

NATIONAL WATER RESEARCH GROUP (NWRG)



*Final Consultative Meeting of the National Research Groups
February 2nd, 2012*

RESEARCH PERSPECTIVES & RECOMMENDATIONS ON WATER RESOURCES IN MAURITIUS



Mauritius Research Council

National Water Research Group

Mauritius Research Council (MRC - Chair)
Agricultural Research & Extension Unit (AREU)
Albion Fisheries Research Centre (AFRC)
Association des Hôteliers et Restaurateurs de l'île Maurice (AHRIM)
Central Water Authority (CWA)
Irrigation Authority (IA)
Manser-Saxon Contracting Ltd
Mauritius Meteorological Services (MMS)
Mauritius Standard Bureau (MSB)
Ministry of Energy & Public Utilities (MEPU)
Ministry of Environment and Sustainable Development (MoESD)
National Environmental Laboratory (NEL)
Road Development Authority (RDA)
Scene-Ries Consult Ltd
University of Mauritius (UoM)
University of Technology (UTM)
Water Research Co Ltd
Water Resources Unit (WRU)



Role of the NWRG

- Interdisciplinary Steering Committee involving public and private sector stakeholders
- Looked at the current water crisis from a Research Perspective
- Identified possible research to be carried out to try to alleviate water crisis in Mauritius

Aims & Objectives of NWRG

- Devising research avenues to alleviate water shortage issue in short, medium and long term through the following:
 - Identifying critical issues on water resources for Mauritius
 - Prioritising research themes in water resources management
 - Coordinating and facilitating research activities related to the water shortage issue

