

# National Action Plan for Sustainable Land Management for Mauritius and Rodrigues

UNDP/GEF/GoM Project on Sustainable land  
management

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# Geographical position of Mauritius



# UNIVERSITY OF MAURITIUS



# Coloured soils of MAURITIUS





# Black River Gorges



# Crater lake



# Mountain peak, PIETER BOTH



# Geological Features





# Sandy Beaches around the Island



# Extreme soil degradation in Rodrigues



# Bush fire (Vandalism deliberate)









# Beach Erosion



# Gabion as a mitigation to beach erosion(Failed)





# Table of Contents

## ■ 1.0 Introduction

## ■ 2.0 Diagnostic Framework

- 2.1. Physical Location
- 2.2. Climate
- 2.3. Hydrogeology
- 2.4. Socioeconomic Indicators
- 2.5. Political Situation
- 2.6. Land Use
- 2.7. Water Resources

## ■ 3.0 Energy

- 3.1. MID project

## ■ 4.0 Biodiversity

## ■ 5.0 Land Ownership

- 5.1. Land Use Changes
- 5.2. Consequences of land use changes
- 5.3. Land Degradation

# Table of Contents

## ■ 6.0 Baseline

- ❑ 6.1.Availability of Resources and Capacity for SLM
- ❑ 6.2. Ministries/Institutions/Stakeholders involved in SLM
- ❑ 6.3.Policy and Legislative Framework
- ❑ 6.4.Prior interventions and studies to address SLM issues
- ❑ 6.5.Regional and International Integration

## ■ 7.0 Rodrigues

- ❑ 7.1.Physical Location and Climate of Rodrigues
- ❑ 7.2.Political Situation and Economy of Rodrigues
- ❑ 7.3.Land resources in Rodrigues
- ❑ 7.4.Hydrology and Hydrogeology
- ❑ 7.5.Water resources in Rodrigues
- ❑ 7.6.Biodiversity in Rodrigues

## ■ 8.0 The National Action Plan

- ❑ 8.1.The Rationale and Requirements of the NAP.

# Table of Contents

## ■ 9.0 National Action Plan for SLM for Mauritius and Rodrigues

- ❑ 9.1 Strategic Axis 1 : Mainstreaming SLM into central planning policies, strategies and regulations
  - ❑ 9.2 Strategic Axis 2 : Establishment of a Mauritius Land Authority (MLA)
  - ❑ 9.3 Strategic Axis 3 : Enhancing systems for assessing land degradation in Mauritius and Rodrigues including the islets
  - ❑ 9.4 Strategic Axis 4 : Prevention of land degradation
  - ❑ 9.5 Strategic Axis 5 : Enhancing training, education and public awareness and community and institutional empowerment regarding land and SLM issues
  - ❑ 9.6 Strategic Axis 6 : Promotion of research and scientific studies on causes and effects of land degradation, and develop appropriate measures for SLM
  - ❑ 9.7 Strategic Axis 7 : Need for early warning systems and emergency plans to mitigate cyclone, drought, floods, tsunamis and other natural disasters, as well as climate change
  - ❑ 9.8 Strategic Axis 8 : Food security and sustainable development of agriculture and Maurice Ile Durable
  - ❑ 9.9 Strategic Axis 9 : Sustainable forest management
  - ❑ 9.10 Strategic Axis 10: Sustainable Coastal Management
  - ❑ 9.11 Strategic Axis 11 : Sustainable watershed management
  - ❑ 9.12 Strategic Axis 12 : Rehabilitation of degraded lands and management of protected areas
- 
- ❑ 9.13 Strategic Axis 13 : Understanding and utilising Traditional Knowledge for SLM
  - ❑ 9.14 Strategic Axis 14 : Establishment of partnerships with the private sector

# Table of Contents

- **10.0 Action Programme Matrix**
- **11.0 Time Line**
- **12.0 Proposed Projects with Project Outlines**
  - 12.1 Project 1 : Development of a Model Agricultural Village (MAV) for VRS I, VRS II and other ex agricultural workers and employees
  - 12.2. Project 2 : Agroforestry project for biofuels for small planters on marginal lands
  - 12.3 Project 3 : Rehabilitation of river reserves (Riparian zones)
  - 12.4 Project 4 : A Review of the Building Codes for Mauritius and Rodrigues
  - 12.5 Project 5 : Reforestation of degraded lands with fruit trees in Rodrigues
  - 12.6 Project 6 : Training of Farmers on SLM
  - 12.7 Project 7 : Review of the Building Requirements and Building Codes on Slopes, Mountain Slopes and Environmental Sensitive Areas (ESAs)
- **13.0 Additional List of Projects that can be Developed**
- **14.0 Financing the NAP**
- **15.0 Monitoring and Evaluation (M & E) of the NAP**
- **16.0 Implementation of the NAP**
- **Bibliography**
- **Annexes**

# Introduction

- Definition of land and land resources
- Importance of land use practices and land management
- Symptoms of pressure on land resources
- Principles of SLM
- Need for NAP
- Conventions and MEAs signed by Mauritius
- The Millennium Ecosystem Assessment defines land degradation as a reduction in the capacity of the land to perform ecosystem functions and services

## Diagnostic Framework

**Table 2 : Land Area of the Republic of Mauritius**  
(Source: *Hydrology Data Book, 2005 and other sources*)

Site	km <sup>2</sup>
Mainland	1,865
Islets	10
Rodrigues	105
Agalega	26
Tromelin	0.84
St. Brandon	5.4
Chagos	13.4



# Socioeconomic indicators

## Population density of the Republic as at 2009

*(Source : CSO, 2009)*

Island	Population	Area (km <sup>2</sup> )	Density (km <sup>2</sup> )
Mauritius	1,237,286 (1, 325,000)	1,864.8	663
Rodrigues	37,748	104	363
Agalega + St. Brandon	289	71.2	4
<b>Total</b>	<b>1,275,323</b>	<b>2,040</b>	<b>625</b>

# Land Use in Mauritius

*(Source : CSO, 2008)*

Land use type	Area (ha)
Sugarcane	72,000 (59,000)
Other agricultural activities	8,674
Forests, scrubs & grazing lands	47,200
Reservoirs, ponds swamps & rocks	2,900*
Roads & footpaths	4,500*
Built up areas	46,500*
Abandoned cane fields	4,726*
<b>Whole island</b>	<b>186,500</b>

# Forest Area

(Source : NBSAP, 2006)

Type of		Area (ha)
<b>STATE</b>		<b>22,200</b>
- Plantations		<b>11,816</b>
- Nature Reserves		<b>799</b>
<i>Mainland</i>	<b>200</b>	
<i>Islets</i>	<b>599</b>	
<b>National Park</b>		<b>6,708</b>
<i>Black River Gorges National Park</i>	<b>6,574</b>	
<i>Islet National Parks</i>	<b>134</b>	
<b>Bras D'Eau &amp; Poste La Fayette Reserves</b>		<b>472</b>
<b>Unplanted, protected or to be planted</b>		<b>1,770</b>
<b>Pas Geometriques</b>		<b>635</b>
<i>Plantations</i>	<b>226</b>	
<i>Leased for grazing &amp; tree planting</i>	<b>230</b>	
<i>Unplanted/to be planted</i>	<b>179</b>	
<b>PRIVATE (including leased land)</b>		<b>25,000</b>
<b>Reserves</b>		<b>6,553</b>
<i>Mountain reserves</i>	<b>3,800</b>	
<i>River reserves</i>	<b>2,740</b>	
<i>Nature reserves</i>	<b>13</b>	
<b>Plantations</b>		<b>2, 600</b>
<b>lands, including scrub, grazing lands (estimate)</b>		<b>15,847</b>
<b>Total</b>		<b>47,200</b>

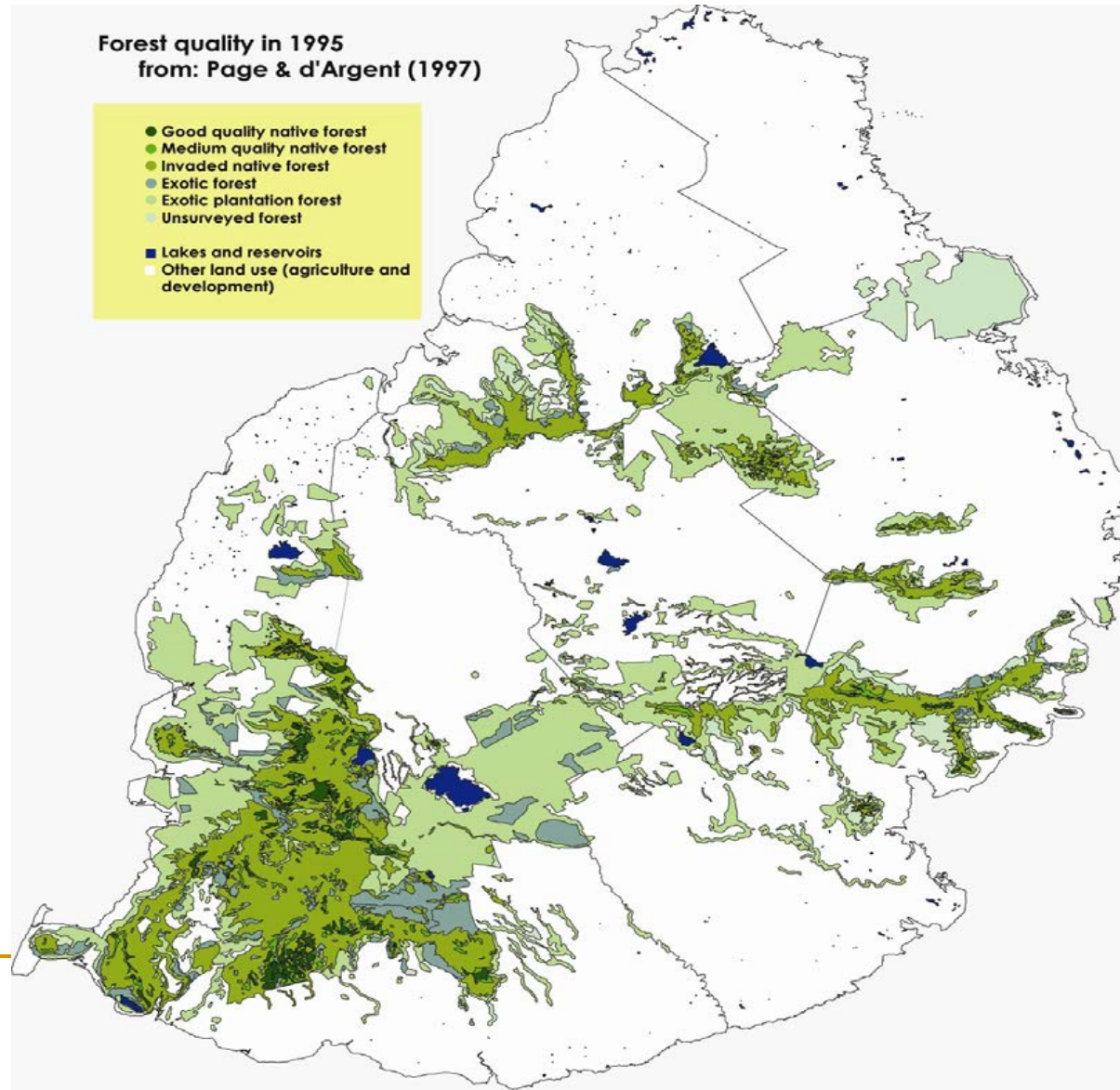
# Major issues of concern for land resources in Mauritius

*(Source : NEP, 2006)*

- Inadequately planned development, especially in prime coastal areas
- Encroachment on Environmentally Sensitive Areas (ESAs);
- Encroachment on coastal and inland green areas by inappropriate intrusion of concrete structures;
- Juxtaposition of conflicting land uses and need for proper integration of transport planning with land use;
- Over concentration of development in central business districts, and towns and villages;
- Lack of resources for upgrading and redevelopment of existing dilapidated urban areas

