

Thematic Working Group Water Resources

Final Report
August 2001

PREFACE

Following the directives of its Board, the Mauritius Research Council (MRC) instituted nine Working Groups with a view to defining priority areas for research in key sectors for sustainable development. The main objectives of the Working Groups were to address problematic issues which are presently hindering development, to propose strategies and measures that could lead to improved productivity and competitiveness, and to provide policy guidelines to the Council.

Water resources development was identified as one of these important sectors. The thematic working group, which comprised 11 members, had 6 working sessions during the period 22 May to 03 July 2001. It also benefited from the guidance of the Chairman and the Executive Director of the MRC on procedural matters and from the advice of co-opted members on specific technical issues. The co-ordination role exercised by the MRC deserves special mention.

Based on an in-depth analysis of the current status of the water sector, the projected water demand and the research work already carried out in this field, a prioritised list of research proposals was identified with the ultimate aim of enhancing the water sector in Mauritius. Special attention was paid to Rodrigues which currently suffers from a serious water shortage problem.

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Chairman

Water Resource Working Group

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LIST OF ABBREVIATIONS.

CIDA	<i>Canadian International Development Agency</i>
CWA	<i>Central Water Authority</i>
DANIDA	<i>Danish International Development Agency</i>
FINIDA	<i>Finnish International Development Agency</i>
GEF	<i>Global Environment Fund</i>
GOM	<i>Government of Mauritius</i>
IA	<i>Irrigation Authority</i>
IAEA	<i>International Atomic Energy Agency</i>
IFAD	<i>International Fund for Agricultural Development</i>
Mm³	<i>Million Cubic Metre</i>
MMO	<i>Mauritius Meteorological Office</i>
MOEnv	<i>Ministry of Environment</i>
MRC	<i>Mauritius Research Council</i>
MSIRI	<i>Mauritius Sugar Industry Research Institute</i>
NEL	<i>National Environment Laboratory</i>
NORAD	<i>Norwegian International Development Agency</i>
ODA	<i>Overseas Development Agency</i>
SIDA	<i>Swedish International Development Agency</i>
UFW	<i>Unaccounted for Water</i>
UNEP	<i>United Nation Environment Program</i>
UOM	<i>University of Mauritius</i>
WB	<i>World Bank</i>
WRU	<i>Water Resource Unit</i>
WWA	<i>Waster Water Authority</i>
WWMA	<i>Waste Water Management Authority</i>

REPORT

1. The Relative Importance of Water in Mauritius.

Each and every country requires an adequate, safe and reliable water supply to meet the water demand of all sectors. Mauritius is not an exception to this rule.

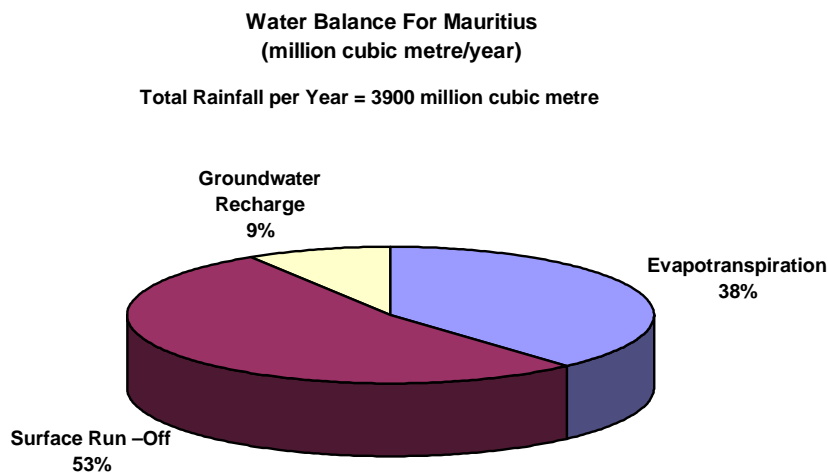
However, over and above this fundamental fact, Mauritius is an island state with a topography that results in substantial flows to the sea during heavy rainfall periods. Furthermore, increase in population growth/human activities and industrialisation render necessary more and more water withdrawal from the environment and have brought along severe risks of water pollution.

Judicious use, conservation and protection of the water resources of Mauritius are essential.

2. The Current Status of the Water Sector.

Mauritius is in the fortunate situation of having sufficient water resources to cope with current demand. However a high proportion of the rainfall occurs during the summer months and cyclones. Because of this rainfall pattern and the topography of the island, there is high surface runoff (53%), corresponding to annual average of 2067Mm³. Only about one third of this amount (744Mm³) is currently being mobilised from reservoirs, lakes and rivers. Consequently, only 9% of the total rainfall contribute to recharge the aquifers and the balance 38% is lost through evapotranspiration. Hence, in spite of the relatively abundant rainfall (3900Mm³) the estimated utilisable potential is only about 1300Mm³. The water balance for Mauritius is shown below in diagram 1.

Diagram 1



Source: WRU, 2001

2.2 Surface Water Resources.

Presently there are 10 man-made reservoirs in Mauritius with a combined total gross storage capacity of 67.36 Mm³ and a regulated annual yield of 230 Mm³. Thirteen sites have been identified for new storage dams with a total storage capacity of about 90 Mm³ and likely regulated annual yield of 330 Mm³. It is important to note that annual loss of storage due to sedimentation ranges from 0.02% to 0.06%, a rate judged much lower than that of similar reservoirs elsewhere in the world.

Water is also abstracted from about 350 river-run off takes, which permit an average annual mobilisation of 514 Mm³ of surface water.

2.2 Groundwater Resources.

The annual groundwater recharge of the five main aquifers of the island has been estimated at 390 Mm³. Currently, there are 337 boreholes in use, 110 for potable water, 110 for industrial use and 117 for agricultural purposes. The average annual volume of groundwater utilised is 145 Mm³ which is equivalent to nearly 15% of the total water consumption. The contribution of groundwater to the municipal water supply is of the order of 57%. The maximum depth of boreholes drilled so far is 172m.

2.3 Water Utilisation.

Table 1 : Water Utilisation in Mauritius – in Mm³ (2000).

Purpose	Surface Water (Mm ³)		Groundwater (Mm ³)	Total (Mm ³)
	River-Run Off takes	Storage		
Domestic, Industrial and Tourism	38	48	113	199
Industrial Private Boreholes				10
Agricultural	370	76	22	468
Hydropower	131	174		305
Overall Utilisation	539	298	145	982
Total Water Mobilisation	514	230	145	889

Source: WRU 2001

Currently, 199 Mm³ of water are utilised in the domestic, industrial and tourism sectors, 468 Mm³ in the agricultural sector and 305 Mm³ for hydroelectric power generation as shown in table 1. It is important for Government to plan the judicious exploitation of water resources to keep pace not only with the growing population but also with anticipated expansion of the various sectors of the economy.

2.4 Research and Development.

An integrated draft plan for water resources development has been prepared by the Water Resources Unit (WRU) for harnessing additional water resources to meet the water requirement of different sectors of the economy up to the year 2040. The projections of potential water requirement assume a population of 1.6 million in 2040 and a per capita consumption of 190 litres/day at present to 250 litres/day in 2040.

Apart from the WRU, the Central Water Authority (CWA), the Irrigation Authority (IA), the Waste Water Authority (WWA), the University of Mauritius (UOM), the Mauritius Sugar Industry Research Institute (MSIRI) and the Mauritius Meteorological Office (MMO) have made considerable efforts in carrying out studies and research work on

the assessment, development, management and conservation of water resources in Mauritius.

A comprehensive list of studies and research work which have been completed or ongoing is shown in Annexures 2(a) and 2(b) respectively.

3. The Constraints and Challenges Facing the Water Sector.

3.1 Water Resources.

Although the average annual rainfall in Mauritius is considered adequate, irregular rainfall and insufficient storage capacity cause seasonal shortages. The utilisable fresh water potential in Mauritius has been estimated at 33% of the average annual rainfall which is appreciably higher than the worldwide average of 22.5%.

TABLE 2:	WATER RESOURCE POTENTIAL	Mm³
Estimated Utilisation Potential		1300
Potential Developed to Date		879
<i>Surface Water</i>		<i>744</i>
<i>Groundwater</i>		<i>135</i>
Planned Development		+175
<i>Surface Water</i>		<i>155</i>
<i>Groundwater</i>		<i>20</i>
Estimated Developed Potential by Year 2040		1065
<i>Surface Water</i>		<i>915</i>
<i>Groundwater</i>		<i>150</i>
Estimated Volume of Treated Waste Water that Could be Used for Irrigation		55

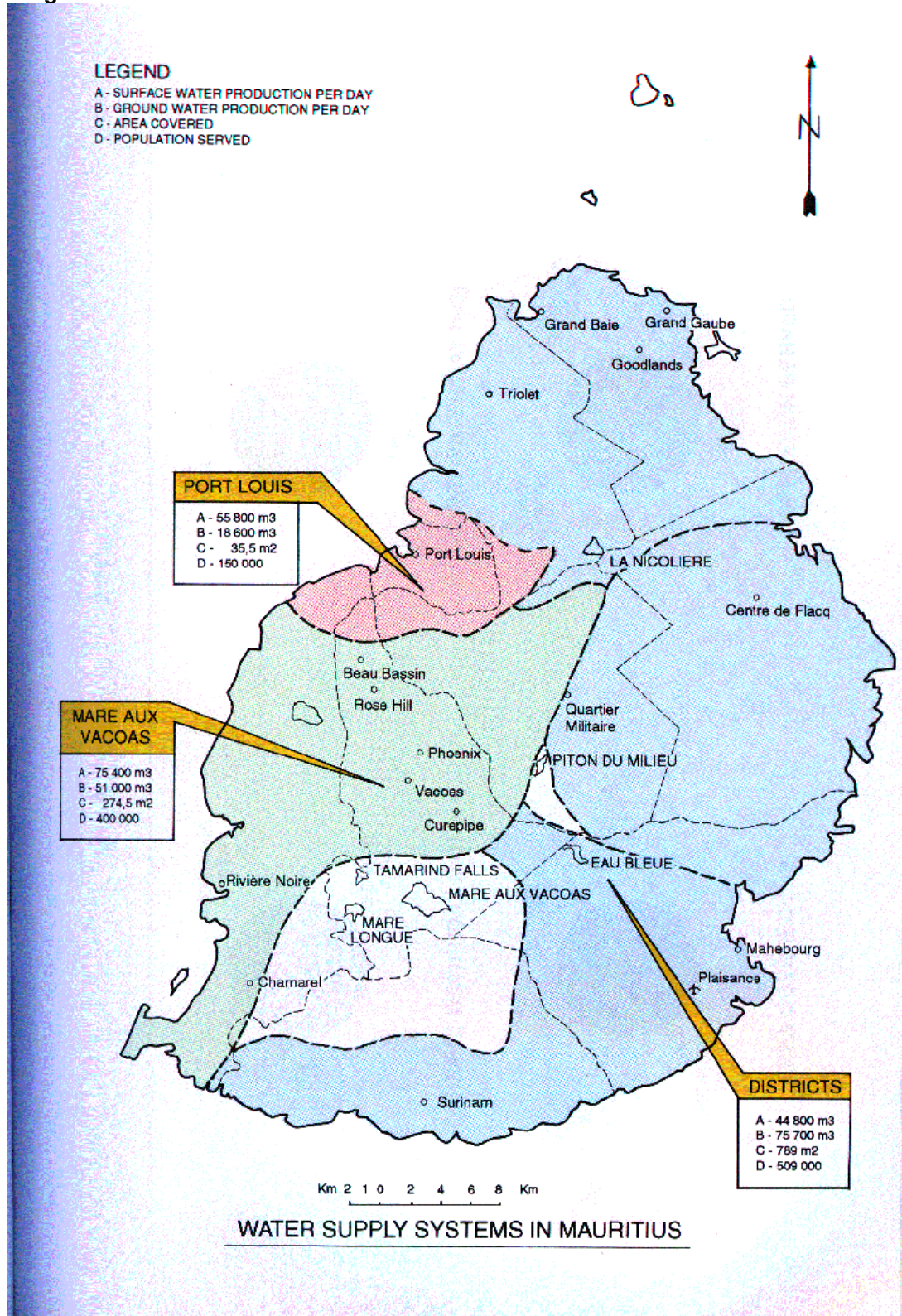
Source: WRU, 2001

The 1999 drought and other prolonged dry periods in the past provided evidence that surface storage if operated judiciously could last for at least one year and the aquifers could withstand two consecutive drought years. Nevertheless, especially in view of uneven distribution of water resources, contingency plans have to be envisaged, especially in Rodrigues.

3.2 Water Distribution.

Unaccounted for water (UFW), which is presently about 50%, is a major problem in the production and distribution of potable water. This is due mainly to leakage in old pipes, inaccuracy of flow metering and pilferage to some extent. Although the country is generally well served by a water distribution system (see Diagram 2), there are some deficiencies in specific localities. Thus, the main constraint faced by Port Louis is that the water supply comes mainly from the Grand River North West (GRNW), which does not have any storage reservoir. The diagram on the next page depicts the water supply system of Mauritius.

Diagram 2



Source: CWA available at <http://ncb.intnet.mu/putil/cwa/fields/distr.htm>.

As the flow of water in the river decreases during the dry months the number of hours of supply are reduced. The North of the island relies heavily on groundwater resources which suffer a decrease in yield during the dry seasons. This problem would be resolved in the near future with the increased input of surface water from Midlands Dam towards CWA's new treatment plant at La Nicoliere.

3.3 Water Quality.

Information on the quality of both surface and ground water is rather scanty. Although the Ministry of Environment has prepared a set of standards for inland waters of Mauritius, these standards could not be promulgated in the absence of reliable and complete water quality database.

In Mauritius, coral sand is used as a filter medium in slow gravity treatment plants at La Marie and at Pailles. However, government's policy is to stop the utilisation of coral sand for construction and for any other purposes. In fact, coral sand extractors have already been given an ultimatum to stop the exploitation of sand from our lagoon. As a consequence of this decision, there is an urgent need to consider the use of alternative filtering media.

4. Proposed measures to enhance development of the Water Sector.

4.1 Water Resources.

It is essential to ensure that sufficient water resources are available to meet future demand. Studies might be needed to select the most appropriate sites for additional storage dams.

Similarly, suitable sites should be identified for the drilling of boreholes to exploit the groundwater potential. The possibility to establish sub-surface reservoirs in Mauritius, including Rodrigues, is worth investigating.

Household harvesting of rainwater could also contribute significantly to our water availability.

4.2 Water Utilisation.

The optimal utilisation of the water resources in Mauritius, including Rodrigues and Agaléga, should be a topmost priority. In this context, it is important to take corrective measures to bring the "Unaccounted for Water (UFW)" to an acceptable level.

In view of the large percentage of water used for irrigation, the improvement in irrigation efficiency should be given due consideration. Other water conservation measures in households, hotels and industries should be envisaged.

More efforts should also be directed towards the treatment and recycling of waste water.

4.3 Water Quality.

It is not only necessary to establish a water quality database for both surface and ground water, but also to ensure continuous monitoring. This is especially important to gauge the effects of pesticides, fertilisers, municipal wastes, landfill sites and industrial wastes on water quality.

The preparation and promulgation of appropriate standards and legislative framework to regulate water quality are equally important.

5. List of Research Topics that Need to be Undertaken,

Research and feasibility studies to be undertaken should reflect the proposed measures to enhance the development of the water sector in Mauritius. These studies could be broadly classified into 6 categories, the proposals have also been prioritised, **A** having the highest priority.

5.1 Water Demand.

Ref	Project Title	Priority
(1)	Water Demand Survey – WRU *	A
(2)	Optimisation of Domestic Water Use – WRU *	B

** These two projects should be carried out in parallel preferably by the same team.*

5.2 Water Quality.

Ref	Project Title	Priority
(3)	Study on the performance of basalt sand or other material as filtering media in a slow sand filter – CWA	A
(4)	Impacts of Dumping and Landfill sites on Surface and Groundwater Quality – WRU	A
(5)	Establishment of a Water Quality Data Base – WRU	A
(6)	Study on groundwater pollution – CWA	A
(7)	Definition of a long term wastewater disposal system in Rodrigues - UOM	B
(8)	Monitoring of ground water quality in Agaléga – WWMA	B
(9)	Tertiary treatment of waste water from hotels for irrigation purposes – WWMA	B
(10)	Pilot project for the incineration of waste cooking oil from hotels and restaurants with bagasse – WWMA	C

5.3 Water Resources.

Ref	Project Title	Priority
(11)	Identification of suitable sites for creation of sub-surface reservoirs – WRU	A
(12)	Mapping the Water Resources Network on a Geographical	A

	Information System –UOM	
(13)	Determination of Environmental Flows in Rivers and Streams - WRU	A
(14)	Identifying groundwater flow pathways in the Northern plains, through isotopic dating method – UOM	B
(15)	Use of slotted lateral pipes to exploit groundwater in small islands (Agaléga) – UOM	B

5.4 Irrigation.

Ref	Project Title	Priority
(16)	Ex-post evaluation of public sector irrigation projects managed by Irrigation Authority – IA	A
(17)	Use of hydrogels to minimise irrigation water demand for short cycle crops in Rodrigues – UOM	B

5.5 Rain Water.

Ref	Project Title	Priority
(18)	Promoting appropriate technologies for harvesting and efficient utilisation of rainwater – Prof Jugessur	A
(19)	Detailed objective analysis of precipitation across Rodrigues – Dr Pathack	A
(20)	Analysis of precipitation over Agaléga with a view to designing an optimal water distribution network – Dr Pathack	B
(21)	Climate and climate change – direct and indirect impacts on water resources in Mauritius and its outer Islands – Dr Pathack	B

5.6 Public Awareness and Information Campaign.

Ref	Project Title	Priority
(22)	Awareness Campaign to Water Resources Conservation & Protection – UOM & Prof Jugessur	A
(23)	Setting up of a forum for stakeholders in the Water Sector (The Water Resources Society (Mauritius)) - UOM	C
(24)	Contribution of Women in Water Conservation at domestic level – UOM (<i>to be carried out in close co-ordination with the optimisation of Domestic water use project</i>)	C

Short write-ups on 24 project proposals identified by the Working Group are shown in Annexure 1.

6. Institutional and Financial Support.

In line with its mandate, the Water Resources Unit is expected to play a major role with regard to the co-ordination of research activities in the Water sector. The Central Water Authority and the University of Mauritius have not only adequate manpower, but also laboratory facilities (which may need to be further upgraded) to undertake a significant number of research projects in this sector. The Waste Water Management Authority, the Irrigation Authority, the MSIRI and the Meteorological Office are appropriate institutions to carry out research in their respective fields of expertise.

Both local and international funding sources should be tapped for the implementation of the research projects listed in Annex 1. All the above-mentioned institutions have some funds allocated to R & D. Moreover, the Mauritius Research Council, the Ministry of Environment (through EIP II) and other Ministries could provide additional funding. International organisations such as the IAEA, GEF and UNEP could also be contacted for this purpose. DANIDA, FINIDA, NORAD and SIDA are also known for their interests in projects in the water sector. Canadian International Development Agency (CIDA) could be contacted also.

7. Concluding Remarks.

The research topics identified by the Thematic Working Group and listed in Annex 1 are by no means exhaustive. However, the involvement of all relevant institutions to elaborate the research programme is a very positive development. Such an approach will not only guard against duplication of efforts but will also foster closer co-operation amongst these different institutions in carrying out research and in optimising resources.

ANNEXURE 1

List of Research Proposals

WATER DEMAND

WATER DEMAND SURVEY

Objective

It is proposed to carry out a sector wise Water Demand Survey to update Water Demand Projections estimated in 1991 in the context of the CWA Master Plan for Water Resources of Mauritius.

Background

In the context of the preparation of the Master Plan for the Water Resources of Mauritius. 1987 – 1991, a Water Demand Survey was carried out. The various sectors surveyed were the potable sector, the industrial and tourism sectors and the irrigation sector.

Subsequently, in 1994, the Water Resources Unit, Ministry of Public Utilities prepared an Integrated Plan for the Harnessing of Additional Water Resources Vision 2040. Data used during this preparation were extracted from the above-mentioned Master Plan which needs to be updated.

Methodology

The sector wise water demand survey for various time frames extending up to 2040 is proposed to be carried out through Consultancy Services. While assessing the water demand for the different sectors of economy, the Consultants will take into account the anticipated growth/expansion, technological improvements/ innovations and other measures for more efficient use of water. It is envisaged to procure Consultancy Services for the Project.

Updated present and future water demands will then be used to update the Integrated Plan for Harnessing Additional Water Resources - Vision 2040 prepared by Water Resources Unit.

Resource requirements

Financial: Rs. 600,000 Funding is being sought under EIP(II), Ministry of Environment.