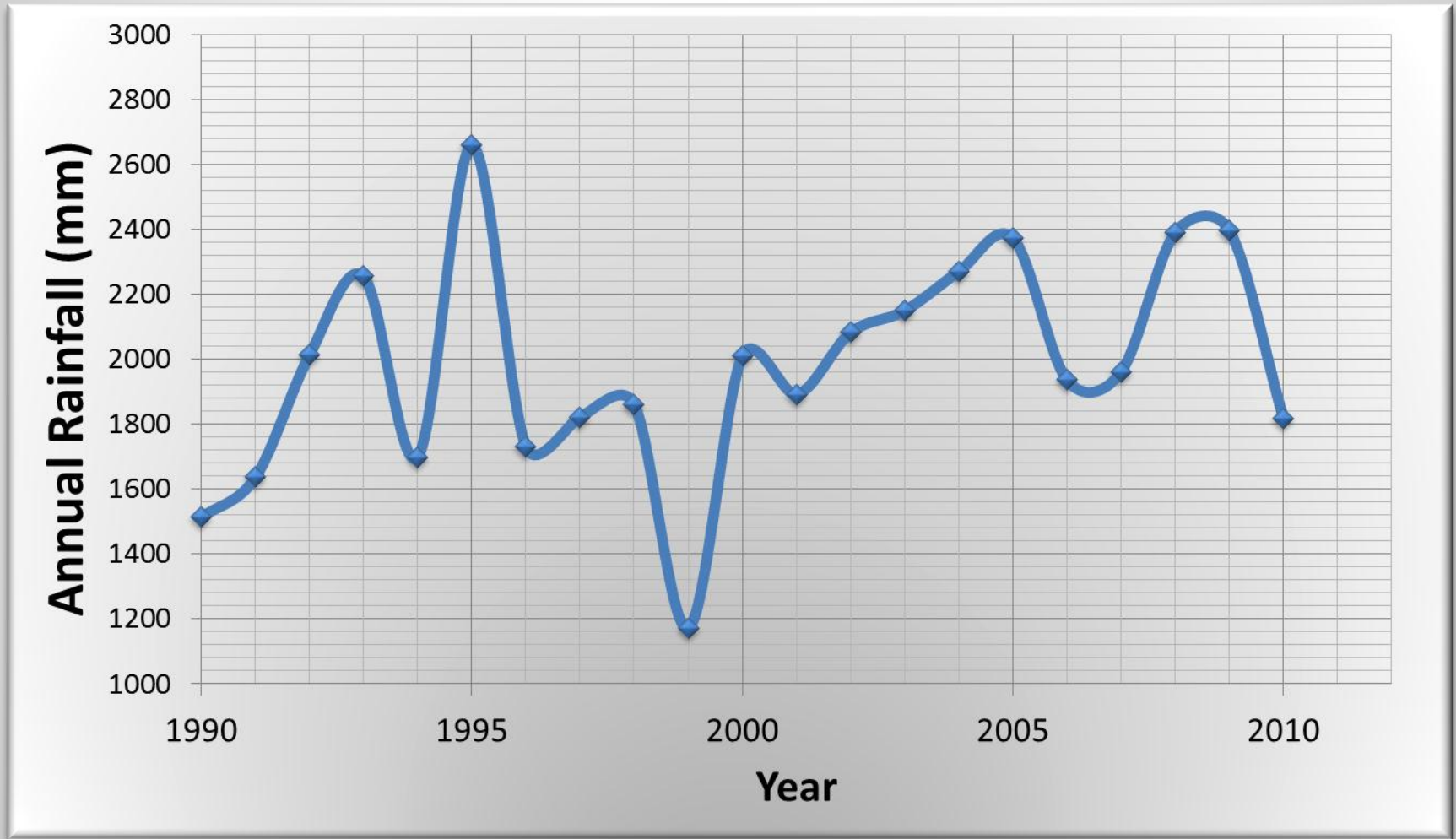
Current Status

- Annual rainfall of about 2000mm - corresponds to an annual volume of about 3700 Mm³
- Over last century, rainfall data recorded in Mauritius shows a general decreasing trend
- ↓ groundwater recharge
- ↑ water demand

Water Production

Zone	Normal Production/m³ per day
Port-Louis	100,000
North	123,000
East	72,000
South	75,000
Mare aux Vacoas – Upper	114,000
Mare aux Vacoas - Lower	110,000
Total	594,000

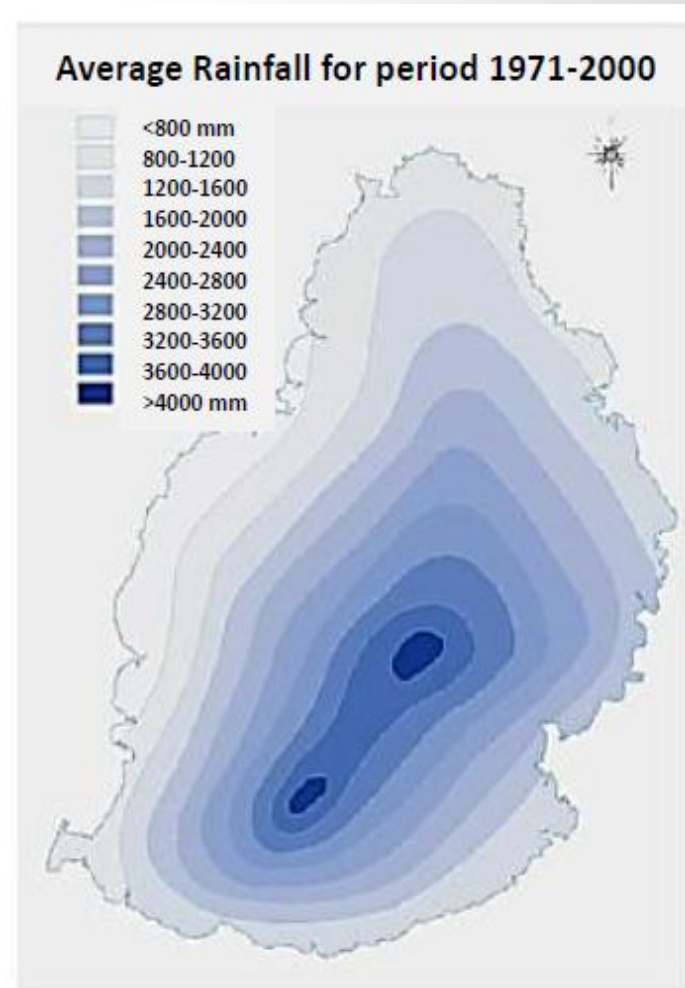
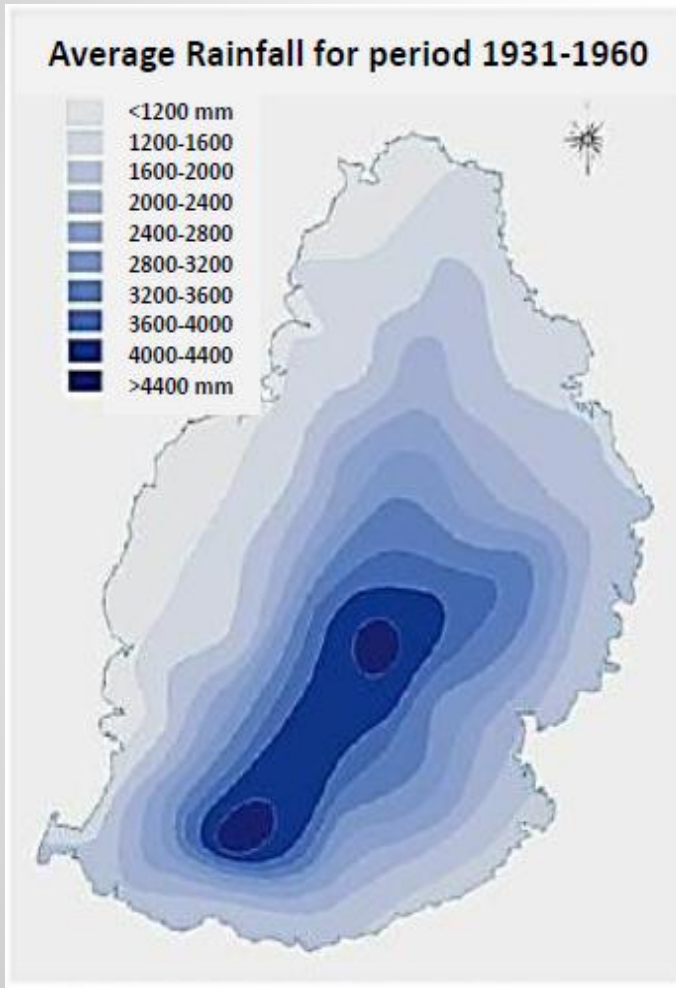
Annual Rainfall Pattern (1990 - 2010)



