all electrical supplies throughout Mauritius.
14. The ground water Act was approved in 1970 and amended in 1989 to establish procedures for issuing licences to obstruct ground water.
15. Prior to the creation of the Central Water Authority, the responsibility for water supplies rested with the Ministry of Works and the Municipality of Port Louis. Recently though the sewage section of the Ministry of Works with its liabilities and assets were all vested in the Ministry of Energy, water resources and postal services. The Central Water Authority is only responsible for the Management of Water Resources for domestic, industrial and commercial uses. The Central Water Authority was established in 1971 and since then it has become a cooperation with specific objectives, powers and duties entailing to the sustainable development and conservation of water resources in Mauritius.
16. In 1979, the Mauritian parliament approved the Irrigation Authority Act. Its aim is to study the development of irrigation and to screen irrigation schemes in different areas on behalf of the Central Water Authority; and to implement and manage irrigation projects whilst undertaking research into the optimum use of water made available by the Central Water Authority.

17. In 1991, the waste water act was established. Its main duties included monitoring, implementing and managing waste water works as well as charging expenses and levying taxes.

18. From the above facts it is clear that the responsibility of water resources management is split among different authorities empowered by various acts; resulting in inefficient management of water resources utilisation in the country.

19. Due to this, the Ministry of Energy and water resources decided to set up the new Water Resources Authority with the mandate of having the responsibility of assessment, development, management and conservation of all water resources in Mauritius, and to enforce and administrate the ground water and rivers and canals act. The Ministry requested the UNECA to assist in the finalisation of the Water Resources Authority draft bill and to review all the existing acts and compile them into a proposal for legal framework for the integrated management of the water resources of the island and to propose recommendations for the restructuring of the water sector. The UNECA replied promptly and positively by providing the services of the regional adviser in the field of water resources.

III. OBJECTIVES AND T.O.R. OF THE MISSION

20. The Ministry of Energy, Water Resources, postal services, scientific research and technology of the Republic of Mauritius - currently the Ministry of Energy and Water Resources requested the UNECA's assistance in finalising the Water Resources Authority Act and to revise the existing acts relating to water issues and for issuing recommendations for the restructuring of the water sector. The Mauritius authorities also requested for some UNECA publications. The chief of WEMS/NRD requested the regional adviser of using this opportunity of being in Mauritius, to discuss the proposed programmed study in large scale irrigation schemes with the officials in Mauritius and to use it at the same time to collect any available data for the study as well as brief the Mauritius officials about the policy, strategy and action plan for water resources assessment in Africa. The UNECA further requested its adviser to distribute the conference report as a follow-up activity for the conference and promotion of its strategy. They also asked their regional adviser to provide the Mauritius officials with the available publications from the UNECA.

THE T.O.R.

1. Collect and compile all the ordinances, regulations and legislative acts currently in effect, which are applicable to the water sector.
2. Review all the existing legislative water acts and draft proposal for a new legislative water act.
3. To propose a firm legal framework for the integrated management of the water resources

of Mauritius.

4. To review and finalise with the water resources unit the proposed bill for the establishment of a water resources authority.

IV. GENERAL REMARKS ON THE STATUS OF ALL EXISTING WATER ACTS.

1. Most of the water acts were enacted a long time ago - during the colonial era. They need to be reviewed and overhauled according to the country's present requirements and to be updated according to modern legislature throughout the world.
2. Water rights are not processed through the right channels and this procedure should be reviewed and renewed.
3. Water availability is taken for granted and misused due to the absence of a tariff system which should be developed and introduced to the general public.
4. The fines imposed are always minor and therefore have very little or no impact on the public.
5. The issue of water conservation is not taken seriously and there are no fines imposed on people disturbing the water sheds by deforestation.
6. The water courses are not clearly graded and defined.
7. The field of water resources is split amongst various authorities and acts and therefore there is no effective management of water resources.
8. Presently there is no way of monitoring human resources development and strengthening the capacity building in the field of water resources.
9. There is at present no unified law dealing with all aspects of water resources in an integrated manner.

V. BRIEF OF THE DISCUSSIONS AND MEETINGS WITH THE OFFICIALS

21. My first meeting was with Dr. Sharma head of the water resources unit in the Ministry of Energy and Water Resources Senior staff from the Engineering and Hydrology Sections were also present during the meeting. Dr. Sharma after introducing me to his staff, briefed us about the creation of this new unit of water resources with the Ministry of Energy and Water Resources. The creation of the water resources unit is a clear indication from the Mauritius

Government regarding their stress on the importance of water resources in the country. In fact they have gone all out to promote public awareness towards this vital natural resource.

22. Later on I briefed the meeting about my personal experience in the field of water resources and about the UNECA's mandate of providing assistance to member states in the development of their socio-economic affairs. I explained and stressed the UNECA's vision on focusing attention towards activities with a direct impact on the member states and regional and sub-regional bodies through cooperation with their IGO's and NGO's.

23. After this meeting we went to the Ministry's headquarters in Port Louis where we met the Permanent Secretary and Senior Officials from the Ministry and the water resources unit. The Permanent Secretary expressed his appreciation for the UNECA's positive response towards the Mauritius government's request for assistance and he wished me a successful mission with a positive outcome.

24. In my reply I explained the UNECA's tradition in providing advisory services to the member states and the UNECA's new vision of giving more emphasis on direct involvement with the member States, their IGO's and NGO's; thus promoting efficiency in the activities of the member states.

25. The Permanent Secretary explained that their problems arose due to the fragmentation of the water acts and also due to the fact that some of these acts date back to colonial times and therefore need a complete overhaul so as to match the present needs of an independent state. He further explained the government's desire to combine all bodies involved in water affairs in one single unit.

26. The Permanent Secretary and his Senior staff went on to remind me of the terms of reference for the mission and requested me to go through all the available documents, giving my views and remarks at the end of it.

27. He asked me to emphasize the need for a complete revision and finalization of the water bill so as to create a water resources authority and he instructed his staff to provide me with all the necessary documents.

28. The documents provided to me are as follows: -

- a) River and Canal Act (1863)
- b) Ground Water Act (1970) and its amendment (1989)
- c) Plains Wilhems Sewage Act (1958)
- d) Central Electricity Board Act (1964)
- e) Port Louis Sewage Act (1906)
- f) Central Water Authority Act (1971)
- g) Irrigation Authority Act

- h) Waste Water Authority Act (1991)
- i) Environment Protection Act (1991) and its amendment (1993)
- j) A paper titled "The Water Sector - a new approach."
- k) A paper titled "water rights".
- l) A paper titled "water resources unit".
- m) Update of Master Plans for water resources in Mauritius
- n) Hydrology year book 1987 - 1991.

29. After presenting me with the documents the Permanent Secretary wished me a fruitful mission and left the meeting. I continued my discussions with the senior staff and we worked out a programme of work. I asked for some time to go through all the documents. At the end we decided that I would discuss the documents with officials from other departments and bodies involved in water resources and then we would have a joint brain-storming session to exchange views on these documents.

