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Water resources management in Mauritius

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Abstract: Water resources management consists in the initial planning and matching of water availabilities and demand. Water is a basic ingredient in economic and social development, and should be one of the main components of national and regional planning. Planning of water resources is usually carried out at three levels: (i) long term overall planning on national level, with time horizons of about 50-100 years (ii) medium term planning with time-horizons of 15 to 25 years (iii) short term project planning with varying time-horizons (usually 5 to 10 years) according to each specific project. It is important to be able to assess availabilities and demand and to define proper criteria for this assessment so that the conclusions may be trustworthy. This assessment must cover water availabilities, include both surface waters and groundwater, consider the aspects of quantity and quality and refer to both present and future situations. This paper explains how on the one hand the water resources were evaluated through a simulation of reservoir performance, while water demand was estimated using several scenarios for consumption. The results from these two basic objectives helped in formulating a Master Plan for the development of water resources in Mauritius. Implementation is presently being carried out, which gives the opportunity to discuss a post analysis of the simulation carried out.

Keywords: water resources, requirements, planning, Master plan, Mauritius

1. INTRODUCTION

The island of Mauritius is situated in the Southwest Indian Ocean between longitudes 57°18′ and 57° 46′ East and latitude 19° 59′ and 20° 32′ South. It lies at about 800 km east of the Republic of Malagasy as shown in Figure 1.

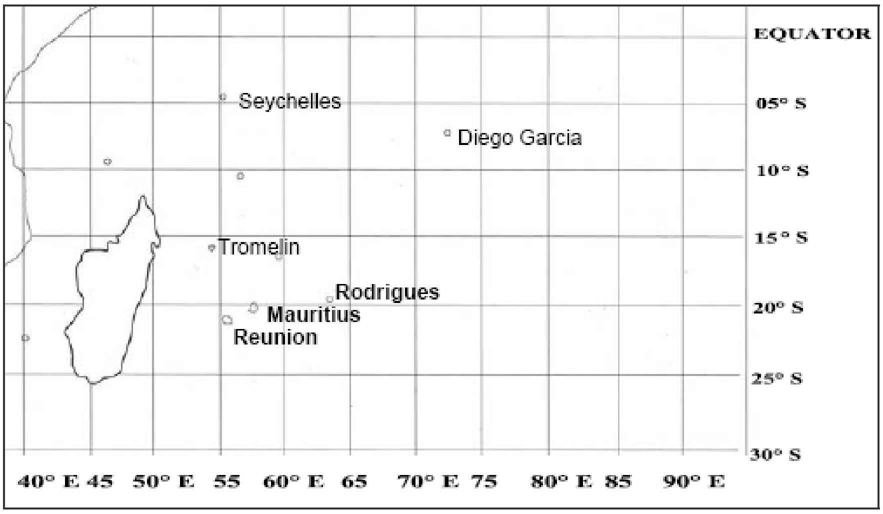

Figure 1. Location of Mauritius

The geology of Mauritius consists basically of basalt rocks only. The complex nature of its formation has given rise to basalt of various densities: the impermeable compact basalt to highly porous basalt. The latter acts a water collector; thus aquifers of Mauritius have a high permeability in excess of 10^{-5} m/s.

The texture and type of formation from the different volcanic activities would thus determine the natural infiltration rates, the contribution of rainfall recharge to aquifers and also the amount of runoff.

The rainfall pattern of Mauritius is strongly influenced by topography. The average annual precipitation over the island is 2120 mm, varying from 1500 mm on the East Coast to 4000 mm on the Central Plateau and 900 mm on the West Coast.

The surface and groundwater regimes are closely related, although aquifer and water catchment boundaries do not necessarily coincide. Groundwater plays a major role in sustaining flows in the rivers.

2. EXISTING SITUATION

2.1 Surface Water Resources

Most of the rivers in Mauritius spring from the Central Plateau and flow radially to the sea. Most of them are perennial. Figure 2 shows the impounding reservoirs in Mauritius, while Table 1 gives their capacities.

Water is also abstracted from about 350 river-run offtakes. Such offtakes permit an average annual mobilisation of 514 Mm^3 of surface water.