Manpower: Consultancy Services, Coordination/supervision – WRU

Equipment:

Institutional support: WRU, CWA, IA, Ministry of Industry, Ministry of Tourism, Central Statistical Office.

Time Frame: About 3-4 months after appointment of Consultant

Expected results: Updated present and future water demands for each relevant sector.

Beneficiaries: Mauritius as a whole

Optimisation of Domestic Water Use

Objective

The objective of this Project is to identify physical and non-physical means to encourage and enable households to optimise water use.

Background

It is internationally established that Water Demand Management is essential in postponing in time and even reducing ultimately the mobilisation of additional water resources. So doing, high investments involved in such mobilisation may also be reduced or spread over a longer time period. Judicious use of water and optimisation of the use of available waters can substantially reduce per capita consumption of water. This has been clearly demonstrated by several Demand Management Studies carried out in England and Wales (Demand Management Bulletin No. 47 June 2001).

Methodology

A recent survey carried out in Scotland shows broadly the household consumption as below:

• Personal Washing and Bathing	=	32%
• WC Flushing	=	31%
• Laundry	=	23%
• Dish washing and cleaning	=	8%
• Drinking and cooking	=	4%
• Car washing	=	1%
• Other uses	=	<u>1%</u>
		<u>100%</u>

It is envisaged to invite consultancy services for the study.

The Consultants shall, inter alia,

- Quantify the volume of water used for different purposes at household level in Mauritius for different categories of housing. Diaries could be given to the households to record water consumption under different uses over a certain period.
- Identify ways and means to channel, store, and treat such grey waters for other uses.
- Work out optimum designs for rainwater harvesting. It has been claimed that rainwater can be used for washing machines in addition to toilet use and outdoor use, and with additional treatment for swimming pools.
- Identify means to ensure dissemination of their findings to the general public.

Resource requirements

Financial: About Rs. 500,000

Manpower: Consultants
Overall coordination and management: WRU/Central Water Authority

Equipment:

Institutional support:

Time Frame: 3 months after appointment of Consultants

Expected results: Identification of physical and non-physical means to optimise domestic water use. Dissemination of findings

Beneficiaries: Mauritius and Outer Islands

WATER QUALITY

STUDY ON THE PERFORMANCE OF BASALT SAND OR OTHER MATERIAL AS FILTERING MEDIA IN A SLOW SAND FILTER

Objective

To identify a suitable grading of basalt sand or alternative filter medium to replace coral sand in slow gravity sand filters.

Background

Two types of filters at water treatment plants are currently being used worldwide to treat raw water from rivers, impounding reservoirs and other sources to potable water standard. These are Slow Sand Filter and Rapid sand filter.

Rapid Sand Filter generally consists of both chemical and physical unit processes while Slow Sand Filter englobes biological and physical treatment only. Rapid gravity filters utilise silica sand which is not lost during the filtering and cleaning process. However slow sand filters utilise a bed of coral sand, the top part of which needs to be regularly scraped away during the cleaning process. Thus the sand bed requires regular topping up after each cleaning operation. Out of the six water filtration plants of the CWA, two use the slow sand filtration process, namely La Marie and Pailles Treatment Plants. The requirement of coral sand is of the order of 5,000 m³ annually. There is therefore the need to consider the use of alternative filtering media.

This project is in line with the government's policy to stop the utilisation of coral sand for construction and for any other purposes and to encourage the use of basalt sand instead. The coral sand extractors have already been given an ultimatum to stop the exploitation of sand from our lagoon.

Several marine studies have shown that the practice of sand removal from our lagoon will cause irreversible damage to our marine ecosystem by systematically destroying our marine habitat.

Methodology

This project aims at making an in-depth study on the use and performance of basalt sand in a Slow Sand Filter. The water quality characteristics will also be monitored following the use of basalt sand to look into the possible water quality deterioration or enhancement if any and to measure the repercussion if any on overall water treatment after disinfection with chlorine. The suitability of any other alternative filter medium may also be studied subsequently.

La Marie Treatment Plant could be chosen to carry out the aforesaid project since one of its filters namely Filter L is having basalt sand as filtering media, on a trial basis.

Raw water and treated water will be collected at appropriate sampling points to carry out related physico-chemical parameters. A sand filter will be used as a control.

Resource Requirements

Financial: Around Rs. 1.0 Million for purchase of the appropriate quality of basalt sand.

Manpower: CWA will fully assist in the spreading of basalt sand in the filters, and in other measurements or analysis. Research Team (from University of Mauritius) will carry out study.

Equipment: CWA will provide any equipment required on site, and CWA's laboratory will assist in water quality analysis.

Institutional Support: University of Mauritius, CWA

Time Frame: 12 months

Expected Results: The project will help to identify a suitable alternative to the use of coral sand in the slow gravity sand filters at CWA Water Treatment Plants at La Marie and Pailles.

IMPACTS OF DUMPING AND LANDFILL SITES ON SURFACE AND GROUNDWATER QUALITY

Objective

Study and assessment of the impacts of dumping/landfill sites on the quality of both surface and groundwater resources.

Background

The establishment and operation of dumping/landfill sites in Mauritius is an activity that may be qualified as recent.

Although, all precautions are taken to locate such sites in such a way as to prevent pollution of water resources used for potable water supply, it is considered necessary to monitor, study and assess the likely pollution of nearby streams, boreholes and of the lagoon. Such a study will also be beneficial to those involved in the design of solid waste disposal facilities.

Methodology

It is proposed to carry out the study in-house (WRU) in collaboration with the University of Mauritius.

The selected site for the proposed study is Mare Chicose Landfill site. One borehole will be drilled upstream of the site and three boreholes at suitable locations on the downstream. One of the boreholes downstream of the landfill site will be equipped with a data logger for continuous recording of certain parameters related to water quality. The quality of the water from each of the 4 boreholes will be regularly monitored over a period that may well extend beyond three years.

Water quality data will be compiled, analysed and interpreted at regular intervals.

Resource Requirements

Financial: Rs. 1,475,000 - Funding is being sought under EIP (II), Ministry of Environment

Manpower: 2 Investigators (1 WRU, 1 UOM)
1 Technician (UOM)

Equipment: 4 boreholes
1 data logger
1 sounding line
1 salinity/conductivity meter
UOM laboratory

Institutional Support: WRU, UOM

Time Frame: 3 years

Expected Results: Extent and nature of pollution and recommendations for location of such sites.

Beneficiaries: All sectors (country in general)

ESTABLISHMENT OF A WATER QUALITY DATA BASE

Objective

The objective of the Project is to collect and compile water quality of raw surface and ground water island-wide. Such data will be transferred to an electronic Data Base. Subsequently, the evolution of water quality in time will be monitored on a permanent basis.

Background

The Department of Environment, Ministry of Environment has prepared a set of standards for Inland Waters of Mauritius.

These standards were to be promulgated. However, as the proposed standards had been worked out on no sound basis and, in particular, in the absence of knowledge regarding the prevailing water quality in our rivers/streams etc., it was decided to freeze such promulgation until and unless the above-mentioned Data Base were available.

Methodology

Initially, samples of surface water island-wide will be collected and analysed. Samples will be collected both upstream and downstream of human activities. Analysis of the water samples is proposed to be carried out at the Central Water Authority Lab and the NEL Lab. After the analysis the data will be recorded in standard format and then transferred to electronic Data Bases.

Resource requirements

Financial: Rs. 500,000 within each Financial year from Government of Mauritius

Manpower: Water Resources Unit
Work may have to be carried out partly beyond normal working hours.)

Equipment: Sampling bottles

Institutional support: C.W.A Lab (against payment), NEL lab

Time Frame: 2 years
Two exercises annually – during wet and dry seasons.

Expected results:

- Establishment of a Water Quality Data Base
- Assessment of extent of dilution available during wet and dry seasons.
- Evolution of water quality in time.

Beneficiaries: All economic sectors

STUDY ON GROUNDWATER POLLUTION

Objective

To evaluate the input of salinity and industrial pollutants on the fresh groundwater resources of Mauritius.

Background

In Mauritius, there are about 340 boreholes exploiting groundwater for various purposes namely potable, industrial and agricultural.

About 55% of the potable water supplied to the population of Mauritius comes from underground, and it will be a matter of deep concern if the aquifers become polluted. It is considered necessary to study the impact of salinity and industrial pollutants on the fresh groundwater resources. It is known that previous studies had been carried out on the presence of agricultural fertilizers, herbicides and pesticides on the ground and surface water resources of Mauritius; hence similar studies should now be extended to the impact of salinity and industrial pollutants.

Methodology

(a) Salinity

Origin of salinity and impacts on fresh ground water resources using isotopic techniques. The methodology to be adopted will be to conduct field research using isotopes to study the source and dynamics of groundwater salination. Seawater encroachment may arise due to groundwater withdrawal at coastal sites.

(b) Industrial Pollution

Assessing and developing isotopic methods to study the transport of industrial pollutants to the groundwater resources. Pollution of water resources occurs primarily by means of transport through the unsaturated zone, either as dissolved constituents in recharge water or by non-aqueous liquid or gas phase flow.

Resource Requirements

Manpower: Research Assistants

Financial: Rs. 3.5 M

Equipment Analysers for radioactive isotopes, chemicals & accessories

Institutional Support: University of Mauritius, WRU, and CWA

Time Frame: 2 years

Expected Results: The project will identify where and to what extent the groundwater resources in Mauritius have been or are likely to be affected by salinity or industrial pollutants, and to address corrective actions.

Beneficiaries: The groundwater users, and by extension the whole population of Mauritius.

DEFINITION OF A LONG TERM WASTEWATER DISPOSAL SYSTEM IN RODRIGUES

Objectives

To collect all wastewater on Rodrigues for safe disposal.

Brief Background

There is at present no wastewater collection network in Rodrigues. This therefore affects the exploitable groundwater aquifers and eventually the lagoon.

Govt. is planning to develop Rodrigues both for tourism and industry. These two activities are going to generate a higher potential for pollution.

Methodology

- Collect data on water use and waste water
- Design wastewater collection network and eventual treatment
- Estimate costs
- Estimate priority for implementation

Resource Requirements

Financial: Rs. 3 million

Manpower: Consultant team comprising civil engineers including waste water specialist

Equipment:

Institutional Support: WRU, WWA, Ministry for Rodrigues

Time Frame: 12 months

Expected Results: Govt. awareness of potential pollution problems in the water supply. A proposed plan of action for a sewerage plan in Rodrigues

Beneficiaries: Population of Rodrigues

MONITORING OF GROUND WATER QUALITY IN AGALÉGA

Objectives

To protect the water resources in formulating a waste water disposal strategy in the long term.

Brief background

There will be significant development on the island of Agaléga especially the construction of a hotel complex. It is therefore important to know the ground water quality, as this is the potential source for domestic consumption. The water table need to be protected as the island is sensitive (coral sand bank with water table less than 1 m below ground level).

Methodology

Monitoring of the ground water quality. The wastewater disposal facilities need to be studied in line with their potential impacts on the environment.

Resource requirements

<i>Financial:</i>	Laboratory sampling and analysis: 1 monthly sampling for one Year.	Rs. 520 000
	Transport:	Rs. 200 000
	Incidentals:	Rs. 280 000
	Total	Rs. 1m

Manpower: 1 engineer -1 laboratory technician

Equipment: Laboratory equipment

Institutional support: W.W.A - Lab-Outer Islands Development Corporation

Time Frame: 1 year to take into consideration seasonal variations.

Expected results: Rehabilitation and definition of an on-site disposal system adapted to the local constraints in order to protect and preserve the water resources.

Beneficiaries: Inhabitants of Agaléga

TERTIARY TREATMENT OF TREATED EFFLUENT FROM HOTELS USING TREATED WASTEWATER FOR IRRIGATION PURPOSES

Objectives

Abate health hazards owing to the parasites present in the treated wastewater.

Brief Background

The chlorination of treated wastewater is not efficient against pathogenic bacteria and viruses. This gives rise to health problems especially when irrigation is effected by sprinkling methods.

Methodology

A pilot project will be established and shall comprise the implementation of a slow sand filter.

Resource Requirements

Financial: Contribution from hotel and MRC. The hotel shall provide for infrastructure works and modification of existing parts or components WWA will be responsible for testing of the water quality coming out of the plant and filter. A set of tests shall be carried out each week comprising analysis of about 8 parameters (Rs. 7.000 per test set). The estimated cost: Rs. 364.000

Manpower: 1 engineer-1 laboratory tech-1 trainee

Equipment: Laboratory equipments

Institutional support: W.W.A, Laboratory, Hotel

Time Frame: Monitoring should be last 1 year in order to estimate the water quantity used during a complete season.

Expected result: To eliminate the parasites in treated effluents and reduce risks of health hazards.

Beneficiaries: Hotels and the environment at large. Improvement in coastal water quality.

PILOT PROJECT FOR THE INCINERATION OF WASTE COOKING OIL FROM HOTELS AND RESTAURANTS WITH BAGASSE

Objectives

To ensure safe collection and disposal of used cooking oil from various sources in order to:

- Avoid blockages in the sewer line;
- Avoid pollution of groundwater; and
- Protect the coastal quality water.

Methodology

To work in collaboration with a sugar factory using bagasse as a source of input in its incinerator. A collection system will have to be established to ensure continuous flow of the waste oil to the disposal site. The incinerator will need retrofitting if need be. The air quality will have to be monitored simultaneously.

Resource Requirements

Financial: A survey on hotels and restaurants will be conducted to evaluate the potential amount of oil to be disposed. A collection system will be defined accordingly. There shall be negotiation with the sugar factory so as to accommodate used cooking oil in their burners.

Estimated cost: Rs. 1.0 m including the purchase of a vehicle (duty free) to collect the used cooking oil. Others sources of funding will be sought from the sugar factory and hotels and restaurants.

Manpower: 1 coordinator-1 lab technical-1 trainee engineer (University)

Equipment: laboratory equipment- special equipment for injection of oil into the incinerator-storage tank.

Institutional support: W.W.A-Lab-Sugar factory

Time Frame:	Survey:	3 months
	Negotiation:	1 month
	Collection and disposal:	3 months
	Monitoring:	5 months
	Total:	1 year

Expected Results: To control and combat risks of pollutions either in the environment or in the sewer network. This project will also ensure the good running of the wastewater treatment plants.

Beneficiaries: The Waste Water Authority, sugar factories, hotels and restaurants and the environment.

WATER RESOURCES

IDENTIFICATION OF SUITABLE SITES FOR CREATION OF SUB-SURFACE RESERVOIRS

Objective

To identify sites that are geologically/hydrogeologically suitable for the creation of sub-surface reservoirs to store groundwater.

Background

Both Mauritius and Rodrigues Islands are of volcanic origin. The ancient lavas are impermeable whereas the recent flows are permeable and, therefore, water bearing. Due to steep slopes a substantial volume of groundwater finds its way to the sea unutilised. If a few sites could be located in the recent flows where the sides are formed of impermeable spurs converging towards the sea, the space between the two impermeable spurs could be plugged at suitable location (s) through piling and sub-surface reservoir(s) could be created. Such reservoir(s) would augment considerably the utilisable ground water resources potential.

Methodology

Geological/hydrogeological maps have already been prepared for Mauritius and Rodrigues. A critical study of these maps supported by further geological/hydrogeological investigations could lead to identification of suitable sites for the creation of sub-surface reservoirs.

Resource Requirements

Financial: About Rs. 3 million (Mauritius Island)

Manpower: WRU staff

Equipment: Available locally

Institutional Support:

Time Frame: 12 months

Expected Results: Identification of suitable sites for the creation of sub-surface reservoirs.

Beneficiaries: The creation of sub-surface reservoirs in Mauritius and Rodrigues could enhance considerably the utilisable groundwater potential and could go a long way towards tiding over the water resources scarcity problems especially during scanty rainfall periods or drought situations.

MAPPING THE WATER RESOURCES NETWORK ON A GEOGRAPHICAL INFORMATION SYSTEM.

Objectives

To bring all salient information linked to the Water Sector into a single database so as to provide a sound basis for decision making.

Background

Geographical Information System is a spatial database which is currently being applied in many countries, to all data which are spatial in nature. The Water Sector is such a field which is associated with information spatial in nature, i.e., having a location. Mapping these information will have two main contributions, the first one which is an interactive database that can be queried, updated and retrieved relatively quicker, and the second one is a management tool that can significantly help in decision-making.

Methodology

- Creating thematic layers for the following:
 - i. Water distribution network & consumer details;
 - ii. Location of boreholes;
 - iii. River Abstraction Points;
 - iv. Groundwater Fed systems (networks);
 - v. Surface Water & Groundwater fed systems;
 - vi. Boundaries of Aquifers; and
 - vii. River Networks.

- Analytical Scenarios
 - Database Queries
 - Decision Support

Resource Requirements

Financial:

Software	100,000
Specialised Computer	100,000
Resource Persons	260,000
Training Sessions (3)	120,000
Digital Database	<u>50,000</u>
TOTAL	630,000
	=====

Institutional Support: UOM, WRU, CWA, Ministry of Agriculture, IA

Time Frame: 1 year

Expected Results:

- Setting up of an interactive database for water sector that would provide relatively rapid information to specific queries.

Beneficiaries: Water Sector
Local inhabitants

DETERMINATION OF ENVIRONMENTAL FLOWS IN RIVERS AND STREAMS

Objective

To determine the minimum flows in our rivers and stream required to sustain our inland aquatic ecosystems.

Background

Population growth and increase in human activities industrial, agricultural, tourism development result in the necessity to mobilise more and more water resources to satisfy increase in water demands.

Uncontrolled water abstraction from the rivers/streams, may lead to degradation, if not destruction, of the inland aquatic ecosystems.

On the other hand, supply of more and more water leads to the generation of increasing volumes of waste waters that may also affect water quality and, therefore, adversely affect the aquatic ecosystems.

It is, therefore, considered essential to assess the water quality and quantity (flow rates) required to sustain these ecosystems.

Methodology

It is proposed to procure consultancy services for this Project.

The Consultants will, inter alia, be requested to:

- Carry out a thorough survey of the existing biodiversity;
- Establish the present water quality within the various aquatic ecosystems; and
- Determine the water quality and the minimum flow rate required to sustain the aquatic eco systems.

To limit the volume of work involved, it is envisaged to select about a dozen or so natural water courses (especially those across which dams are proposed) in the context of this First Phase of the study.

Resource Requirements

Financial: US \$ 120,000

Manpower: (Expt. Mm 12) - Consultant
Local Staff (Water Resources Unit, MOE, Ministry of Fisheries, National Parks Conservation Service

Equipment: Specific equipment, if any, will be identified by the Consultants

Institutional Support: WRU, UOM, MOE, Ministry of Fisheries, National Parks Conservation Service

Time Frame: 18 months

Expected Results:

- Prevailing water quality in rivers/streams selected for the study;
- Biodiversity census; and
- Water quality and quantity required to sustain inland aquatic ecosystems.

Beneficiaries: All economic sectors

IDENTIFYING GROUNDWATER FLOW PATHWAYS IN THE NORTHERN PLAINS, THROUGH ISOTOPIC TECHNIQUES.

Objectives

To identify the channel through which the groundwater recharge, from additional irrigation water of midlands Dam, will move, so as to capture it for domestic purposes.

Background

The hydrogeology of the Northern Plains have been studied since the late 1960's up to the most recently published study of FAC project 2000. Though a lot has been revealed as to the characteristics of this aquifer, much still remains unclear. This high degree of uncertainty is typical of hydrogeological studies of volcanic subsurface. Isotopic techniques and tracer studies have proved to be a method fairly reliable in volcanic medium, thus the basis for this study.

Methodology

- Monitor on a frequent basis groundwater levels in the Northern Plains Aquifer;
- Identify the type of isotope/tracer to be used in this particular geological setting which will bring about most reliable results;
- Carry out the tracer studies in a localised area where go recharge is expected to occur (from findings of past studies);
- Extend the study over the whole Northern Plains Aquifer if need be;
- Monitor the aquifer response with time during wet periods; and
- Identify regions which will be economically feasible for groundwater explanation after Midlands Dam is in operation.

Resource Requirements

Financial: (This study will need major inputs from experts from IAEA, hence the actual costing is yet to be finalised).

Expert Advise on Isotopic techniques
Resource Persons (at least 3)
Training Sessions
Specialised Tests & Equipment

Institutional Support: UOM, WRU, CWA, MoAgriculture, IA

Expected results:

- Locate zones which can be explained further once additional recharge comes from irrigation practice after Midlands dam comes into operation

Beneficiaries: Water Sector
Local inhabitants

USE OF SLOTTED LATERAL PIPES TO EXPLOIT GROUNDWATER IN SMALL ISLANDS (AGALÉGA)

Objectives

To evaluate the efficiency of lateral wells in small low sandy islands.