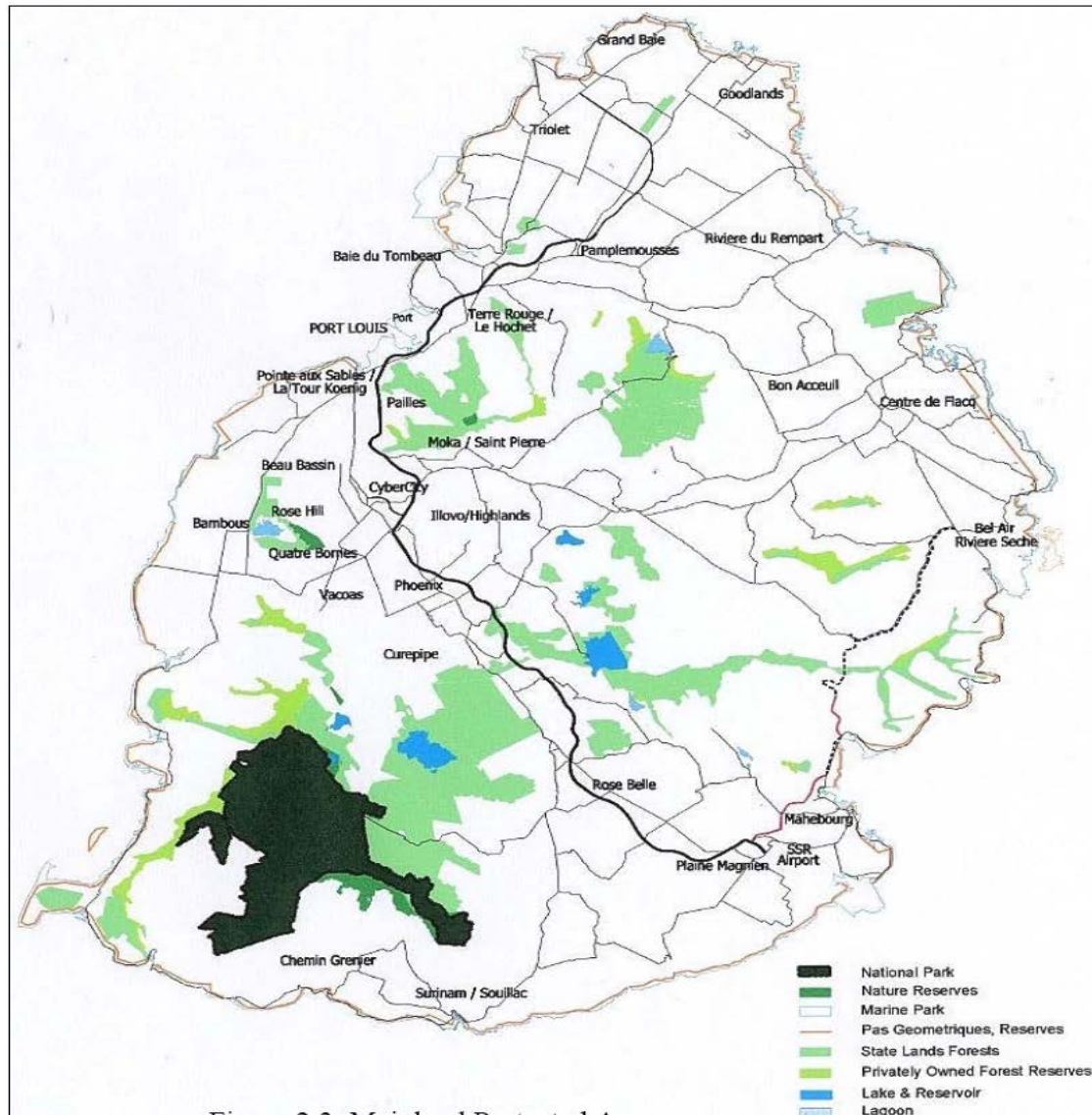
# Forest Types

*(Source : Page and D'Argent, 1997)*



# Main protected areas

(Source : NBSAP, 2006)

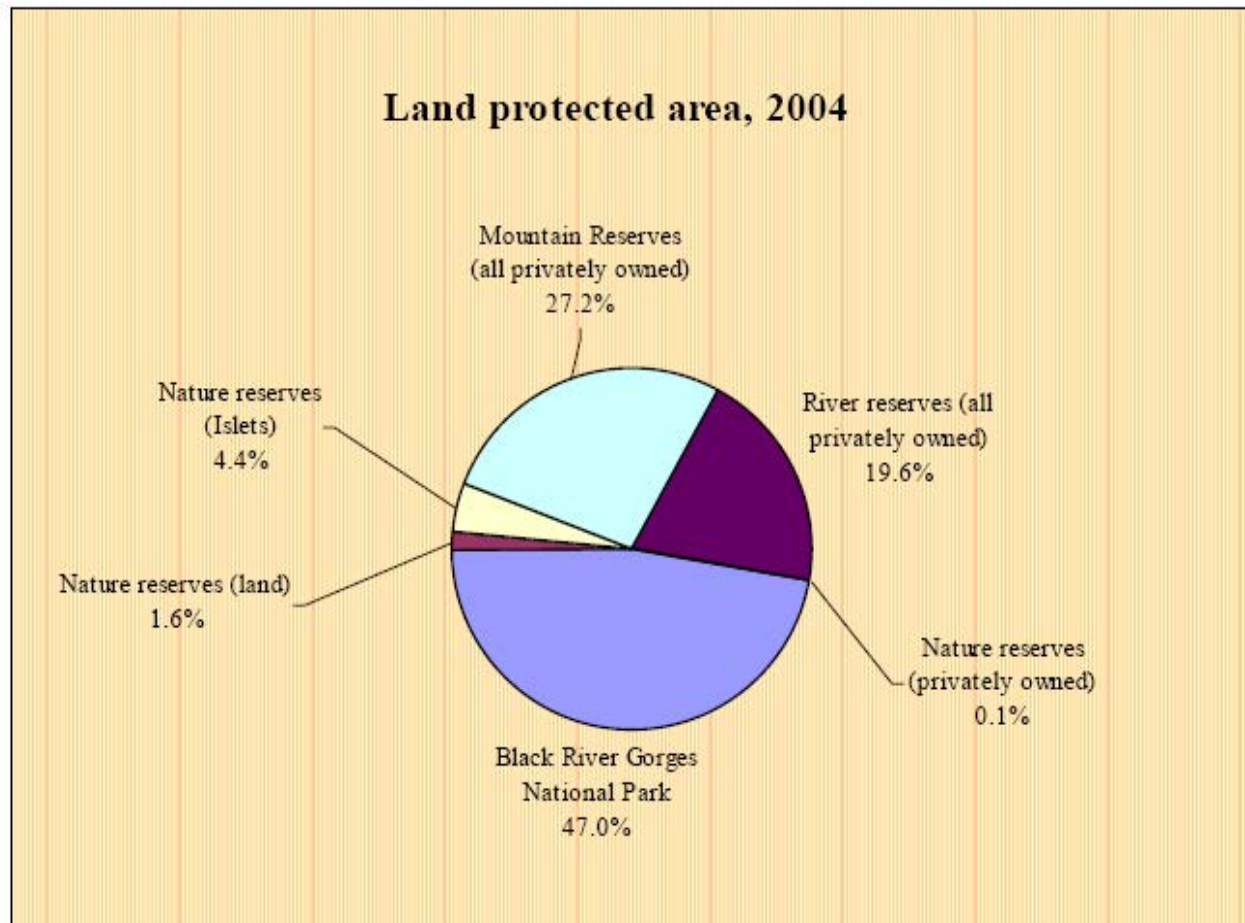




# Protected Areas

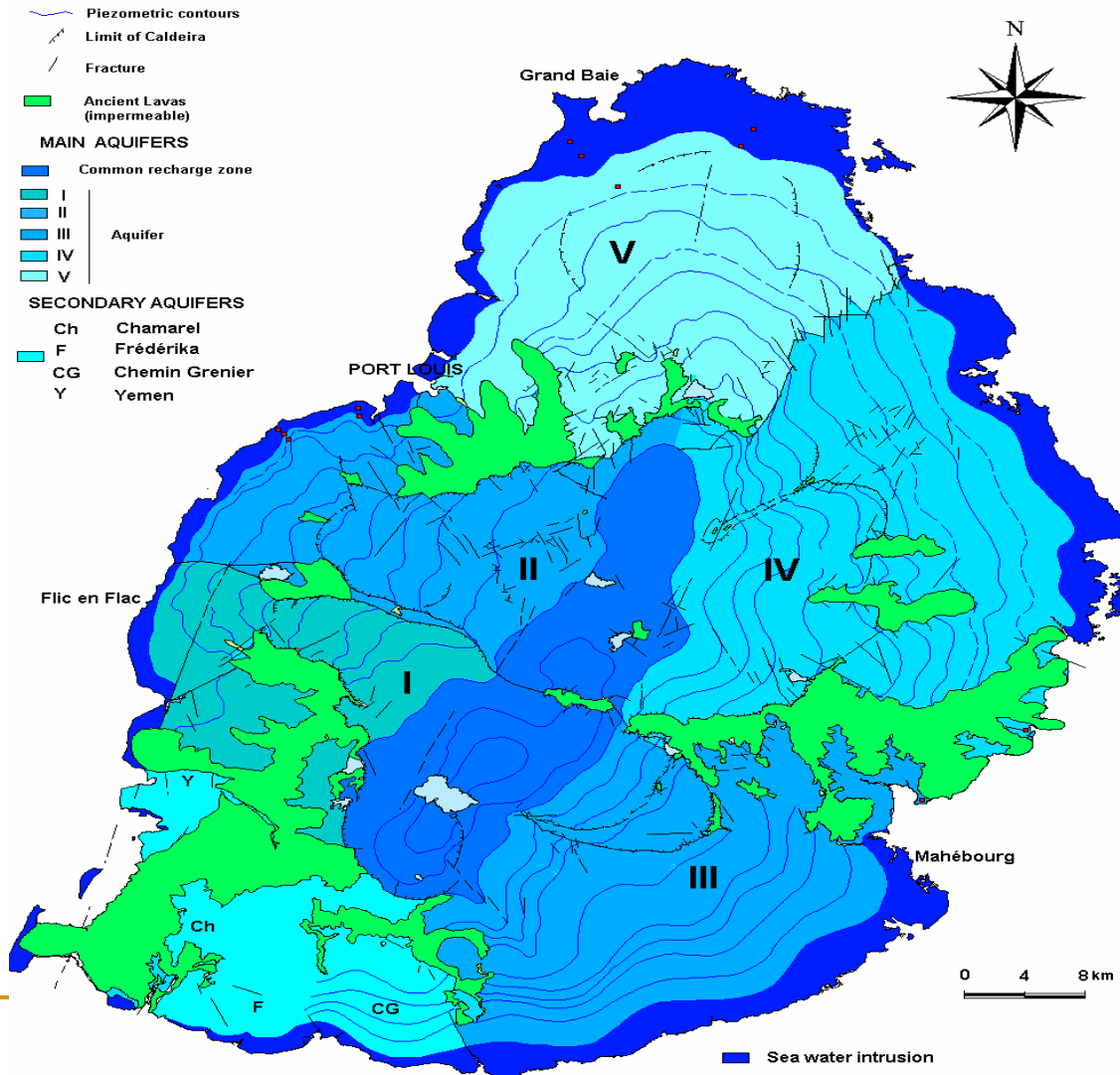
*(Source : Pocketbook of Environmental Statistics, 2006)*

Total protected land area of Mauritius was 11,125 ha in 1995 & 13,926 ha in 2004 (i.e. 5.97% & 7.47%, resp of total area of the island).