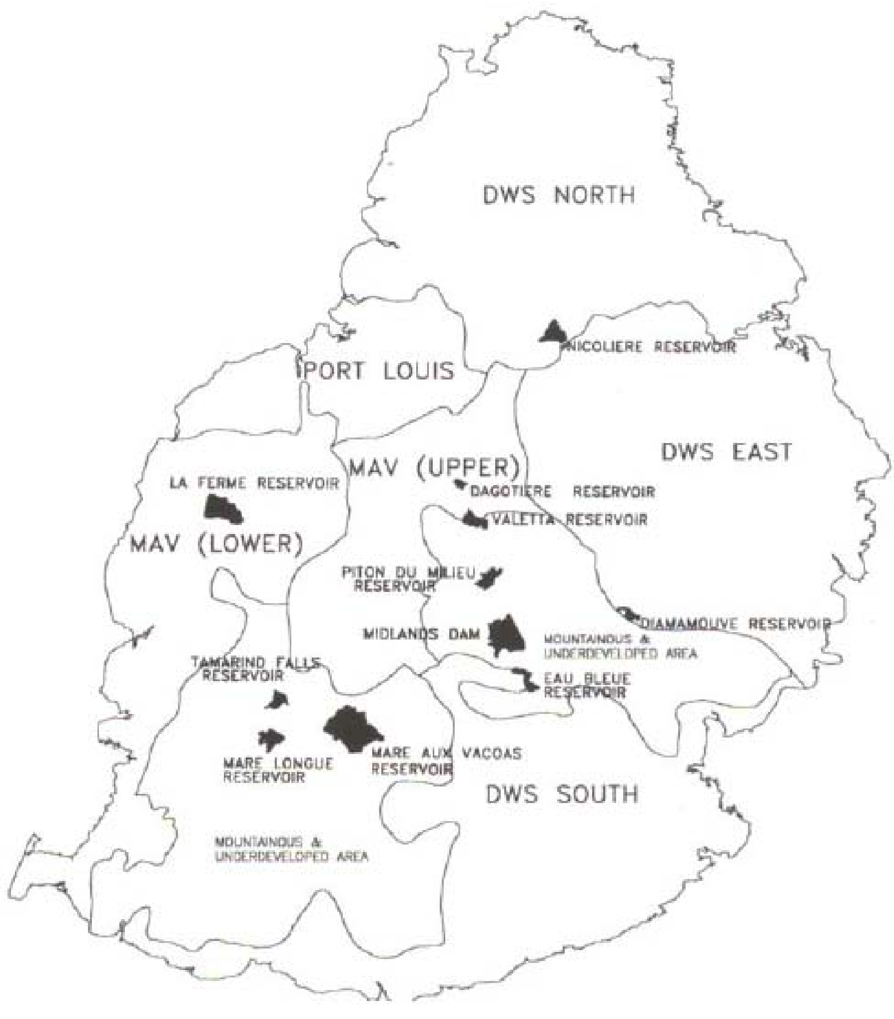

Figure 2. Distribution Water Systems and Impounding Reservoirs in Mauritius

Table 1. Capacity of Man-made Reservoirs

Reservoirs	Gross Capacity Mm^3
Mare aux Vacoas	25.89
Midlands	25.50
Mare Longue	6.2
La Ferme	11.52
Piton du Milieu	2.99
La Nicoliere	5.26
Tamarind Falls	2.3
Eau Bleue	6.2
Diamamouve	4.4
Dagotiere	0.6
Valetta	2.0
Total Storage Capacity	**92.86**

2.2 Groundwater Resources

There are five main aquifers of Mauritius. The annual groundwater recharge has been estimated at 390 Mm^3. Geological and hydrogeological investigations have resulted in the drilling of about 900 boreholes of diameter ranging from 150 to 300 mm. Presently, there are 339 boreholes in use as classified in Table 2.

Table 2. No. of Boreholes in use

Total No. of boreholes in use	339
No. of boreholes used for potable water (administered by CWA)	112
No. of boreholes used by industries	110
No. of boreholes used for Agricultural purposes	117

In addition to the 112 boreholes used for potable water supply, 18 other boreholes have been equipped as stand by. The maximum depth of borehole, which has been drilled so far, is 172 m. The maximum yield from a single borehole is 8000 m^3/day. The average annual volume utilised is 145 Mm^3. The average annual contribution to potable water supply is 57%.