Background

Small islands are characterised by a lense of groundwater of good potable quality, resting on saline water. Pumping groundwater using the normal technique of drilling vertical wells, severely disturb the fresh/saline equilibrium, and consequently mixing of salt water in the extracted water.

Lateral wells are structured in such a way that the ground above the salt water is exploited without disturbing this interface. Fresh potable water can then be exploited for domestic uses.

Methodology

- Identification of sites appropriate for such study;
- Installation of a few slotted pipes;
- Extraction of the groundwater & monitoring of the salinity of water extracted over time; and
- Evaluate the productivity of such as exploitation system.

Resource Requirements

Financial:

• Transport (5 visits)	-	60,000
• Lateral, slotted pipes	-	200,000
• Pump	-	10,000
• Installation kit (shelter)	-	100,000
• Resource Person	-	<u>60,000</u>
		<u>430,000</u>

Manpower:

Equipment:

Institutional Support: UOM, CWA, WRU

Time Frame: 1 year

Expected Results:

- The economical aspect of lateral wells to groundwater exploitation in small wells, whether such system is recommendable; and
- Results if positive can be extended to Rodrigues to alleviate the water problems there.

Beneficiaries:

- Local inhabitants; and
- Water Authority.

IRRIGATION

EX-POST EVALUATION OF PUBLIC SECTOR IRRIGATION PROJECTS MANAGED BY IRRIGATION AUTHORITY.

Objectives

- To assess the social impact of irrigation facilities towards the upgrading of the standard of living of the beneficiaries;
- To assess the economic impact of irrigation on the beneficiaries and on the national economy; and
- To complement the technical evaluation of the targeted schemes.

Brief Background

The Irrigation Authority is operating 15 irrigation projects for the benefits of small, medium and large planters across the island. Some of them are nearing their economic life span. To-date, however, no Ex-post evaluation has been carried out to determine the extent to which these projects have addressed the needs of the planting community and met the Ex ante set objectives. The absence of updated Ex-post report justifies this proposal.

Methodology

Evaluation methods will consist of document review and key informant interviews and use of such tools as interview guides and survey questionnaire to organize and collect data for evaluation. The collected data will then be processed, analysed and presented in form of a report.

Resource Requirements

Financial: MUR 500 000

Manpower: Team leader (IRS), Research/field officer (1)

Equipment: Computer, software – SPSS

Institutional support: vehicle (driver), stationeries, one additional staff (preferably holder of a degree in Agriculture) will be required.

Time Frame: 1 year (may need to be extended)

Expected Results: The report will indicate whether the provision of irrigation facilities have been useful toward the betterment of the planting community and has had a positive contribution to the national economy. This applies to sugar cane, vegetables, food crops and cash crops production. More so, the report will also give an indication of any immediate works which need to be carried out in order to sustain the viability of the project.

Beneficiaries: Funding Agencies, MoA, Irrigation Authority and other stakeholders (Water Users Cooperative Societies, Water Users Association and Water Syndic).

USE OF HYDROGELS TO MINIMISE IRRIGATION WATER DEMAND FOR SHORT CYCLE CROPS IN RODRIGUES.

Objectives

To evaluate the extent to which hydrogels can help reducing amount of water used for irrigation purposes in semi arid regions.

Background

The island of Rodrigues has serious water scarcity problems and this severely handicap farmers. Hydrogels are polymers which have water absorptive properties combined with gradual reduction with time. Hydrogels would be effective in semi arid areas where rainfall is highly irregular. However, unless a study is carried out on the actual performance of hydrogels in a specific location for a specific crop, not much can be deduced as to their adaptability in a given condition.

Methodology

- Identify the different types of hydrogels currently available on the local market;
- Evaluate these different hydrogels with respect to properties, adaptability, care of use and cost, to identify the hydrogel(s) to be used for the study;
- Carry out actual field studies in Rodrigues with different crops and at different sites;
- Monitor and evaluate crop performance with regards to water demand; and
- Modify test plot if necessary for another crop cycle before concluding.

Resource Requirements

Financial:	Rs.
- Purchase of hydrogels	50,000
- Purchase of seedlings for crops	10,000
- Transport (3 visits)	45,000
- Resource Persons (Two in Rodrigues)	320,000
- Training Session for farmers	<u>20,000</u>
	<u>445,000</u>

Institutional Support: University of Mauritius
Water Resources Unit
Agricultural Research and Extension Unit
CWA

Time Frame: 1 Year

Expected Results:

- The extent to which hydrogels help to reduce irrigation water demand;
- To identify which hydrogel best suit a particular soil type/crop type; and
- Whether large-scale use of hydrogels would be recommendable for Rodrigues.

Beneficiaries: Farmers, Water Sector

RAIN WATER

PROMOTING APPROPRIATE TECHNOLOGIES FOR HARVESTING AND EFFICIENT UTILIZATION OF RAINWATER.

Objective

The project objective is to popularise appropriate technologies for household harvesting and efficient utilization of rainwater.

Background and justification

A significant volume of rainwater in Mauritius and Rodrigues goes unutilised because people are not having appropriate technologies for harvesting and storing the same. Reliance on readily available tap water has conditioned the people not to pay attention to the significant volume of water they could collect from their own roof tops during heavy rains. This is compounded by the relatively low prices for treated water from the CWA. The concept of gutter pipes and small-scale ponds once common in Mauritius has slowly been abandoned, and there is need to reintroduce some of the technologies to reduce wastage and make optimal use of rainwater. This problem is all the more acute in Rodrigues where year round availability of treated tapped water is not guaranteed. In Mauritius there is need for sensitising the population to pay much more attention to use every drop of water efficiently, and make optimal use of rainwater. Through radio talks, publications and video presentations the public can be educated to make use of these technologies in their own homes, and to pay special attention to introducing them in their design and construction of new buildings. There is need for introducing legislation to encourage and enforce new building designs to adopt such technologies.

Methodology

A desk study of available technologies for household rainwater harvesting and small ponds construction will be carried out with the assistance of students of the University of Mauritius. The results of this study will be published in brochure form and also made into a video film that can be shown on the TV so as to enhance public awareness on the efficient utilization of rainwater.

The potential social, economic and environmental impacts of such technologies will be analysed and published so as to educate the people.

Resources required

Financial: One hundred and fifty thousand rupees.

Institutional Support: WRU, UoM, CWA, Ministry of Local Government, Ministry for Rodrigues, Mauritius College of the Air.

Time Frame: One year

Expected Results: People will be much more sensitised to the need for better water collection and storage, and to utilize this precious resource very carefully. Brochures, and video films will be made available.

DETAILED OBJECTIVE ANALYSIS OF PRECIPITATION ACROSS RODRIGUES.

Objectives

Long-term planning for water storage and distribution.

Brief Background and Methodology

Rainfall data for Rodrigues are available. However, it is believed that there is a lack of consistency in time and space; this is mainly due to significant volume of missing values at various stations.

The most representative records are from Pointe Canon and Plaines Corail. In order to make better use of precipitation data for water resources issues, it is proposed to re-compile all available data and develop empirical, but scientifically sound, methods of analysis.

Resource Requirements

Financial: Rs. 150 000

Manpower: University students and a resource person.

Equipment PC based

Institutional Support: MRC; Meteorological Services; University of Mauritius.

Time Frame: 10 to 15 months.

Expected Results: Temporal and spatial rainfall mapping for Rodrigues, for use in water resources management.

ANALYSIS OF PRECIPITATION OVER AGALÉGA WITH A VIEW TO DESIGNING AN OPTIMAL WATER DISTRIBUTION NETWORK.

Objectives

Long-term planning for water storage and distribution at Agaléga.

Brief Background and Methodology

At present there is no water distribution network at Agaléga. Rain is the only source of water. Since recently, activities on the island have been gradually increasing. In order to avoid undesirable future impacts on the environment, a well-designed water distribution system would be appropriate.

The major aim in this proposal is to carefully examine the water potential of the Island. The methodology proposed is the temporal and spatial analysis of rainfall variation.

Resource Requirements

Financial: Rs. 150 000

Manpower: University students and a resource person.

Equipment: PC based

Institutional Support: MRC; Meteorological Services; University of Mauritius.

Time Frame: 10 to 15 months.

Expected Results: Temporal and spatial rainfall mapping for Agaléga, for use in water resources management.

CLIMATE AND CLIMATE CHANGE – DIRECT AND INDIRECT IMPACTS ON WATER RESOURCES IN MAURITIUS AND ITS OUTER ISLANDS.

Objectives

Long-term planning for water storage and distribution.

Brief Background

The only source of water on Island States is precipitation. Precipitation is largely controlled by broad-scale circulation as well as local effects. There has been increasing evidence that, due to climate change, large-scale circulation patterns may change; also fluctuations between extreme circulation patterns cannot be discarded.

The present proposal aims at investigating the likely repercussions of projected climate trends on long-term rainfall.

Methodology

- Compile long-term rainfall statistics, on island and regional scales;
- Select a few Rainfall Simulation Models (UK, ECMWF, USA);
- Tune models and examine behaviour with respect to actual data; and
- Introduce projected climate-scale changes and analyse results.

Resource Requirements

Financial: Rs. 150 000

Manpower: University students and a resource person.

Equipment: PC based

Institutional Support: MRC; Meteorological Services; University of Mauritius.

Expected Results: Rainfall patterns under various projected climate scenarios.

Time Frame: 10 to 15 months.

PUBLIC AWARENESS AND INFORMATION CAMPAIGN

AWARENESS CAMPAIGN TO WATER RESOURCES CONSERVATION & PROTECTION

Objectives

To educate students in water resources conservation and protection, through active participation.

Background

Best approach is to educate the younger generation and get them to cultivate a different habit and attitude to water problems.

The target groups are students at primary, secondary and tertiary levels. Presently students do not take an active part in water resources problems and this needs to be look into. Unless students actively participate we will not get much feedback and concern from them.

Methodology

- Initially surveys will be carried out to get to know to what extent the students are aware of the need for conserving and protecting water resources.
- The next step will be to organise a series of talks at selected institutions with a view to create awareness.
- This will be followed with video session to show students why water needs protection, and what is being done in other countries.
- Depending upon the level of students the following will be organised:
 - ❖ Poster competition (Primary Level);
 - ❖ Quiz competition (Secondary Level); and
 - ❖ Project Competition & Presentation (Secondary & Tertiary Level)

Resource Requirements

Financial:

	Rs.
• Resource Persons to organise the activities	320,000
• Transport Facilities	25,000
• Videos to be purchased	100,000
• Video to be made on local water resource issues	100,000
• Incentives & Prizes to be given to students	<u>200,000</u>
	<u>745,000</u>

Institutional Support: UOM in collaboration with Representatives from different Ministries (WRU, WWA, MoE, CWA)

Time Frame: 2 years

Expected Results:

- i. Get to know how the younger generation perceives their responsibility in the society with regards to the environment;
- ii. Identify the best approach to bring about a change in the attitude of youngsters to environmental protection; and
- iii. To ensure that the protection and conservation issue is not an issue to be considered only in drastic situation, but more of a usual habit.

Beneficiaries: The various sectors

SETTING UP OF A FORUM FOR STAKEHOLDERS IN THE WATER SECTOR

Objectives

To bring scientists and Engineers, working in the field of water resources, together so as to share their experiences and express their needs for studying and implementing particular projects or issues.

Background

In Mauritius, the World Water Day (March) is probably the only yearly event where all those working in the field of water resources meet and discuss about a number of issues. There is no local Water Resources Society yet where such issues could be raised and expressed in the form of official documents and publications.

Methodology

- Organise half day seminar/workshop to present the idea and to brain storm about how to go about the set up;
- Officially set up this technical forum; and
- Launching of this forum via a conference.

Resource Requirements

Financial:

	Rs.
Secretarial Services	40,000
Half Day Workshop	50,000
Setting up of the Society	20,000
Launching/Conference	150,000
Bimonthly Meetings	<u>15,000</u>
	<u>275,000</u>

Institutional Support: UOM in collaboration with Representatives from different Ministries (WRU, WWA, MoE, CWA)

Time Frame: 1 year

Beneficiaries: All those working in the field of Water Resources

CONTRIBUTION OF WOMEN IN WATER CONSERVATION AT DOMESTIC LEVEL.

Objectives

Educate women in the different ways that they could adopt and consequently influence other family members to adopt, so as to reduce on water consumption at domestic level.

Background

Having been provided with good quality and referable quantity of water most of the time, most probably we Mauritians we have adapted a careless attitude towards use of water. Nowadays with an increase in population size, the shortage of water is already being felt. We now not only need to use water with care but to optimise the use of water. Reducing water demand at user level is a currently encouraged practice in many countries.

Methodology

- Organise talks and video sessions at Women Centres to make them aware of the need and on how to go about conserving water;
- To select a number of households of different size and different activities (through surveys);
- To educate these people on how to reduce water consumption;
- To provide facilities such as rainwater harvesters and storage tanks to encourage the practice; and
- Monitor of the impacts of these studies through water bills.

Resource Requirements

Financial:

Storage Tanks	200,000
Rain Harvesters	200,000
Surveys	50,000
Talks/Videos	50,000
Resource Persons	<u>320,000</u>
	<u>820,000</u>

Institutional Support: UOM, WRU, CWA, WOMEN CENTRES & relevant Ministry

Time Frame: 1 Year

Beneficiaries: Water Sector & Public

ANNEXURE 2

(a) List of Completed Projects

WATER RESOURCES UNIT (Ministry of Public Utilities)

Hydro Graphic Survey of Four Impounding Reservoirs

A Hydrographic Survey of four of the impounding reservoirs in Mauritius, namely Mare aux Vacoas, La Nicolière, Piton du Milieu and La Ferme, was carried out in 1997. The Study has enabled an accurate determination of the live storage capacity and the dead storage for each of the reservoirs surveyed.

It was also found that annual loss of storage due to sedimentation ranges from 0.02 to 0.07%, a rate judged much lower to that of similar reservoirs elsewhere in the world.

Safety Analysis of Dams

To maximise benefits from existing water resources infrastructure, a Safety Analysis of Dams Study was carried out during the period 1997 to 2000.

The following six dams, including their appurtenant works, were studied: Mare aux Vacoas, La Nicolière, Piton du Milieu, La Ferme, Mare Longue and the Municipal Dyke.

All rehabilitation works have been identified and are being undertaken on a priority basis.

Island-wide Geological / Hydrogeological Study (Mauritius & Rodrigues)

A 4-yr island-wide geological / hydrogeological study was completed in 1999, for both the Islands of Mauritius and Rodrigues.

This Study has led to the preparation and publication of a geological / hydrogeological map of Mauritius and of Rodrigues.

In addition, the Study has permitted a better definition and understanding of

- (a) The overall geology;
- (b) The aquifer boundaries and potential;
- (c) Direction of groundwater flow; and
- (d) Risks to the groundwater resources, of the 2 islands.

CENTRAL WATER AUTHORITY

Project No.	1	2	3
Title	Master Plan Study on Water Resources of Mauritius	Ground and surface water contamination by herbicides residues	Fertilizers Studies and Research
Brief Objectives /Outcome			
Institution	CWA	CWA/MSIRI	CWA and Min. of Agriculture
Type Of Project	Study	Research Project	Research Project
Funding	Fonds D'aide et de Cooperation (French Cooperation)	Funded by MRC	By World Bank
Human Resources	French Expert + CWA Staff	Ng Kee Kwong, MSIRI G. Umrit, MSIRI M. Nowbutsing, MSIRI A. K. Gopaul, CWA	Min. of Agriculture/CWA
Infrastructure	-	HPLC	Spectrophotometer
Status	1987 – 1991	Completed in 1999	1995 – 1997
Recommendations/ Actions	Conclusions & Recommendation submitted in a separate report in March 1991	Level of pesticide was within permissible limit for drinking water	Level of Nitrate was well < permissible limit for drinking water. In some places, level was high.

UNIVERSITY OF MAURITIUS (FACULTY OF ENGINEERING)

#	TITLE	BRIEF OBJECTIVES / OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS / ACTIONS
1	Seepage of water through soil.	To study seepage in/through soils using a seepage tank and to determine seepage losses under sheet piles and through dams. Results are satisfactory, as theoretical and measurements on the tank tally.	UOM M/DIS TA710.IC6	Dip. Build.&Civil Eng.		Kong Kam Wah, N.K. / E. James		May-75	Satisfactory results obtained from seepage tank, but improvements required.
2	Industrial pollution in Mauritius.	To study the effects of industrial pollutants on health and the environment. Management of polluting organisations appear to neglect environmental aspects.	UOM M/DIS TD174.W6	Dip. Build.&Civil Eng.		Wong Sin Wai, G.S. / S. Ramphul & Hossenmamo de		May-75	Pollution problem in streams has not yet reached an alarming status but treatment is still required; filters are also required on chimney stacks.
3	Compound weir discharge.	To investigate the relationship between upstream water level and discharge for a compound weir owned by the CWA found on River Cascade, Reduit.	UOM M/DIS TD553.Y4	Dip. Build.&Civil Eng.		Yeung Chin Shing, C.F. / M. Allybokus		Jan-81	The values recorded by the CWA are unreliable, especially for large flow rates.
4	Sewage and sewerage disposal in Mauritius.	To investigate existing and future development in sewerage and sewage disposal in Mauritius.	UOM M/DIS TD643.L5	Dip. Build.&Civil Eng.		Li Tien Chong, A.C. / M. Allybokus		May-81	Need for upgrading of wastewater disposal facilities and sanitation.
5	Optimising flow on La Nicoliere feeder channel at Bois Clair diversion weir.	To investigate the amount of water lost at Bois Clair diversion weir using a FORTRAN IV-based program to simulate the losses, and to suggest means to remedy the situation.	UOM M/DIS TC119.M30 51	B. Tech. Civil		Oomur, M.R.S. / A. Parfait & B.K. Baguant		May-82	Design of a new flume to increase flow into La Nicoliere by 0.34 cumec.

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6	Study of the St. Martin sewage treatment plant and its effect on the environment.	To assess the efficiency of the treatment plant, characterise the wastewater and propose improvement options for the existing system.	UOM M/DIS TD639.M3G 6	B. Tech. Civil		Goburdhone, S. / K. Jayaram, M. Allybokus & R. Laloo		May-87	To include a flow-measuring structure at the treatment plant, put the existing oxidation ponds to effective use and use effluent for irrigation.
7	Modelling of the Curepipe aquifer.	To detail the steps involved in mathematical modelling of groundwater basins by setting up a numerical model of the Curepipe aquifer using the multiple cell method.	UOM M/DIS TD434.L8	B. Tech. Civil		Ramroop, K. / A. Chan Chim Yuk		May-87	Problems expected in computation due to excessively high hydraulic gradients, but these may be remedied by the use of a network of finer mesh for modelling.
8	Major health problem at l'Esperance village and its solution.	To carry out a survey in l'Esperance to identify the source of health problem and propose a solution. Inadequate water supplies causes water-shortage related health problems.	UOM M/DIS TD920.B3	Dip. Publ. Health Eng.		Bothma, D.J.C. / M. Allybokus		Jun-88	Increasing the number of water supply hours to improve level of sanitation.
9	Improvement of water supply in l'Esperance village.	To carry out an assessment of the environmental health problems and needs in the community to propose solutions. Scabies, a water-wash disease, is prevalent in the community.	UOM M/DIS TD927.N51	Dip. Publ. Health Eng.		Njagi-Nkonge, A. / M. Allybokus		Jun-88	Scabies can be eradicated in the community by increasing water supplies and an effective health education.