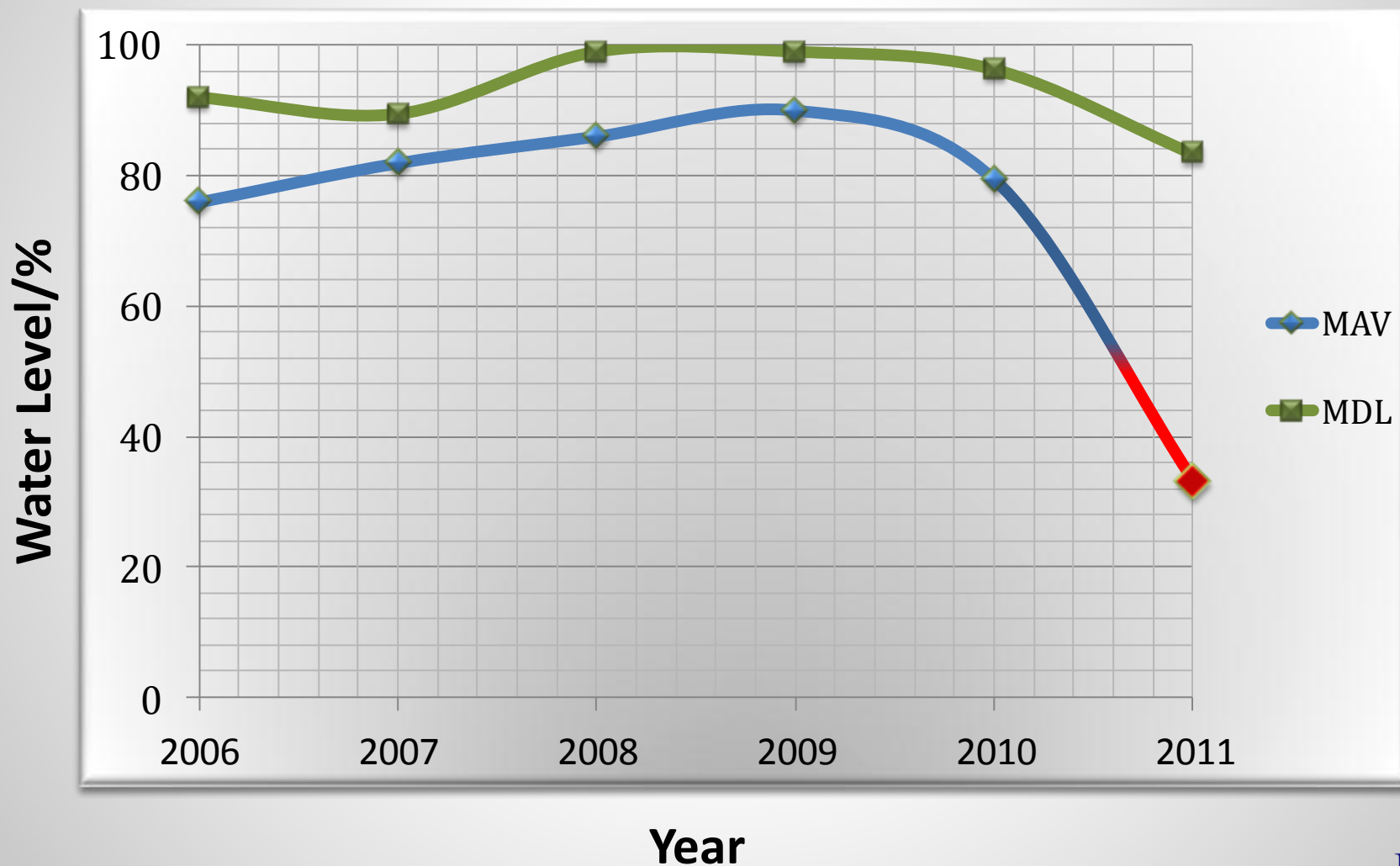
Courtesy: Mauritius Meteorological Services