2.3 Present Water Demand and Supply

The whole population of Mauritius has access to piped potable water. The Housing and Population Census 2000 survey reveals that 98.7% of the population had access to piped potable water within their premises, with 85.5% having piped water inside their house as compared to 75% in 1990. The remaining 1.3% of the Population relied on public fountains, CWA mobile tanker service and other sources for their daily supply of potable water.

The C.W.A estimates that the average demands for potable water from households is 170 L/h/d and non domestic demand is equivalent to 441 L/h/d.

Water is used for different purposes as shown in Table 3, while Table 4 shows the population with level of service hours of water.

2.4 The Institutional Arrangement for the Water Sector

The Ministry of Public Utilities is the main body responsible for policy and implementation as regards Water Resources. There are five organisations, which operates in the water sector in Mauritius. Figure 3 shows the water resources institutional set-up. They are responsible for harnessing, treating, and distributing water.

Table 3. Water Utilisation (Mm^3 per Year)

Purpose	Surface Water		Groundwater	Total
	River-run Off-takes	Storage		
Domestic, Industrial and Tourism	38[1]	48	113	199
Industrial (private boreholes)	-	-	10	10
Agricultural	370	76[2]	22	468
Hydropower	131	174[3]	-	305
Overall Utilisation	539	298	145	982
Total Water Mobilisation	514	230	145	889

[1] Includes 25 Mm^3 used for power generation at Reduit H.E.P.S
[2] Includes 30 Mm^3 used for power generation at Tamarind Falls and Magenta H.E.P.S
[3] Includes 38 Mm^3 used twice (14 Mm3 at Le Val and Ferney, and 24 Mm^3 at Tamarind Falls and Magenta H.E.P.S)

Table 4. Population with service hours of water

Hours of supply	Population served	%
24 hours	651,240	57.3
18-23 hours	185,320	16.3
10-17 hours	283,220	25.0
6-9 hours	11,530	1.0
< 6 hours	4,930	0.4
TOTAL	**1,136,000**	**100**

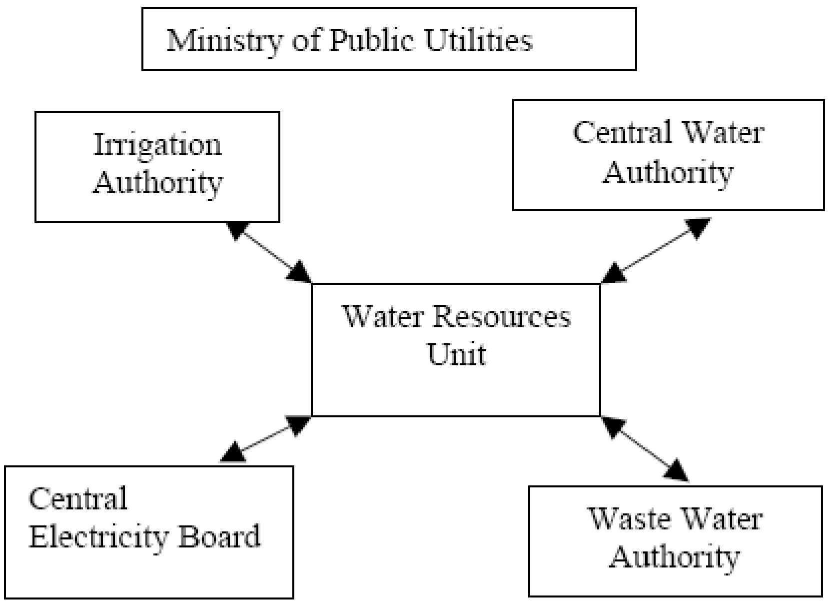

Figure 3. Water Resources institutional set up

3. FUTURE WATER REQUIREMENTS

3.1 Water Requirements and Time Schedule

The water requirement is the water demand (actually sold to the consumer) plus all the unaccounted for water (UFW). Thus the water requirement is the water which needs to be produced by the Central Water Authority (CWA). The UFW ratio is the percentage of water produced that does not get billed.

A Master Plan for Water Resources was prepared by the Central Water Authority during the years 1987-1989. Surveys of water demand from different sectors, namely the domestic, touristic and industrial sectors were carried out. Findings included a basic water demand ranging from a minimum of 80 L/p/d (where hours of supply were minimum) to values exceeding 250 L/p/d in areas where water distribution presented no problem. The monthly household income did not seem to be a hindrance in water demand.