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10	Water treatment system design.	To design a complete water treatment plant system for a population of 20 000 for a period of 20 years.	UOM M/DIS TD745.V8	Dip. Publ. Health Eng.		Vytelingum, S. / K. Jayaram & M. Allybokus		May-89	2 alternatives proposed: one consists of coagulation / flocculation units, sedimentation tanks, rapid sand filters and a disinfection unit; the other option is to use slow sand filters followed by disinfection.
11	Design of a wastewater treatment plant.	Description of conventional wastewater treatment systems, with emphasis on waste stabilisation ponds and trickling filters.	UOM M/DIS TD745.O8	Dip. Publ. Health Eng.		Otai-Okimait, J.J / M. Allybokus		Jun-89	Recommendation: use of ponds (trickling filters as an alternative) for treatment needs of a projected population of 29 000.
12	Design of a wastewater treatment plant.	Description of conventional unit processes in wastewater treatment.	UOM M/DIS TD745.C6M 5	Dip. Publ. Health Eng.		Muwangala, C. / M. Allybokus		Jun-89	A treatment plant consisting of a screen, a grit chamber, primary and secondary basins and a trickling filter, supported by a brief study of cost implications, and operation and maintenance requirements.
13	The role of waste stabilisation ponds in wastewater reuse.	Study of the characteristics (hydraulic and organic) of a domestic wastewater and survey of existing wastewater treatment techniques.	UOM M/DIS TD745.K5	Dip. Publ. Health Eng.		Milonzo, J.M. / M. Allybokus		Jun-90	A treatment plant making use of stabilisation ponds, and possible reuse of the final effluent in agriculture.
14	Water supply project for a small rural community.	Investigation of means of tapping groundwater and the subsequent treatment facilities (with the associated equipment) for a water treatment plant to cater for a population of 2 000 people.	UOM M/DIS TD927.M81	Dip. Publ. Health Eng.		Mukono, S. / M. Allybokus		Jun-90	

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15	Project on water supply for a small community.	Hydraulic design of appurtenances for a water treatment plant to supply a projected population of 41 000.	UOM M/DIS TD927.M8	Dip. Publ. Health Eng.		Muhwezi Rwasande, L. / M. Allybokus		Jun-90	Unit operations considered are screens, an aeration unit, a plain sedimentation tank, rapid sand filters and a clear water reservoir.
16	The role of waste stabilisation ponds in wastewater reuse.	Characterisation of domestic wastewater and removal of pathogens by waste stabilisation ponds, and planning and management of reuse programs.	UOM M/DIS TD745.T3	Dip. Publ. Health Eng.		Taulo, S. / M. Allybokus		Jun-90	Use of waste stabilisation ponds as treatment for removal of pathogens and effectiveness can be increased by the use of several maturation ponds.
17	Provision of water supply to a small community.	Hydraulic design of unit operations for a water treatment plant for a population of 20 000.	UOM M/DIS TD927.G6	Dip. Publ. Health Eng.		Goolaub, D. / M. Allybokus		Jun-90	A water treatment plant consisting of a flocculation basin, sedimentation tanks and a rapid sand filter.
18	Appraisal of slow sand filtration in Mauritius.	An assessment of the relative merits of using new sand against the option of using washed dirty filter sand; to compare the respective performance of rocksand with respect to coral sand in slow sand filters.	UOM M/DIS TD445.B5	B. Tech. Civil		Bissessur, M.F. / M. Allybokus		Apr-92	Rock sand can be used as a substitute for coral sand in slow sand filters; however, disinfection needs to be more stringent.
19	Colour removal from dye-house effluents.	Investigation of the optimum dose of coagulant (lime and alum) and a commercially available polyelectrolyte (cholfloc 3915), and the optimum pH at which maximum coagulation can be achieved. Colour removal by chlorine is also studied.	UOM M/DIS TP893.L65	B. Tech. Textile		Lollmun, C.		Mar-93	Use of polyelectrolyte will be expensive; limited efficiency of colour removal by chlorine.
20	Design of a trunk main to supply MTMD Sugar Estate with water.	Case study: investigation of means of replacing, by an appropriate pipeline, the existing conveyance of water made by an open channel of 6km from La Chaux river to Mon Tresor Mon Desert Sugar Estate.	UOM M/DIS TC409.R3	B. Tech. Mech.		Raghoonandan, I.		Mar-94	An economic analysis of the proposed pipeline material, layout and implementation is carried out: Project is feasible.

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21	Implementation of a photovoltaic pump for small-scale irrigation in Mauritius.	To show the potential of exploiting solar energy by proposing a photovoltaic pump with a power rating that is sufficient for irrigation equipment and the possible location of such a project.	UOM M/DIS TC927.K38	B. Tech. Mech.		Kaully, G.R. / J. Gukhool		Apr-94	Photovoltaic pump is restricted to a low power rating, hence suitable for small-scale projects requiring low pressures and flow rates. Optimisation by the use of a storage tank is feasible and advantageous in terms of reliability and effectiveness.
22	Automation of effluent system at Reunion Manufacturing Ltd.	Design and development of a control system for enabling an efficient and effective functioning of the plant effluent system that has improved reliability and minimum human intervention.	UOM M/DIS TD897.5.V4	B. Tech. Mech.		Vencataya, L. / O.P. Seejore		Apr-94	Treatment of effluent can be ensured by keeping temperatures down below 35 degrees Celsius; this can be done by incorporating a cooling tower for effluents before treatment.
23	Performance evaluation of lab-scale waste stabilisation ponds in the treatment of a synthetic textile wastewater.	To study the treatment efficiency of a synthetic coloured textile wastewater by model waste stabilisation ponds. The pond system for treatment of wastes is efficient.	UOM M/DIS TD899.T4G 6	B. Tech. Civil		Gopaldu, P. / M. Allybokus		Aug-94	Algal-bacterial ecosystem living in the test ponds showed potential for removing pollutants from the waste. The facultative ponding system was shown to be feasible.
24	Groundwater modelling - Curepipe aquifer	To simulate groundwater movement of the Curepipe aquifer using a 2-D, single layer steady state numerical model (FLOWPATH software)	UOM M/DIS TD40.B45	B. Tech. Civil		Bhagirutty, L. / M. Nowbuth		Mar-95	To set up a more reliable 3-D model due to heterogeneous nature of geologic formations; regular updating of database at CWA for a better estimate of transmissivity.

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25	Conceptual modelling of the Northern aquifer	To determine the parameters governing ground water flow in Mauritius, using geological and hydrological maps, and analysis of corehole logs for building a groundwater flow model	UOM M/DIS TD403.M6	B. Tech. Civil		Moonoosamy, D. / M. Nowbuth		Mar-95	Model can be used to set up a mathematical model to predict aquifer behaviour under various stress scenarii in one simple situation.
26	A study of dyewaste treatment using anaerobic-aerobic process.	Treatment of a dyehouse waste using an UASB (Upflow Anaerobic Sludge Blanket) reactor and a conventional activated sludge process.	UOM M/DIS TD899.D9R3	B. Tech. Civil		Ramchurn, R.P. / M. Allybokus		Mar-95	Efficiency (75% COD removal and 55% colour reduction) insufficient for compliance with statutory discharge limits: efficiency to be improved.
27	A study of dyewaste treatment using anaerobic- aerobic process.	Treatment of a dyehouse waste using an UASB (Upflow Anaerobic Sludge Blanket) reactor and a conventional activated sludge process.	UOM M/DIS TD899.D9S4	B. Tech. Civil		Seeburrun, G. / M. Allybokus		Mar-95	UASB is an efficient and economic technology for dyewaste treatment; improvement still possible.
28	Pilot scale investigation of a high-rate anaerobic treatment system for wastewater at Rose Belle sugar factory.	To assess and demonstrate the feasibility of anaerobic treatment of sugarmill waste, as well as energy recovery benefitted. 80-90% COD removal attained and 0.25 cubic metres of methane per kg of COD recovered.	UOM M/DIS TD755.C3	B. Tech. Mech.		Catacoopen, J.P.C.C. / L. Seebaluck		Mar-95	To add a dissolved air flotation unit for oil/grease removal and implementation of a full-scale anaerobic treatment plant.

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29	Environmental auditing of a cane sugar factory: case study at Mon Tresor Mon Desert sugar estate.	To identify the ways in which the sugar factory impacts on the environment with a view to reduce waste generation and propose reuse/recycle options. Need for an oil/grease separator at milling tandems and re-design of fly-ash remover.	UOM M/DIS TD194.7.C6	B. Tech. Sugar Eng.		Courteau, C. / T. Ramjeawon		Mar-95	To increase awareness of management on existing legal framework and point out focus areas to work towards environmental compliance.
30	Preliminary studies of sugarmill wastewater treatment using water hyacinth (<i>Eichornia crassipes</i>)	To rate the removal of organic matter from wastewater effluents of Bel Ombre S.E. Proposed solution is efficient, but problems are expected to arise during shutdown periods.	UOM M/DIS TD898.S8F 4	B. Tech. Sugar Eng.		Francis, J.N. / R. Sooknah & / R. Panray		Mar-95	A water survey at the factory would help in the design of the wastewater treatment plant.
31	Wastewater management in a cane sugar factory: a case study of comparison of treatment technologies at Constance S.E.	To perform a wastewater audit inside the factory and compare various alternatives of wastewater treatment.	UOM M/DIS TD899.S3T 3	B. Tech. Sugar Eng.		Tailly, J-E.M. / T. Ramjeawon		Mar-95	Treatment system to include a spray pond, anaerobic treatment (anaerobic pond and UASB reactor) and polishing by aerobic pond before disposal by direct application for infiltration or irrigation.

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32	Preliminary studies of sugarmill wastewater treatment using water hyacinth (<i>Eichornia crassipes</i>)	Study of treatment of sugarmill wastewater using water hyacinths over 21-day periods. Treatment efficiency is satisfactory, but primary sedimentation tank is required.	UOM M/DIS TD899.S84 6	B. Tech. Sugar Eng.		Loyeung, Y.K.B. / R.D. Sooknah		Mar-95	Further investigation in shape factors and hydraulic design of the reactors is required.
33	Use of waste stabilisation pond systems for treatment of cane sugar factory wastewaters in Mauritius.	To assess the performance of waste stabilisation pond systems for the treatment of sugarmill effluent by investigating actual ponds and comparing to a 175TCH model factory to achieve standards for discharge.	UOM M/DIS TD899.S8C 45	B. Tech. Sugar Eng.		Chengebroye n, S. / T. Ramjeawon		Mar-95	Failure of existing pond systems is due to inadequate buffering capacity. Evaluation of full-scale systems should concentrate on integration with agricultural or aquacultural programmes.
34	Comparison of the water supply systems and components of water demand for a wet and dry industry	Comparison of the various types of water sources and their uses in a wet industry (dye house) and a dry industry (sewing factory) for the textile industry.	UOM M/DIS TD353.K45	Dip. Build.&Civil Eng.		Khodabacus, R. / V. Proag		Mar-95	New way of assessing water consumption based on production, not on number of employees.

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35	Comparison of the water supply systems and components of water demand for a wet and dry industry	Comparison of the various types of water sources and their uses in a wet industry (dye house) and a dry industry (sewing factory).	UOM M/DIS TD353.K5	Dip. Build.&Civil Eng.		Kinnoo, V. / Proag, V.		Mar-95	Specific ways of calculating water consumption for wet and dry industries and steam recycling to be adopted for boilers.
36	Design of a wastewater treatment plant.	To propose a treatment plant based on trickling filters, activated sludge process and wastewater stabilisation ponds as alternatives. Study incorporates structural design of main elements of treatment.	UOM M/DIS TD745.K3	Dip. Publ. Health Eng.		Kariuki, J.G. / M. Allybokus		Mar-95	Use of a system based on trickling filters is recommended.
37	Environmental auditing of a textile dyeing factory.	To make an environmental audit with a view to detect inefficiencies and reduce wastes.	UOM M/DIS TD194.7.L4	?		Le Brette, C.P.N. / T. Ramjeawon & M. Allybokus		Apr-95	Good house-keeping practices, reuse of 2nd and 3rd rinse waters, optimisation of chemical usage and modifications on equipment and processes, separation of wastes for a reduction in installation and running costs of treatment.
38	Integrated management of cane-sugar factory wastewaters in Mauritius using the Upflow Anaerobic Sludge Blanket (UASB) process.	To characterise sugarmill wastewaters, identify cleaner production opportunities and assess the applicability of UASB reactors for the treatment of such wastes. Water demand is between 2 to 16 times the weight of processed cane; this can be reduced by recycling; cost of wastewater treatment is principally in providing high alkalinity requirements.	UOM M/DIS TD899.S8R 3	Ph.D.		Ramjeawon, T. / J. Baguant		Sep-95	Construction of an industrial scale pilot plant for future research on operational parameters.

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39	Efficiency of water use in irrigation in Mauritius.	To assess claims of planters that dry periods affect sugar cane yield negatively and the common belief that yield in the North is low. The yield in the North is only 8% lower than the island mean, and despite droughts, yield remains almost constant.	UOM M/DIS TC805.S8	B. Tech. Civil		Sunkur, S. / V. Proag		Mar-96	Financial analysis by discounted cash flow technique shows that irrigation projects are not viable.
40	Desalination plant at the CEB of Port Mathurin thermal power station.	Assessment of viability of installing an 'Alpha-Laval' desalination plant. Overall cost would be Rs 8.6M.	UOM M/DIS TD479.G6	B. Tech. MECH.		Gokulsing, K.R.S.P. / O.P. Seejore		Mar-96	Two alternatives: selling bottled water at Rs 3.50 per litre, or selling the water at Rs 20 per cubic metre to CWA with a payback period oscillating between 0.5 and 1.7 years.
41	Environmental auditing of a textile dyeing factory.	To use environmental auditing to establish means of achieving cleaner production at a dyehouse and improving operational efficiency of the wastewater treatment plant.	UOM M/DIS TD194.7.P8	B. Tech. Civil		Puran, J-M. / T. Ramjeawon & M. Allybokus		Mar-96	Clean production techniques have to be applied together with improvement in house-keeping, reduction in wastewater generation and decrease in effluent strength.
42	Water quality modelling along GRNW.	To produce a tool with the capability of simulating the behaviour of river water quality and predicting the response of the parameters from upstream data using a computational model QUAL2. For all streams tested, model and observations tally.	UOM M/DIS TD365.V5	B. Tech. Civil		Victor, E.P. / V. Proag		Mar-96	Modifications to the model are needed in order to improve the accuracy.
43	Rainfall / flow estimation.	Use of frequency distributions to estimate and forecast rainfall and the subsequent generation of river flow, and determine the potential of using that river for storage. The method is useful and efficient.	UOM M/DIS QC925.6.M 3S4	B. Eng. Civil		Seevathean, N. / V. Proag		Mar-97	The method can be used to forecast rainfall for each monthly or annual mean; for flow predictions, more sets of stations need to be analysed.

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44	Frequency analysis of river flow.	Using 20-year data for Riviere du Poste to predict discharge in the river, and the probability of occurrence for the near future. Frequency analysis shows that 0.14L/s will always occur in the river.	UOM M/DIS TC175.L4	B. Eng. Civil		Lecordier, J. F. / V. Proag		Mar-97	The probability distribution method is more reliable than the relative frequency method.
45	Constraints of achieving a piped water supply level of service in a black spot area of Mauritius and environmental health impact assessment.	To determine the reasons behind the deficiency of a piped water supply, identify constraints, and recommend strategies for improving level of service.	UOM M/DIS TD482.P4 FOE80	B. Eng. Civil		Permala, R. / T. Ramjeawon		Mar-97	Design of a new pipeline to meet demand of population, rain water harvesting, protection of springs from contamination and improvement of sanitation systems.
46	Comparison of the biodegradability of common wastewaters in Mauritius.	To compare biodegradability of wastewaters of textile and industry with that of domestic origin and to assess the feasibility of biological treatment on them.	UOM M/DIS TD745.C3	B. Eng. Civil		Cadersa, A.S. / M. Allybokus		Mar-97	Sugarmill waste is readily biodegradable, but not textile waste due to high inert organics content that remains unaltered despite biological treatment.
47	Effluent treatment in two Mauritian dyehouses.	To study the generation of wastes from two unsewered dyehouses and suggest ways of improving the effluent quality of the treatment plant. Water consumption can be reduced.	UOM M/DIS TD899.T4H 4	B. Tech. Textile Tech.		Heeramun, J. / S. Rosunee		Mar-97	Process water economy and process/equipment modification required to reduce waste generation. Process modification in the treatment plant required for improving efficiency.
48	Statistical analysis of rainfall.	To find a suitable method of analysing rainfall using continuous data analysis over 20 years for Mauritius. The moving average technique and the frequency function worked for Arnaud station.	UOM M/DIS QC925.B6	Dip. Build.&Civil Eng.		Boyaram, G. / V. Proag		Mar-97	The two techniques could be extended to other stations for forecasting rainfall amounts.

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49	Influence of soil characteristics on the design of on-site sanitation systems.	To design an underground sanitation system involving a septic tank discharging its effluent to a soakaway / dispersion trench.	UOM M/DIS TD760.J6	Dip. Build.&Civil Eng.		Joomun, F.U. / M. Allybokus		Mar-97	Provision of adequate ventilation for the septic tank and regular maintenance required.
50	Influence of soil characteristics on the design of on-site sanitation systems.	To design an underground sanitation system involving a septic tank discharging its effluent to a soakaway / dispersion trench.	UOM M/DIS TD760.N3	Dip. Build.&Civil Eng.		Naga, S.D. / M. Allybokus		Mar-97	Regular maintenance required.
51	Rainfall analysis using Fourier series.	To use a mathematical approach (the Fourier series) to study rainfall data in an attempt to find trends and forecast rainfall events in the near future. The Fourier series was unsuccessfully used to predict total weekly rainfall values despite good correlation values.	UOM M/DIS QC926.2.L6	B. Eng. Civil		Lolljee, L.P. / V. Proag		Mar-98	Despite good correlation values, method is not accurate enough for use.
52	Water requirements in irrigation.	To identify crop water deficits for Bel Ombre SE and estimate risk associated with an irrigation project. Use of VisualBASIC for application combined with basic MS-EXCEL for predicting irrigation requirements.	UOM M/DIS TC809.S8	B. Eng. Civil		Samputh, A. / V. Proag		Mar-98	From a botanical point of view, irrigation is needed. Despite expected increase in yield, financial analysis shows that associated risks are too high to make an irrigation project worthwhile.
53	Water quality modelling along a river receiving a point source of organic discharge.	To assess the impact of a sugar cane factory effluent on receiving water quality and to model the impact using a computer model QUAL2E. After calibration, a good correlation between actual and predicted values was obtained.	UOM M/DIS TD367.H3	B. Eng. Civil		Hassarup, R. / T. Ramjeawon		Mar-98	The model has a high prediction accuracy (70%) and can be used for predicting river water quality under given ambient conditions.

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54	Assessment of the treatability of selected industrial wastewaters.	Study of wastewaters from sugar, textile and chemical (paint factory) plants, and to assess their respective degradability and detect the presence of inhibitors. The only readily biodegradable waste is the sugarmill waste.	UOM M/DIS TD755.D6	B. Eng. Civil		Doosoye, K.L. / M. Allybokus		Mar-98	Textile wastes need higher COD removal, while chemical wastes require advanced treatment before meeting effluents discharge limits.
55	Use of aquatic plants for wastewater treatment.	An investigation on the performance of an aquatic plant (water hyacinth) to treat synthetic sugarmill waste. Good COD removal efficiency observed.	UOM M/DIS TD755.M4	B. Eng. Civil		Meethoo, M.S. / M. Allybokus		Mar-98	Greater removal efficiency can be achieved by using an algal pond before a hyacinth basin.
56	Design and operation of a laboratory scale ABR (Anaerobic Baffled Reactor) treating a synthetic sucrose feed.	To construct a model ABR and assess stability of treatment during shock loads after start-up and operation. Lab model is efficient and withstands shock loads reasonably.	UOM M/DIS TD897.5.C3	B. Eng. Civil		Caullychurn, M. / T. Ramjeawon		Mar-98	Further research required on a full-scale model, especially to determine the behaviour of the reactor during seasonal and intermittent operation.
57	Start-up and operation of an Upflow Anaerobic Sludge Blanket (UASB) reactor using a synthetic sucrose feed solution.	To study the behaviour of a model 2-phase system (an acidification reactor/storage tank and a 10L UASB pilot plant under feeding with synthetic sucrose. System is reliable under steady state conditions, but not under hydraulic shock loads.	UOM M/DIS TD899.S82 3	B. Eng. Civil		Ramdhony, R.R. / T. Ramjeawon		Mar-98	Using a buffer tank together with the UASB reactor may be relevant as a treatment option for sugarmill wastewater.

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58	Highway drainage system.	To review design methods for highway drainage systems and hydrologic data to design a drainage system for a region in Rose Hill.	UOM M/DIS TE215.V3	B. Eng. Civil		Valayden, V. / U. Armoogum		Mar-98	Hydraulic design of a drainage system with a disposal system consisting of a connection to a collection reservoir.
59	In-situ determination of soil permeability using Guelph permeameter.	To determine the range of application of the Guelph permeameter in the local context.	UOM M/DIS TA710.M4	Dip. Build.&Civil Eng.		Meenowa, V. / A. Chan Chim Yuk		Mar-98	The Guelph permeameter should not be used in neither water-logged soils nor for soils of high permeability.
60	Statistical analysis of river flow and rainfall.	Analysis of rainfall data and river discharge to find trends and patterns using the moving average technique and use results to forecast rainfall and river discharge values. Weekly and monthly average rainfall can be forecast with this method.	UOM M/DIS TC175.J45	Dip. Build.&Civil Eng.		Jhotty, / V. Proag		Mar-98	Upon comparison with actual rainfall data, the moving average technique seems to be a good method of forecasting weekly and monthly average rainfall values.
61	Wastewater management strategy for a housing estate.	To propose a wastewater disposal system for a housing estate: problem of high water table makes it impossible for soakaways to drain septic tank effluent. Solution includes hydraulic design of primary and secondary treatment.	UOM M/DIS TD743.K45	Dip. Build.&Civil Eng.		Khodabakus, M.N. / M. Allybokus		Mar-98	Installation of grease traps at each individual housing unit, flow measuring devices and constant monitoring of effluent from treatment plant.
62	Choice of an appropriate on-site wastewater disposal system.	To review existing on-site sanitation systems and propose new designs.	UOM M/DIS TD745.S4	B. Eng. Civil		Sew Chung Hong, G.M.K.C / K. Jayaraman & / M. Allybokus		May-98	To eliminate the practice of open defecation and increase education to improve sanitation standards in the country.