Rainfall Pattern



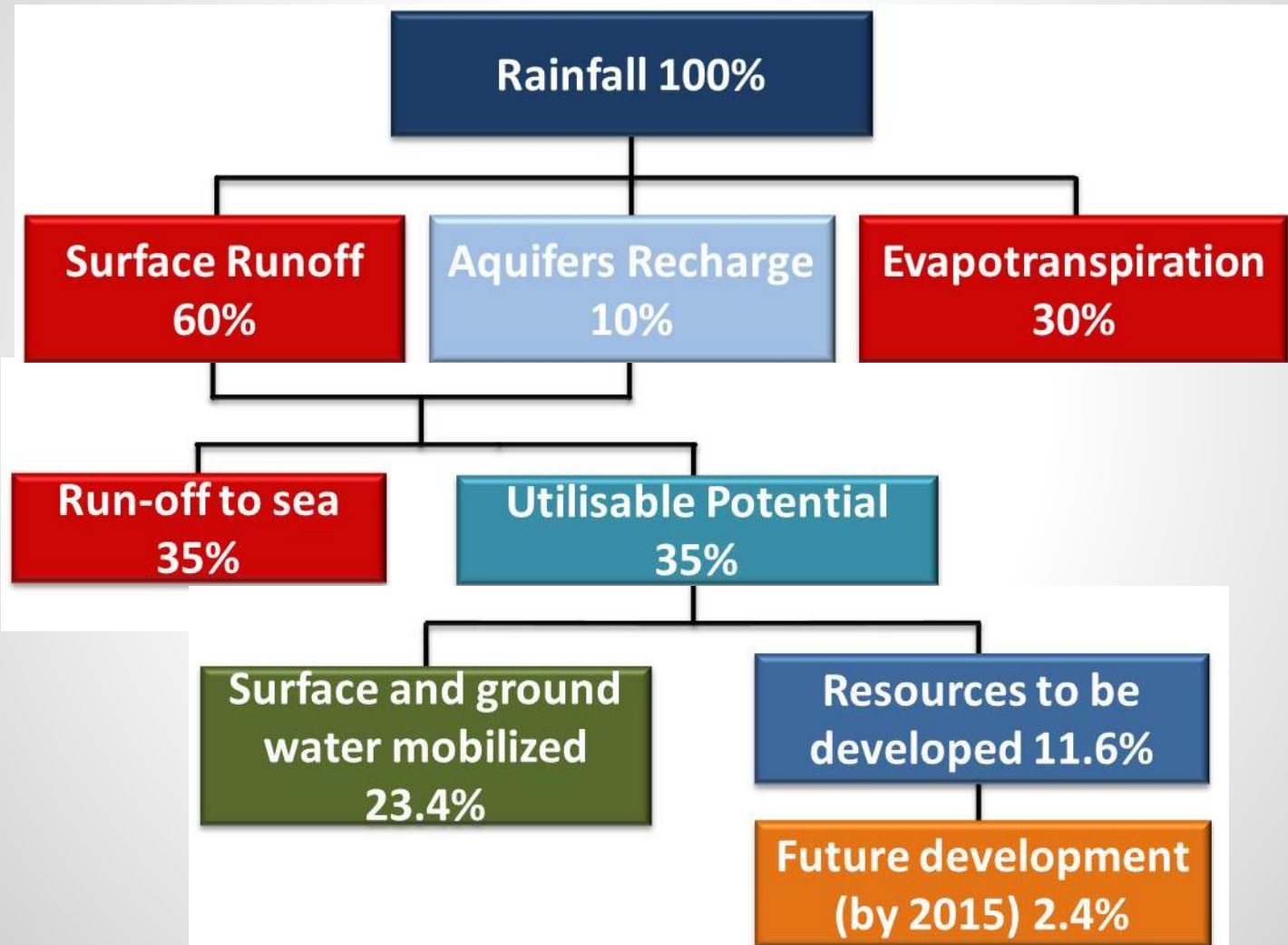
Comparison between Mare aux Vacoas reservoir and Midlands Dam