In fact, when the water tariff increased a few years ago, there was no major decrease in water consumption, confirming the inelasticity of water demand.

The next issue was to determine the target years for which to estimate the water demand and the water requirements. While the short term may be anything between 1 to 5 years, and the medium term about 10 years, there is some debate about the terminology long term. Many people cannot look beyond 20 years. Past experience in planning works within the CWA has shown that actual implementation of a major project (trunk mains or a system of service reservoirs, not to mention a dam) may not start before 10 years after inception of the project. By the time the project is completed, it is found that the services provided have already reached its useful capacity (as designed 20 years ago) i.e. even before it starts operation, it is already underdesigned!

It is in this respect that it was decided to look at least 50 years ahead, bearing in mind that

- a pipe is still in useable condition 50 to 70 years after its laying,
- reservoirs and dams structures have a similar lifetime, and
- economic analysis tends to taper off beyond a 50 year lifetime.

Of course, it cannot be foreseen what type of new technology will come along in the future. Thus going too far ahead in the future could tend to become wishful thinking. But this exercise had one big advantage. It immediately brought down the hard facts of planning. Massive investment in terms of infrastructure and water conservation would be required not for meeting the requirements in 50 years, but in the next 20 years.

3.2 Domestic Water Requirements

Thus, estimates for water demand and water requirements have been made for different years as given in Table 5.

Table 5. Water Requirement in the different systems (Mm^3/year)

Year	P-Louis	North	South	East	Upper MaV	Lower MaV	TOTAL
2001	25.3	30.8	26.7	18.3	28.5	30.9	160.5
2010	27.4	34.7	30.4	22.8	32.4	33.8	181.5
2020	28.5	34.5	29.5	22.9	32.2	33.9	181.5
2030	31.1	38.2	32.0	25.6	35.6	37.8	200.3
2040	32.9	41.5	34.4	28.1	38.9	40.1	215.9
2050	33.1	42.7	35.2	29.1	40.0	41.7	221.8

The basic assumptions for this estimation were a per capita consumption of 157 L/p/d in year 2001 rising to 170 L/p/d in year 2010, up to 200 L/p/d in year 2050. It is also expected that the unaccounted for water (UFW) ratio will be brought down gradually from the present value exceeding 50% to 30 – 40% in year 2040. This also explains why the total requirement appears identical for both 2010 and 2020. These assumptions are, in a way, somewhat optimistic. Depending on the actual circumstances, they may be understating the real requirements.

Water supply for industry being supplied by boreholes is not included in the above table as the water is consumed at source.

3.3 Irrigation Water Requirements

In practically every country, the claim is the same: all planters want as much water as possible, and at the lowest price. Mauritius does not escape the rule. The very nature of its agricultural background has resulted in an extensive irrigation system. The big sugar estates derive their water from riparian water rights (there is no tax on this water), as much of their lands is along the rivers. On the other hand the government, through the Irrigation Authority, has planned irrigation schemes for the benefit of small planters. The water requirements in this sector would range from some 30 to 100 Mm^3.

In the early days the required water was obtained from natural springs, streams or rivers in the proximity of the plantations, and few sugar cane growers had impounding reservoirs for storing their irrigation water. La Ferme and La Nicolière impounding reservoirs were constructed with the specific purpose of providing irrigation water for the sugar industry. Extensive systems of feeders (e.g. Nicolière feeder and La Ferme distribution canals) were also constructed for the supply to reservoirs and distribution of water on large areas.

Irrigation projects are sometimes decided upon without the full backing of technical data. Observations that may be made relate to the choice of location of irrigation projects. Why should areas receiving high rainfall (St. Felix in the south with 3400 mm annually) be irrigated? It is possible that several essential criteria may have been overlooked. These include yield of sugar cane, soil type, etc.

It has been observed that two areas, both located within the same rainfall belts, may yet have different cane yields. Results for vegetables show similar trends.

If the conclusions regarding the economic benefits accruing from irrigation are strictly considered, serious doubts may be raised about the need for further irrigation over the island.