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63	Rainfall / runoff correlation for a given catchment.	To obtain the influence of catchment characteristics on the amount of runoff and use the Basic Hydrology System to simulate the response of a real catchment. Due to complexity of rainfall/runoff process, no general formula achieved.	UOM M/DIS QC924.7.D3	B. Eng. Civil		Darmalingum, D / M. Nowbuth		Mar-99	The influence of other parameters in the rainfall/runoff process need to be studied.
64	Investigating the influence of the properties of the subsurface medium on seepage flow.	To investigate the parameters that influence seepage flow and devise ways of controlling or reducing seepage. The seepage tank provides a good means of verifying equations governing seepage flow.	UOM M/DIS TC176.L8	B. Eng. Civil		Lutchmiah, B.K. / M. Nowbuth	Seepage tank apparatus.	Mar-99	Use of double sheet pile walls can reduce seepage drastically, and experiments can be refined by the use of finite element methods.
65	Multi-objective programming in water resources management.	Using the multi-objective programming technique (using the Epsilon constraint approach) to establish a priority list from enabling decision-making in investment in water resources projects.	UOM M/DIS TD365.S6	B. Eng. Civil		Sowamber, J. / V. Proag		Mar-99	The integrated model shows that emphasis should be laid on maximisation of revenue, rather than minimising cost of treatment or minimising harm done on the environment.
66	A steady state groundwater modelling of the Eastern aquifer.	To use the groundwater flow/abstraction rig to demonstrate Darcy's and Dupuit's formulae for seepage, and modelling the Eastern aquifer on the apparatus for calibrating the numerical model built using FLOWPATH.	UOM M/DIS TD403.K49	B. Eng. Civil		Khedah, M.N. / M. Nowbuth		Mar-99	Numerical model, when properly calibrated, gives more accurate results when compared to field measurements.
67	Pre-treatment of textile dyeing industry wastewaters using the UASB process: a pilot-scale study.	To assess stability of a pilot-scale UASB reactor under re-starting, steady state and shock loading with dyewaste feed: satisfactory performance observed.	UOM M/DIS TD430.H6	B. Eng. Civil		Hosany, M.S. / T. Ramjeawon		Mar-99	Effluent to be polished with other treatment methods before final disposal; a reactor with a deeper settling zone is required to prevent washout during shock loading.

#	TITLE	BRIEF OBJECTIVES / OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS / ACTIONS
68	Design of an appropriate wastewater disposal system for a low-income housing estate.	To assess situation prevailing in La Caverne CHA estate and vicinity to propose a sewerage system for the area.	UOM M/DIS TD521.J43	B. Eng. Civil		Jhurry, K. / M. Allybokus		Mar-99	To consider for rehabilitation of neighbouring estates for wastewater disposal system, and bypass existing septic tank/leaching field system when the area will be connected to the trunk main sewer in the future.
69	Waste minimisation in small and medium enterprises: a case study.	To investigate on the various techniques of minimising waste generated in some small and medium enterprises.	UOM M/DIS TD793.9.S4	B. Eng. Civil		Seewoosurrun, H. / T. Ramjeawon		Mar-99	Cleaner production technologies are available and should be applied at source to supplement conventional techniques of waste minimisation.
70	Estimation of pollution load from the Coromandel industrial estate.	To identify the characteristics of major polluting industries and their associated pollution loads to be compared to domestic wastewater from the region. The high organic load is diluted in the sewer line; 9 factories use 94% of the total estate water supply.	UOM M/DIS TD897.5.N3	B. Eng. Civil		Nabeebux, A.A. / M. Allybokus.		Mar-99	
71	Pre-treatment of textile dyeing industry wastewaters using the Anaerobic Baffled Reactor (ABR): a pilot-scale study.	To investigate the performance of an ABR in treating a textile dye waste. Good removal efficiency for COD and colour; good recovery form shock loading.	UOM M/DIS TD897.M3	B. Eng. Civil		Mahadowa, N. / T. Ramjeawon		Mar-99	To increase efficiency of the organic load removal, a deeper sludge bed is required; ABR can be used for pre-treating dye-waste.

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72	Ground treatment and disposal of domestic wastewaters.	To study the degree of attenuation of the strength of domestic wastewater when applied to a soil, by simulating a septic tank / leaching field system. Ground treatment is very reliable, but nitrate removal is insufficient.	UOM M/DIS TH6651.J3	B. Eng. Civil		Jaumbocus, M.T. / M. Allybokus		Mar-99	A modification of the model is required (increase in depth) to cause faster denitrification.
73	Toxicity of mixed knitted factory wastewater.	Characterisation of mixed factory wastewater and assessment of its toxicity on <i>Gambusia</i> (mosquito fish). Both organic and inorganic fractions of the waste exert toxicity on the specimen, though to different extents.	UOM M/DIS TD899.R3	B. Tech. Textile Tech.ILE		Ramsokul, O. / Rosunee		Apr-99	Other long term tests required to have complete picture of the toxicity of the waste.
74	Wastewater treatment in two medium-sized industries.	To characterise wastewater from two textile factories and make pilot plant studies to propose optimisation of existing treatment and improve effluent quality. Biological treatment is not feasible due to high inert organics content.	UOM M/DIS TD430.D6	MSc. Env. Eng.		Dookee, D. / M. Allbokus		Aug-99	Treatment efficiency relies principally on optimisation of existing physico-chemical processes.
75	Disappearance of faecal coliform after marine discharge of urban wastewater by the Pointe aux Sables sea outfall.	To assess the bacteriological quality of Pointe aux Sables lagoon water and to determine T-10 (the time taken for faecal coliform concentration to decrease tenfold) for the sea outfall. The outfall performs satisfactorily.	UOM M/DIS TD763.R3	MSc. Env. Eng.		Ramkhelawon, L.M.D. / T. Ramjeawon		Aug-99	To study the effects of light, sedimentation, suspended solids, organic matter, pH, salinity and turbidity on the lagoon water for a complete picture of the performance of the sea outfall.
76	Wastewater management in a coastal area.	To determine the impacts of wastewater disposal methods on the ecosystem, esp. surface, ground and lagoon water. High concentration of pathogens and nutrients found in the lagoon.	UOM M/DIS TD763.S4	MSc. Env. Eng.		Seewoobaduth, J. / M. Allybokus		Aug-99	Sewerage network coupled to treatment plant (esp. for nutrient removal) and disposal as irrigation water (in Magenta canal) for surrounding dry areas.

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77	Use of sand filters for treating septic tank effluents.	Characterisation of septic tank effluent and assessing effectiveness of sand filters using pilot plant studies. High efficiency obtained, as well as reliability despite high organic loading rates. Nitrate levels however remain high.	UOM M/DIS TD778.T4	MSc. Env. Eng.		Teeroovengadum, J.S. / M. Allybokus		Aug-99	Separate treatment for denitrification is required.
78	Estimation of pollution load from the Coromandel industrial estate and its impact on the domestic wastewater disposal system.	To characterise wastes issuing from the industrial estate and to suggest treatment options for a safe disposal. The high organic load is diluted with the domestic wastewater when mixing occurs in the sewer line. Sulphate and colour removal are problematic.	UOM M/DIS TD897.F6	MSc. Env. Eng.		Soyfoo, F.R. / M. Allybokus		Aug-99	To carry out waste audits to minimise production of wastewater, especially sulphates; Colour removal by using polyelectrolyte may be very expensive, while lime treatment produces excessive sludge.
79	Cleaner production in the Mauritian industry: case study of a small-scale industry (tannery) and a large-scale industry (brewery).	To highlight the differences in environmental protection approach by a large and a small industries, and to identify cleaner production options for both by making waste audits and material balances.	UOM M/DIS TD897.V5	MSc. Env. Eng.		Virah Sawmy, V. / T. Ramjeawon		Aug-99	Clean production techniques were already in use, but further reduction of wastes is still feasible. Waste management programmes and codes of practice should be implemented.
80	Wastewater management in the Mauritian sugar industry using the UASB process.	To devise a strategy for wastewater and water management to optimise water usage and use the UASB process to achieve environmental goals. The reactor showed stability against organic shock loading.	UOM M/DIS TD899.S8R 3	MSc. Env. Eng.		Ragen, A.K. / T. Ramjeawon		Aug-99	For effluent standards to be met, the reactor should be coupled to an aerobic pond.

#	TITLE	BRIEF OBJECTIVES / OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS / ACTIONS
81	Environmental and socio-economic impact of the Mare Chicose sanitary landfill.	To investigate the effects of the landfill at Mare Chicose on its immediate vicinity. Negative perception of the landfill by nearby residents.	UOM M/DIS FOE1013	Dip. Publ. Health Eng.		Wan Ying Ching, C.S. / ?		Oct-99	Landfills are useful, but waste management authorities must also seek other ways of disposing of wastes.
82	Effect of treatment on the quality of water at Riviere du Poste treatment plant.	To assess performance of water treatment plant at Riviere du Poste and identify a safe disposal method for sludge.	UOM M/DIS TD434.K5	Dip. Publ. Health Eng.		Kistnasamy, S. / M. Nowbuth		Oct-99	Sludge to be disposed of as soil conditioner for agriculture; installation of in-line meters for measuring pH, turbidity, and residual chlorine to allow quick reaction to changes in raw water characteristics.
83	Study of the hydrogeology of an oceanic basaltic aquifer using a numerical groundwater flow model.	To provide a quantitative study of the processes controlling groundwater flow, esp. in the North, using a 3-D numerical model, VisualMODFLOW. Sea and rivers exert significant influence on groundwater flux both in direction and magnitude.	UOM M/DIS GB1197.7.N 6	Ph.D.		Nowbuth, M.D. / J. Baguant, A. Chan Chim Yuk & B.K. Baguant		Oct-99	To carry out similar studies in smaller areas all over the island to assess and quantify influence of surrounding aquifers on each other.
84	A survey on the sewage disposal system in Central Flacq Commercial Centre.	To find problems arising from sewage disposal practices at Central Flacq Commercial Centre.	UOM M/DIS FOE1010	Dip. Publ. Health Eng.		Jauhan, M.S.A.K. / V. Proag		Nov-99	To connect CCFC to the sewerage network and treat the waste in Cite Hibiscus or implement an on-site treatment plant.

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85	The sewage disposal system in Central Flacq Commercial Centre.	To find problems arising from sewage disposal practices at Central Flacq Commercial Centre.	UOM M/DIS FOE1016	Dip. Publ. Health Eng.		Rughooputh, V.I. / V. Proag		Nov-99	To connect CCFC to the sewerage network and treat the waste in Cite Hibiscus or implement an on-site treatment plant.
86	The study of sewage treatment and disposal at Central Flacq Commercial Centre.	To assess the methods of sewage disposal at the Central Flacq Commercial Centre. Proper disposal facilities are clearly lacking in the commercial centre.	UOM M/DIS FOE1008	Dip. Publ. Health Eng.		Ramatoolah, N.B. / V. Proag		Nov-99	Sewers to be connected to treatment plant at Cite Hibiscus, and absorption pits to be provided on site as a short term solution.
87	Effects of treatment on the quality of water at Riviere du Poste treatment plant.	To study the effects of treatment: identify effects of rainfall on water quality and evaluate mode of operation of the treatment plant. Despite high turbidity during rainfall, treatment is effective in removing suspended solids.	UOM M/DIS FOE1009	Dip. Publ. Health Eng.		Bojo, D. / G.M. Veeramootoo		Nov-99	Sludge handling should be attended to and longer monitoring required to assess performance of the treatment plant over time.
88	Environment impact of the Mare Chicose sanitary landfill.	To assess impacts of the Mare Chicose landfill on the immediate environment. Landfill is clearly resented by local population.	UOM M/DIS FOE1000	Dip. Publ. Health Eng.		Hymabacus, A.F. / M. Allybokus		Nov-99	To reduce overall aesthetic impacts and to implement segregation of non-degradable wastes for recycling and incineration; To implement better communication with nearby residents.
89	Treatment and disposal of wastewater from a poultry processing plant.	To characterise wastewater generated by a poultry processing plant and suggest treatment and disposal options. Management is reluctant to invest in initial running and maintenance costs of a treatment plant.	UOM M/DIS FOE1001	Dip. Publ. Health Eng.		Mungur, B. / T. Ramjeawon		Nov-99	To reduce wastes at source by minimising water use. Provision of financial facilities by authorities to encourage setting up of treatment plants.

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90	Wastewater treatment and disposal from a poultry slaughterhouse - the case of Happy World Foods Ltd.	To evaluate the performance and efficiency of a treatment plant for a poultry and slaughterhouse. The existing system of aerobic tank is not suited to this type of waste.	UOM M/DIS FOE1007	Dip. Publ. Health Eng.		Jomadard, H.K. / T. Ramjeawon		Nov-99	Efficiency of treatment of aerobic tank may be increased, and constant monitoring required as well as flow measuring devices.
91	Environmental impacts of Mare Chicose landfill.	To study the effects of the landfilling activities on the immediate environment of the landfill.	UOM M/DIS FOE1014	Dip. Publ. Health Eng.		Lolljee, S.K. / M. Allybokus		Nov-99	Need for monitoring of gas generation, reduction of visual impact by tree screens, and proper enforcement of existing laws for waste carriers.
92	Predicting leachate generation at Mare Chicose landfill.	To use a water balance method to predict leachate generation to compare with the HELP (Hydrological Evaluation of Landfill Performance) software model. Both models are acceptable, but water balance method is more accurate.	UOM M/DIS TD795.7.R8	B. Eng. Chem. Eng.		Rughooputh, B.K. / R. Mohee		Mar-00	Reduction of infiltration by increasing runoff and leachate re-circulation.
93	Determination of Cadmium and Nickel from leachates from landfill and compacting / transfer sites.	To analyse the levels of two heavy metals in the leachate at Mare Chicose landfill and assess compliance with environmental standards. Levels of Cd and Ni are too low to cause ecological and health problems; but effluent cannot be discharged at sea.	UOM M/DIS FOE1019	B. Eng. Chem. Eng.		Ramessur, K. / R. Gopee		Mar-00	The efficiency of the leachate treatment plant is to be assessed; Control on dust, vector, birds and odour is to be implemented.
94	Desalination of seawater by reverse osmosis process.	To carry out a review on reverse osmosis for water production and assess the feasibility of the process in Mauritius. A preliminary costing indicates a requirement of Rs 136.5 M as capital cost for a production of 150cu.m/day.	UOM M/DIS FOE1020	B. Eng. Chem. Eng.		Ahamud, B.O. / R. Gopee		Mar-00	System will benefit from economies of scale for very large plants.

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95	Characterisation of effluents in cane sugar factories - case study at Riche en Eau sugar factory - development of methods of analysis at University of Mauritius.	To characterise the waste effluent for the sugar factory and suggest treatment options for compliance with environmental standards.	UOM M/DIS FOE1021	B. Eng. Chem. Eng.		Nellaya, A. / Gopee		Mar-00	To implement strict house-keeping procedures, efficient oil/grease trap installation and treatment plant (physical and aerated lagoon).
96	Assessing and siting of hazardous waste disposal facility using GIS.	To survey organisations producing hazardous wastes and using a GIS (Geographic Information System) software (ARCVIEW) to locate a potential disposal site. Majority of hazardous wastes in Mauritius are not disposed of safely.	UOM M/DIS FOE1023	B. Eng. Chem. Eng.		Seebaluck, V. / J. Beedassy		Mar-00	Potential incinerator sites have been identified on GIS maps. Before final choice is made, further studies on social, political, economical, technological and engineering aspects are required.
97	Cleaner production at Floreal Knitwear Ltd.	To identify cleaner production opportunities at a textile washing and dyeing factory. Cleaner production strategies already in place, but waste audit showed water and energy consumption are still high.	UOM M/DIS FOE1025	B. Eng. Chem. Eng.		Dookhun, V. / R. Mohee		Mar-00	Substitute high-COD chemicals and recycling of second rinse water to reduce amount of wastewater; segregation of wastes (dyewaste and kitchen waste) for more efficient waste management; energy reduction at boiler house.

#	TITLE	BRIEF OBJECTIVES / OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS / ACTIONS
98	Potential for anaerobic co-digestion of municipal solid waste and wastewater derived sludge in Mauritius.	To present and adapt anaerobic digestion technology as an alternative waste management option by the simultaneous digestion of the organic fraction of municipal solid waste and wastewater derived sludge.	UOM M/DIS FOE1036	B. Eng. Chem. Eng.		Lobin, Y. / R. Mohee & / T. Ramjeawon		Mar-00	The reactor is successful in the digestion of organic fraction of wastes, with an optimum retention time of 23 days; addition of a feed richest in sludge has a beneficial effect.
99	The study of the impact of an organic shock loading on an anaerobic baffled reactor treating a synthetic sugarmill effluent.	To monitor COD (and VFA, and solids levels) removal efficiency after applying a shock load similar to weekend shutdown of a sugarmill. Recovery of removal efficiency is observed within 6 days after a sharp decrease in efficiency.	UOM M/DIS FOE1040	B. Eng. Chem. Eng.		Rojubally, S. / T. Ramjeawon & R. Mohee		Mar-00	The reactor can be used for treating sugarmill effluents for both daily and weekend loads but only after pre-treatment (screening and cooling). Post treatment also needed to replenish oxygen deficit before discharge.
100	Best practices in water and energy management at Universal Fabric Ltd.	To identify uses of water and energy in a textile dyeing plant and distribution system for an audit and suggest saving options. Saving options were identified after inefficiencies were detected.	UOM M/DIS TD388.M3G 8	B. Eng. Chem. Eng.		Gurreeboo, M.E. / K.P. Beeharry		Mar-00	Suggested production strategies include system optimisation, process modification, reuse and recycling of water.
101	Statistical analysis of rainfall using Kriging technique.	To use rainfall data collected at some stations in Mauritius and Rodrigues to estimate the precipitation at other locations using Kriging, and comparing with conventional methods of estimating rainfall.	UOM M/DIS QC925.6.A3 M3	B. Eng. Civil		Multra, V.S. / V. Proag		Mar-00	Kriged estimates are very accurate if they are based on rainfall values recorded at the highest and lowest elevations, but not at all if values from one of the highest elevation is used.

#	TITLE	BRIEF OBJECTIVES / OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS / ACTIONS
102	Estimate of outgoing groundwater fluxes along the coast.	To calculate groundwater flux rates during wet and dry seasons using potentiometric surface maps and using a numerical groundwater model (FLOWPATH) to simulate the flow regime and estimate flux rates to the sea.	UOM M/DIS TC176.K6	B. Eng. Civil		Koolwont, H. / M. Nowbuth		Mar-00	Northern coast has negligible flux rates, while some localised high-flux zones exist; A 3-D model would eliminate the simplifying assumptions and some on-site measurements are needed for comparison and refining the model.
103	Investigation of the technical and economic feasibility of a dual water system in a housing complex.	The study of the possibility of implementing a dual water distribution system in small communities such as a housing complex, based on public health, technical and economic feasibility aspects.	UOM M/DIS TD353.O55	B. Eng. Civil		Oodit, D. / T. Ramjeawon		Mar-00	The system is technically feasible with minimum adverse environmental effects, costing Rs 6.00 per head for a population size of 4 000; grey water reclamation is more economical compared to total sewage reuse.
104	Monitoring groundwater quality in selected boreholes in the Northern plains aquifer.	To determine the impact of climate, land use and aquifer productivity on groundwater parameters, esp. nitrate levels. High nitrate levels for the region are confirmed.	UOM M/DIS TD403.G6	B. Eng. Civil		Ramdhonee, S.G. / M. Nowbuth		Mar-00	Respective contribution to high nitrate levels from domestic waste and agricultural fertilisers needs to be quantified; Larger areas with different population density but with same land use need to be investigated.
105	Water production by non-conventional methods.	Assessment of four major non-conventional means of producing fresh water by comparing their respective true cost of production. Desalination is the best method, as is independent of prevailing climatic conditions, though costly.	UOM M/DIS TD429.C49	B. Eng. Civil		Ramma, C. / V. Proag		Mar-00	Reuse of wastewater cannot be implemented unless it is integrated with an irrigation scheme, but desalination remains the best choice for water production due to higher reliability.