30. The water resources unit organised a meeting with representatives of different organisations involved in water resources through out the country. This meeting gave a chance to all concerned parties to exchange views and ideas regarding the present structure of the water sector and the problems encountered by the different departments. Proposals were put forward with the aim of overcoming such problems and I proposed that the best solution was to set up an umbrella organisation covering all present bodies. The establishment of a single organisation would also avoid conflicts amongst the existing bodies as was the case at present.

31. I had a meeting with officials from the Water Resources Unit after reviewing all documents pertaining to the present water acts. During this meeting we discussed the proposed draft of the Water Resources Authority Bill thoroughly and we fixed a date for another meeting to finalise the Water Resources Authority Bill.

32. At a follow-up meeting with senior officers from the water resources unit, the draft for the proposed Water Resources Authority Bill was finalised. A proposal for the establishment of a Water Resources Commission and its implications was put forward and discussed. The role of such an organisation towards consumers was threshed out with particular stress on how to avoid conflicts amongst the broad spectrum of users of the commodity. Setting up an umbrella organisation would in future avoid duplication in the planning and implementation of water projects and would be more efficient in dealing with water resources throughout the country. my final meeting was with the Permanent Secretary in the Ministry of Energy and Water Resources. I briefed him about the outcome of the mission. The Permanent Secretary was very pleased with our achievements and expressed his satisfaction with the results. He also expressed his gratitude towards the UNECA in aiding his Ministry's senior staff to finalise the water Resources Authority Bill and called for further co-operation in the future especially in the field of capacity building and in aiding the government of Mauritius in a complete restructural of the water sector. He also called for revising, amending and compiling all the water acts in the country. Further, the Permanent Secretary said that his ministry would seek the UNECA's aid in the legislation

of energy. At the end he wished me a safe journey and I expressed my thanks towards co-operation from him and his staff during my stay in Mauritius.

33. A meeting was arranged for me with officials from the Irrigation Authority, to collect data and information regarding large scale irrigation schemes in Mauritius; as an input for the programmed UNECA study. The officials concerned provided me with very useful information and data.

34. In another meeting with senior staff from the water resources unit I briefed them and promoted the strategy and plan of Action for Water Resources monitoring and assessment in Africa. I briefed them about the ECA/WMO International Conference in Water Resources, and they were supplied with the conference report and some other documents which they had asked for. They were very pleased with the documents and informed me that they would definitely consider the strategy and the action plan for water resources in their future plans.

VI. RECOMMENDATIONS.

35. There is a need for establishing a technical commission under the Ministry of Energy and water resources with the aim of co-ordinating and supervising all activities of departments and bodies dealing with water resources in the country. Such a commission would be an umbrella organisation consisting of the Water Resources Authority, the Central Water Authority, the Irrigation Authority and the Waste Water Authority.

36. The main responsibility of the Commission would be to oversee and coordinate the activities of all bodies involved in water resources with the aim of facilitating smooth implementation of all their plans for sustainable development.

37. It is a suggestion that the commission be named "Water Resources Development and Conservation Commission (WRDCC). It must be made very clear that there should be no contradiction of ideas with the existing National Water Commission which is a Ministerial committee responsible for devising policies and recommendations and for establishing guidelines for rational and efficient management of all water resources in the country. Presently there also exists a water resources technical committee which is responsible for reviewing all aspects of the management of water resources and recommending measures for efficiency in the use of water resources for the various economic sectors in the country. The new water development and conservation commission will be involved mainly in coordination, liaison and supervision with other bodies involved in the field of water so as to ensure optimum utilization of water resources and avoid any conflicts of interest arising among the main consumers.

38. It is further recommended that all existing Acts in the field of water be revised and amended according to the present socio-economic conditions prevailing in Mauritius; these include the Central Water Authority Act, the Irrigation Authority Act, Water Resources

Authority Act, Ground Water Act, Rivers and canals Act, waste water Authority Act and the Central Electricity Board Act. These should all be combined in one comprehensive act which will be the guide book for the proposed new commission; the proposed name for this new act should be "The Mauritius Water Act". Such an act should be formulated according to the new present requirements and include future aspirations and expectations. Mauritius is an independent nation which has no further use of the old colonial acts". The Mauritius Water Act" should also cover issues involving water in the health, tourism, industry and environment sectors.

39. After the creation of the water resources authority, the Central Water Authority will be mainly concerned with the distribution and maintenance of water supply and therefore should be renamed "The Water Supply Authority" which should be under the umbrella of the proposed commission.

40. The Irrigation Authority should be moved to the Ministry of Energy and Water. Its main task would be in dealing with and ensuring adequate water supplies for irrigation purposes in the country. It should also fall under the umbrella of the Water Resources Development and Conservation Commission.

41. Similar measures should be taken with the Central Electricity Board and the waste water department. They should both fall under the Ministry of Energy as this is the right body to overlook the implementation of their plans.

42. A tariff system should be set up. This is in line with modern day development and it would enable the government to recover its cost of investment in the water field and provide better modern services to the consumers.

43. The water rights system should be changed to a water licensing system for the use of water. One of the responsibilities of the proposed new commission would be the issuance of such licenses.

44. When compiling the new water act reference should be made towards the imposition of fines for the misuse of this vital commodity. Fines should be reasonable and in line with modern times. Such action would be a clear indication of the government's policy of ensuring effective use of the water resources to day.

45. The Ministry of Energy and Water Resources should introduce and encourage the use of rain-water harvesting systems and the micro-dam systems to harvest and use water energy, which otherwise is wasted by flowing to the ocean.

46. The Ministry should also educate the people on conservation measures and encourage community involvement in the development and conservation of water resources. It should further allow women to play a major role in policy formulation of this resource.