# Aquifers of Mauritius

(Source: Hydrology Data Book, 1999-2005)



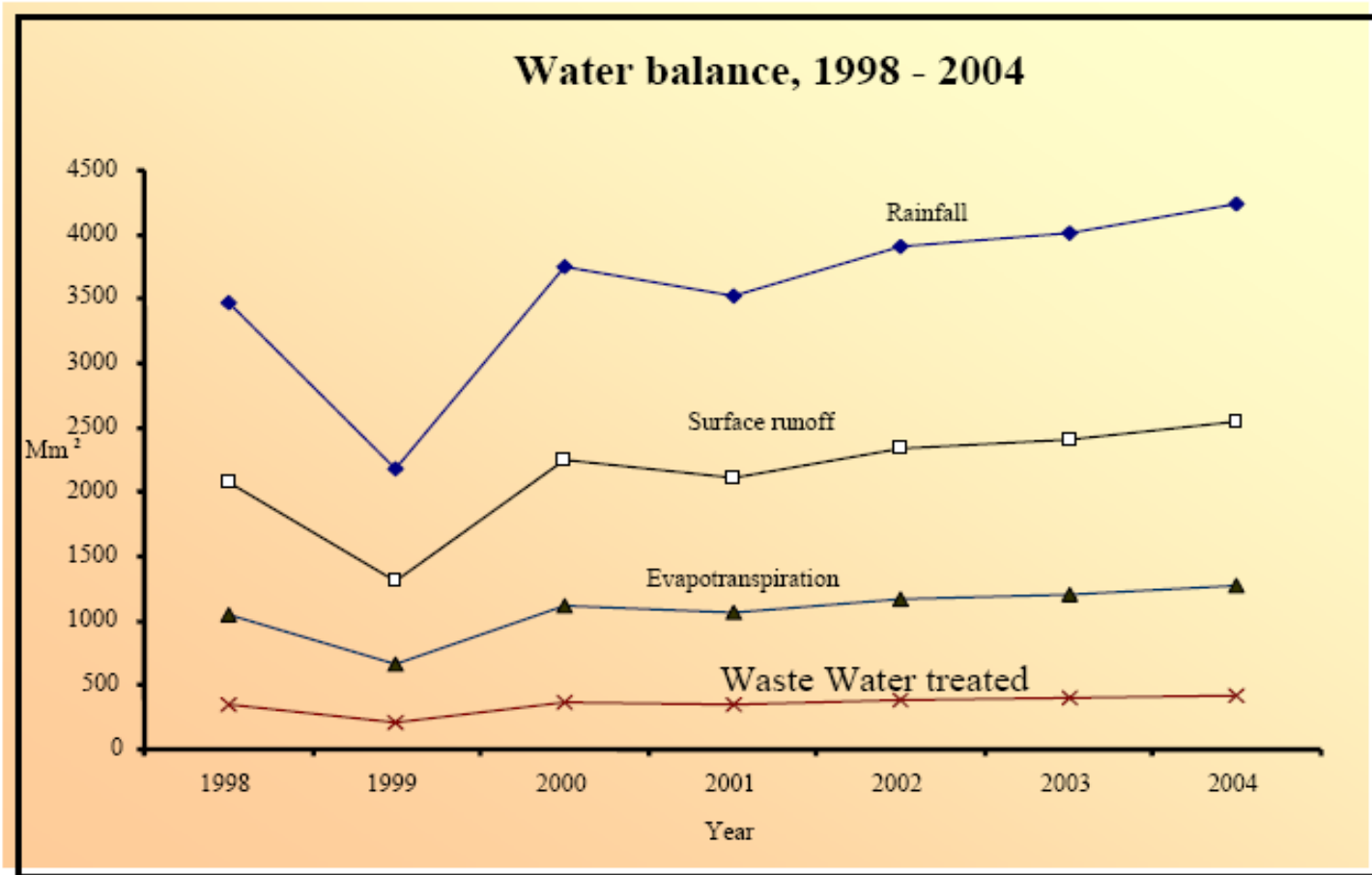
# Water Utilisation in Mauritius (Mm<sup>3</sup>)

(Source : *Pocketbook of Environmental Statistics, 2006*)

	Surface Water		Ground	Total
	Riverrun offtakes	Storage		
<b>Domestic, Industrial and Tourism</b>	38	72	114	224
<b>Industrial (private boreholes )</b>	-	-	11	11
<b>Agricultural (irrigation)</b>	370	95	25	490
<b>Hydropower</b>	129	160	-	289
<b>Total</b>	<b>537</b>	<b>327</b>	<b>150</b>	<b>1,014</b>

# Key Issues Identified for the Water Sector

- Long term pressure on water resources and meeting demand especially during periods of drought;
- Insufficient control of activities/land use in common aquifers recharge zones;
- Degradation of water sheds;
- Development of large dams;(Midlands, Bagatelle, Riviere des Anguilles)
- Threats to ground water pollution quality from agricultural pollution, waste and waste water disposal;
- Latrine and absorption pits (although the ongoing project in Plaine Wilhems will help);
- Salt water intrusion from the sea;
- Pollution from various sources of rivers used for domestic water supply;
- Collection, treatment and transport of waste water and sludge;
- Insufficient capacity for hazardous waste treatment and disposal;
- Desalination.



Source : *Pocketbook of Environmental Statistics, 2006*

Construction of new water storage dams are underway to cater for increase in population, increase in the arrival of Tourists (2 million), industrial development (Jen Fei, Highlands etc.) at Bagatelle and Tyack.

# Renewable Water Resources of Mauritius

*(Source : Aquastat- Water Report No. 5. FAO, 2005)*

Average Precipitation	2041 mm /year = $4.16 \times 10^9 \text{ m}^3 \text{ /year}$
Internal Renewable Water Resources	$2.75 \times 10^9 \text{ m}^3 \text{ /year}$
Total Actual Renewable Water Resources per Inhabitant	2,231 $\text{m}^3 \text{ / year}$
Total Dam Capacity (2003)	$93 \times 10^6 \text{ m}^3 \text{ /year}$



# Water Withdrawal in Mauritius

*(Source : Aquastat- Water Report No. 5. FAO, 2005)*

Total Water Withdrawal	725 x 10 <sup>6</sup> m <sup>3</sup> /year
Irrigation + Livestock	491 x 10 <sup>6</sup> m <sup>3</sup> /year
Municipalities	214 x 10 <sup>6</sup> m <sup>3</sup> /year
Industry	20 x 10 <sup>6</sup> m <sup>3</sup> /year
Per Inhabitant	594 m <sup>3</sup> /year
Surface water + ground water withdrawal (as a % of actual renewable water resources	26%

# Energy profile of Mauritius

*(Source : Outline of Energy Policy, 2007)*

Source	Percentage contribution to electricity generation
Bagasse	16
Hydro	6
Coal	26
Fuel	49

**The energy sector accounts for almost 80% of all greenhouse gas emissions (Outline of Energy Policy, 2007) - the root cause of climate change.**

# Energy Production from Bagasse (Giga Watt Hours)

*(Source : Outline of Energy Policy, 2007)*

1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
119	124	194	188	278	296	299	296	317	301

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- Sugarcane research in Mauritius also includes the development of high-energy cane varieties, i.e. sugarcane producing more biomass.
  - Furthermore, Government is encouraging the sugar industry to increase energy production, e.g. through tax exemptions for conversion of sugarcane lands to biomass energy factories, and other fiscal incentives (MAAS, 2006).
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# Government's energy policy

*(Budget speech, 7<sup>th</sup> June 2008, Minister of Finance)*

- Setting up of windmill farms;
- Replacing all sodium vapour lamps with low-energy bulbs for street lighting;
- Encouraging the use of energy-economic lighting devices in replacement of the energy-greedy tungsten bulbs;
- Providing incentives to the public to use solar-powered household heating devices;
- Research on alternate energy sources, e.g. hydropower, biomass energy, solid waste burning, etc;
- Introduction of the Daylight Saving Hours principle to save on electricity consumption;
- Reduction of Customs duty on energy-hybrid vehicles and other similar fiscal incentives;
- Public awareness and sensitization campaigns for energy conservation.

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## Maurice Ile Durable

The objectives of the MID fund are to finance :

- Preservation of local natural resources for SD and CC adaptation;
  - Explore and harness potential sources of renewable energy;
  - Promotion of energy savings;
  - Reduce consumption of fossil fuels, & achieve greater efficiency in the use of engines in businesses, offices, houses, public sector, hotels, transportation , etc.
  - Encourage innovation by households as well as by businesses to produce the country's energy requirements for sale of any surpluses at a premium.
  - Grant of Rs. 10,000 for purchase of solar heaters, an initial grant of 20 million to CEB to provide CFCs, grant for bus modernization programme to enable all bus operators to renew their fleet with environmentally friendly engines, reduce emission, etc.
  - Support efforts to protect environment through waste recycling.
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## Other measures

- With the help of the UNDP, about 1,450 traffic lights have been fitted with light emitting diodes (LED).
  - Subsidized loans by the Development Bank of Mauritius for conversion of motor engines to autogas.
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## Biodiversity

- Due to its geographically isolated position in the Western Indian Ocean, evolutionary radiation has resulted in a diversity of flora and fauna, many of them unique in the world.
  - 15 vegetation types are classified, ranging from marsh communities to scrub associations to forest communities.
  - 47 % of higher plants (311 of 671 species of indigenous flowering plants), 60% of birds, and 80% of reptiles are endemic (NBSAP, 2006).
-



## Mauritius has one of the most threatened island floras in the world

- 94% of its endemic flora is classed as threatened.
- 77 of its indigenous species are already classified as extinct;
- 155 of its flowering plant species are listed as critically endangered,
- 79 taxa are represented by ten or fewer known individuals in the wild,
- 10 taxa are represented by only a single known individual;
- a further 93 species are endangered;
- 241 are classified as vulnerable.

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# Human-induced threats to biodiversity

- Anthropogenic activities has resulted in the decimation or extinction of a large number of floral and faunal species
  - Most significant ones :
    - ❑ Land conversion leading to habitat loss and fragmentation,
    - ❑ habitat modification for ranching of non native deer,
    - ❑ the spread of invasive alien species, and
    - ❑ damage by fire.
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## Protected Area Network (PAN)

- Mauritius has established a PAN to safeguard its biodiversity.
  - The total terrestrial PAN on the mainland of Mauritius covers 7,259 ha. and includes two forest reserves, one bird sanctuary and fourteen nature reserves proclaimed under the Forests and Reserve Act; two national parks proclaimed under the Wildlife and National Parks Act; and privately owned mountain and river reserves designated in terms of the Forests and Reserve Act.
  - Nevertheless, the fact remains that the bulk of the extant natural habitat of high conservation value lies outside the PAN (PAN Project, 2008).
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# Key issues identified regarding biodiversity

- Insufficient knowledge and awareness about the local biodiversity;
  - Insufficient knowledge and management of biodiversity in marine and freshwater ecosystems;
  - Insufficient protection of biodiversity in privately owned forests;
  - Destruction of habitats and ecosystems;
  - Invasion by alien species;
  - Insufficient knowledge of optimum use of species for medicinal, pesticidal, cosmetic and other uses;
  - Inadequate benefit sharing from biodiversity use;
  - Unsustainable use of natural resources;
  - Loss of wetlands;
  - Loss of biodiversity in caves and lava tunnels.
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# Land Ownership

- The population density in Mauritius is one of the highest in the world, i.e. 1 km<sup>2</sup> for 663 persons.
  - However, land ownership is highly skewed in Mauritius, especially in relation to agricultural land.
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# Distribution of arable land

Area (ha)	No. of planters (area harvested in ha)	Sugar (tonnes)
≤ 0.49	14,572 (3,705)	19,088
0.5 – 0.99	6,447 (4,679)	22,822
1.0 – 1.99	3,458 (4,796)	24,146
2.0 – 4.99	1,893 (5,506)	27,924
5.0 – 9.99	340 (2,327)	12,336
10 – 99.99	127 (3,471)	19,934
> 100 ha	50 (42,920)	281,208
Millerplanter	11 (42,920)	114,083
Total	26,898(67,404)	<b>521,541</b>

## Land Ownership contd

- Several forms of land tenure in Mauritius :
  - Freehold system, whereby people hold title deeds.
  - State lands, which are leased for hunting and shooting;
  - Pas Geometriques, which are leased as campement sites, industrial leases and hotel leases.
  - State land is also leased for agriculture, known as land settlements.
  - Metayers who rent land mainly for sugarcane production, and who pay rent in kind (part of sugar proceeds), not in cash.
- 80 - 90% of the land in Mauritius is under private ownership.
- Remaining 10 -20% of state land includes mountains, rivers, gorges, etc. which cannot be exploited because of its ecosystem functions.
- There are more privately owned forest lands than state-owned forest lands.
- Many of the state-owned forests, as well as Pas Geometriques, are already leased out to the private sector on long term leases.
- Legislations need to be amended so that SLM Practices become mandatory on the private forests also.
- Very little land is therefore available to the State for its present and future developments.