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106	Anaerobic treatment of wastewaters containing refractory organic compounds.	To assess treatability of refractory organics using a high-rate anaerobic system (a pilot UASB plant). At low doses of chloroform, 95% COD removal can be achieved, but biomass is inhibited at higher doses.	UOM M/DIS TD433.R3	B. Eng. Civil		Ramkhelawon, K. / T. Ramjeawon		Mar-00	To assess performance using gas chromatography for an accurate determination of removal of refractory organics; to assess behaviour of reactor under a feed of a mixture of refractory chemicals.
107	Monitoring of the performance of a full-scale wastewater treatment plant.	To monitor the performance of a leachate treatment plant at Mare Chicose and propose modifications to upgrade effluent quality. Amount of rainfall around the landfill largely influences the leachate characteristics.	UOM M/DIS TD745.S6	B. Eng. Civil		Soobhug, S.D. / M. Allybokus		Mar-00	Optimisation of unit processes and modification of their configuration in relation to leachate characteristics significantly reduces the cost of treatment and ensures that discharge limits are respected.

UNIVERSITY OF MAURITIUS – COMPLETED PROJECTS 2001

N O.	TITLE	BRIEF OBJECTIVES/OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS/ACTIONS
1	High Rate Anaerobic Treatment of Industrial Wastewaters	Project consists of reducing the BOD/COD loads from the effluents of sugar industries by anaerobic treatment.	UOM	Btech project		Runjeet/T. Ramjeawon		Completed in March 2001	Results showed that the anerobically activated sludge needs to mature before it can become effective.
2	Assessment of long range patterns and problems of water resources through vulnerability indices	Project makes use of vulnerability indices to classify the water resources of Mauritius, and from there identify which long term approach needs to be adopted.	UOM	Btech project		Beekarry/T. Ramjeawon		Completed in March 2001	Mauritius is rated by the vulnerability index method as a water stress country, implying that long term planning in the water sector is important.
3	Wetland systems for water pollution control	Treatment of wastewater by the artificial wetlands (ponds) systems.	UOM	Btech project		Putty/T. Ramjeawon		Completed in March 2001	Treatment of wastewater via this system is effective and low cost.
4	Analysis of Rainfall in space and time	Interpolation of rainfall data over Rodrigues using geostatistical methods.	UOM	Btech project		Kinnoo Vikash/V. Proag		Completed in March 2001	Geostatistical methods, krigging, has proved to be a good tool in interpolating point data over space, and this method also provides users to include a number of parameters known to influence the rainfall data.
5	Landuse and water quality	Analysis water quality at a number of boreholes which are subjected to various landuse activities.	UOM	Btech project		Lobin/M. Nowbuth		Completed in March 2001	Preliminary results indicated that domestic sewage disposal was the cause of higher nitrate levels than compared to other boreholes, given the geology of the Northern Plains aquifer is of high permeability.

N O.	TITLE	BRIEF OBJECTIVES/OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS/ACTIONS
6	Use of Geographical Information Systems to map the vulnerability of Wetlands in Mauritius	Study how a GIS can be effectively used to assess the landuse activities and their impacts on wetlands.	UOM	Btech project		Dowlol/M. Nowbuth		Completed in March 2001	Results were encouraging, and clearly demonstrated with the help of a map how landuse development has not respected the buffer zones and also how these landuse activities handicap the quality of the wetlands.
7	Assessment of the status of water quality in Mauritius	Study of the variations of water quality along the reach of two rivers; River Citron and River Du Rempart (North).	UOM	Btech project		Sheik Fareed/M. Nowbuth		Completed in March 2001	Water Quality indexing method appears to be a very good approach to analysis and reporting the quality of water in rivers, and this method needs to be combined with water quality modelling.
8	Effect of urbanisation on existing stormwater distribution network	This project is a land drainage study of the Port Louis city, with a view to assess the causes of overflow during flood events.	UOM	Btech project		Ramnochane/M. Nowbuth		Completed in March 2001	Results of this study clearly demonstrated that the flood problems was caused not only because of the fact that drainage systems are old in Port Louis but also because the flood prone areas are located far from natural streams through which flood water is being channelled for most of the city.
9	Correlation of rainfall and groundwater levels to predict impact of drought conditions on groundwater resources.	This project consists of estimating recharge to the Northern Plains aquifer by two methods (The Groundwater level fluctuation method and the Chloride Balance method), and from there assess the sensitivity of this aquifer.	UOM	Btech project		Mohungoo/M. Nowbuth		Completed in March 2001	The Northern Plains Aquifer receives most of its recharge from rainfall and the results of this study clearly demonstrated that recharge is rapid, but the aquifer has low storage properties.

N O.	TITLE	BRIEF OBJECTIVES/OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS/ACTIONS
10	Sludge treatment and disposal	Treatment of sludge by compost method.	UOM	Btech project		Dookayka S./M. Allybokus		Completed in March 2001	Results showed that though sludge treatment using compost has been a success in many countries, treating low volumes of sludge by this method may not be cost effective.
11	Eutrophication in an artificial lake	Identifying the causes of eutrophication problems and propose and test possible solutions.	UOM	Btech project		Gura Goredor/M. Allybokus		Completed in March 2001	Fertilisers carried into surface runoff is the cause of eutrophication, but if the system is well designed, by automatic cleaning along the open channel, eutrophication problem may be minimised.

UNIVERSITY OF MAURITIUS (FACULTY OF SCIENCE)

#	TITLE	BRIEF OBJECTIVES / OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS / ACTIONS
1	Improvement in the general sanitation in the village of Creve Coeur.	To assess present sanitary conditions and causes of problems: to suggest ways of improving sanitation levels in the village. Water supplies and garbage collection systems are deficient.	UOM M/DIS TD920.B3	Dip. Sanitary Sc.		Baboolall & Beharee / Jayaranam		May-88	To upgrade general infrastructure including water supplies and drains, as well as refuse bins and public toilets, combined with education health of local inhabitants.
2	Modelling of dissolved oxygen in a polluted river.	To develop a mathematical model to predict dissolved oxygen levels along the river. Models used were Streeter-Phelps equation and the successive over-relaxation method.	UOM M/DIS QH545.R3C 3	B.Sc. (Joint) Pure Sc.		Cahaneeah, R. / G. Hossen & T. Ramjeawon		Jun-89	Models can be used in wastewater management programmes to decrease gross pollution effects. As for the successive over-relaxation method, only symmetric matrices with diagonal dominance give acceptable results.
3	Selected aspects of marine pollution at Bel Ombre.	To establish baseline data for assessment of marine pollution at Bel Ombre due to wastewater discharge during the milling season. Using the Leopold's matrix to assess impacts, damage to the environment is found to be consequent.	UOM M/DIS GC1085.V4	B.Sc. (Joint) Pure Sc.		Veerappa, K. / R.T. Ramessur		Jun-90	To use screens and sedimentation ponds to capture fly ash and suspended solids and prevent thermal pollution.

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4	The effect of large-scale weather systems such as <i>El Nino</i> on climate of Mauritius and the position of tropical cyclones within 500km of Mauritius and its effect on rainfall distribution.	To determine the effect of large-scale weather systems on the cyclonic activity on the South West of the Indian Ocean, and to analyse precipitation anomalies during <i>El Nino</i> years; To investigate the effect of the position of cyclones on rainfall distribution.	UOM M/DIS QC857.S6	B.Sc. (Joint) Pure Sc.		Sookun, R. / ?		Jun-90	Strong and very strong <i>El Nino</i> years correspond to dry years in Mauritius. High precipitations are expected if a cyclone passes to the North or the West of Mauritius, but the island is not prone to frequent cyclone attacks.
5	Characterisation of effluents from a cane sugar factory in Mauritius.	To assess the nuisance potential of gaseous, liquid and solid wastes from a cane sugar factory during harvest season.	UOM M/DIS QH545.R5D 8	B.Sc. (Joint) Pure Sc.		Dyall, A. / T. Ramjeawon & R. Beeharry Panray		Jun-90	Proper management of spills, leaks and solid wastes required, as well as a reduction in water usage through dry-cleaning and recycling, and biological treatment of wastewaters. Specific laws concerning sugarmill effluents are needed.
6	Hydrobiological survey of river St. Martin and its influence on groundwater quality.	Assessment of water quality of river St. Martin (receiving textile wastes) which is in direct hydraulic contact with the Curepipe aquifer. River St. Martin is polluted and it affects the groundwater quality.	UOM M/DIS QH545.R5S 4	B.Sc. (Joint) Pure Sc.		Seelarbokus, B.C. / T. Ramjeawon		Jun-90	Improvement of river water quality must be made in order to keep groundwater quality potable.
7	Distribution of dominant intertidal species in the different shores around Mauritius.	Review of the biology, ecology, chemical and mathematical techniques to study invertebrates in the intertidal zones.	UOM M/DIS QL121.S4	B.Sc. (Joint) Pure Sc.		Seesurn, K. / R. Ramessur		Jun-90	Some species of invertebrates can be used as pollution indicators.

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8	Eradication of <i>schistosomiasis</i> at Carreau Esnouf and Carreau Accacia villages.	To study the prevalence and causes of <i>schistosomiasis</i> and devise ways to eradicate the disease.	UOM M/DIS QH541.5S3 M8	Dip. Sanitary . Sc.		Munien & Seebocus / R. Lutchmeeah		Apr-91	Health education programmes and awareness about sanitation, coupled to proper water supplies are recommended together with avoidance of contact with marshes.
9	Bacteriological quality of the coastal waters of 5 recreational beaches on the North-West coast of Mauritius.	To study the impacts of the four sewer outfalls (employing only preliminary wastewater treatment) on the North-West on the coastal water quality. On five beaches surveyed, only Bain des Dames is highly polluted.	UOM M/DIS QH511.5.A 6	B.Sc. (Joint) Pure Sc.		Appadoo, M. / T. Ramjeawon		May-91	No significant difference observed between MPN and Membrane Filtration values; Most appropriate technique for routine analysis is membrane filtration.
10	Environmental sanitation in the industrial estate of Vacoas/Phoenix.	To assess and evaluate the enforcement of hygienic norms at the industrial estate. Proper sanitation is deficient in the area.	UOM M/DIS TD897.5.G3	Dip. Sanitary . Sc.		Gaungoo, Y. / D.N. Jeewoonarain		May-91	To increase health education of workers; storage and collection system for solid wastes and proper sanitation maintenance programs need to be implemented.
11	Assessment of the physico-chemical process of removal of colour and COD from different dyes.	Assessment of the performance of three coagulants on 12 different dyes from 5 dye classes. Each dye class and type has to be treated with a specific coagulant.	UOM M/DIS QD473.R3	B.Sc. (Joint) Pure Sc.		Ramsewak, S. / Li Kam Wah & M. Allybokus		Jun-91	Further research required on aspects of toxicity of the dyes.
12	A survey of refuse and sewage disposal of hotels at Grand Bay.	To inquire into the existing system of sewerage and refuse collection at Grand Bay with a view to prevent the deterioration of the aesthetic qualities of the area and land pollution.	UOM M/DIS TD897.5.M 8	Dip. Sanitary . Sc.		Munoruth - Jauhan - Conjobeeharry / N. Jeewoonarain		Jun-91	Grand Bay needs a sewage treatment plant, to be located preferably near Sottise; Sludge is to be digested and methane gas thus produced can be used for power generation; refuse collection appears to be satisfactory.

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13	Investigation of the possible impacts of sugar factory wastewater on the intertidal macrobenthic fauna at Beau-Champ.	To characterise and study the effects of the wastewater generated by Beau-Champ sugar factory on the distribution of intertidal macrobenthic fauna and the prevailing environmental health. Effects of released wastewater are confined to an area close to the sea outfall.	UOM M/DIS QH541.5.C 6A6	B.Sc. (Joint) Pure Sc.		Appadoo, A. / T. Ramjeawon		May-92	To set up a "Benthic Pollution Index".
14	Spatiotemporal distribution of <i>zooxanthellae</i> in <i>acropora</i> at Trou aux Biches and Flic en Flac.	To find variation in algal symbiont density in <i>Acropora</i> coral tips with respect to spatial distribution, time, dissolved oxygen levels, nutrients and temperature.	UOM M/DIS QH541.5.C 7S3	B.Sc. (Joint) Pure Sc.		Sakhabuth, S.R.N. / I. Fagoonee		May-92	Study to be extended to year-round observations to detect seasonal variations, as well as reaction to stress conditions.
15	Nutrient studies in mangrove ecosystem (<i>Rhizophora mucronata</i>) of Riviere du Cap estuary.	To study the aspects (particularly the nutrient balance) governing the functioning of the ecosystem in the mangrove patch at the estuary of Riviere du Cap.	UOM M/DIS QH541.A2	B.Sc. (Joint) Pure Sc.		Abdoolah, D. / I. Fagoonee		May-92	The nutrient-generating aptitude of the mangrove support the idea of proper protection and management of mangroves.
16	Determination of the role of water quality on the algal events in the lagoon of Trou aux Biches and Flic en Flac.	To investigate and compare the dynamics of harmful algal blooms at Trou aux Biches and Flic en Flac beaches by carrying out nutrient and plankton studies. Red tide events at Trou aux Biches linked to high nutrient levels, while Flic en Flac is spared due to different meteorological conditions.	UOM M/DIS QH541.5.L2 7B5	B.Sc. (Joint) Pure Sc.		Bholah, B.Z. / I. Fagoonee & D. Daby		May-93	Bloom progression and succession of phytoplankton species to be further investigated. Results can be used in local management context through predictive models and management strategies.

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17	A comparative study of the environmental conditions at selected lagoons in the North-West coast of Mauritius.	To assess the health status of selected lagoons on the North-West coast of Mauritius by an analysis of nutrient levels and physical water parameters.	UOM M/DIS QH541.5.L2 7N8	B.Sc. (Joint) Pure Sc.		Nundloll, O.D, / D.Daby		May-93	Increased use of phosphate detergents and release in rivers or lagoons may cause proliferation of algae and associated consequences.
18	Testing of toxicity of dyewastes obtained from 2 dyehouses on <i>artemia</i> and a green alga.	Assessing the toxicity of dyewastes on a pure culture of <i>artemia</i> and a local wild green alga. Effect on <i>artemia</i> is insignificant and the green alga, but a decrease in chlorophyll in all algae is observed.	UOM M/DIS QH545.W3 R3	B.Sc. (Joint) Pure Sc.		Ramjain, E.B.S. / M. Allybokus		May-93	
19	Determination of some heavy metals in dyehouse effluents in Mauritius.	To investigate the concentration of heavy metals (chromium, iron, manganese and nickel) in three dyehouse wastes and analysis of some dye stuffs for chromium and iron.	UOM M/DIS TP893.A5	B.Sc. (Joint) Pure Sc.		Anasany, B. / R. Ramjuttun & R. Ramgoolam	Flame atomic absorption spectrometry.	May-93	No direct cause-to-effect relationship found for presence of heavy metals in the wastes, except at Ferney Spinning, where dyeing processes seem inefficient. Daily monitoring (with an automatic sampler) required to confirm the study.
20	A study of the nature of industrial effluents in the zone of Vacoas/Phoenix and their methods of disposal.	To investigate consequences of industrial effluents on the environment and health, and to suggest disposal methods for alleviating problems. Industrial estate is located too close to residential areas, and problems are unavoidable.	UOM M/DIS TD897.S4	Dip. SANIT. Sc.		Seedheeyan, <i>et al.</i> / R. Munbodh		May-93	A treatment plant for liquid wastes is needed; new factories should be forced to include a wastewater treatment plant in their design before obtaining approval for their building permit.

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21	UASB pilot plant investigation at Highlands sugar factory.	To treat a sugarmill wastewater using an upflow anaerobic sludge process. Removal of COD is not satisfactory due to inefficient pH control.	UOM M/DIS TD434.L8	B.Sc. (Joint) Pure Sc.		Luckoo, M.S. / T. Ramjeawon		Jun-93	Reactor volume could be increased to increase COD removal.
22	A study of borehole protection.	A survey of the water resources of Mauritius, with emphasis on boreholes and how to protect this resource.	UOM M/DIS TD407.B8	Dip. Sanitary . Sc.		Busawon - Sorefan - Veerasamy / V. Proag		Jul-93	Proper construction and monitoring practices, stricter laws concerning pollutoin and zoning are needed.
23	A survey on the water uses in hotels of Mauritius.	To quantify water usage and reuse in hotels of Mauritius.	UOM M/DIS TX911.3W3 J3	Dip. Sanitary . Sc.		Lobin - Seetohul - Soneea / V. Proag		Aug-93	To encourage the setting up of wastewater treatment plants and limiting water usage by monitoring quantities.
24	Zooplankton in Trou aux Biches lagoon.	To investigate the occurrence and distribution of zooplankton; to determine degree of influence of environmental variability over species population characteristics. The distribution of zooplankton is uniform and independent of environmental variability.	UOM M/DIS QL123.M3	B.Sc. (Joint) Pure Sc.		Manrakan, A. / D. Daby		Apr-95	Diurnal and seasonal variations need to be studied, and have to be extended to reef gaps and beyond reefs.
25	The bacteriological quality of bottled waters in Mauritius.	Examination of two local brands of bottled water to determine their microbiological purity. No coliforms were detected in any 100 samples, but presence of opportunist bacteria detected in a significant proportion of bottles.	UOM M/DIS QR129.B6J 3	Dip. Medic. Lab. Tech.		Jagessur, S. / R. Seenundun		Apr-95	Presence of opportunists bacteria suggests that bottled water is not an alternative source of water for infants.
26	The bacteriological quality of bottled waters in Mauritius.	Examination of two local brands of bottled water to determine their microbiological purity. Overall quality is unsatisfactory due to presence of an opportunist pathogen in 19% of the samples.	UOM M/DIS QR129.B6T 3	Dip. Medic. Lab. Tech.		Taujoo, A.B.N. / R. Seenundun		Apr-95	Bottled water is not fit for infants; public health authorities should legislate on total biological count, not on coliforms only.

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27	Studies on residual aluminium concentration following water treatment.	To investigate the treatment efficiency by aluminium sulphate with respect to WHO drinking water guidelines and water quality criteria for renal dialysis. Water from Piton du Milieu only has high aluminium content: flocculator dysfunction is suspected.	UOM M/DIS TD455.R3	Dip. Chem. Anal. & Instrum.		Ramroch, J. / T. Ramjeawon		Apr-96	Corrective measures to reduce residual aluminium in water: in long run, excessive aluminium levels can cause intoxication.
28	Nutrients in rivulet Terre Rouge.	To monitor the variation of nutrient levels over a period of 10 months and trace back sources of pollution. Excessive nutrient levels are attributed to heavy industrial activity and agricultural runoff.	UOM M/DIS QH5451.8. R5	Dip. Chem. Anal. & Instrum.		Nursoo, Y. / R.T. Ramessur		Apr-96	
29	Hardness of drinking water in Mauritius.	Investigating the hardness of potable water from different point sources and to establish a relationship between hardness and geographic location. Geologic formations of some regions and climatic changes do influence water hardness.	UOM M/DIS TD374.R4	Dip. Chem. Anal. & Instrum.		Resaul, A. / R. Chong Kwet Yive		Apr-96	
30	Impact of fertilisers on surface and ground water quality. Case study: Northern region of Mauritius.	To study the impacts of agro-chemicals on our surface and ground water, esp. the rising levels of nitrate and phosphate resulting from increased fertiliser usage. Nitrate levels are higher, esp. in regions under intensive agriculture.	UOM M/DIS TD427.F419	Dip. Chem. Anal. & Instrum.		Iyasamy, V. / T. Ramjeawon & A.K. Gopaul		Apr-96	
31	Variations of nutrients in the Poste de Flacq river.	To assess the effects of nutrient enrichment in the marine environment of the Poste de Flacq river. Despite nutrient levels found to be well below limits, effluents from Constance SE, domestic and agricultural wastes contribute to enrichment.	UOM M/DIS TD427.N87 G6	Dip. Chem. Anal. & Instrum.		Gooljar, P. / R.T. Ramessur		Apr-96	

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32	Monitoring of <i>Atrazine</i> , <i>Diuron</i> , and <i>Hexazinone</i> in surface water of the Grand River North West catchment area.	To predict the concentration of three common herbicides in run-off as surface water from catchment W. Direct correlation found between herbicide level in water and rainfall/river flow rate in the catchment.	UOM M/DIS TD432.B6	BSc. ?		Booth, J. / T. Ramjeawon		May-96	Need for proper resource monitoring targetted to halides and organic halides in raw water and control over herbicide usage.
33	Evaluation of different microbiological methods for water quality monitoring.	To compare and evaluate the relative merits of two methods of monitoring bacterial contamination of water quality, namely, the Multiple Tube Technique, and the Membrane Filtration.	UOM M/DIS QD142.G6	Dip. Chem. Anal. & Instrum.		Gooly, A. / G. Khittoo		May-96	The MF technique combined with the specific glucuronide (agar) medium is better for fast and effective evaluation of microbiological quality of water. Need to compare the method with the PCR (polymerase chain reaction) test.
34	Variation of nutrients in the Riviere du Rempart river.	To establish baseline data on the variation of nutrients along the river and the level and type of marine pollution at Pointe des Lascars village. Nutrient levels rise in winter and fall in summer.	UOM M/DIS QH541.5.R 5M6	Dip. Chem. Anal. & Instrum.		Motaye, K. / R.T. Ramessur		May-96	Water quality needs to be further analysed over time.
35	Variation of nutrients in a river in the Wolmar region.	To establish pollution events in the region of Wolmar by conducting nutrient studies in the riverine ecosystem. Nutrient enrichment occuring due to erosion and variation of nutrients is seasonal, being higher in winter.	UOM M/DIS TD427.N87 C49	Dip. Chem. Anal. & Instrum.		Chummun, A. / R. Ramessur	UNICAM 8700 spectro meter	May-96	
36	Convective thunderstorm prediction in the Mauritius area.	To use general laws of heat exchanges and conservation of energy to study the thermodynamic structure of the troposphere, with reference to occurrence of thunderstorms.	UOM M/DIS QC968.B6	B. Sc. Phys.		Booneeady, P. / S.D.D.V. Rughooputh		Mar-97	Based on the definition of conditional instability and buoyancy of air, a success rate of 75-80% for weather forecasting has been achieved.