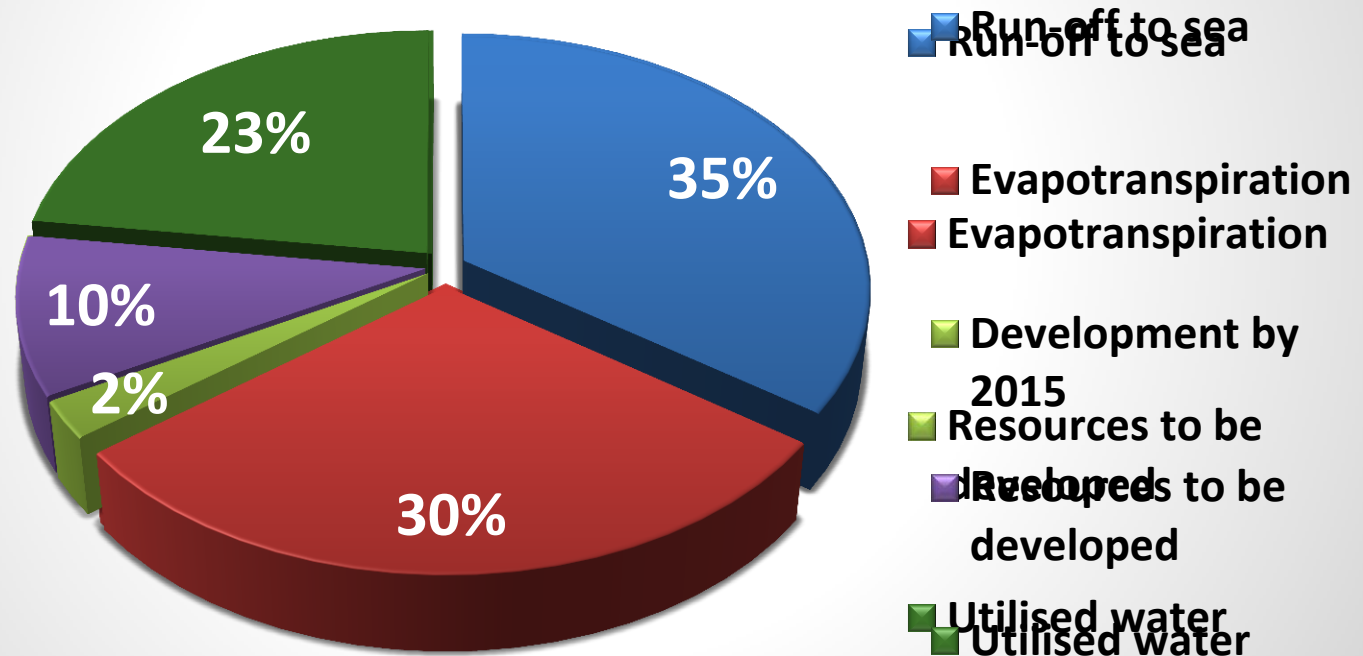
Courtesy: Mr Prem Saddul



Rainwater Utilisation



Rainwater Utilisation



9 Areas of Research Prioritised

Areas of Research identified by NWRG

5. Studying
scale c

8 |

9. Investigating innovative
ways to reduce
evapotranspiration

larger
native

- a) Finding sub-terrain reservoirs to store water
- b) Assessment of measures to reduce evapotranspiration, for example:
 - Floating covers
 - Shade structures
 - Chemical covers
 - Biological covers

and other diseases in target populations.