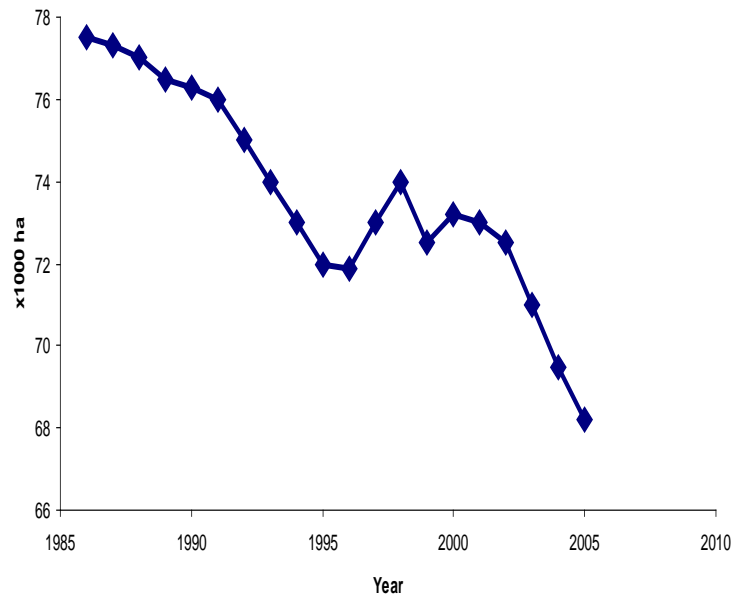


Fig. 1. Change in land area of sugarcane harvested

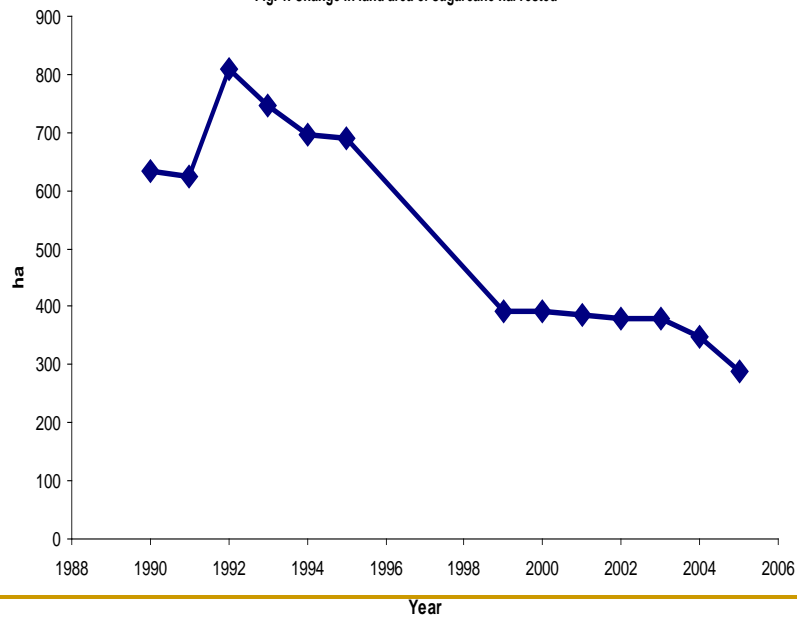


Fig. 3. Change in land cover under tobacco

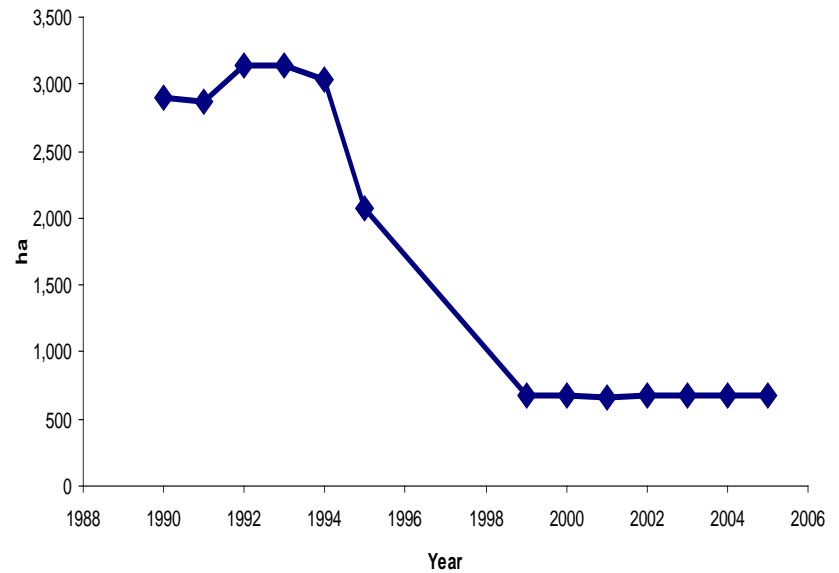


Fig. 2. Change in land cover under tea (drawn from data obtained from CSO, 2006; Tea Board, 2006)

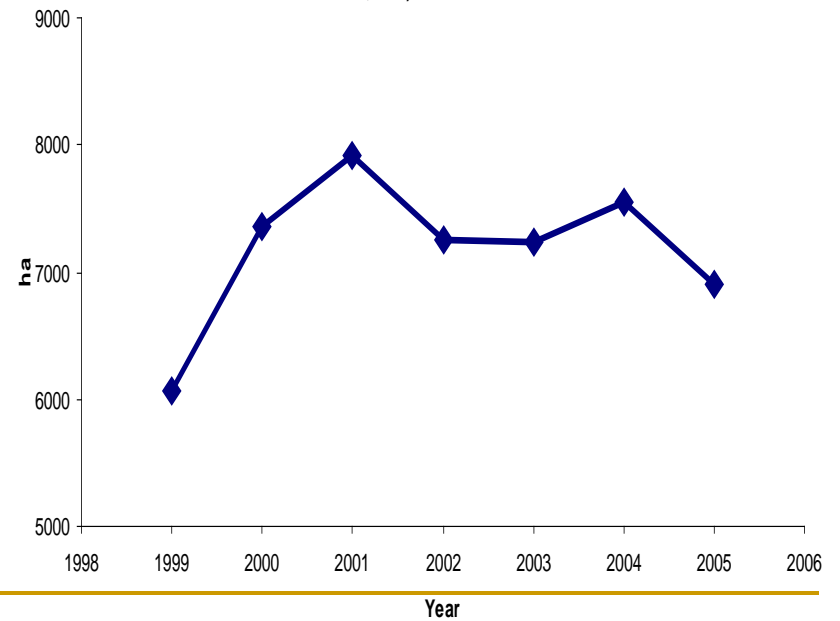


Fig. 4. Change in land cover under food crops



# Land Use Changes

Land Use has been constantly changing over time due to the internal and external driving forces such as increasing population, changes in income and lifestyles, technology advancement, education, competing uses for land, changes in world demand and prices of export and import commodities, climate, pests, diseases, policy changes, and now globalization.

Some driving forces of recent major land use changes :

- •Illovo deal
- •Integrated Resort Schemes (IRS) and Real Estate Schemes (RES)
- •Sugar Investment Trust (SIT) property development
- •Residential morcellement
- •Non residential morcellement
- •Agricultural morcellement
- •Industrial development

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## Land Use Changes

- Large acreage of land under agriculture, mainly sugarcane, is being converted to other uses, e.g. residential, industrial, hotels, roads, hospitals, Universities, etc.
  - Over 8,200 sugar industry workers have been, or will be, laid off, and will receive about 300 – 380 m<sup>2</sup> of residential land each under VRS I & II.
  - SIT land, purchased under the Illovo Deal, have been subdivided into agricultural plots of 1-3 acres to be sold to SIT shareholders and the general public (SIT Annual Report, 2007).
  - SIT has embarked on several residential morcellement, e.g. at Wooton, Cote D'Or, etc. and an IRS at Le Bouchon.
  - It is important and urgent to ensure that all these land use changes be carried out in a sustainable manner with relevant policies and regulations for SLM.
  - New policies are needed to be enunciated for holders and lessees of residential and industrial (including land used for tourism development, and for business development) land.
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# Consequences of land use changes

## 1. Carbon sequestration

- Sugarcane is a C<sub>4</sub> plant, and a very efficient CO<sub>2</sub> absorber and C-fixer.
- Removal of sugarcane will decrease C-sequestration potential, which will add to the weather changes beginning to occur, e.g. flash floods of March 2008 which lead to the loss of human lives, the high temperatures prevailing beyond April 2008, the extended drought from November 2007 to January 2008, the extended winter conditions of 2009.
- Land use change from agriculture to non-agriculture requires increased energy input, which will come mostly from fossil fuels, and which will further increase CO<sub>2</sub> emissions in the atmosphere.
- As an end result, the CO<sub>2</sub> balance sheet will be positive.

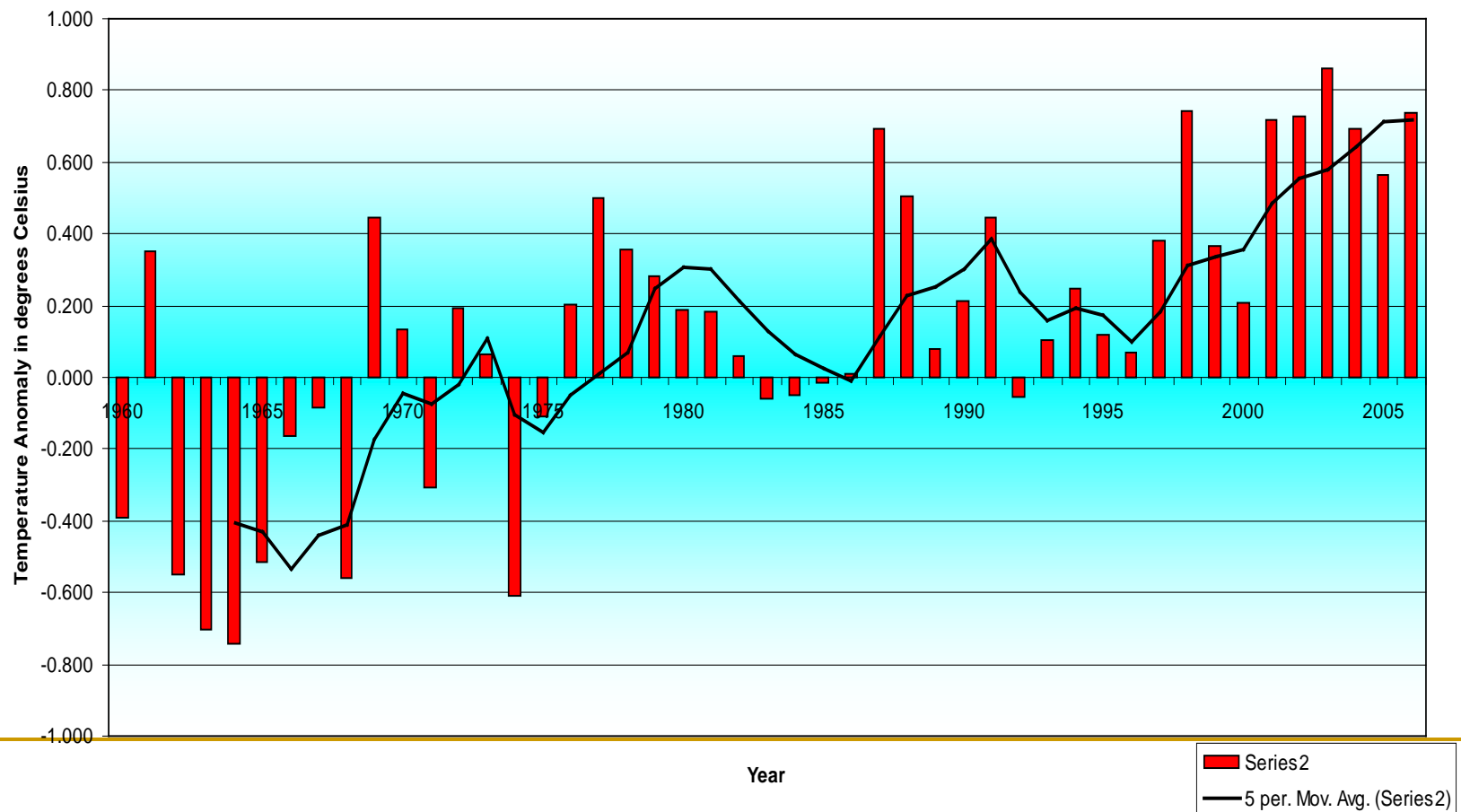
# Consequences of land use changes contd

## 2. Global Warming

- Changes in land cover will invariably lead to changes in the climate of the island, and will also contribute to global warming. In fact, some of these changes are already becoming alarming.
- The average temperature in Mauritius during the last decade (1997-2006) was higher than the normal by  $0.60^{\circ}\text{C}$ , while 2006 was the third warmest year after 2003 and 1998.
- Average temperature has risen by  $0.88^{\circ}\text{C}$  compared to the decade of 1961-70, and seven of the warmest years ever (1998, 2001, 2002, 2003, 2004, 2005, 2006) occurred in the last decade (Boodhoo and Goolaup, Pers. Comm.).
- Mean temperatures in the outer islands of Rodrigues, St. Brandon and Agalega have also been steadily increasing (Meteorological Division, 2008).
- There has been a reduction of about 100 mm in the annual precipitation over the last 50 years.