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37	Assessment of the Galerkin finite element method to fluid dynamics problems.	To simulate 2-D flow past a cylindrical body in a channel, taking into account the physical, mathematical and computational modelling (Galerkin's) approach for both compressible and incompressible flows.	UOM M/DIS QC207.F56 F6	B. Sc. Math.		Fowdur, S.K. / A. Sudhoo		Apr-97	To further investigate the Galerkin's approach by successively eliminating the simplifying assumptions.
38	Physico-chemical characteristics of a river stream at River Savanne.	To monitor physico-chemical characteristics (esp. nutrients) along a river stream at River Savanne. Seasonal variation of nutrients explained by the availability of sunlight: nutrient levels fall due to increase in photosynthesis in summer.	UOM M/DIS QH541.5.S 7T4	B. Sc. Chem.		Teeluck, V. / R.T. Ramessur		May-97	
39	Physico-chemical characteristics of Riviere Rempart in the region of Beaux Songes and Flic en Flac.	To use water quality indexing systems to describe the waters of Riviere Rempart for summer and winter periods. Nutrient levels and other parameters indicate that the river cannot be considered as polluted.	UOM M/DIS QH541.5S7 B6	B. Sc. Chem.		Boodhonee, R. / R.T. Ramessur		May-97	Monitoring of toxic compounds should be implemented.
40	Evaluation of algal growth in Nicoliere reservoir and its impact on water treatment works.	To investigate the effect of increasing nutrient level of the Nicoliere waters on algal growth and water treatment works. Eutrophication is also present inside the treatment works.	UOM M/DIS QK566.C45	Dip. Chem. Anal. & Instrum.		Choony, S. / V. Proag		Mar-98	To implement strict control on land use in the vicinity of the reservoir and provide cover over treatment works to limit eutrophication inside the works.
41	Chlorination and chlorine demand determination on surface water, borehole water and in the distribution system.	To provide guidelines for the selection of optimum dosage and contact time to achieve proper disinfection; to assess evolution of residual chlorine in the distribution system. Chlorine demand of groundwater is close to treated water. Residual chlorine levels decrease along the distribution network.	UOM M/DIS TD462.B4	Dip. Chem. Anal. & Instrum.		Bedessy, A. / V. Proag		Mar-98	

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42	Assessment of eutrophication in Piton du Milieu reservoir and related water quality aspects.	To carry out studies to assess the impact of eutrophication, if any, on drinking water quality. The feeder canals supplying the reservoir (Terrain Chasse and River Vacoas) have low nutrient content. The lake is in an oligotrophic state.	UOM M/DIS TD496.J4	Dip. Chem. Anal. & Instrum.		Jeeawoody, N. / T. Ramjeawon & Gopaul		Mar-98	
43	Water quality assessment of Mauritian rivers using invertebrate bioindicator species.	To devise a biotic score system to supplement the use of these methods in monitoring water quality following some international biotic indices. Biotic scores are feasible for Mauritian context.	UOM M/DIS QH91.57.B 564	B. Sc. Biol.		Geddedu, J.R. / J. Maureemooto o		Apr-98	Biotic score is feasible, with incorporation of vertebrate taxon (tadpoles) due to its sensitivity to pollution. Need to search for pristine rivers for comparison and establishment of baseline data.
44	Bacteriological examination of drinking water quality of bottled waters in Mauritius.	To investigate whether drinking water meets national standards and WHO guideline values for bacteriological aspects. High rainfall can be associated with high levels of total coliforms and low level of nutrients.	UOM M/DIS QR105.5.R 3	B. Sc. Biol.		Ramchurit, C. / D. Daby		Apr-98	
45	A comparative study of different techniques used in the bacteriological analysis of potable water.	To use different indicator organisms and different testing methods to compare with common test methods of assessing bacteriological quality of potable water.	UOM M/DIS QR105.5.R 8	B. Sc. Biol.		Rungoo, P. / G. Khittoo		Apr-98	Use of pathogenic bacteria as indicator with the PCR (Polymerase Chain Reaction) technique is quicker and as sensitive as common tests; can be used to supplement these common tests.
46	Physico-chemical characteristics of GRNW.	To assess water quality of GRNW by monitoring physical parameters as well as nutrients and some metals. Phosphate levels are above CWA limits probably due to domestic and industrial effluents reaching the river.	UOM M/DIS QD142.E5	B. Sc. Chem.		Emritte, I. / R.T. Ramessur		Apr-98	Further studies should have wider scope and tests including organic and heavy metal pollution would be important.

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47	Characterisation of effluents from a dyehouse and their treatment by coagulation-flocculation.	To determine the optimum dose and physico-chemical parameters in the coagulation-flocculation treatment simulation by the Jar test for a dyehouse waste using 2 coagulants (alum and ammonium III sulphate). Optimum dose is 1g/L at pH 4 to 6.	UOM M/DIS TD751.P3	B. Sc. Chem.		Parepiah, R. / D. Jhurry		Apr-98	Iron salts give better results, but the whole process of coagulation and flocculation is ineffective on reactive dye wastes.
48	Variation of nutrients in River du Tombeau.	To monitor the effects of wastewater outfall from various human activities, especially on nutrient level, to discuss the possible factors influencing nutrient enrichment. CWA standards have not been exceeded for nutrient levels.	UOM M/DIS TD427.N87 S4	Dip. Chem. Anal. & Instrum.		Seedyah, G. / R.T. Ramessur		Apr-98	High levels of nitrate and silicate indicate that human activity has affected water quality; monitoring of water quality and specific standards for riverine and marine waters are recommended.
49	Investigation of the BOD, COD and TOC for effluents from textile factories.	To establish a relationship between BOD, COD, and TOC levels in effluents discharged by certain textile factories. The BOD/COD, COD/TOC and BOD/TOC values depend on the type of process and chemicals used and discharged as wastes.	UOM M/DIS TD735.E5	Dip. Chem. Anal. & Instrum.		Emrith, C. / V. Proag & Gopaul	DC-190 high temperature TOC analyser	Apr-98	Each factory and process needs a correlation to be established before predicting values for BOD and TOC from COD values.
50	Impact of sugar industry effluents on surface water bodies. Case study: Riv. du Poste de Flacq.	To study and compare the impact of sugar factory effluents (Constance SE) on surface water quality (especially organic and thermal discharge) during and after milling season. Water quality decreased during milling and recovered afterwards.	UOM M/DIS TD763.B3	Dip. Chem. Anal. & Instrum.		Baloo, T. / T. Ramjeawon & Gopaul		Apr-98	
51	Collection, treatment and disposal of wastewater from a hospital.	To study the collection, treatment and disposal of wastewater of J. Nehru hospital.	UOM M/DIS TD899.H6B 6	Dip. Chem. Anal. & Instrum.		Boodhun, N. / Fokeer		Apr-98	Extension of hours of operation to 24h per day to optimise treatment plant performance and covering up of sludge drying beds for shorter loading periods.

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52	Collection, treatment and disposal of wastewater from a hotel near the sea.	To suggest a treatment option for wastewater of a hotel located near the sea.	UOM M/DIS TD899.H6T 45	Dip. Chem. Anal. & Instrum.		Thagalee, K.A. / ?		Apr-98	Use of wastewater stabilisation ponds for pathogen removal combined to several maturation ponds.
53	Treatment and disposal of wastewater from a poultry processing plant.	To survey a wastewater treatment plant handling poultry effluents, and to assess weaknesses of system. Most treatment unit processes require upgrading.	UOM M/DIS TD897.S3	Dip. Sanitary . Sc.		Salabhee, B. / M. Naghen		Apr-98	Improvement of various treatment processes is needed, especially a greater number of drying beds for sludge handling.
54	Collection, treatment and disposal of wastewater from a textile factory.	To characterise the waste effluent from the unit processes in Novel Textiles Ltd. and propose disposal methods. Effluent quality has decreased due to increase in wastewater production.	UOM M/DIS TD899.T4A 9	Dip. Sanitary . Sc.		Awatarowa, A. / M. Nagen		Apr-98	Treatment needs to focus on colour removal and reuse of treated effluent.
55	Determination of nutrients in the Curepipe aquifer.	To monitor water quality in boreholes found in the Curepipe aquifer. Generally, nutrient levels are within CWA standards, but peak after heavy rains and after application of fertilisers in sugar cane fields.	UOM M/DIS QH90.57.B 5A4	Dip. Chem. Anal. & Instrum.		Adnath, J. / Li Kam Wah		May-98	
56	Impact assessment of environmental factors on the branching coral <i>Acropora formosa</i> in the Mon Choisy - Trou aux Biches lagoon system.	To find variations in algal symbiont density in <i>Acropora formosa</i> due to time and environmental factors. Coral health is apparently not affected by environmental factors.	UOM M/DIS QH541.5.C 7K5	B. Sc. Biol.		Kistoo, K.D. / D. Daby		Apr-99	Only long term studies can confirm that coral health is affected at Mon Choisy; mapping of coral population and monitoring is required.

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57	Physico-chemical characteristics of Caudan Basin, GRNW and St. Louis river.	To monitor the variation of nutrients, physical parameters and some trace metals in Caudan Basin and St Louis river, and trace metals along St. Louis river. Water quality parameters do not exceed CWA standards, but high levels of lead and zinc in St. Louis due to heavy industry; these are diluted in the GRNW estuary.	UOM M/DIS QH541.5.S 7.R3	B. Sc. Chem.		Ramdour, N.C. / R. Ramessur		Apr-99	
58	Occurrence and tracking of tropical cyclones.	To study the development of tropical cyclones and using a FORTRAN program modified for use with MATLAB to make a dynamical analytical type model to predict their position.	UOM M/DIS QC941.P4	B. Sc. Phys.		Peerally, B.N.K. / S.D.D.V. Rughooputh		Apr-99	The low-level model has a lack of accuracy; reversal of wind direction and unsymmetricality of cyclonic phenomena make the model yield erroneous results.
59	El Nino and climate variability.	To investigate the El Nino effect as a chaotic dynamical event and to analyse the chaotic behaviour in a simple non-linear difference map. Mathematical models demonstrate the chaotic behaviour of El Nino.	UOM M/DIS QC981.8.C 53F8	B. Sc. Phys.		Fullee, A. / S.K. Ramchurn.		Apr-99	A strong El Nino condition makes the occurrence of tropical cyclones in the South of the Indian Ocean less probable.
60	Bioaccumulation of heavy metals in macroalgae.	To make a baseline study of coastal pollution with heavy metals using two green algae species from three selected sites and choose a suitable bioindicator species. Zinc contamination found at all sites.	UOM M/DIS QK568.M3 C45	B. Sc. Biol.		Cheetamun, K. / M. Bhikajee		May-99	Bioaccumulation is influenced by location of algae on the shore. <i>Enteromorpha spp</i> can be used as bioindicator for zinc and cadmium, and <i>Ulva</i> for lead pollution.
61	Mathematical models for the treatment of wastewater using water hyacinth.	To construct mathematical models to simulate wastewater treatment, using a pond filled with water hyacinths fed with wastewater for calibration. Most accurate results for BOD and COD removal obtained when a linear trend is adopted.	UOM M/DIS TD746.5.R4	MSc. Applied Mathematics and Modelling		Mahadowa- Reechaye, S. / P.N. Gonpot		May-99	Using younger plants, plants with longer roots, greater tank depth, longer detention time and maximum plant density can increase organic load removal efficiency.

#	TITLE	BRIEF OBJECTIVES / OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS / ACTIONS
62	Macro-invertebrates as potential bioindicators for heavy metal pollution in the coastal environment of Mauritius.	To analyse macro-invertebrates for cadmium, copper, lead and zinc in order to assess their use as bio-indicators and locate pollution "hot spots". From identical macro-invertebrates, northern plain coasts are more polluted than others.	UOM M/DIS QH362.46. M6A6	B. Sc. Biol.		Appadu, P. / D. Daby		Apr-00	Smaller macro-invertebrates are good indicators of cadmium and lead pollution; larger ones are suitable for zinc and copper.
63	Physico-chemical characteristics of fresh water systems at Flic en Flac.	To monitor water quality parameters in fresh water system at Flic and Flac during winter and summer periods. No nutrient was in excess of standards, while high COD values indicate organic pollution; lead accumulation found at Beaux Songes.	UOM M/DIS FOS1033	B. Sc. Chem.		Lutchmanen, P. / R.T.Ramessur		Apr-00	No seasonal variation. Lead pollution at Beaux Songes probably due to air-borne or land inputs.
64	Physico-chemical characteristics of Grand River North West.	Monitoring of level of nutrients along GRNW as well as physical parameters and some trace metals. The river has a wider nutrient variation than at the estuary where lead and zinc levels are high.	UOM M/DIS FOS1298	B. Sc. Chem.		Panchoo, A.K. / R.T. Ramessur		Apr-00	To monitor organic pollutants as regards to the numerous industries found along GRNW.
65	Regression analysis on cloud-seeding experiment.	To fit an appropriate model to the data generated from cloud-seeding experiments made in 1975 in Florida, using a statistical analysis software, SPSS. There is a non-negligible evidence that cloud-seeding has induced cloud merger and increased rainfall over the fixed target station.	UOM M/DIS FOS1033	B. Sc. Math.		Dookhee, A. / P. Gooroochurn		Apr-00	

#	TITLE	BRIEF OBJECTIVES / OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS / ACTIONS
66	A preliminary study on the estimation of rainfall from METEOSAT images.	To estimate the amount of rainfall from cloud images obtained from METEOSAT weather satellite using TAMSAT rainfall estimation techniques.	UOM M/DIS FOS1317	B. Sc. Phys.		Dilloo, N.B. / S. Rughooputh		Apr-00	Reasonable agreement between estimates and rain gauge values; discrepancy occurs due to the assumption that only convective clouds produce rain, which is not true.
67	Principles and physics of desalination processes.	To extract the principles of physics behind the various desalination processes (heat and power losses, heat and mass transfer processes). Power consumption is mainly influenced by feed water temperature, salinity, and hydraulic loading rate.	UOM M/DIS FOS1318	B. Sc. Phys.		Dhurmea, K.R. / M. Bunwaree		Apr-00	
68	Wastewater treatment under supercritical conditions.	To review the processes (physical and chemical) in the SCWO (Super Critical Water Oxidation) for the hydrothermal treatment of wastewater. The SCWO process is advantageous compared to other hydrothermal processes.	UOM M/DIS FOS1324	B. Sc. Phys.		Joyram, H. / S. Oree & Kis- Sion		Apr-00	Owing to cost aspect, the SCWO is advantageous, compared to other hydrothermal processes.
69	El Nino and weather pattern in the Indian Ocean.	To determine whether a low dimensional chaotic behaviour can be associated with the weather pattern in the Indian Ocean, if it is associated with El Nino. Possible existence of a low dimensional chaotic attractor in the Indian Ocean.	UOM M/DIS FOS1336	B. Sc. Phys.		Tengur, K.K. / S.K. Ramchurn		Apr-00	More observational data required to confirm findings.
70	Effluent analysis of some textile industries in Mauritius.	To characterise common effluents of textile factories.	UOM M/DIS FOS1009	Dip. Sanitary . Sc.		Mistry, A. / A.H. Subratty		Apr-00	Treatment of wastewater is required for complying with standards for disposal of effluents.

#	TITLE	BRIEF OBJECTIVES / OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS / ACTIONS
71	Wastewater management from textile industries.	To establish problems caused by effluent disposal and overflow of a manhole in the industrial estate. Visual and odour problems are most felt at the industrial estate.	UOM M/DIS FOS1015	Dip. Sanitary . Sc.		Hoossen <i>et al.</i> / Jeewoonarain		Apr-00	Wastewater needs treatment before disposal.
72	Sanitary problems caused by industries in the district of Riviere du Rempart.	To assess a method of sewage disposal in the district of Riviere du Rempart. The type of wastewater determines the type of treatment plant required.	UOM M/DIS FOS1017	Dip. Sanitary . Sc.		Gokhoola, N. / P. Mootoosamy		Apr-00	A wastewater treatment plant is suggested for treating textile wastewaters.
73	Physico-chemical characteristics of a river system at Flic en Flac.	Monitoring of water quality parameters (esp. nutrients and heavy metals) at Flic en Flac. All parameters are within permissible limits, except for phosphate and during cyclonic periods.	UOM M/DIS FOS1298	B. Sc. Chem.		Gurbah, S.D. / R.T. Ramessur		May-00	Water quality monitoring to be made on larger scale and reduction of heavy metals and nutrients in common everyday-use products to limit pollution.
74	Rainfall analysis in Mauritius.	To draw inferences about trends in rainfall patterns using regression analysis, Markov chain analysis and analysis of time series, using SPSS 7.5 and MINITAB (student edition). Strong seasonal patterns exist, but no trends.	UOM M/DIS FOS1017	B. Sc. Math.		Dusoruth, V. / P. Gooroochurn		May-00	No trends in rainfall exist; while checking for uncorrelated residuals, almost all autocorrelations lie between confidence limits.
75	Some basic parameters along river St. Louis.	To characterise parameters influencing water quality of river St. Louis. Contamination cannot be clearly established.	UOM M/DIS FOS1000	Dip. Sanitary . Sc.		Allymun, H. / R.T. Ramessur		May-00	Monitoring of some more parameters over a longer time period required to obtain more reliable data.
76	Some basic parameters along river St. Louis.	To characterise parameters influencing river quality of St. Louis. Contamination cannot be clearly established.	UOM M/DIS FOS1002	Dip. Sanitary . Sc.		Boodhoo, L.M.D. / R.T. Ramessur		May-00	Monitoring of some more parameters over a longer time period required to obtain more reliable data.
77	Physico-chemical parameters of St.Louis river.	To monitor the variation of nutrient levels and other physical parameters at river St Louis. All parameters monitored were well below CWA standards.	UOM M/DIS FOS1008	Dip. Sanitary . Sc.		Jhuboo, A. / R.T. Ramessur		May-00	More parameters need to be monitored, like organic content and colour.

UNIVERSITY OF MAURITIUS (FACULTY OF AGRICULTURE)

NO	TITLE	BRIEF OBJECTIVES/OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS/ACTIONS
1	Overhead irrigation at Bagatelle.	Study of irrigation methods for sugar cane land in relationship to topography, soil type and water availability in the region.	UOM	B.Sc.(Hons) Agriculture	296,000	P. D'Espagnac/ Prof A.S. MacDonald, Mr.A.Osman		Completed in May 1973	The implementation of Overhead Irrigation Project and Construction of reservoir for underground water storage. Also recommends a better record-keeping of factors such as amount of rainfall and temperature.
2	Bacteriological Examination of Water Supplies.	Assess degree of service and maintainance of water supplies & provide feedback for the validity of original planning assumptions.	UOM	Diploma in Agriculture		R. Jutton/ Mr.C.Lapierre		Completed in April 1982	Improvement of water supplies for health benefits and the strict monitoring of these supplies is of importance.
3	Aquaculture of the major Chinese and Indian carps and aquaculture development in Mauritius & Analysis of growth in the common carp, cyprinus carpio, linnaeus, using different feed.	Review of aquaculture development in Mauritius and analysis of methods used in aquaculture industry.	UOM	Diploma in Agriculture		Wan Sai Cheong Y.T.N.C./ Dr.I.Fagoonee		Completed in June 1986	Recommends the setting up of a Fishery Research Centre & longer term researches on integrated fish culture.