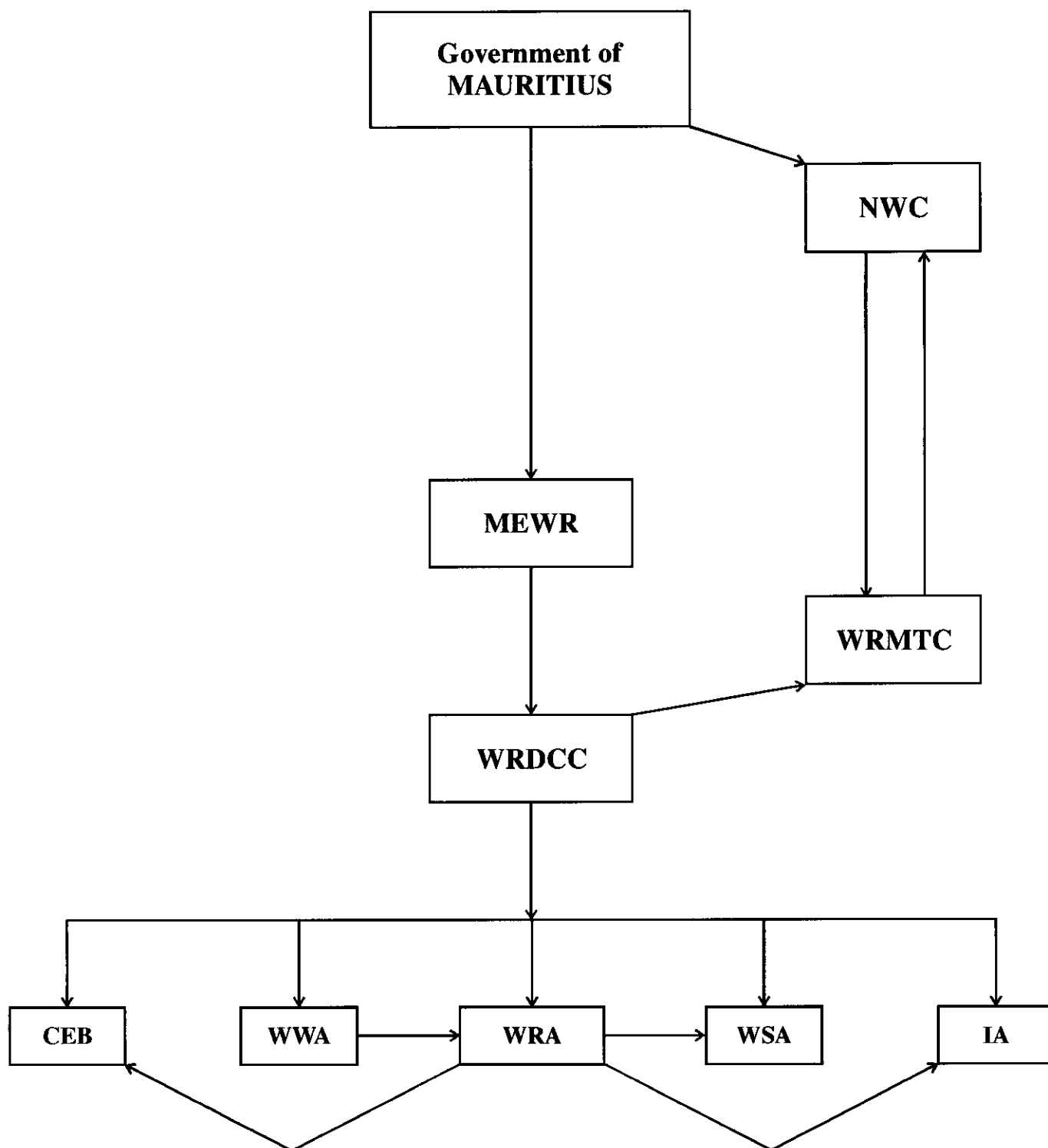
47. Campaigns should be undertaken to bring about public awareness towards the value of water resources for economic and social success. People should be taught conservation measures as water is becoming a scarce commodity in the world today. A joint effort is required by making if we are to preserve this vital life - giving commodity for future generations. The public would then understand, accept and appreciate the government's reasons and actions in changing the water act and overhauling the water sector at large.

48. The Ministry of Energy and Water Resources should use all available opportunities in the communication media to promote public awareness and the government's plans in the development of water resources. Celebrating world day for water in schools and the governmental departments would be one way of enlightening the people.

49. Manpower in the water resources sector is very weak and needs strengthening. This can be done through comprehensive training programmes including short courses and field studies.

50. Exchange of information and technology should be encouraged with other countries and by subscribing towards technical publications to upgrade manpower's knowledge in the water sector.

51. The government can further its development plans by offering incentives to encourage technically trained and qualified experts in the field of water to join their staff. This would result in more effective and up-to-date services to the general public.



- MEWR:** Ministry of Energy and Water Resources: Responsible for all water activities in Mauritius.
- NWC:** National Water Committee: - Set up policies. Recommend and establish guidelines for rationalization and efficient management of water resources
- WRMTC:** Water Resources Management Technical Committee: To review all aspects of water resources management and recommend measures for efficiency in the use of water resources.
- WRDCC:** Water Resources Development and Conservation Commission: To coordinate and liaise with all departments and bodies dealing with water resources in Mauritius.
- WRA:** Water Resources Authority: To assess, plan, develop and manage all water resources in the country. It will supply water to the CEB, WSA, IA and it will itself receive water from the WWA.
- WSA:** Water Supply Authority: Previously known as "Central Water Authority". Responsible for the creation and maintenance of a network involving the treatment and distribution of water for all domestic and industrial use.
- IA:** Irrigation Authority: Responsible for carrying out studies and maintaining the development, implementation and management of irrigation projects.
- WWA:** Waste water authority: Previously known as "waste water division" Responsible for collection and treatment of sewage and its quality control.
- CEB:** Central Electricity Board: Responsible for the generation, supply and distribution of electricity.

VII. ADVISORY SERVICES PROVIDED

52. In the initial stages all the documents provided were screened and reviewed. After this advisory services were provided in three categories:

- i. Remarking on the reformulation and amendment of the draft bill for the water resources authority act and drafting an explanatory memorandum. An explanatory memorandum was prepared and the draft for water resources authority act was amended (refer to annex 2)
- ii. General comments on all existing water acts and their status (refer to item IV)

- iii. Recommendations on capacity-building and improved efficiency in all areas of the water sector. (refer to item V)

VIII. OTHER MISSION ACTIVITIES

53. I used the opportunity of being in Mauritius of reaping maximum benefit from the mission which could be in line with the UNECA's directive to promote the African Strategy and Action Plan for water Resources Assessment, to collect data for the programmed study on large scale irrigation schemes in Africa and to strengthen capacity building by introducing the training courses to African engineers in the field of Hydraulic Engineering in Cairo and the water quality workshop in Nairobi. As per the request by the Mauritius government to the UNECA, some documents and ECA publications for the required fields were distributed.

WMO Conference Follow up.

54. During my meetings with officials from the water resources unit, I briefed them about the ECA/WMO conference which was attended by forty two countries with the unfortunate absence of Mauritius. I explained the conference's objectives and outcome of formulating an African policy, strategy and action plan for water Resources in Africa - "The way forward". A copy of the ECA's final report was given out for distribution.

55. The head of the water resources unit expressed his satisfaction with the conference's outcome and ensured me that copies of the outcome report would be distributed to concerned parties so as to study the recommendations and the plan of action.

Data Collection.

56. I briefed the head of the water Resources Unit of the proposed study undertaken by the UNECA on large scale irrigation schemes in Africa and my intention of meeting people involved in such schemes in order to obtain useful data for the preparation of the study. He responded positively and introduced me to high ranking officials from the Irrigation Authority who provided me with all the necessary data for such a study concerning Mauritius (refer to annex 3.)

Strengthening capacity in Africa in the field of water resources.

57. After our discussions we unanimously concluded that there was a dire need in Mauritius like the other Southern African countries, to reinforce the human resources sector through capacity building in the field of water Resources. I briefed the officials about the upcoming courses in Africa - in particular the water quality one in Nairobi and the hydraulic engineering one in Cairo.

58. The head of the water resources unit showed keen interest in the participation by Mauritius in such courses and assured me that funds could be secured to send their personnel on such training programmes.

59. I also used this opportunity of being in Mauritius by contacting the organisers of the Cairo workshop to invite participants from Mauritius. A letter of invitation was promptly sent out by Cairo and received in Mauritius by the head of the water resources unit, who then forwarded it to the Permanent Secretary in the Ministry of Energy and Water Resources. Regarding the Kenyan workshop on water quality, I talked to the Kenya organisers who assured me that Mauritius would definitely be on their list of invitees when it was prepared and sent out.