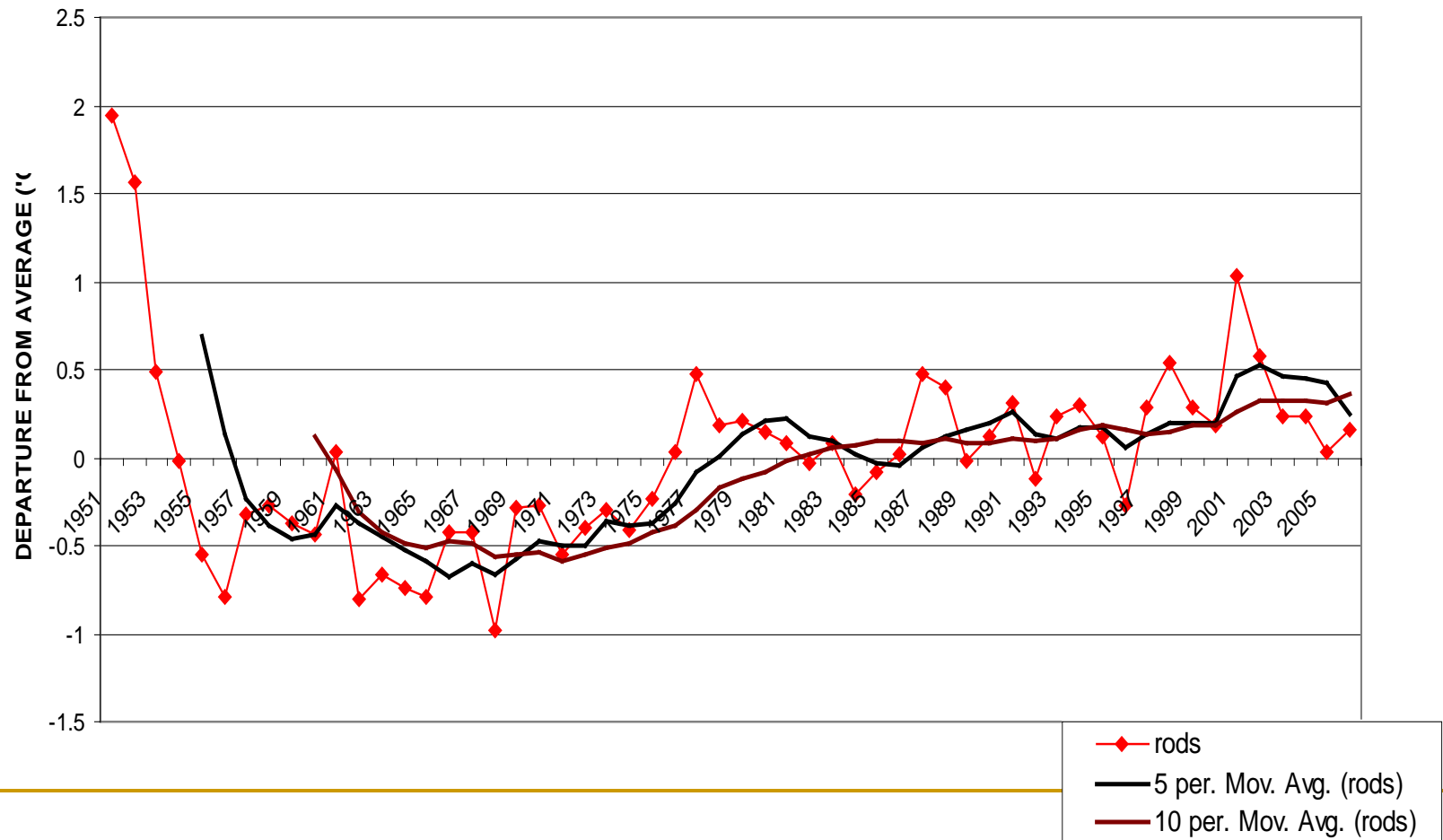
# Mean Annual Temperature in Mauritius (1960-2006)

*(Source : Meteorological Services, 2008)*



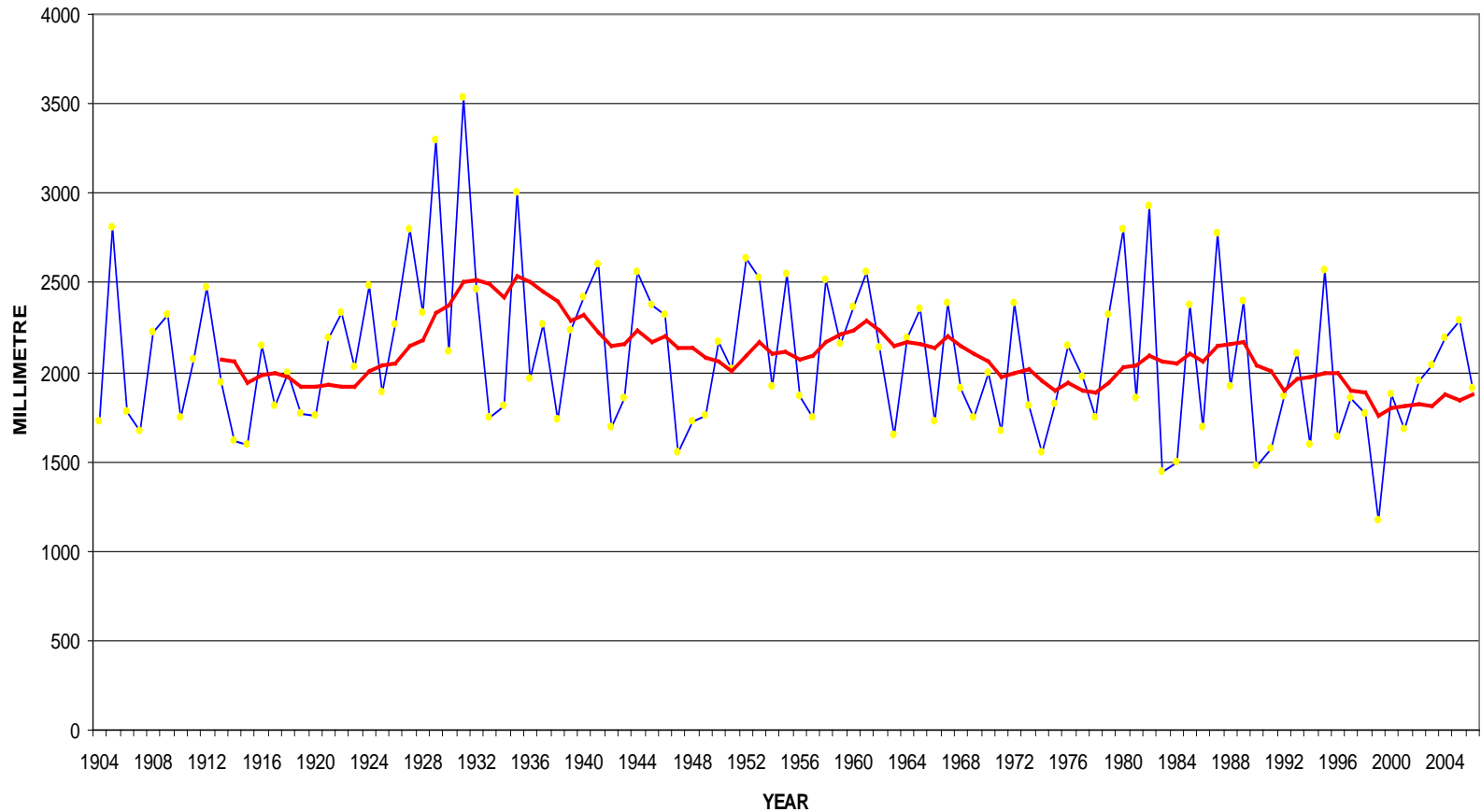
# Temperature changes in Rodrigues (1951-2006)

(Source : Meteorological Services, 2008)



# Trend of Annual Rainfall over Mauritius (1904-2004)

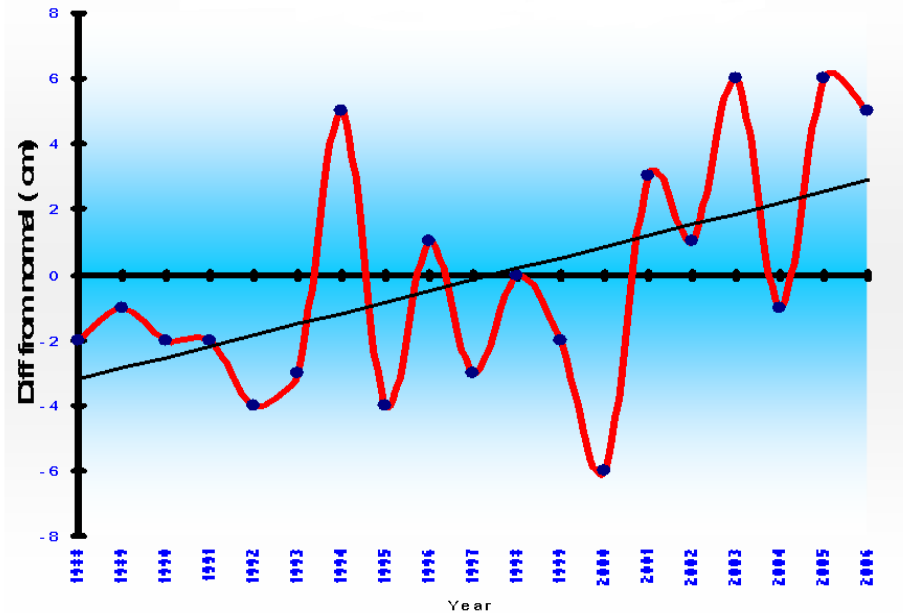
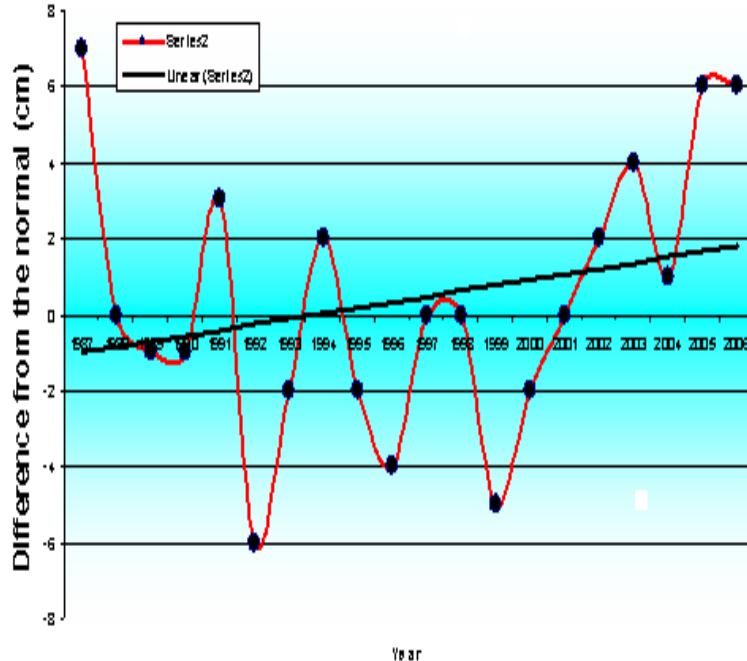
(Source : Meteorological Services, 2008)



—●— ANNUAL RAINFALL — 10 per. Mov. Avg. (ANNUAL RAINFALL)

# Annual Mean Sea Level in Port Louis and in Rodrigues

(Source : Meteorological Division, 2008)





# Impacts of climate change on land

- Agriculture : change in yield of crops, increased pest and disease incidence, inability to grow certain crops, loss in soil fertility, etc.
- Health : effects of high temperatures and heat waves, increase in pests and diseases, decrease in available labour, decrease in productivity, increased burden on hospitals and other health facilities, etc.
- Biodiversity : change in structure and composition of biodiversity, effects of high temperatures, reduced rainfall, etc.
- Energy : increase in use of fossil fuels for air conditioners, fans, coolers, etc.