NO	TITLE	BRIEF OBJECTIVES/OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS/ACTIONS
4	Hydroponics.	Analysis of methods available for the implementation of hydroponics cultivation & efficiency of hydroponics unit as compared to traditional methods of cultivation.	UOM	B.Sc.(Hons) Agriculture		S.I.Sayed/ Mr.K.Ruhe		Completed in May 1986	The sterility factor of the Hydroponics unit is beneficial for growth of seed as compared to soil that may be contaminated.
5	Irrigation Development in Mauritius: A review of problems and prospects.	Review of aspects(climate, agricultural diversification policies, etc) contributing towards a proper agricultural program for irrigation.	UOM	B.Sc.(Hons) Agriculture		B. Dabeesing/ Mr.H.K.Mundil		Completed in June 1987	Recommend new irrigation strategies & policies with respect to energy cost with emphasis on Government support for funding of research projects. Proper training of technical personnel is encouraged.
6	Irrigation of sugar cane lands in Mauritius.	Examine the irrigation methods of sugar cane fields,constraints and government policies concerning irrigation schemes.	UOM	B.Sc.(Hons) Agriculture		A.Beeharry Panray/ Dr.S.Bhoojedhur		Completed in June 1987	Irrigation Methods (ex: Overhead irrigation, drip irrigation) are to be implemented according to soil properties and topography.
7	Field Measurement of Soil Hydraulic Conductivity in a cropped and uncropped plot.	Collect information on soil hydraulic conductivity for solving problems related to irrigation, ground water recharge and water run-off control.	UOM	B.Sc.(Hons) Agriculture		M.Goolamhossein/ Dr.G.C.Soopramanien & Mr.R.Sattar		Completed in June 1990	The use of quantitative terms to define soil hydraulic properties instead of subjective terms is recommended & Development of crop varieties suitable for particular climate and soil conditions.

NO	TITLE	BRIEF OBJECTIVES/OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS/ACTIONS
8	Optimising potato yield with drip irrigation in rain deficient regions.	Develop an irrigation schedule for potato that would optimise potato yield and drip irrigation water usage depending on the microclimate of the region.	UOM	B.Sc.(Hons) Agriculture		R.Soopaya/ Mr.D.AhKoon		Completed in April 1994	The use of tensiometers for monitoring irrigation of potato field & recommend further fully replicated trials to confirm results of the experiments.
9	Method for determining crop canopy interception evaporation and wind drift losses in a Centre Pivot Irrigation System in sugar cane.	Examining problems and prospects of centre pivot system as compared to other irrigation methods in operation in Mauritius.	UOM	B.Sc.(Hons) Agriculture		M.Teeluck/Mr.D.AhKoon, Dr.C.Soopramanien		Completed in May 1994	Better understanding of interception losses over a season can be obtained by canopy interception measurements at different growth stages of the plant.The use of Video Image Analyser for measurement of water droplet sizing is recommended.
10	The biology and culture of Berri Rouge and <i>Rhabdasargus Sarba</i> in Mauritius.	Compile information on Berri Rouge biology,biological requirements & systems of production.	UOM	B.Sc.(Hons) Agriculture		B.A.Alleesaib/ Dr.D.C.West		Completed in April 1996	Regular flushing of fish tanks is necessary & the implementation of 'closed water recirculation' systems and better marketing strategies also.
11	An Irrigation Monitoring System for sugar cane.	Improve irrigation management level by using a computer-based program to record and provide agronomic & technical information.	UOM	B.Sc.(Hons) Agriculture		S.Chan Chu/ Mr.K.Bheenick		Completed in April 1997	Recommend Microsoft™ Access™ for management of database & setting up of a monitoring system to field level to allow better distinction of soil type and irrigation surpluses.

NO	TITLE	BRIEF OBJECTIVES/OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS/ACTIONS
12	The Aquaculture Industry in Mauritius: A Diagnostic Study.	Identify the weaknesses of the sector & economical, technical and managerial problems affecting aquaculture industry.	UOM	B.Sc.(Hons) Agriculture		C.Clarel Seevathean/ Dr.M.Bhikajee		Completed in April 1997	Holistic Approach to Aquaculture with proper training of personnel, definition of new framework of operation in the sector & streamlining of procedures. Emphasis is laid on the creation of a database & proper flow of information.
13	Changes in water parameters following simulation of power failure in a closed aquaculture system.	Carry out experiments to determine the effect of frequent power failures resulting in a break in the aeration and filtration of water on berri rouge in the aquaria.	UOM	B.Sc.(Hons) Agriculture		A.M.Wong Fat Sang/ Dr.M.Bhikajee		Completed in April 1997	Recommend extended research on carbon dioxide retention in water and further investigation to find out change in feeding behaviour in conditions of stress of the fish.
14	Lettuce production in soilless culture systems as compared to the conventional system of production.	Carry out a preliminary study of newly designed systems of hydroponics culture.	UOM	B.Sc.(Hons) Horticulture		K.Dewkeea/ Dr.S.Gobhurdhun		Completed in April 1998	Air pumps are to be used for good aeration of nutrient solution and the Use of seedlings produced in sterilised artificial material such as standard techniculture trays available on the local market.
15	The evaluation of an aquaponic unit for the production of tilapia and lettuce.	Set up a small scale aquaponic unit combining aquaculture and hydroponic.Minimise frequency of partial water flushing and monitor the system's ability to reduce mineral accumulations	UOM	B.Sc.(Hons) Agriculture		J.B.Henriot/ Dr.M.Bhikajee		Completed in April 2000	Set up a feasibility study for a large scale aquaponic unit and Experiments are to be carried out to determine the lethal concentration of nutrients in water for Tilapia.

NO	TITLE	BRIEF OBJECTIVES/OUTCOME	INSTITUTION	TYPE OF PROJECT	FUNDING LEVEL	HUMAN RESOURCES	INFRASTRUCTURE	STATUS	RECOMMENDATIONS/ACTIONS
16	Appraisal of a low-cost home-made drip irrigation system on the yield of potato.	Design a system of irrigation that can be efficient on a small scale production.	UOM	B.Sc.(Hons) Agriculture		J.Poinapen/ Dr.S.Goburdhun, Mr.B.Dabeesing		Completed in April 2000	THE DISSERTATION CAN NO LONGER BE FOUND AT THE MAURITIANA SECTION IN THE LIBRARY.
17	Lettuce production through aquaponics: A comparison with hydroponics.	Comparison of aquaponic and hydroponics and the systems' capability of producing quality lettuce and maintain water quality.	UOM	B.Sc.(Hons) Agriculture		K.I.Kodai/ Dr.M.Bhikajee		Completed in April 2001	The systems can be adapted to confined surroundings such as spaceship and a feasibility study can be carried out to analyse differences in potential financial returns for both systems.
18	An evaluation of two types of sprinkler system: the dragline and the centre pivot.	Evaluation of both systems with respect to the efficiency and profitability aspects of both of them.	UOM	B.Sc.(Hons) Agriculture		J.Domane/ Mr Naidoo		Completed in April 2001	Determination of the coefficient of uniformity of the two systems under different working conditions and the optimum area of irrigation of both dragline and centre pivot systems.

LIST OF COMPLETED PROJECTS CONCERNING WATER RESOURCES WITHIN THE FACULTY OF AGRICULTURE AT THE UNIVERSITY OF MAURITIUS

NO.	Author/Supervisor(s)	Project Title	UOM Library Reference
1	P. D'Espagnac/ Prof.A.S. MacDonald, Mr.A.Osman	Overhead irrigation at Bagatelle	M/D S613.D4 1973
2	R. Jutton/ Mr.C.Lapierre	Bacteriological Examination of Water Supplies	M/D RA591.J8 1982
3	Wan Sai Cheong Y.T.N.C./ Dr.I.Fagoonee	Aquaculture of the major chinese and indian carps and aquaculture development in Mauritius & Analysis of growth in the common carp, cyprinus carpio, linnaeus, using different feed	M/D SH315.D3 1986
4	S.I.Sayed/ Mr.K.Ruheer	Hydroponics	M/D SB139.S2 1986
5	B. Dabeesing/ Mr.H.K.Mundil	Irrigation Development in Mauritius: A review of problems and prospects.	M/D S613.D3 1987
6	A.Beeharry Panray/ Dr.S.Bhoojedhur	Irrigation of sugar cane lands in Mauritius	M/D SB229.M3B4 1987
7	M.Goolamhossen/ Dr.G.C.Soopramanien & Mr.R.Sattar	Field Measurement of Soil Hydraulic Conductivity in a cropped and uncropped plot	M/D S593.G6 1990
8	R.Soopaya/ Mr.D.AhKoon	Optimising potato yield with drip irrigation in raw deficient regions	M/D SB211.P8S6 1994
9	M.Teeluck/ Mr.D.AhKoon, Dr.C.Soopramanien	Method for determining crop canopy interception evaporation and wind drift losses in a Centre Pivot Irrigation System in sugar cane.	M/D S616.M3T4 1994

10	B.A.Alleesaib/ Dr.D.C.West	The biology and culture of Berri Rouge and <i>Rhabdasargus Sarba</i> in Mauritius	M/D SH167.B4A5 1996
11	S.Chan Chu/ Mr.K.Bheenick	An Irrigation Monitoring System for sugar cane	M/D SB112.C45 1997
12	C.Clarel Seevathean/ Dr.M.Bhikajee	The Aquaculture Industry in Mauritius: A Diagnostic Study	M/D HD9450.S4 1997
13	A.M.Wong Fat Sang/ Dr.M.Bhikajee	Changes in water parameters following simulation of power failure in a closed aquaculture system	M/D SF457.SW6 1997
14	K.Dewkeea/ Dr.S.Goburdhun	Lettuce production in soil less culture systems as compared to the conventional system of production	M/D SH315.D6 1998
15	J.B.Henriot/ Dr.M.Bhikajee	The evaluation of an aquaponic unit for the production of tilapia and lettuce	NMD FOA 1024 1999/2000
16	J.Poinapen/ Dr.S.Goburdhun, Mr.B.Dabeesing	Appraisal of a low-cost home-made drip irrigation system on the yield of potato	NMD FOA 1034 1999/2000
17	K.I.Kodai/ Dr.M.Bhikajee	Lettuce production through aquaponics: A comparison with hydroponics	N/A 2000/2001
18	J.Domane/ Mr Naidoo	An evaluation of two types of sprinkler system: the dragline and the centre pivot	N/A 2000/2001

IRRIGATION AUTHORITY

No.	Title	Brief Objective/ Outcome	Institution	Type of project	Funding level (project value)	Human Resources*	Infras-tructure	Status	Recommendati ons/actions
1	Northern Plains - Stage 1	To alleviate the difficulties of small planters agricultu-rally active in subhumid areas and ensure sustaina-bility of production	MOA / BELLE VUE S.E AND I.A	PUBLIC SECTOR IRR-IGATION PROJECT	CDC / ODA / GOM (Rs 110 m)	STAFF OF I.A	IRRIGATION INFRASTUTURE & INFIELD EQUIPMENT	COMPLE TED & OPERA TED AS FROM 1979	All the Irrigation schemes need an ex-post evaluation
2	Souvenir Drip Irrigation Project	"	I.A AND BEAU PLAN S.E	"	USAID (Rs 22m)	STAFF OF I.A	"	1988	"
3	Palma East S.S.I.P.	"	I.A AND MEDINE S.E.	"	CFD (Rs 7m)	STAFF OF I.A	"	1987	"
4	Plaisance (N) S.S.I.P.	"	M.O.A AND I.A	"	FAC / CFD (Rs 7 m)	STAFF OF I.A / WUA	"	1982	"
5	Trou D'Eau Douce S.S.I.P.	"	M.O.A AND I.A	"	FAC (Rs 1.7m)	STAFF OF I.A / WUA	"	1983	"
6	Belle Mare S.S.I.P.	"	M.O.A AND I.A	"	CFD / FAC / GOM (Rs 35 m)	STAFF OF I.A / WUA	"	1987	"
7	Bel Ombre S.S.I.P.	"	M.O.A AND I.A	"	CFD / FAC / GOM (Rs 9.6)	STAFF OF I.A / WUA	"	1989	"
8	Riche Terre	"	N.D.U. AND I.A	"	IFAD (Rs 6.6m)	STAFF OF I.A	"	1990	"
9	Arsenal litchi project	"	N.D.U. AND I.A	"	IFAD (Rs 0.6m)	STAFF OF I.A	"	1990	"
10	Western coast irrigation project	"	I.A	"	EU / GOM (Rs 145m)	STAFF OF I.A / WUA	"	1992	"
11	Solitude drip irrigation project phase 1	"	I.A	"	GOM (Rs 20m)	STAFF OF I.A	"	1993	"

No.	Title	Brief Objective/ Outcome	Institution	Type of project	Funding level (project value)	Human Resources*	Infras-structure	Status	Recommendations/actions
12	Solitude drip irrigation project phase 2	"	I.A	"	WB / GOM	STAFF OF I.A	"	2000	"
13	Cressonville S.S.I.P	"	I.A	"	GOM (Rs 5.5m)	STAFF OF I.A / WUA	"	1996	"
14	Riviere du Rempart irrigation project	"	I.A	"	GOM (Rs 50m)	STAFF OF I.A	"	1996	"
15	St Felix Irrigation Project	"	I.A	"	LUXEMBOURG/ GOM (Rs 35m)	STAFF OF I.A	"	1997	"
16	M1 pipeline	Improvement of irrigation water supply to the northern plains	I.A	"	Grant from EU (Rs 125m)	STAFF OF I.A	Main pipeline of dia1200 mm and length 6.8 Km	1998	Will be fully operational after midlands dam is completed

ALL PROJECTS DOC OF THE IRRIGATION AUTHORITY ARE PREPARED BY STAFFS OF I.A. PROJECTS ARE THEN CONSTRUCTED BY CONTRACTORS UNDER SUPERVISIONS OF CONSULTING ENGINEERS

OR UNDER THE SUPERVISION OF THE ENGINEERS OF THE SUPERVISION AND CONSTRUCTION DEPARTMENT OF THE IRRIGATION AUTHORITY. THE SCHEME IS THEN HANDED OVER TO THE OPERATION

DEPARTMENT OF THE SAME INSTITUTION.

MAURITIUS SUGAR INDUSTRY RESEARCH INSTITUTE

MARIE-JEANNE, S. (1977). Pollution control in sugar factories - Design, operation and evaluation of a pilot scale subsider for suspended solids removal from water effluents. Project, B.Sc.(Hons.), Sugar Technology. ; University of Mauritius, School of Industrial Technology, Réduit, MU. 39 p., appen., 2 pl.

AH KOON, P. D. (1987). Effects of emission rate from drip irrigators on the distribution and drainage of water beneath a crop of sugar cane. Thesis, M.Sc., Soil Science. ; University of Reading, GB. 161 p., 13 tbls, 39 figs, 5 appen.

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(b) List of On-going Projects

WATER RESOURCES UNIT

(i) Water Balance of Mauritius

A water balance exists for the Island of Mauritius.

It is considered necessary to update the existing water balance with a view to having a more accurate assessment of the available water resources.

This is a MRC sponsored Study.

(ii) Monitoring and Control of Surface Water and Groundwater Pollution

Also, a MRC sponsored Study; the objective is to formulate guidelines for proper monitoring and control of water resources pollution in Mauritius.

(iii) Study of the land Drainage System of the Island of Mauritius

This is a Study scheduled to start within a few days.

The aim is to identify flood prone areas over the island, analyse the causes and devise remedial measures.

The Study involves, inter alia, island-wide topographical and indepth hydrological studies.

CENTRAL WATER AUTHORITY

Project No.	1
Title	Studying the fate of Nitrate in soil and water under intensive vegetable production
Brief objectives /outcome	
Institution	CWA/AREU
Type of project	
Funding	IAEA U\$ 103,000
Human resources	
Infrastructure	N – 15 analyser
Status	On-going
Recommendations actions	

IRRIGATION AUTHORITY

No.	Title	Brief Objective/ Outcome	Institution	Type of project	Funding level (project value)	Human Resources	Infrastructure	Status	Recommendations /actions
1	Conversion of NPIP STG 1	Im prove the water use efficiency by adopting more efficient irrigation systems	Irrigation Authority	PUBLIC SECTOR IRRIGATION PROJECT	CFD / GOM (Rs 210m)	STAFF OF I.A	IRRIGATION INFRASTUTURE & INFIELD EQUIPMENT	Ongoing	Providing a more reliable and efficient irrigation service
2	Distribution main A5	Take water from M1 to irrigation some 3500 ha of land after the completion of midlands dam	Irrigation Authority	PUBLIC SECTOR IRRIGATION PROJECT	EU grant / GOM (Rs 109 m)	"	Tapered Distribution main of length 8.2Km	ongoing	Will be supplying water to a new area ref as NPIP Phase 2
3	Extension of M1B2 main to Irrigate part of NPIP Phase 2 Block 2	With the improvement in water use efficiencies, due to conversion of NPIP Stage 1, the excess water will be used to irrigate this new area under the existing circumstances.	Irrigation Authority	PUBLIC SECTOR IRRIGATION PROJECT	GOM	STAFF OF I.A	Extension of Main M1B2 and installation of in-field infrastructure and equipment	Tendering stage	Will be supplying water to a new area ref as NPIP Phase 2 Block 2
4	Rehabilitation Of Massyllia canal of the Northern canal system	repairing the canal to ensure a better supply of water to the users and efficient use of water resources	Irrigation Authority	PUBLIC SECTOR IRRIGATION PROJECT	GOM	STAFF OF I.A	Repairing an open canal of length 6.4 km	Tenders will be floated very soon	

No.	Title	Brief Objective/ Outcome	Institution	Type of project	Funding level (project value)	Human Resources	Infrastructure	Status	Recommendations /actions
5	Rehabilitation of Souvenir drip irrigation project	Ensure water use efficiency	Irrigation Authority	PUBLIC SECTOR IRRIGATION PROJECT	IFAD	STAFF OF I.A	Improvement of Management & System	on going	
6	Rehabilitation of Arsenal litchi irrigation project	Ensure water use efficiency	Irrigation Authority	PUBLIC SECTOR IRRIGATION PROJECT	IFAD	STAFF OF I.A	Improvement of Management & System	on going	
7	Rehabilitation of Riche-Terre irrigation project	Ensure water use efficiency	Irrigation Authority	PUBLIC SECTOR IRRIGATION PROJECT	IFAD	STAFF OF I.A	Improvement of Management & System	on going	
8	Rehabilitation of Belle Mare irrigation project	Ensure water use efficiency	Irrigation Authority	PUBLIC SECTOR IRRIGATION PROJECT	IFAD	STAFF OF I.A	Improvement of Management & System	on going	
9	Victoria Irrigation Scheme	To alleviate the difficulties of small planters agriculturally active in subhumid areas and ensure sustainability of production	Irrigation Authority	PUBLIC SECTOR IRRIGATION PROJECT	IFAD	STAFF OF I.A	IRRIGATION INFRASTRUCTURE & INFIELD EQUIPMENT	Award of Contract	

MAURITIUS SUGAR INDUSTRY RESEARCH INSTITUTE

IRRIGATION

Irrigation is one of the most important factors for increasing cane yield, or maintaining the current production level on a smaller land area. There is increasing competition for water from other sectors of the economy, and research will aim at optimizing limited water resources. This can be achieved through the application of deficit irrigation, more efficient irrigation systems, the use of alternative (waste) water sources, computer-aided scheduling, etc.

Project titles

- i. Agronomic and economic evaluation of deficit irrigation practices
- ii. Assessment of different techniques and strategies of deficit irrigation practices
- iii. Evaluation of the performance of the different irrigation systems in terms of water application and water-use efficiency
- iv. Development of irrigation scheduling models
- v. Irrigation modelling

WATER QUALITY AND ENVIRONMENT

It has been recognized that cane growing can be a source of pollution to the environment, in view of the appearance of low levels of nitrate and pesticides in drinking water sources. The conditions for pollution from non-point sources have to be identified and the risks quantified. Furthermore, the risks associated with using non-conventional sources of water for irrigation also have to be assessed.

Project titles

- i. Monitoring of agrochemicals in ground and surface waters;
- ii. Measurements and prediction of agrochemical movement from sugar cane fields; and
- iii. Monitoring of effects of effluent water irrigation on soil physical properties and cane yield.