60. The government of Mauritius requested me for the UNECA's publications in the field of water resources and I obliged by delivering the following:

- a) Two copies of the UNECA/WMO report on the International Conference in water resources assessment.
- b) One copy of the draft study by the UNECA on pricing and cost sharing/recovery relating to water resources.
- c) A copy of the study on cost recovery for irrigation in Egypt
- d) A copy of the Environmental Action Plan of Egypt.

61. These publications were greatly appreciated by the officials from the water resources unit and they requested me for a regular update of any publications by the UNECA for keeping their staff up-to-date. I assured them that they would be included on the UNECA's mailing list of its annual bulletin of Maji.

IX. MISSION OUTCOME AND ITS IMPACT.

62. The mission's objectives were achieved and it was very successful. Its outcome is as follows:

- a) All ordinances, regulations and legislative acts currently effective which are applicable to the water sector were collected.
- b) All the legislative rules were reviewed and recommendations were put forward for a new unified water act compiling all acts concerning the water sector.
- c) A proposal was put forward for the establishment of a water resources development and conservation commission as an umbrella organisation coordinating all the water

activities currently implemented by different bodies.

d) A proposal was put forward for the set up of a firm legal framework for the integrated management of water resources in Mauritius.

e) Finalisation of the water resources authority's draft bill and its explanatory memorandum;

The mission had an immense direct impact on Mauritius government which was clearly indicated by the Permanent Secretary's remarks of appreciation and his request for the UNECA's assistance in drafting his country's energy legislation.

ANNEX 1

List of People Met

- | | |
|---|---|
| 1. Mr. Soochramanien Vithilingem
Permanent Secretary | Ministry of Energy and
Water Resources
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| 2. Mr. R. Bikoo,
Secretary for Energy Development | Ministry of Energy and
Water Resources |
| 3. Miss Valere Sawdme
Assistant Secretary Ministry of Energy and Water Resources | " " " |
| 4. Dr. H.R. Sharma,
Head of Water Resources Unite | " " " |
| 5. Mr. Dhanesh Deepchand,
Principle Engineer - | " " " |
| 6. Mr. M. Ramrekha,
Principle Hydrologist | " " " |
| 7. Mr. Moncharlin Gerard
Head of the FAC Project "Water Management" | " " " |
| 8. Mrs. Boodhoo Suzanne
Hydrological Officer WRU | " " " |
| 9. Mr. Aubeeluck Gooroodco
Executive Officer WRU | " " " |
| 10. Mr. F. Mowlabucus
Hydrological Officer W.R.U. | " " " |

ECA/MRAG/96/15/MR

Annex 1

Page 2

11. Mr. Sowdagur Daramdeo
Manager Commercial Services CWA
12. Mr. Joseph Hermann
Chief Financial Officer CWA
13. Mr. R. Laulluo
Director waste water division
14. Mr. N. Toolsee
Head of Irrigation Planning Unit (Irrigation Authority)
15. Mr. B. Dabeesig
Investigation/Research Specialist (Irrigation Authority)

ANNEX 2
DRAFT BILL FOR WATER RESOURCES AUTHORITY ACT
AND
ITS EXPLANATORY MEMORANDUM

Explanatory Memorandum

Water is such a vital resource but at times the value of its existence is underestimated and ignored. The economic strength of any country is mostly determined in terms of its fresh water resources. The increase in demand for water during the last twenty five years has exerted tremendous pressure on Mauritius's fresh water bodies with the result that there is a slight deterioration in both quantity and quality of inland fresh waters in Mauritius.

Water from the rivers and springs was originally used for the irrigation of cane crops which for the last 350 years has remained the back-bone of the Mauritius economy. Nowadays of course water is also used for the generation of electrical power as well as domestic and commercial reasons. With time of course water has become such a precious commodity that its now high time to seriously think of modernising all legislations concerning water resources based on the concept of the water cycle initially from the time of the rainfall up to its penetration into the ground water basins and its consequent resurgence and ultimate discharge into the lagoons.

The Republic of Mauritius is now stepping up its second phase of industrialisation and more and more pressure is being exerted on the quantity and quality of water resources. This therefore is the right time for the country to modernise its water laws in line with other countries involved in similar situations of change in administrative, legal and structural aspects of the water industries.

To face and overcome such challenges there is need for the establishment of a technical body for the management of water resources in the hinterland giving effective and optimum results.

The cabinet in Mauritius approved the setting up of the water resources unit in April 1992 for the management of water resources throughout the country in the most efficient and optimum way. Recently the government has also set up a national water commission under the chairmanship of the Minister of Energy and Water Resources. It has Ministers representing different sectors of the economy as its members and four members from the private sector.

The main function of the national water commission is to devise policies, recommendations and guidelines for rationalization and efficient management of all the water resources. The government has also set up a technical committee on the management of water resources to review all aspects of water resources management and recommend measures for efficiency in the use of water resources in the economic sector.

Experience has shown that the water resources unit is too small to deal with all the challenges in the water sector and there is a great need for enlarging and expanding the unit. Such moves will ensure effectiveness in carrying out its duties, face the challenges ahead and

guarantee efficient and successful management of water resources in the country.

The objective of this bill is the establishment of the water resources authority to replace the water resources unit.

The Bill consists of twelve clauses covering the title, interpretation, establishment and objectives of the Authority, powers and duties of the Authority, transfer of rights and liabilities, offences and penalties, regulations and consequential amendments.

The establishment of the water Resources Authority will be the first step in the restructuring of institutions involved in water resources management to guarantee efficient and optimum use of this scarce commodity.

ECA/MRAG/96/15/MR

Annex 2

Page 4

THE WATER RESOURCES AUTHORITY BILL
N° of 1996

Arrangement of Clauses

Clause.

1. Short title
2. Interpretation
3. Establishment of the Authority
4. Objects of the Authority
5. Powers of the Authority
6. Duties of the Authority
7. Protection of Water Resources
8. Vesting of Property in the Authority
9. Transfer of rights and liabilities
10. Offences and Penalties
11. Regulations
12. Consequential amendments.

BILL

To make provision for:

1. Short title.
This Act may be cited as the Water Resources Authority Bill.
2. Interpretation.
 - "Authority" means the Water Resources Authority established under Section 3
 - "Canal" means all artificial water courses belonging to any Corporation or Community of riverians but does not include any water course belonging to any individual.
 - "Central Water Authority" means the Central Water Authority established under section 3 of the Central Water Authority Act.
 - "Effluent" means any liquid or solid waste material or by product which is discharged into rivers, canals and lakes.
 - "Ground Water" means any water under the surface of the ground and includes underground streams, natural subsurface reservoirs and lakes and any water held underground in a zone of saturation, but does not include water flowing in or contained in artificial pipes, conduits or reservoirs, nor does it include surface water having as its immediate origin atmospheric precipitation or natural springs issuing at the ground surface and flowing over or retained on the surface of the ground
 - "Ground Water Licence" means a licence issued under section 7 of the Ground water Act.
 - "Minister" means the Minister to whom the responsibility for the subject of water resources is assigned.
 - "Permanent Secretary" means the Permanent Secretary of the Ministry dealing with Water Resources.
 - "Rivers and streams" means all natural water courses, but doesnot include any artificial ones.
 - "Supply" means Providing raw water for all purposes.
 - "Surface Water" means water in any river, stream, lake and from springs at the ground level.