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# Consequences of land use changes contd

## 3. Land Degradation

Includes nutrient runoff, water logging, desertification, acidification, salinisation, compaction, crusting, loss of organic matter, salinisation, pollution by pesticides and other toxicants, depletion of nutrients, sealing of the soil through urbanisation, contamination by anthropogenic wastes, etc.

The consequences of land degradation include reduced productivity, migration, food insecurity, damage to basic resources and ecosystems, and loss of biodiversity through changes to habitats at both species and genetic levels, loss of ecosystem functioning, and ecosystem services (CBD, 2002).

It also has important implications for climate change mitigation and adaptation, as the loss of biomass and soil organic matter releases carbon into the atmosphere and affects the quality of soil and its ability to hold water and nutrients (FAO 2009).

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# Root Cause Matrix of Land Degradation in Mauritius and Rodrigues

## **Type of Land Degradation :**

- Overgrazed, eroded range/pasture lands of decreased productivity and forage quality
- Deforestation
- Eroded, unproductive and/or abandoned agricultural lands
- Severe degradation from fire on steep slopes in mountain rain shadow
- Loss of wetlands (Lack of monitoring system does not allow quantification)
- Erosion in developed areas

# Sectoral pressure on key land resources

	Land Resource				
Sector	Soil	Water	Biodiversity	Coastal zones	Forests
Agriculture	***	***	**	**	**
Tourism	*	***	**	***	**
Industry	**	***	**	***	*
Residences	***	***	**	**	*
Wastes	***	***	**	***	*
Transport	*	*	*	*	*
Fisheries	*	***	***	***	*

\* Low  
 \*\* Medium  
 \*\*\* High

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# Base line

The baseline represents the interventions which are presently being carried out or will be carried out even in the absence of the NAP.

These include :

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# 1. Resources and Capacity for SLM

- National Remote Sensing Center (NRSC) conducted a few training courses and awareness raising programs on GIS and Remote Sensing.
  - Over 100 participants recently received training at the Faculty of Agriculture of the University of Mauritius (FoA/UoM) on Sustainable Agricultural Practices, Participatory Pasture Management, Remote Sensing for SLM, GIS/LIS/LMIS/GPS for SLM, Project Proposal Preparation.
  - Short term training course on Natural Resource Economics for SLM on a ToT mode.
  - UoM programmes : MSc Sustainable Agriculture, BSc programmes with specialisation in Land & Water Management, Environmental Science, Organic Farming, Natural Resource Management, Sustainable Forestry, Town and Country Planning, Environmental Economics.
  - Training by AREU of farmers in its Farming Training School on good farming practices.
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# 1. Resources and Capacity for SLM contd

- Farmers Service Centre (FSC) have ongoing projects and services involving assistance in land preparation works, grouping of small planters through Land Area Management Units (LAMU) and Block Management Units (BMU), and training of sugarcane planters on sustainable cultural practices.
- Ongoing Marine Protected Area (MPA) project in Mauritius and Rodrigues funded by UNDP/GEF.
- Ongoing Marine and Agriculture Resource Support Programme of the Ministry of Agroindustry & Food Security, funded by the FAO.
- LAVIMS project



## 2. Ministries/Institutions involved in SLM

- Ministry of Agro Industry & Food Security and its various units, MCA, MSIR), UoM are involved in work dealing with agricultural lands and improvement in soil fertility;
- Ministry of Environment and Sustainable Development; Ministry of Tourism & Leisure, Beach Authority, AHRIM, Ministry of Local Government, Forestry Service, Ministry of Agro Industry and Food Security and others are involved in work dealing with the coastal zone;
- Ministry of Local Government; RRA; Forestry Service, NPCCS; MWF; Private Forest Owners; Sugar Estates and others are involved with work dealing with forest lands in Mauritius, Rodrigues and Islets;
- Ministry of Housing and Lands, Min. of Tourism & Leisure, Ministry of Local Government and Local Authorities, are involved in planning issues;
- Irrigation Authority, WRU, CWA, Agric Services, Ministry of Public Utilities, Forestry Service are involved in work dealing with the dams, rivers, canals, and other water bodies, etc.
- ~~□ Met Services are involved in early warning systems for weather;~~

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## 2. Ministries/Institutions involved in SLM contd

- ❑ Ministry of Tertiary Education, Science, Research & Technology; Ministry of Environment and Sustainable Development, Ministry of Youth & Sports, MIE are involved in environmental awareness campaigns;
  - ❑ UoM, MSIRI, MRC are involved in capacity building, training of manpower, research on land issues;
  - ❑ Ministry of Environment and Sustainable Development, Remote Sensing Unit are involved in mapping of sensitive areas;
  - ❑ SLO is responsible for formulation of policies and other legal matters.
  - ❑ The RRA has authority to grant leases for state lands. There is absence of an operational cadastral plan as well as land planning and management tools adapted to the development of agriculture and sustainable natural resources management on Rodrigues.
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### 3. Policy and Legislative Framework

- 'Conservation in Mauritius' report in 1974
  - White Paper on "National Conservation Strategy" (NCS, 1985)
  - 1<sup>st</sup> National Environmental Action Plan (NEAP, 1988) identified SLM as one of the major environmental issues
  - White Paper for a National Environment Policy (1991)
  - Vision 2020 : The National Long Term Perspective Study
  - 2<sup>nd</sup> NEAP in 1999
  - National Development Strategy (NDS, 2003)
  - Non-Sugar Sector Strategic Plan (2003-2007),
  - Strategic Options in Crop Diversification and Livestock Sector (2007-2015),
  - Blueprint for a Sustainable Diversified Agri Food Strategy for Mauritius (2008-2015)
  - NPDP and SIDPR (2008) for Rodrigues.
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### 3. Other plans that include SLM contd

- The first National Physical Development Plan (1993);
- the National Physical Development Plan of 1994 and 2003;
- the Tirvengadam Report;
- the Sugar Industry Efficiency (SIE) Act of 1988, 1998 and 2002;
- the Finance Act of 1994;
- the Environmental Protection Act (EPA) of 1991 and 2002;
- the “Morcellement” Act;
- the Municipal and District Council Regulations,
- the Zoning Committee of the Ministry of Housing and Lands,
- the Sugar Productivity and Efficiency Unit of the MoAF;
- the Sugar Sector Strategic Plan of 2002;
- the State Lands Act of 1982;
- the Pas Geometriques Act of 1982;
- the Land Acquisition Act of 1982;
- the State Land Alienation Act;
- the Land (Taxes and Duties) Act;
- the National Environmental Policy Draft of 2006;
- the National Forest Policy of 2006;
- the National Biodiversity Strategy and Action Plan (2006),
- the Sustainable Integrated Development of Rodrigues (SIDPR) 2008

## 4. Prior interventions and studies that address SLM issues

- ❑ Study of coastal erosion in Mauritius. MoENDU, 2002;
- ❑ Management plans prepared for the main islets around Mauritius;
- ❑ Two national reports by the Forestry Services on SLM.
- ❑ The Midland Dam Project;
- ❑ Rehabilitation of Nicoliere Feeder canal;
- ❑ Rehabilitation of Mare aux Vacoas Dam;
- ❑ Rehabilitation of Trianon-Grosses Feeder canal;
- ❑ Rehabilitation of Municipal dyke for Port-Louis water supply;
- ❑ Restoration of degraded native forest in the Black River Gorge National Park;
- ❑ Breeding of drought-tolerant sugarcane varieties;
- ❑ Mangrove propagation in Mauritius and Rodrigues;
- ❑ Mapping of forest areas;
- ❑ Classification of forest maps;

## 4. Prior interventions and studies that address

### SLM issues contd

- ❑ Study of environmental risk in Grand Bay;
- ❑ The National Physical Development Plan;
- ❑ Control and mitigation of erosion in 3 watersheds in Rodrigues;
- ❑ Rehabilitation of drains at Pistache, Mourouk and Riviere Banane;
- ❑ Desiltation of dams in Rodrigues;
- ❑ Construction of Bagatelle Dam (feasibility study);
- ❑ Reafforestation of degraded forests in Port-Louis;
- ❑ Feasibility study of Chamarel Dam;
- ❑ Construction of dam at Anse Rafine and Pave La Bonte (Rodrigues);
- ❑ Map of ESAs prepared by the MOE & NDU;
- ❑ Map of wetlands of Mauritius by the CWA.
- ❑ Forest Land Information System (FLIS)

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## 5. Regional and International Integration

- The Republic of Mauritius is a member of COMESA (Common Market for Eastern and Southern Africa), IOC Indian Ocean Commission), IOR-ARC (Indian Ocean Rim Association for Regional Cooperation), SADC (Southern African Development Committee).
  - It also benefits from AGOA (African Growth and Opportunity Act) and EU-ACP (European Union-African, Caribbean, Pacific) Cooperation.
  - Hence, although the Republic is small, due to regional cooperation and integration, Mauritius has a very large market for its products and service.
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# The National Action Plan

- The National Action Plan (NAP) maps out strategies, goals, and objectives for improved efficiencies and effectiveness of land management over the next 5 years in making the Republic a sustainable, green and clean island.
- The NAP provides a framework for the orderly, judicious and progressive land development in Mauritius and Rodrigues, and appropriate measures to ensure sustainable land development, that will allow food security, sustainable urbanization, biodiversity conservation.
- The NAP is an overarching framework for balanced decisions for SLM and sustainable development as a whole.

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## Vision of the NAP

- The NAP is based on the five pillars of sustainability : productivity, security, protection, viability, and acceptability.
  - The NAP is a dynamic initiative to effectively meet the sustainable development of the Republic of Mauritius.
  - Although the vision and goals will not change significantly with time, the actual interventions may vary.
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## Strategic Axis 1 : Mainstreaming SLM into central planning policies, strategies and regulations

- Goal : To mainstream SLM into central planning policies, regulations, strategies, plans, educational systems in order to harmonise, rationalize and remove overlaps and promote effective institutional coordination, information exchange and synergies

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## Critical Actions

- Review existing legislation related to land degradation and SLM at national, district and village levels, e.g. land lease clauses;
  - develop legislation in relation to land resource management and land use planning;
  - harmonise and strengthen institutional arrangements for land planning and land management;
  - strengthen natural resources and environmental management institutional arrangements;
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## Critical Actions

- develop and strengthen the land information system (including a soil information system) for information access, sharing and management;
- develop human resources to enhance knowledge and benefits from implementation of programmes;
- promote public awareness among all stakeholders and ensure their active involvement in land and SLM issues;
- provide an enabling environment, opportunities, scholarships for education and training in SLM.

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## Strategic Axis 2 : Establishment of a Mauritius Land Authority (MLA)

- Goal : To establish an effective and efficient, world class Mauritius Land Authority (MLA) with the mission to optimize land resources for the economic and social development of the Republic of Mauritius
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## Critical Actions

- Create a competent authority composed of key stakeholders in the sector of land use, land development and land management with the view to balance the economic and social needs of the country, while ensuring the best use of State land;
- provide an effective and reliable land management system, including the issuance and guarantee of land titles and geo-spatial demarcation of land;
- enable the full use of land information for better land management and creation of new business opportunities.
- The MLA would be a statutory board under the Ministry of Housing and Lands. The main focus will be on land resource optimisation.



## Critical Actions

- The MLA will have a dual role: developmental and regulatory.

It will be responsible for the management of State land, land sales, leases, acquisitions and allocation, developing and marketing land-related information and maintaining the national land information database (LAVMIS).

In its regulatory role, the MLA will be the national land registration authority, and will be responsible for the management and maintenance of the national land survey system.

- The MLA will have a network of strategic alliances and partnerships in both the public and private sectors, and by working closely with all key stakeholders, will help fair, just, efficient and

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## Strategic Axis 3 : Enhancing systems for assessing land degradation in Mauritius and Rodrigues including the islets.