Of course, the question is not to stop irrigation. The problem lies in understanding:

- that the extra water which is being used for irrigation may not be effective at all i.e. it is not increasing the yield at all.
- that there is no possibility of recovering the expenditure incurred. This is the marginal costing exercise.
- that the extra water might instead be diverted to some other uses like potable water supply.

The solution is to use irrigation efficiently and judiciously.

3.4 Hydropower

Because of its volcanic formation, Mauritius does not possess natural underground sources of energy like coal, oil or uranium. Water has been until recently, however, a non-negligible source of power in the form of its hydroelectricity potential. While twenty years ago hydropower was a major component of electricity production in Mauritius**,** it stands now as a mere 7-8% of the total production.

When the water requirements for hydroelectricity are examined, an important consideration comes to light. Water used for hydroelectricity generation is initially at a high elevation and could alternatively be used for water supply under gravity. This totals up to 220 Mm^3 annually. This volume of water produces about 100 GWh.

There is thus a possibility of not generating hydroelectricity, but using the water for other purposes. The trade-off in obtaining 220 Mm^3 of water extra annually is losing 100 GWh of energy. This shortfall of at least 100 GWh in the electricity production will of course have to be made good by some other method.

4. SIMULATION OF WATER RESOURCES POTENTIAL

4.1 Regulated Flow

The flow from a river is irregular, in the sense that on the same day, peaks several times the daily mean may occur. And during this same day, flows lower than the daily mean will last for several hours.

If the draw-off needed from the river was the daily mean, then this would be impossible during some hours when the river flow is less than the daily mean, though during the peak flow period, there would be more water than necessary.

If however, a dam is constructed, then the excess volume of water flowing during the peak period may be stored in the reservoir. Later on, a flow equal to the daily mean may still be obtained from the reservoir. Here all the water flowing has been stored, and the daily mean is the maximum constant flow that can be drawn from the reservoir.

4.2 Reliability of Guaranteed Flow

Consider a system (reservoir of high capacity, or reservoir of low capacity and rivers) supplying a constant (guaranteed) flow.

If this flow is available every day of the whole year, then it may be said that the water requirements has been met 365 days out of 365.

Similarly, if water is supplied everyday of the year during 20 years, then it may be said that the water requirements has been met 20 years out of 20, or simply 20/20 years, or at 100% reliability.

If water is supplied everyday of the year during 19 years not necessarily consecutive) and intermittent during one year (one failure year) then it may be said that the water demand has been met 19/20 years, i.e. the reliability is 95%.

If the water requirement was met 18/20 years, (i.e. 2 failure years) then the reliability would be 90% and so on.

It is important to realise here that:

1. intermittent supply during one year may mean NO supply during 1 day, or a few days, or several days in several months of the same year.
2. a 90% reliability means NOT ONLY 1 failure year out of 10, but also 2 failure years out of 20. In this probability game, the failure year may come any time, and the worst case is that the 2 failure years follow each other.
3. in hydrology, the severe case is to consider 3 consecutive drought years, though one may argue that dry spells in Mauritius may last longer than that.
4. a large reservoir with higher reliability (e.g. 95%) is less vulnerable to such severe drought than a reservoir with lower reliability (e.g 90% or lower).

The psychological impact is of course greatest on the public if the drought happens just after commissioning of the dam. Mass media will be active in discussing the technical merits of the project and its cost!

It is therefore imperative that the capacity of the reservoir be chosen to give a high level of reliability, due regard being given to cost of the project.

On the other hand, a higher level of reliability requires a bigger dam for larger capacity, and hence the cost increases.

4.3 Mathematical Formulation

The following notation is used for the different levels in the reservoir:

V_{min} is the minimum capacity of the reservoir, after consideration of possible sedimentation, etc.

V_{max} is the maximum capacity of the reservoir, at spillway level.

V_1 is the initial volume in the reservoir on a given day.

V_{IN} is the inflow into the reservoir on this given day.

V_{OUT} is the outflow from the reservoir on this given day.

V_2 is the final volume in the reservoir on the given day, and will be equal to V_1 of the following day.

This leads to the following formulation:

$V_2 = V_1 + V_{IN} - V_{OUT}$,	subject to the following constraints,
If $V_2 > V_{MAX}$, then $V_2 = V_{MAX}$	and some spilling occurs.
If $V_2 < V_{MIN}$, then $V_{OUT} = 0$.	No drawoff is allowed on this day, and the reservoir fills further.