- "Vesting day" means the day on which this act will be enforced.
- "Water resources" means water from direct precipitation, surface water, groundwater and treated effluents.
- "Water Source" means springs, rivers, streams, lakes and wells.
- "Works" means any structure, device for abstracting, diverting, obstructing, storing, measuring or using ground water, surface water or effluents or any other structure required by the Authority.

3. Establishment of the Authority.

1. There is established for the purposes of this Act the Water Resources Authority which shall be under the responsibility of the Permanent Secretary.
2. The Authority shall have such technical, administrative and other officers as may be designated by the Permanent Secretary for carrying out its duties under this Act.

4. Objectives of the Authority

The Authority shall be responsible for-

- (a) The assessment, development, management and conservation of water resources in Mauritius;
- (b) The enforcement and administration of this Act, the Ground Water Act and the Rivers and Canals Act.

5. Powers of the Authority.

- (a) Carry out works in, over or under any property whether in Private or Public ownership or occupation including any building, road, lane, footpath, track or bridges
- (b) Study Contracts or give any assignment to any companies or individual to carry out any works
- (c) Ensure that such works are properly carried out
- (d) Construct any:

- (i) Dam, reservoir, barrage or such other structure for the conservation and regulation of water.
 - (ii) Structure for the supply of water for domestic, commercial, industrial, recreation, agricultural and hydro-electric power purposes.
- (e) Ensure that the water resources are utilized in an effective and efficient manner;
- (f) Ensure that the water resources are protected against pollution;
- (g) Enforce laws relating to water resources;
- (h) In the public interest, acquire compulsorily any existing water rights, withdraw or revoke any ground water licence.
- (i) Determine, levy and collect charges or fees for the supply of water and any related services or works in connection thereof;
- (j) Discontinue or cause to discontinue the supply of water to any body or person that discharges polluted water direct or indirect to any water body or in case of failing to pay any fees or charges for the supply of water or any related words or services.

6. Duties of the Authority.

The Authority shall for the purpose of section 5

- (a) Collect charges or fees for the supply of water and any related services or for carrying out works in connection thereof.
- (b) carry out investigation and collect, interpret and correlate any data with regard to water resources
- (c) prepare and regularly update an inventory of water resources
- (d) study and formulate policy in relation to the control and use of water resources for -
 - (i) The provision of water for domestic, industrial, agricultural and commercial supply and hydropower generation.

- (ii) Irrigation, land drainage, land reclamation, flood, control, the development of fisheries, recreation, the protection of wild life, afforestation and the control of soil erosion;
 - (iii) Any other purpose ancillary to the purposes specified in subparagraphs (i) and (ii) or such other purpose as the Authority may, with the approval of the Minister, determine;
- (e) Up-date and implement or cause to implement National Water master Plan with other plans for the development and management of water resources;
- (f) Coordinate and appraise projects undertaken by any body or person relating to the conservation, utilisation coordinate and development of water resources;
- (g) Conduct and co-ordinate research and investigations on all water aspects including the efficient and economic use of water;
- (h) Ensure that appropriate measures are taken for the prevention of pollution of water resources;
- (i) Promote, design and construct, in consultation and collaboration with other appropriate bodies, schemes and works for the development and management of water resources and for the purposes specified in paragraph (a);
- (j) Identify and arrange for the appropriate body or persons to and maintain of such schemes and works as specified in Paragraph (i)
- (k) Inspect any work carried out in connection with water resources development, utilisation and conservation
- (l) Co-ordinate with other bodies responsible for treatment, supply and distribution of water
- (m) Process applications for water rights and issue groundwater licenses
- (n) Supervise the enforcement of any water legislation;
- (p) Advise the Minister on any matter relating to water resources.
- (o) To enhance the human resources and strengthen the capacity in the field of water resources through training programmes, workshops, seminars and conferences.

7. Protection of water resources

(1) Where the Authority has reason to believe that effluent from any industrial establishment, or workshop or other premises contains or is liable to contain any element which is likely to contaminate water resources, or be prejudicial to public health, the Authority may serve a notice on the owner, occupier, manager or other person in charge of the premises to ensure that appropriate steps are taken to prevent the contamination or prejudice within such reasonable time as may be specified in the notice.

(2) Every person on whom a notice is served under subsection (1) shall comply with it within the time limit specified in such notice.

(3) A notice under subsection (1) -

- (a) may specify the nature of the remedial or preventive steps that may be taken;
- (b) shall be without prejudice to any prosecution for any offence.

(4) No person shall -

- (a) discharge any effluent in any watercourse, lake, or well, unless he is authorised to do so by the Authority;
- (b) allow ground water or surface water to run to waste;
- (c) abstract water from any reservoir, well, borehole or any other water sources in excess of his reasonable requirements;
- (d) use any dam, lake or reservoir for navigation, fishing or leisure except with the permission of the Authority;
- (e) destroy or damage any flora, fauna, geological or physiographical features of special interests around any lake, reservoir, dam, river, borehole, well;
- (f) carry out any engineering or building operation within a distance of 30 metres, or such other distance as may be determined by the Authority, from any water body;

- (g) construct any plant or other assembly plant meant for the conveyance, treatment or disposal of effluent within a distance of 30 metres, or such other distance as may be determined by the Authority, from any water body

8. Vesting of property in the Authority

There shall be vested in the Authority by virtue of this section, and without compliance with any other formality, all property connected with water resources including natural and artificial lakes, dams, wells, boreholes and canals at present managed by the Central Water Authority, as specified in the Schedule and all ancillary property including liabilities, benefits and contracts related to water resources, other than water treatment plants, water and distribution networks and contracts related to the treatment and distribution of water.

9. Transfer of rights and liabilities

Subject to section 8, any contract entered into by the Central Water Authority in respect of the rights and liabilities transferred to the Authority, shall have effect on and after the vesting day as if it had been entered into on the same terms and conditions by the Authority and all obligations, liabilities and arrangements subsisting against the Central Water Authority under such contract shall continue to subsist on the same terms and conditions against the Authority.

10. Offences and penalties

(1) Any person who contravenes any provision of this Act or any subsidiary enactment made under this Act, shall commit an offence and shall, on conviction be liable to a fine not exceeding 250,000 rupees and to imprisonment for a term not exceeding 2 years.

(2) Notwithstanding section 114 of the Courts Act and Section 72 of the District and Intermediate Court (Criminal Jurisdiction) Act, a Magistrate shall have jurisdiction to try all offences under this Act and any subsidiary enactment made under this Act and may impose any penalty provided by this Act.

11. Regulations

(1) The Minister may make such regulations as he thinks fit for the purposes of this Act.

(2) Any regulation made under subsection (1) may provide for -

- (a) the amendment of the Schedule;
- (b) the levying of fees and charges.