- Goal : To establish or improve systems for gathering information about the extent of land degradation, and the factors responsible for the different types of degradation
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## Critical Actions

- Monitoring of soil erosion, sedimentation;
- Monitoring of forest fires;
- Inventory and mapping of degraded lands using latest technologies, e.g. LADA (Land Degradation Assessment in Drylands), RS (Remote Sensing), GIS (Geographical Information Systems), LIS (Land Information Systems), LMIS (Land Management Information Systems), GPS (Geographical Positioning System);
- Identification and mapping of wetlands;
- Identification and classification of degraded lands, including coastal zones and mountain slopes and islets;

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## Critical Actions

- Management of land degradation data and information system through proposed LAVMIS and FLIS and environmental indicators;
  - Identification of root causes and impacts of land degradation on socioeconomic and sociocultural conditions using proper research methodologies;
  - Development of land use, land capability, and soil fertility maps at regular intervals;
  - Development of erosion susceptibility land areas map at regular intervals;
  - Development of maps of Environmentally Sensitive Areas (ESAs) at regular intervals.
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## Strategic Axis 4 : Prevention of land degradation

- Goal : To prevent degradation of hitherto unspoilt land areas, including coastal zones, and to halt further degradation of land already subject to some level of degradation
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## Critical Actions

- Formulate, extend and strengthen multilevel stakeholder participation in land degradation prevention projects;
- Promote soil and water conservation through raining and workshops
- Develop sensitization campaigns on the dangers and risks of land degradation and benefits of soil and water conservation;
- Fire prevention in sugarcane fields and mountain slopes;
- Provide guidelines and standards for soil and water conservation techniques;
- Improve fire prevention and response capacity through networking training and sensitisation campaigns;
- Improve and promote urban and community forest and green space activities.

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## Strategic Axis 5 : Enhancing training, education and public awareness and community and institutional empowerment regarding land and SLM issues

- Goal 1 : To establish and enhance public education and awareness campaigns regarding land and SLM issues
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## Critical Actions

- Assess the pressures and driving forces in Mauritius and Rodrigues that lead to land degradation;
  - Undertake an exercise to analyse gaps and design education and awareness programmes for SLM issues;
  - Implement educational programmes through networking at the district and village levels with Government, NGOs, civil societies and communities;
  - Enhance and maximise tools such as radio/ TV programmes, science programmes, newsletters, brochures, pamphlets, web pages, local media, etc.;
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## Critical Actions

- Educate and sensitize stakeholders on sustainable use of land and conservation practices to address;
  - Formalization of exchange of information between stakeholders to ensure sharing of information and understanding the cause and effects of land degradation;
  - Prepare and include educational programmes for SLM at all levels of the formal and informal educational system.
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- **Goal 2: To develop institutional capacities for SLM**

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## Critical Actions

- Undertaking a skill assessment for SLM.
  - Develop training programmes to deliver essential skills needed for SLM through targeted short courses, seminars, workshops in areas such as Sustainable Agricultural Practices, Soil and Water Conservation, Land Degradation, GPS, LIS, RS, SEA, EIA;
  - Training of extension officers in SLM issues;
  - Training of forestry officers in SLM issues;
  - Training of environmental officers in SLM issues, EIA, SEA;
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## Critical Actions

- Training of officers of the Water Resources Unit on SLM issues, water quality;
  - Training of farmers, herders and other users of land on SLM issues;
  - Establish a SLM Unit in the future MLA;
  - Identify and purchase equipment and provide resources (financial and human) for the SLM Unit;
  - Develop a regulatory framework for the SLM Unit.
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- **Goal 3 : To empower communities and end-users for SLM**

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## Critical Actions

- Facilitating the development of district level SLM plans;
  - Empowering stakeholder communities such as farmers, herders and institutions to address land degradation and SLM issues;
  - Supporting inclusive community visioning activities
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## Strategic Axis 6 : Promotion of research and scientific studies on causes and effects of land degradation, and develop appropriate measures for SLM

- Goal : To promote research and the collection, processing and exchange of information on the scientific, technical and socio-economic aspects of land degradation
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# Critical Actions

- Soil diagnosis;
- nutrient balance study;
- efficient crop nutrient management;
- best fertilizer management practices;
- best plant protection management practices;
- soil health management practices;
- appropriate land preparation techniques, e.g. minimum tillage, terracing, mulching, strip cropping, composting, water harvesting methods, intercropping and crop rotation, use of green manures and biofertilisers, etc.



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# Critical Actions

- socio-economic and cultural trends affecting land and SLM issues;
  - qualitative and quantitative trends in natural resource management; and
  - interactions between climate and land degradation.
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## Strategic Axis 7 : Need for early warning systems and emergency plans to mitigate cyclone, drought, floods, tsunamis and other natural disasters, as well as climate change

- Goal : To better understand the effects of natural and man-made disasters on land areas, and to prepare the Republic to face these disasters with minimum damage, and to adopt mitigation measures
-

## Critical Actions

- identify and implement actions to reduce natural and man-made fires, especially on forested mountain slopes and in sugarcane fields;
- identify, improve and implement early warning systems for disaster preparedness;
- develop a comprehensive national disaster response and management plan;
- strengthen institutional arrangements for disaster preparedness and response;
- explain and improve existing weather stations and database systems;

# Critical Actions

- develop detailed trend analysis documenting climate change;
- conduct targeted research on impact of climate change related to land degradation and loss of biodiversity;
- develop models for sea-level rise and inundation susceptibility areas in the coastal zones;
- strengthen research activity to develop drought resistant crops;
- formulate drought contingency plans;
- monitor water availability;
- monitor climate change impacts for SLM.

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## Strategic Axis 8 : Food security and sustainable development of agriculture

- Goal : To achieve food security and sustainable development of agriculture with minimum negative effects on the land and on the environment in general
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# Critical Actions

- Support and promote agricultural diversification
- Support and promote agricultural research and extension to provide back-stopping for agricultural diversification programmes
- Promote soil conservation and stringent management through sustainable agricultural practices, e.g. sustainable land preparation, integrated nutrient management, integrated pest management, integrated water resource management
- Add value to local and indigenous crop species through agroprocessing, postharvest technology and marketing
- Evaluate the potential of marginal lands and land released from sugarcane for production of non-sugar crops
- Expand and promote clustering through the setting up of community/ village-based agriculture initiatives, e.g. Agricultural village, Village fruitiere, village laitiere.

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# Strategic Axis 9 : Sustainable Forest Management

- **Goal 1 : To protect and conserve watersheds**

## Critical Actions

- increase planting of naïve tree species and other plants for watershed protection around lakes and river lakes;
- increase preferably native tree species on steep slopes and coastal zones o reduce soil erosion and sedimentation in lagoons;
- promote SLM practices in water catchment areas for protection of recharge zones and water resources through legislation;
- convert half of the exotic forest plantations to native forest plantations (NBSAP, 2006).



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- **Goal 2 : To increase tree cover to enhance the environment and carbon sink capacity of forests**

## Critical Actions

- Launch nationwide campaign to sensitize the population on forest and trees;
- reforestation and afforestation and agroforestry practices through provision of free/subsidized seedlings, training on maintenance and ,management of new plantings and extending tree planting programmes to privately owned forest land;
- develop programmes to encourage stakeholders (Government, district councils, contractors, etc.) to plant trees along road sides around schools and in new residential morcellement, RES, IRS, etc.) through legislation;

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## Critical Actions

- planting of melliferous trees in Mauritius and Rodrigues for improved honey production and apiculture;
  - planting and monitoring of neem and other pesticidal/ medicinal species;
  - planting of flowering trees species for embellishment;
  - rehabilitate the soil through the use of high performing indigenous green cover crops/trees.
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- **Goal 3 :To protect native forests from Alien Invasive Species (AIS)**

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## Critical Actions

- Increase quality of native forests;
  - identify and locate biodiversity hotspots;
  - control invasive plant and animal species;
  - improve plant and animal quarantine;
  - reverse the process of biodiversity degradation through habitat restoration using in situ and where necessary ex situ conservation techniques
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- **Goal 4 : Make deer ranching an environmentally sustainable activity**

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## Critical Actions

- Ensure sustainable management of state-owned forest land leased for deer ranching;
  - ensure sustainable management of private forests opened up for deer ranching;
  - adjust stocking of deer in state and private forests to match carrying capacity of the ecosystem;
  - increase pasture capacity with improved pasture and preferred species;
  - eliminate or reduce deer ranching in sensitive areas in state owned and private forests to avoid damage to forest ecosystems.
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- **Goal 5: to encourage environmentally sustainable eco-tourism activities**



# Critical Actions

- Determine best sites for ecotourism development;
- develop guidelines for design and construction of infrastructures related to eco-tourism (e.g. rest houses, restaurants, nature trails, etc.);
- conduct assessment of the carrying capacity of areas set aside for ecotourism;
- regulate and ensure equitable leasing of state owned ecotourism sites to tour operators;
- train and educate public and private sector personnel in ecotourism management;
- charge fees for ecotourism sites to offset cost of managing the site.

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- **Goal 6 : To protect forests from cyclones, fires, insect pests and diseases**

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## Critical Actions

- Plant cyclone resistant native tree species;
  - strengthen cooperation among appropriate institutions for response to emergency situations;
  - conduct research on and monitor, insect pests and pathogens responsible for damage to forest trees;
  - establish database to be used for prediction and prevention of large scale insect pest and disease outbreaks;
  - establish a monitoring system to detect early stage insect pest and diseased infestation by both native and introduced pests and invasive species.
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- **Goal 7 : To convert to forests land which was previously under sugarcane**

## Critical Actions

- Encourage planting of abandoned sugarcane lands, especially in ESAs, with MTPS, either alone or as part of agroforestry systems;
- assess the extent of land that will become available for conversion;
- conduct an EIA of this land conversion;
- investigate the possibility of reforestation of state owned agricultural lands previously leased for sugarcane and food crops in the former teabelt area.

- 
- **Goal 8 : To develop small scale, forest-based businesses for income generation and poverty alleviation**

# Critical Actions

- Create plantations of species suitable for handicraft and other products for income generating activities for the poorer sections of the population , including women;
- prepare and implement management plan for the establishment of community forests;
- introduce in community forests fruit, flowering, fodder, pesticidal, medicinal plants and other species having economic potential for cottage industries;
- prepare programmes to train forest personnel in participatory forest management and extension methods;
- develop a suitable marketing strategy for forest based products;
- train stakeholders in value-addition of forest based products.

- 
- **Goal 9 : To develop sustainable agroforestry systems**



# Critical Actions

- Investigation of economically viable and sustainable agroforestry systems;
- conduct research trials on varying agroforestry practices, species combinations and soil suitability wherever agroforestry systems are envisaged
- develop agroforestry demonstration areas for different soil types and land conservation goals;
- promote local knowledge and technology utilisation in agroforestry practices;
- facilitate that purchase of quality seeds and planting materials for drought resistant t species;
- promote indigenous species of multipurpose plantations in marginal areas, such as mountain slopes, superhumid areas, etc;

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## Strategic Axis 10: Sustainable Coastal Management

- Goal : To protect the coastal ecosystems from natural and anthropogenic activities and reverse the effects of damage caused by human interventions
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## Critical Actions

- Restore original and endemic species by replacing exotic ones such as casuarinas trees;
  - provide irrigation facilities for year round watering of planted seedlings;
  - protect and restore corals and associated communities of the lagoon;
  - assess physical damage to lagoon corals;
  - assess lagoon sediment production capacity and examine sediment pathway movements;
  - develop protocols to monitor reef lagoon habitats;
  - implement recommendations for sustainable management of beaches, construction and setback distance from the beach;
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# Critical Actions

- evaluate suitability of existing antierosive measures, e.g. gabion;
- setting up of a defensible setback policy based on physical processes of flooding and land and beach erosion;
- prepare a comprehensive Coastal Zone Management Plan;
- protect and sustain long term use of mangroves, seagrass, coral reefs, and beaches;
- establish and enforce standards to control discharge of effluents into drainage systems, sensitive areas, etc;
- analyse coastal water quality for generating baseline data;
- establish mooring areas for boats, yachts, and cruising vessels.

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## Strategic Axis 11 : Sustainable Watershed Management

- Goal : To manage sustainably drainage basins and watershed for a sustainable supply of water for sustainable development, involving an integrated water resources management approach
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# Critical Actions

- Surveying main catchment areas for legal protection;
- conservation and rehabilitation of watersheds through protection of existing forests and implementation of reforestation, afforestation and agroforestry activities;
- restoration and protection of biodiversity and watersheds in collaboration with relevant authorities, e.g. NPCS, MWF, Shoals of Rodrigues;
- undertake surface, coastal and groundwater situational analyses, including an assessment of salt water intrusion and develop appropriate hydrological models;

# Critical Actions

- improve and rehabilitate existing water storage and delivery systems and minimize losses during delivery;
- improve water quality monitoring, especially in Rodrigues;
- ensure that the water delivery system uses appropriate technologies and avoid wastage and water losses through distribution channels;
- support and implement the Drainage Master Plan and the Irrigation Master Plan
- strengthen and expand the role of water users associations in sustainable water management.