A computer programme was written where all the parameters, excluding V_{IN} could be varied by the user. V_{IN} consisted of the daily flows of the river(s) feeding the reservoir. Thus with a given V_{MAX}, and a given drawoff V_{OUT}, the result obtained was the number of days during which this drawoff V_{OUT} could not be supplied for the period of river inflows used (in our case, 20 years). With a given V_{MAX}, a set of curves could be drawn to indicate the various degrees of reliablity for various values of guaranteed flows (V_{OUT}). This in turn led to getting a set of curves of cost against V_{MAX} and cost against flows.

4.4 Potential Dam Sites in Mauritius

An exercise was carried out to estimate the potential of several dam sites. These potential dam sites are shown on Figure 4, namely at Calebasses, Bagatelle, Mon Vallon, Black River, Chamarel, La Flora and Astroea. The results, of course, combine capacities, regulated flows and estimated costs.

5. WATER RESOURCES MANAGEMENT

The concept of water resources management requires integrated planning and management. This combines supply and demand management strategies to take into account all the economic, environmental, social, political and institutional factors related to water.

5.1 Non Technical Strategies

This can only be achieved by implementing some of the following strategies:

- Pricing Measures
- Minimising unaccounted-for water
- Reuse of Wastewater

- Conservation of water quality
- Artificial Recharge
- Public Awareness

Figure 4. Location of Proposed Impounding Reservoirs

5.1.1 Concept of Water Pricing

As mentioned earlier, water consumption is a broadly inelastic commodity, and not much can be achieved here.

The domestic consumers cannot do much. The other consumers (commercial, industry, hotels) pass the increase to the final buyers.

5.1.2 Minimising Unaccounted-for water

The level of unaccounted-for water varies between 45 to 55% throughout the different networks of the island. The maximum UFW occurs during the normal season when resources are plentiful and declines to an average of 50% in dry season. In order to reduce the unaccounted-for water, the following are required:

- Funds,
- Modern leakage techniques and equipment,
- Management in terms of management commitment, consultant support, staff motivation, skills, training, and finance,
- Resources in terms of manpower : Engineers, Technical staff, and skilled labour force and,
- Public Awareness.

It has been estimated that if the network efficiency could be improved to 80%, the total annual savings would be of the order of Rs. 60 million.

However the cost of improving the network work efficiency should be taken into consideration. The C.W.A estimates that to bring down the unaccounted for water from 50-61% to 25% by the year 2007 the projects and programmes would cost approximately Rs 1.047 billion. Therefore, it is worth reflecting on the feasibility of the investment and the period required to recover it.

5.1.3 Reuse of wastewater

The cost of treatment varies with volume treated. For the St Martin project the cost of treatment of effluent for irrigation purposes is estimated at Rs 2.00/m^3. For the La Nicoliere Treatment Plant the cost of treatment of raw water for potable use is estimated at Rs 0.40m^3/d. Although, it is cheaper to treat raw water than wastewater the advantages as well as motivating factors for wastewater reuse are identified as follows:

Water pollution abatement, not discharging into receiving waters:

- Availability of highly treated effluents for various beneficial uses enforced by increasingly stringent water pollution control requirements
- Providing long-term water supply reliability within the community by substituting freshwater
- Water demand and drought management in overall water resources planning.
- Recycled water can reduce fertiliser use for agriculture.

Reuse of wastewater enables the allocation of good quality fresh surface or groundwater for the highest value purposes, which are either for human consumption, or meeting domestic needs. It also protects existing sources of fresh water as it obviated the requirement of mobilisation of additional resources to meet increasing demand.

Today, technically proven wastewater treatment or purification processes exist to provide water of almost any quality desired. Frequent droughts, increasing water development costs, institutional and environmental concerns, and a growing conservation philosophy are key factors accounting for current surge of interest in wastewater reclamation and reuse. Thus, wastewater reuse has a rightful place and an important role in optimal planning and more efficient management and use of water resources.