12. Consequential amendments

(1) The Central Water Authority Act is amended as follow: -

(i) by deleting section 4 and replacing it by the following section -

4. Objects of the Authority

The Authority shall be responsible for the treatment of raw water and for the distribution of water for domestic, industrial, commercial and agricultural purposes.

(ii) by deleting section 20 and replacing it by the following section -

Duties of the Authority

(1) subject to subsection 5 (b) of water resources Authority Act, the Authority shall be the only responsible body in the Country for the treatment of raw water, supply and distribution of water for domestic, Commercial and industrial purposes.

(2) The Authority shall

(a) conduct and coordinate researches and investigations on the economic use of water;

(b) establish, maintain and operate laboratories, experimental and research stations to carry out experiments and research in relation to water supply.

(c) ensure that water supply conforms to such standards as are laid down by law;

(d) to collect such fees at charges as may be approved by the minister:

(e) advise the Minister on any matter concerning potable water supply

(iii) by deleting section 21;

(iv) by deleting section 35 and replacing it by the following section -

Grant of state land

"The Government of Mauritius may grant to the Authority upon such terms and conditions as it thinks fit any interest in and over any state land occupied by it in relation to the treatment and distribution of water;

(2) The Rivers and Canals Act is amended in sections 78, 92, 93, 94 and 95 by deleting the words "Ministry of Works" and replacing them by the words "Ministry responsible for water resource".

(3) The Ground Water Act is amended in section 2 by deleting the definition of "Authority" and replacing it by the following definition -

"Authority" means the Water Resources Authority established by the Water Resources Authority Act 1996

(4) The Irrigation Authority Act is amended in section 4 (a), 4 (c), 15(1) (b) and 15 (4) (F) by deleting the words "Central Water Authority" and replacing them by the words "Water Resources Authority".

(5) The Central electricity board Act is amended as follow:
subsection 5.1 a.vi and subsection 5.1.b by deleting the words "Central water Authority" and replacing them by the words "water resources Authority".

ECA/MRAG/96/15/MR

Annex 3

Page 1

**DATA FOR LARGE SCALE IRRIGATION
SCHEEM IN MAURITIUES**

IRRIGATION AUTHORITY

1.0 INTRODUCTION

1.1 BACKGROUND

Sustainable agricultural development is based on the efficient and rational use of three main component of the agricultural system namely: land, inputs and water. Although land is a very scarce resource in Mauritius, yet it is not being intensively used in many regions commonly identified as dry areas. These areas are classified as being dry because they are deprived of adequate rainfall, water storage facilities and the supply of irrigation water through distribution system.

1.2 NEED FOR IRRIGATION

The Government has been promoting over the past two decades, a policy of Agricultural diversification whilst maintaining the same level of sugar production. This policy is becoming more and more difficult to support because of the scarcity of land and labour resources and the continuous pressure for converting Agricultural Land for development of other sectors viz residential and industrial.

Presently some 40% of the sugar cane produced by the country comes from the dry regions mainly in the north and the west. Since virtually all arable lands are already under cultivation no spectacular increase in output can be envisaged unless there are major development in the Irrigation Sub-Sector. This development is deemed to show increase in yield as well as reactivation of agricultural activities on abandoned lands. It is imperative that improved crop varieties and good agricultural practices need to be adopted concurrently.

It is an accepted fact that Mauritius is well endowed with rainfall, yet the northern and western parts of the island suffer severely from inadequacy of rainfall for sound agricultural activities. There are at present some 17,000 ha of land being irrigated by both the public and private sector. The potential irrigable region covers an additional area of 17,500 hectares.

1.3. OBJECTIVE OF IA

The objectives of IA as per its act N^o. 39 of 1978 are as follows:

- (1) To study the development of irrigation and to make proposals to the Central Water Authority for the preparation of schemes for the irrigation of specific areas;

- (2) To implement and manage irrigation projects in every irrigation area and to do all other acts incidental thereto; and
- (3) To undertake research into the optimum use of water made available by the Central Water Authority for irrigation.

2.0 PRESENT STATUS OF THE IRRIGATION AUTHORITY

The irrigation Authority is currently engaged in the management, operation, maintenance of the existing irrigation schemes and in the planning, design and supervision of construction of new irrigation schemes.

1 hectare = 2.3692 Arpents (french unit for acre)

2.1 EXISTING OPERATING SCHEMES OF THE IRRIGATION AUTHORITY

	Hectares	N° of Planters	Project Value (MRs)	Crops Grown
1. Northern Plains Irrigation Project - Stage 1	1895	1500	110	Sugarcane, Tobacco, Vegetables and Foodcrops
2. Belle Mare Small Scale Irrigation Project	217	507	30	Onion and Vegetables
3. Souvenir Drip Irrigation Pilot Project	137	84	22	Sugarcane, Vegetables and Foodcrops
4. Palma Small Scale Irrigation Project	137	125	7	Sugarcane, Vegetable and Foodcrops
5. Plaisance Small Scale Irrigation Project	66	132	3.4	Onion, Vegetables and Foodcrops
6. Bel Ombre Small Scale Irrigation Project	32	68	9.6	Vegetables and Foodcrops
7. Trou d'Eau Douce Small Scale Irrigation Project	15	64	1.7	Onion and Vegetables
8. Arsenal Litchi Small Scale Irrigation Project	11	25	0.6	Litchi, Vegetables and Foodcrops
9. Riche Terre Small Scale Irrigation Project	95	215	6.6	Vegetables and Foodcrops
10. Western Coast Irrigation Project (Rehabilitation of la Ferme Canal)	1468	112	20	Sugarcane and Vegetables
11. Solitude L.A.M.U. Irrigation Project	95	141	20	Vegetables and Foodcrops
Total	4168	2973		

2.2 IMMEDIATE PROGRAMME

The irrigation Authority is presently implementing its short term and long term plans and at the same time completing the Small Scale Irrigation Schemes which are already under the construction phase or due to start. Mention should be made here of the following schemes.

2.2.1 Rivière du Rempart LAMU Irrigation Project

This scheme has been completed and first irrigation has started as from 27th November, 1995. The project covers an area of 161 hectares - (382 arpents) and the investment cost amounts to Rs48 million. Some 180 small planters of the Rivière du Rempart, Schoenfeld and Haute Rive regions, will be benefitting from the project.

2.2.2 St Felix LAMU Irrigation Project- 95 ha - (225 arpents)

This project is located at Surinam in the South and covers an area of 225 arpents. It is being implemented in the three phases namely 50, 75 and 100 arpents respectively. At completion, some 120 planters would benefit from irrigation facilities. The first phase of the project comprising of two retention dams across Rivière Patate and the irrigation infrastructure over an area of 50 arpents has already been completed and ready to be operated. The construction works has been temporarily stopped as the Contractor has been expelled from the site due to bad performance. Tenders will be floated by end of January, 1996 in order to appoint a substitute Contractor for the completion of the works. It is expected that the project will be fully operational by October 1996.

2.2.3 Cressonville Small Scale Irrigation Project- 9 ha-(21.3 arpents)

This project is located at Cressonville near Beau Songes. It is ment solely for foodcrop production. The construction of the project will start during the month of January 1996 and is expected to be completed by May 1996. Some 28 small vegetable planters will benefit from this project.