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## Strategic Axis 12 : Rehabilitation of degraded lands and management of protected areas

- Goal : To rehabilitate land that has been degraded by natural processor through unsustainable practices by humans
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# Critical Actions

- Review of completed and ongoing projects o land rehabilitation/ soil remediation carried out by the Government, private, parastatal, NGO, CBO bodies, eg. the Antierosion programme;
- rehabilitation of degraded forest and other lands;
- intercropping food, pesticidal, medicinal, horticultural crops under tree stands on degraded lands;
- develop costal erosion mitigation action plans with beaches most severely affected by coastal erosion;
- extend and strengthen local participation of local farmers and herders in reforestation and afforestation programmes;
- rehabilitate solid waste disposal sites, e.g. Mare Chicose, La Brasserie, Solferino;
- develop conservation parks in collaboration with the NPCCS;
- establish procedures to facilitate and promote community based actions with regard to conservation of sensitive areas.

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## Strategic Axis 13 : Understanding and utilising Traditional Knowledge for SLM

- Goal : To gather information on, and to better understand and revalorize, the knowledge and practices developed by earlier generations of farmers and other land stewards for sustainable use of land
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## Critical Actions

- Develop a *modus operandi* to gather local knowledge and information on a regular basis and using a multilevel stakeholder approach;
- Develop a database and make an inventory of best practices for SLM;
- conduce trials to study scientific merit and technical feasibility of traditional practices for SLM;
- incorporate, wherever possible, traditional knowledge best practices into land planning and management systems.

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## Strategic Axis 14 : Establishment of partnerships with the private sector for SLM

- Goal : To create the enabling environment and incentives for the private sector to contribute to SLM
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# Critical Actions

- All Integrated resort Schemes (IRS) to have at least 50% green areas (which could include trees, golf courses, lawns, parks, etc.);
- All Residential Estate Schemes (RES) of small sugarcane planters to have at least 50% green areas (which could include trees, golf courses, lawns, parks, etc.);
- All new roads to be lined with perennial flowering trees;
- All roundabouts to be taken charge of by private firms for maintenance and embellishment as part of their Corporate Social Responsibility (CSR). For a win-win situation, advertisement in these areas will be allowed if done in an environmentally harmonious way (to be controlled by the MLA and Ministry of Infrastructure);
- All roads to be sponsored by private firms, who will have the responsibility of embellishing them, and be allowed free advertisements therein in return.

# Stakeholder Analysis

	<b>Low Influence</b>	<b>High Influence</b>
<b>High Importance</b>	NGOs Civil Society groups Land Use Division	Forestry Services AREU; MoESD; MoHL
<b>Low Importance</b>	Irrigation Authority MoPINDULTS Beach Authority	MoFED; UoM; NRSC; MIE; MSIRI; FARC; MoI; Met Services

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# Proposed Projects with Project Outlines

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## *Project 1.*

# Development of a Model Agricultural Village (MAV) for VRS I, VRS II and other ex agricultural workers and employees

### ■ ***Responsible Authority***

- Ministry of Agroindustry & Food Security, Ministry of Housing & Lands, Ministry of Environment & Sustainable Development, University of Mauritius.

### ■ ***Time Frame***

- 1-5 years.
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# Project Outline

- Creation of several Agricultural Villages comprising of individual plots of a given area for VRS I, VRS II and other employees for cultivation of specific crops, flowers, spices, organic produce, medicinal/pesticidal plants, livestock, and dairy farming.
- Individual plots grouped together for a common agricultural activity for greater economy of scale, reduced completion and reduced cost of labour.
- This will create a model village such as Village Laitiere, Village Epice, Village Fruitiere, etc.
- Well planned village with schools, health centre, market, shopping complex, park and recreational area, green spaces jogging tracks, swimming pool.
- **Not a neo-camp sucriere !**
- An annex comprising of a light industrial area for agroprocessing (e.g. cut flowers, bouquet making, processing of fruits, vegetables, dairy products such as dahi, cheese, etc.).
- It is very important that the enabling environment be created to ensure the success of such a project, through handholding of farmers, provision of scientific/ technical support, market outlets, credit facilities, infrastructure, helping farmers meet sanitary and quality norms, etc.

# Benefits of such an Agricultural Village project

*(Source : Lalljee, 2008)*

- ❑ contribution to poverty alleviation
  - ❑ contribution to food security
  - ❑ reduction of import of agricultural commodities
  - ❑ savings in foreign exchange
  - ❑ addressing the issue of exclusion
  - ❑ job creation
  - ❑ wealth creation
  - ❑ changing the mindset from job seekers to job creators
  - ❑ availability in the country of more healthy and fresh foods
- 
- ❑ create possibilities for agritourism.

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## *Project 2.*

# Agroforestry project for biofuels for small planters on marginal lands

## ■ ***Responsible Authority***

- Ministry of Agroindustry & Food Security, Ministry of Environment & Sustainable Development, Ministry of Public Infrastructure, NDU, Land Transport & Shipping.

## ■ ***Time Frame***

- 4-8 years.
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## Project Outline

- According to SIFB records, 8,000 planters have abandoned their sugarcane plantations due to loss of profitability.
- Creation of Eucalyptus Energy Farms (or Eucalyptus Parks) on marginal lands (rocky, shallow, excessively dry, slopy lands, e.g. the 5,000 ha of land belonging to the small sugarcane planters that are becoming increasingly unprofitable for sugarcane cultivation).
- The biomass produced by this fast growing tree species will be harvested, either with light machinery or by a fully mechanised process, and sent to sugar/flexifactories.
- The factories will use the biomass for cogeneration of energy, for their own factory operation and sell the excess to the national grid. These factories will be called sugar/ bioenergy factories.

## Project Outline

- Small sugarcane planters, including metayers, owning marginal land will be clustered together, on a regional basis, into 'Tree Planters Cooperatives' (TPC) to benefit from the economies of scale.
- It is very important that the associate supporting framework and enabling policies be created by the Government for the success of such an industry as it will take a few years (about 3 years) before the industry starts paying dividends.
- This innovative idea is eligible for carbon credits as a CDM (Clean Development Mechanism) project of the Kyoto Protocol, and can therefore generate substantial income.

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## *Project 3.*

### Rehabilitation of river reserves (Riparian zones)

- ***Responsible Authority***

- Ministry of Environment & Sustainable Development, Ministry of Agroindustry & Food Security.

- ***Time Frame***

- 3-8 years
-

## Project Outline

- Rehabilitation of degraded riparian zones by the planting of perennial fruit trees, e.g. litchis, mangoes, with sustainable cultural practices.
- A survey of all river reserves will be carried out to know the extent of clearing and the soil cover, and information will be on digital platform.
- Owners will be inculcated in SLM principles and will be provided with the planting material at subsidized rates and will be trained on the appropriate cultural practices.
- The project, in addition to contributing to SLM, is expected to increase the revenue of riparian owners, address the issue of food security and health, reduce volume of fruits imported, and help save foreign exchange.

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## *Project 4.*

# **A Review of the Building Codes for Mauritius and Rodrigues**

### ■ ***Responsible Authority***

- Ministry of Housing and Lands, Ministry of Local Administration and Outer Islands, State Law Office.

### ■ ***Time Frame***

- 2-5 years.
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## Project Outline

- The project will involve revisiting the laws and regulations governing building permit requirements for both commercial and residential buildings, as well as for construction under the RES and IRS programmes.
  - The laws will be reformulated / reviewed to meet the MID concept. Buildings will be required to adopt a “Green Building” concept.
  - Regulations that will be included in the building legislation will require buildings to have provision for rain water harvesting, natural lighting, natural ventilation, solar heating, etc.
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## *Project 5.*

# Reforestation of degraded lands with fruit trees in Rodrigues.

### ■ ***Responsible Authority***

- Ministry of Environment & Sustainable Development, Ministry of Agroindustry & Food Security, Rodrigues Regional Assembly, University of Mauritius.

### ■ ***Time Frame***

- 3-8 years.
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# Project Outline

- Rehabilitation of the degraded areas of Rodrigues through the planting of fruit trees (e.g. mangoes, cashewnuts, jamblon, etc.).
  - Lessees or owners of such degraded lands will be trained on the principles of SLM and will be provided with planting materials and other inputs such as fertilisers, compost, irrigation facilities.
  - The harvested fruits will be sold fresh or processed (in the soon-to-be-set up community kitchen), both for the local market as well as for export to Mauritius.
  - The project outcomes include land rehabilitation, reduction of soil erosion, protection of the coastal and lagoonal environment, income generation, job creation and poverty alleviation.
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## *Project 6.*

# Training of Farmers and other Stakeholders on SLM

- ***Responsible Authority***

- University of Mauritius in collaboration with AREU.

- ***Time Frame***

- 1-3 years.
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## Project Outline

- A series of short term training courses will lead to a better appreciation of the issue of SLM among the farmers and grass root level stakeholders.
- Such courses will be run by the UoM which already has the expertise and experience in such courses, having successfully run seven courses related to SLM in Mauritius and Rodrigues for specific target groups during 2007-2008.
- The courses will be tailor made for the farming community, policy makers, extension officers, community leaders and NGOs, etc.

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## Project 7.

# Review of the Building Requirements and Building Codes on Slopes, Mountain Slopes and ESAs

### ■ ***Responsible Authority***

- Ministry of Housing and Lands, Ministry of Environment & Sustainable Development, Ministry of Agroindustry & Food Security, Ministry of Local Administration and Outer Islands, State Law Office.

### ■ ***Time Frame***

- 3-5 years.
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## Project Outline

- This project will revisit and update laws and regulations with respect to buildings, roads, drains, carrying capacity, green spaces, etc. with respect to the slopes.
  - Certain areas may be completely debarred from further infrastructural development and for conservation of ecosystem functions.
  - All developments taking place should be in harmony with the environment and with the MID concept.
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# Additional List of Projects that can be Developed

- ❑ All new roads to be lined with flowering or fruiting trees.
  - ❑ Review of all land leases for commercial, industrial, farming, deer farming, campement sites, Pas Geometriques.
  - ❑ Soil erosion control through the planting of live hedges, such as vetiver, citronella, fataque (boom), etc. all of which have eco-functions and economic return.
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# Financing the NAP

(to be used to prepare the National Investment Plan)

- Funds for the NAP will be for the most part derived from grants from the UNCCD through the GEF and the Global Mechanism (GM) as Mauritius is a party to this convention. Furthermore, funds will also be allocated in the annual budget of the Central Government and Local Government. Other sources of funding include :
  - A 'Green Fund' levied on the private sector;
  - Environmental levy on tourist stay
  - Funding mechanisms by the GEF and GM as land degradation has synergies with the CBD and the UNFCCC;
  - Funds from regional sustainable land management projects, e.g. TerrAfrica;
  - Funds from regional integration such as SADC, NEPAD;
  - Funds from EU accompanying measures;
  - Funds from EU Decentralised Programmes (DCP);
  - MID Fund;
  - Food Security Fund;
  - IOC-COI;
  - Regional funding agencies, e.g. WIOLAB.

## Monitoring and Evaluation (M & E) of the NAP

- The Project Management Unit (PMU) proposed in this NAP should also be responsible for M & E.
- The PMU will ensure the quality and quantity indicators of the programmes.
- The M & E system will include the time horizons, i.e. short term, middle term implementations as per the GANNT Chart given in the NAP.
- It will also include publications of annual reports of the progress of the NAP as well as elaboration of an interim and final assessment.
- If the stated objectives are lagging behind an in-depth study to analyze the shortcomings and bottle necks will be required and timely corrective actions taken to overcome the challenges.

# Implementation of the NAP

- The political, social, economic and institutional realities were considered in designing a practical and easily measurable set of objectives with supporting activities for implementation over a 1- 8 year period.
- The Plan emphasises the importance of peoples' participation, and co-management of all aspects of land resource conservation, cognizant of the fact that key threat to land degradation lies with human induced behaviour, including climate change.
- Towards the end of this period, a review of the Strategy and Action Plan should be undertaken and a new NAP for further activities should be proposed.

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*Thank you for your attention*

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