5.1.4 Conservation of water quality

The quality of water resources in Mauritius are within the acceptable limits. However, the quality of water is prone to deterioration therefore more frequent monitoring should be carried out, preferably daily and at odd hours if possible. Research work should be carried out on contaminants and pollutants affecting the water quality while maintaining an understanding of the fundamental natural processes and human input factors affecting the fate and transport of non point water pollutants. More stringent legislative and administrative policies should be enforced such that the polluters should think twice before discharging waste into the water resources. The Ministry of Health and quality of Life can conduct more frequent and independent analysis of the potable water supplied by the C.W.A. Additionally the C.W.A could adopt a programme for regular inspections and cleansing of its service reservoirs. Moreover since Mauritius is developing rapidly, sensitive zones can be established which will indicate where specific activities can be carried out without endangering ground and surface water resources.

5.1.5 Artificial Recharge

It is proposed to use the outflow from some treatment plants for irrigation during the months of October till May this implies that during four months treated water will be available. One of the options is to divert the water from the Treatment plants of St Martin and Montagne Jacquot to La Ferme Reservoir. But, the storage capacity of the Reservoir must be considered, secondly during the diversion from the treatment plants to the reservoir there could be losses. This could be wastage of the water. Therefore, another option would be to store water into the aquifers by artificial recharge. However, the cost of artificial recharge and pumping the water from the aquifer should be compared to the construction of a dam. Therefore, aquifer recharge can become an integral part of water resources planning, as it is one form of providing the need towards sustainable water supplies.

5.1.6 Public Awareness

Public awareness was emphasised during the year 1999 when Mauritius faced severe drought conditions. In certain ways, the campaign was successful during the period; people reacted positively to the issue. On the other hand, when top officials themselves (both at the CWA and in other quarters had spotless cars), when the government spent Rs. 50 million in developing new boreholes and in providing water tanker service, the success is debatable. The campaign was dropped after the drought period. It is not certain that the Mauritian population has understood what to do and what NOT to do in a drought situation?

The public should be made aware of the water conservation equipment such as dual-flush and water conservation equipment. Some hotels participated in a water conservation programme and made use of water saving devices, thereby reducing the hotel water consumption.

People have the misconception that wastewater, even when treated, is still unsafe to use. However, treated wastewater is used for drinking purposes in Windhoek, the capital of Namibia, where severe water shortages exist. Hence, people should be made aware that treatment plants can treat wastewater to any quality desired. The CWA is the sole undertaker for water distribution, and responsible to reduce unaccounted-for water, however the public could participate actively in an unaccounted-for water programme by reporting any leakages, meters that are not do not work properly and thefts. Another aspect where public could help in the conservation of water is by making use of water harvesting methods. Hence, public awareness plays an importance role in the conservation of water resources.

5.2 Matching Water Resources against Water Requirements

As the population grows, the water available per capita inevitably decreases. Water presently used for irrigation amounts to some 440 Mm^3 annually, which is nearly three times the annual potable water consumption (domestic, touristic and industrial) amounting to 160 Mm^3.

In the long term, an extra amount of a minimum of 60 Mm^3 will need to be harnessed, for the potable water sector.

The simulation of the water resources potential has shown that there are several impounding reservoirs which can be constructed in Mauritius. In fact, several have been planned, so as to meet the gradually increasing demand. However, dam construction may be expensive and a lengthy process.

Any asset (dam, borehole, etc) once built can satisfy a certain demand or requirement. This may be constant, decrease with time (wear and tear, etc) or increase (very rarely). With time as the population grows, so does the requirement, as is given by the curve on Figure 5. However, after a certain time, the existing asset is no longer satisfactory, and an increase in capacity is required.