2.2.4 Rehabilitation of Magenta Canal

The Western Coast Irrigation Project covers an area of 1468 ha and serves 112 planters and Medine Sugar Estate. The command area is supplied with irrigation by two public canals namely La Ferme and Magenta. Prior to rehabilitation works being carried out both canals were registering heavy losses up to 50%. The rehabilitation of La Ferme Canal of length 21 Km was completed in December 1992. From October 1994, rehabilitation works started on the Magenta canal of length 23 km. Works on the canal has been divided into two parts, namely the upstream part - (8 km) and downstream part

(15km). The upstream part of the canal is being replaced by a 1000 mm pipeline funded by the European Union as a grant to the tune of Rs 92 million. Works are nearing completion. The downstream part of the canal has been relined at a cost of Rs 30 million. Works were completed in November, 1995.

3.0 IRRIGATION DEVELOPMENT STRATEGY

The strategic irrigation development plan (short and long term) would target the needy areas in the North, West, South and East belts. The north and west being the priority areas because of the high deficiency of rainfall and the high concentration of small planters.

The importance of irrigation development in the local context would aim at primarily:

- improving and stabilizing yield of sugarcane;
- promoting agricultural diversification and stabilising yield of non-sugarcane crops;
- arresting the tendency among small planters to abandon their agricultural activities;
- enhancing the economic value of certain regions by enabling marginal lands to be developed for agricultural purposes.

The overall impact will be to increase land productivity per unit area and to allow new production targets to be reached (inclusive of the additional quote of sugar).

The Irrigation Development Strategy is based on three prongs:

1. Upgrading and modernising the existing irrigation schemes by converting the irrigation system from labour intensive and luxurious use of water to one where labour involvement is low and water usage highly efficient;
2. Construction of Small Scale Irrigation Project;
3. Implementation of major irrigation projects namely in the north and west;

The strategy pivots on the full exploitation of water resources - be it from the surface (rivers), underground (boreholes) or recycled waste water. Major and minor dams have to be constructed to impound surface water while drilling of boreholes will be accelerated. IA envisages to embark on a pilot scheme using recycled waste water for irrigation.

3.1. POTENTIAL FOR IRRIGATION DEVELOPMENT

The cultivable areas of Mauritius is about 80, 000 ha. Out of this cultivated area, the potential irrigable area inclusive of presently irrigated areas is estimated at 34,500 hectares, lying mainly in the North, West, East and South belt of Mauritius.

The irrigable areas with respect to each region are as follows:

Region	Irrigable Areas (ha)	Irrigated Area at present	% Irrigated Area
North	13,000	4,086	31.4
West	8,000	5,351	67.2
South	7,500	4,393	58.5
East	6,000	3,294	54.9
TOTAL	34,500	17,124	49.6

3. SHORT TERM PLAN

1. The urgent replacement of M1 Pipeline in order to ensure a more reliable supply of water for irrigation purposes to the Northern Plains and to prepare for the extension of the irrigation distribution system to the extremes North areas after the completion of Midlands Dam project.

The feasibility study to provide irrigation facilities to an additional area of 3500 ha of additional area in the regions of Fond du Sac, La Salette, Vale, Petit Raffray etc. is associated with the construction of Midlands Dam and replacement of M1 Pipeline. The completed study has been submitted to the European Union. The replacement of the M1 Pipeline has been retained for funding as a grant to the tune of Rs 140.0 m under Lomé IV Convention.

2. **Identification and Construction of 3 Nos. Small Scale Irrigation Pilot Scheme**

The Agricultural Management Services Project funded by the World Bank provides Rs 38.38 m towards the costs of three pilot small scale irrigation project

to cover some 300 ha to test the technical and economic facilities of the low cost irrigation and greater farmers participation in operation and management.

Three Small Scale Irrigation Pilot Projects have been identified namely at Solitude (76 ha), Poste de Flacq (180 ha) and Calebasses (85 ha). The feasibility study and preliminary design of the three projects have just been completed.

The construction of the Solitude Project is expected to be completed by December 1997 whilst the construction of Rivière du poste and Calebasses will be completed in March 1998.

3. Conversion of 1200 ha into Drip Irrigation under the existing Northern Plains Irrigation Project - Stage I

The existing high pressure system at the Northern Plains Irrigation Project has become very uneconomical due to high labour cost and equipment costs. There are heavy losses of water in the existing system. It is envisaged to convert this high pressure system to Drip irrigation in 3 Phases of about 400 ha each. The project is being financed by the Caisse Française de Développement and Government of Mauritius. The project value is estimated at Rs 210 m. The contributions of the Government of Mauritius will be Rs 100 m.

4. Conversion of Flood Irrigation to Drip

This project consists of the conversion of the present flood system to drip irrigation system. The prequalified shortlisted firms has been approved by the Central Tender Board. Bidding documents have been submitted to seven firms. The contract will be awarded by May 1996 and it is expected that works will be completed by December 1997. The project value is estimated at Rs 26.0 m.

As a measure to improve irrigation efficiency in the existing Western Plains simultaneous action has been initiated with the approval of the World Bank for the conversion of 220 ha of wild flooding to drip irrigation.

5. Conversion of Flood Irrigation to Furrow or Sprinkler System

In order to improve the efficiency in the existing system of wild flooding prevalent at present, an area of 235 ha is earmarked under the la Ferme Command area to be converted to furrow or sprinkler system. The construction of the project is estimated at Rs 9.0 m. It is expected to start work by October 1996 and completed by October 1997.

6. Ground Water Investigation for Irrigation

Ground water development for small planters in the North and Western areas are being taken through two drilling rigs to be obtained by Line of Credit facilities from the Government of India. An expert of India has been on deputation to Mauritius during January - February 1995 and collected relevant details to draw specifications for drilling rigs and accessories suitable for groundwater exploration. The specifications have been approved by Irrigation Authority and the Government of India is in the process of calling for tenders for the procurement of the rigs. These rigs, expected to arrive in Mauritius by June 1996.

3.3 LONG TERM PLAN

For the long term plan, consideration has been given to the implementation of the following:

- (1) Conversion of Downstream part of Magenta Canal in the Western Coast from Surface Irrigation to Drip System. This will complete the conversion of potential irrigable areas on both La Ferme and Magenta Canal from a less efficient system to a highly efficient system i.e. Drip. The total area under drip after completion of downstream part of Magenta Canal will be 551 hectares.
- (2) After the major conversion works are completed to the Western Irrigation System, it is expected that the water saving that will occur due to the use of more efficient system will enable the provision of irrigation facilities to some 550 hectares of new areas which are presently lying fallow.
- (3) After the Replacement of M1 Pipeline in the North and the completion of Midlands Dam, IA projects to expand irrigation infrastructure to provide irrigation to other regions of the North namely: Fond du Sac, Vale, Petit Raffray, Grand Gaube, Roche Terre, Mapou and adjoining villages. The project will cover an area of 3500 hectares.
- (4) Continue with the investigation for ground water and implementation of small irrigation schemes.
- (5) Continue with the construction of several small impounding dams on rivers for the implementation of Small Scale Irrigation Projects (This is determinant for irrigation development in the Southern and Eastern belt).
- (6) Construction of the Mon Vallon Dam and Chamarel Dam in the West for the

irrigation of an additional 1614 hectares.