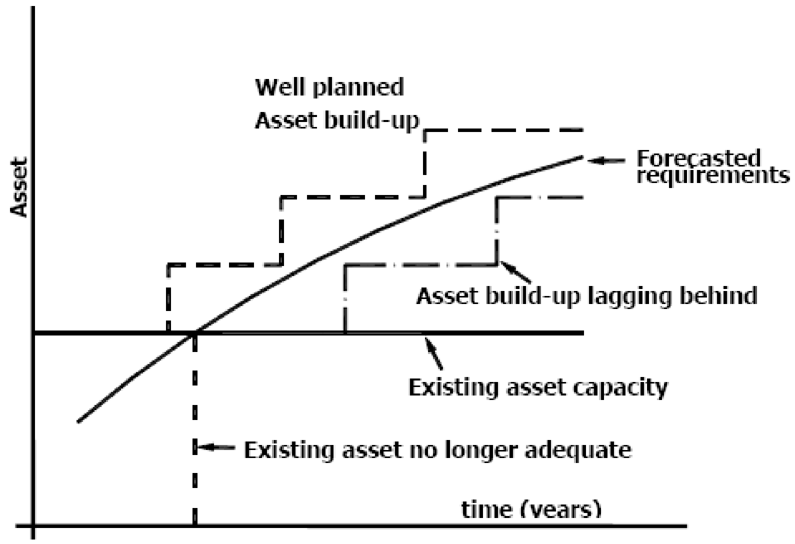

Figure 5. Bridging the missing resource

If planned well in advance, the asset build up is carried out in time and is always adequate to satisfy the requirements.

If, however, there is some time lag in assessing the requirements and then providing the asset increase, there is a non-stop cat chasing tail experience.

The Champagne hydroelectric project with an earth/rockfill dam with a 4 Mm^3 impounding reservoir was completed in 1983 at a cost of nearly twice the tender price of Rs. 400 million.

Nearly twenty years after, the Midlands dam was completed in 2002, at a cost of around Rs. 1.4 billion, for a 25 Mm^3 storage capacity. This is just to confirm that an impounding reservoir is quite expensive in Mauritius.

And, this needs to be highlighted, it is quite difficult, for Mauritius, to spend/complete a Rs 1 billion within a year.

The next dam, Bagatelle, is under study for feasibility. A stumbling block, however, would be cost as mentioned above. This is where the social, economic and other strategies could come in useful.

Hydroelectricity uses water only once to the tune of some 220 Mm^3 annually. In most cases, the tailrace water is at a low elevation with respect to nearby villages, thereby preventing direct supply by gravity. There is however, a case for considering the pumping of only the small amounts required for the small villages, after the adequate treatment process of course. At the extreme, closing the hydro stations mentioned above would certainly solve a water problem at the cost of an energy problem. In this case the economics of investing into new gas turbines need to be compared with the construction of new impounding reservoirs.

On the other hand, a 15% saving in potable water supply is equivalent in 5% irrigation water. It is certain that if irrigation is wisely chosen, there should be a decrease in water demand in this sector. Better irrigation techniques (drip or pivot systems) will reduce water use for the same irrigated area. It is also better to irrigate soils which are going to retain the water, rather than stony soils or soils overlain by lava tunnels!

Presently, the riparian owners (holders of water rights, along rivers) are free to use their water for irrigation at any time. It is not unknown to see sprinklers operating while it is raining! The usual excuse is that the irrigation schedule had been planned beforehand, and stopping this now would disrupt the whole schedule. Whatever be the merits of this reasoning, the result is that soil receives more water that it can retain - with an eventual loss to the sea or non availability at the right time.

One idea worth considering is the use of either a tax imposition on all water abstracted through riparian ownership or a water bank. The tax behind water usage would inevitably cause users to think twice before irrigating. The water bank would buy water from these riparian owners when they do not really need it. In both cases, there would be some reflection on the real efficiency of the water being used for irrigation. The extreme case is of course to apply the full rigour of the law: as all water belongs to the State, there cannot be anybody who should have privileged water rights. Such a nationalisation of water rights would, in effect, be as effective as the tax imposition. But the perception might be different.

Mauritius is one of the few African countries to have 100% water supply coverage for the years 1990 and 2000 as stated by the Global Water Supply and Sanitation Assessment 2000 Report.

In Mauritius some of the pressures that exist on water resources are:

- Increase in potable water requirement from present 190L/p/d to 250 in 2040 assuming population to rise to 1.6 million,
- Unaccounted-for water is estimated to be between 45-55%,
- Degradation of water quality mainly from industrial, agricultural sector and domestic wastewater,
- Seawater intrusion in the coastal zones affecting underground water

6. CONCLUSION

With or without irrigation, there is likely to be a shortage of water in the long term, even with the development of water resources schemes. Hydropower generation, which uses much water for only a marginal electricity production, will probably need to be drastically reduced so as to allow diversion towards use for potable purposes. The allocation of water to various secondary and tertiary sectors will probably increase in view of their larger contribution to the economy compared to the agriculture. Implementation of the non-technical strategies discussed above will form part and parcel of future water resources management plans.

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