- (7) Rehabilitation of Trianon Grosses Roches and Rempart feeder canals to improve the reliability of water supply to La Ferme Reservoir
- (8) Construction of the Calebasses Dam in the North for the irrigation of an additional area of 1100 hectares.
- (9) Implementation of irrigation projects using recycled waste water in the Northern and Western parts of Mauritius.

Table I summarises the projects to be completed and implemented between years 1996 to 2003.

**IRRIGATION AUTHORITY
PORT LOUIS**

JANUARY 1996

TABLE I

TABLE I		IRRIGATION AUTHORITY								
		DEVELOPMENT PLAN 1995-2003								
S.No	Name of Project	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	
NEW AREAS TO BE IRRIGATED (ARPENTS)										
1	Riviere du Rempart Project	382								100
2	St Felix Project	50	175							30
3	Western coast System									175
	la Ferme conversion (Drip)		236							336
	la Ferme & Magenta conv.			236						236
	la Ferme & Magenta conv.			394						336
	la Ferme & Magenta conv.				396					336
	New irrigable areas					1042				1042
4	World Bank S.S.I.P									100
(i)	Solidude S.S.I.P (World Bank)			180						236
(ii)	Calebasse S.S.I.P (W.bank)			236						355
(iii)	Poste DE Flacq S.S.I.P (W.B)			355						236
5	Localised schemes from Boreholes (100 ha as from 1996)		236							236
				236						236
					236					236
						236				236
6	Cressonville S.S.I.P		21				236			21
7	Conversion of NPIP stage1			948						948
					948					948
						948				948
8	Northern plains Ph 2 scheme						4000			4000
									2751	2751
9	Futur S.S.I.P			100						100
					100					100
						100				100
							100			100
9	Futur S.S.I.P							100		100
									100	100
									100	100
GRAND TOTAL / YEAR		432	668	2685	1690	2326	4336	100	2851	15078
conversion: 1 arpent =0.42 hectare										

conversion: 1 arpent = 0.42 hectare

IRRIGATION AUTHORITY

SURVEY ON IRRIGATION ACTIVITIES

SUMMARY (SUGAR CANE IRRIGATED AREAS)

	NORTH	SOUTH	EAST	WEST	CENTRE	TOTAL
HIGH PRESS	2756.38	2821	2543	841.06	874	9835.44
LOW PRESS	1552	—	50	135.88	94	1831.88
CENT. PIVOT	389	170	145	339.26	35	1078.26
HOSE COILER	—	—	—	112.11	—	112.11
DRIP	412	214	45	159.6	—	830.6
SURFACE	461	434	125	2277.9	97	3394.9
FURROW	—	—	—	223.37	—	223.37
TOTAL	5570.38	3639	2908	4089.18	1100	17306.56

IRRIGATION AUTHORITY

SURVEY ON IRRIGATION ACTIVITIES

SUMMARY (SUGAR CANE IRRIGATED AREAS)

	NORTH	SOUTH	EAST	WEST	CENTRE	TOTAL
MILLER	2920.38	3552	2858	3079.18	1006	13415.56
IRRIGATION AUTHORITY	1743	87		860	94	2784
OTHERS	907		50	150		1107
TOTAL (HA)	5570.38	3639	2908	4089.18	1100	17306.56
IPU 15th AUGUST 1995						

Some statistics relating to the 1993 crop for the ex St Antoine and Belle Vue Factory areas

Range	N° of plots	Belle Vue T.U. Canes	N° of planters	N° of plots	St Antoine T.U. Canes	N° of planters	Total Number of plots	Total Undercane	Total N° of planters
0.001- 0.499	1.683	291.319	1.162	1.876	312.826	1281	3.599	604.145	2.443
0.500 - 0.999	708	240.628	335	965	323.383	451	1.673	564.013	786
1.000 - 1.999	670	338.508	244	625	331.120	243	1.295	669.628	487
2.000 - 4.999	409	346.179	118	530	409.676	141	939	755.855	259
5.000 - 8.999	101	127.613	20	76	105.080	17	177	232.693	37
9.000 - 9.999	18	18.965	2	18	28.676	3	36	47.641	5
10.000 - 14.999	49	71.221	6	11	13.084	1	60	84.305	7
15.000 - 19.999	30	50.086	3	37	34.708	2	67		5
20.000 - 24.999									
25.000 - 49.999	17	31.867	1				17	31.867	1
Sub Total	3.685	1.516	1.891	4.138	1.599	2.139	7.823	3.074.941	4.030
50.000 - 99.999	128	312.540	4	110	176.476	2	238	489.016	6
100.000 - 149.999	105	248.040	2	35	105.890	1	140	353.930	3
150.000 - 199.999									
200.000 - 499.999	689	1079.180	3	113	215.801	1	802	1.294.981	4
500 +	601	1762.010	2	473	1174.454	2.144	1.074	2.936.464	3
Total	5.208	4.918.155	1.902	4.869	3.231.176		10.077	8.149.332	4.046

For growers cultivating less than 50 hectares the data for the whole of ex St Antoine and Belle Vue (without Mount) are:

Total number of plots - 7823
Total under cane - 3074.941
Total number of planters - 4030
That is (i) average size of plot - 0.39
(ii) average extent cultivated by planter - 0.76

It may also be relevant to note that the really small plots (less than 1h) are concentrated collation wise and the uniform scatterness may considerable affect the water distribution strategy.

MAPS AND FIGURES

ECA/MRAG/96/15/MR

Annex 4.1.

Page 1

MAP FOR DRAINAGE AREAS OF MAURITIUS

MAP FOR IRRIGATED AREAS OF MAURITIUS

WATER DEMAND AND SCENARIO IN MAURITIUS

WATER DEMAND AND SUPPLY SCENARIO IN MAURITIUS				
	(Mm3)			
	1993	2000	2010	2040
MUNICIPAL DEMAND				
- DOMESTIC	71	81	101	141
- INDUSTRIAL	33	36	39	50
- TOURISM	6	8	11	11
TOTAL MUNICIPAL	110	125	151	202
ASSUMED LOSSES IN TR. & DISTRIBUTION NETWORKS (%)	52	45	35	30
TOTAL GROSS MUNICIPAL DEMAND	230	230	233	290
PRESENT MUNICIPAL SUPPLY	155 -67%			
IRRIGATION DEMAND				
- AREA IRRIGATED (ha.)*	17124	18000	25000	34500
- GROSS WATER DEMAND		240	322	430
TOTAL WATER DEMAND (ex. HYDROPOWER)		470	655	720
PRESENT WATER USE				
- MUNICIPAL	155	(81 surface + 74 groundwater)		
- IRRIGATION	460	(444 surface + 16 groundwater)		
- SUB TOTAL	615			
- HYDROPOWER	233			
- TOTAL	848		SURFACE = 758 Mm3 G.WATER = 90 Mm3	
* under sugarcane only				

ECA/MRAG/96/15/MR

Annex 4 (d)

Page 1

PICTURES FOR COLOURING AND COMMENTS COMPETITION