Existing Alternatives

- Desalination Technologies
- Rainwater Harvesting
- Cloud Seeding
- Solid Rain

Desalination Technologies

Small Scale Solar Desalination in Mauritius

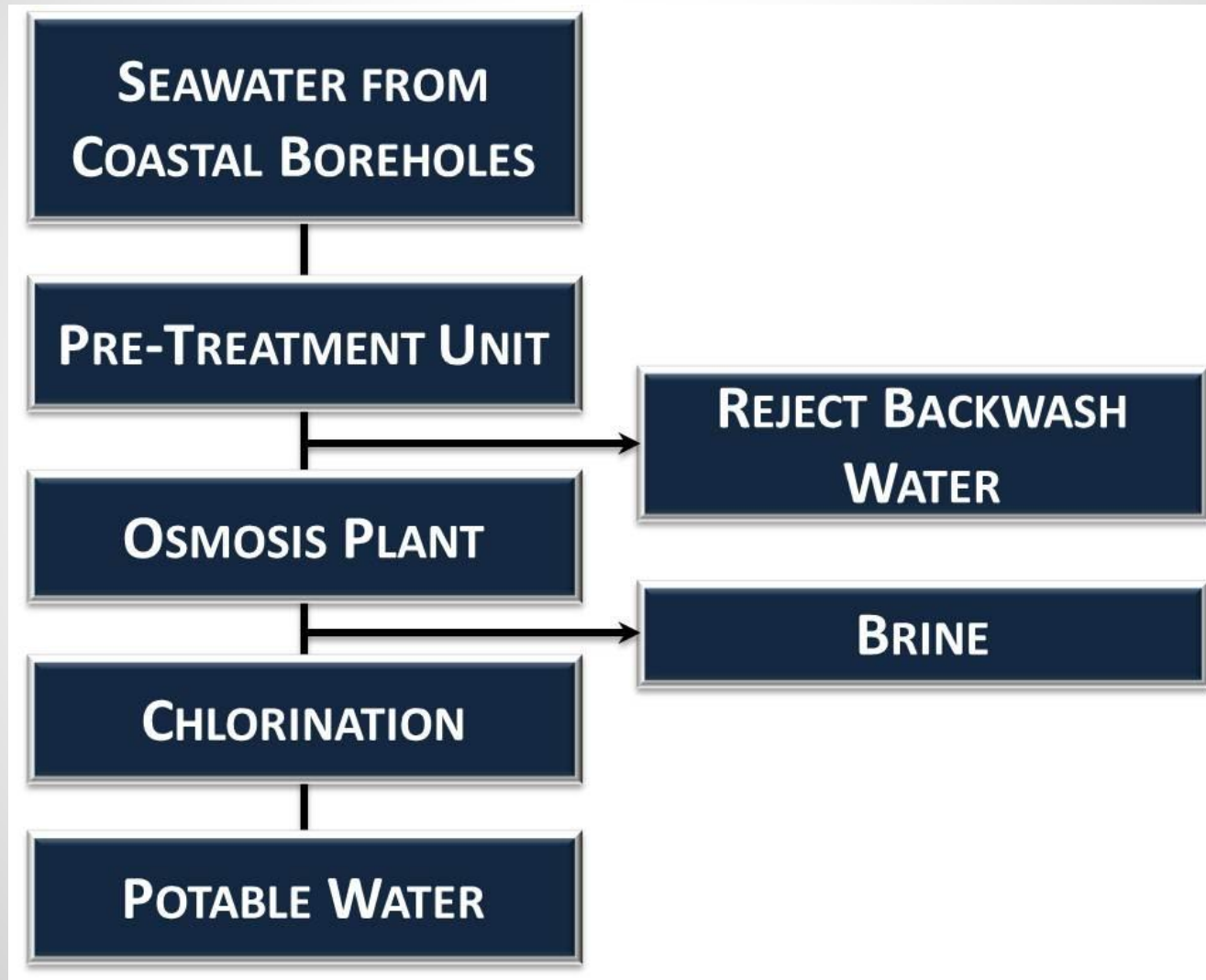
UNDP Funded Project

- Name: Solar Water Desalination in Coastal Villages
- Location: Rodrigues, Mauritius
- Date: September 1997
- Cost of equipment: \$200-\$250 per still
- Capacity: Produces 3-7 liters of drinkable water per 10 liters of seawater in one day
- Number Served: 21 households



Source: http://sgp.undp.org/download/SGP_Mauritius.pdf

Typical Seawater Desalination Facility within Coastal Zones



Financial Investment

Capital Costs

500m³-600m³/day plant (with top-of-range pressure exchanger energy recuperation) MUR 22-25 million

Operating Costs

% of overall cost

Costs of chemicals 20-25%

Costs of cartridges and membranes 15-20%

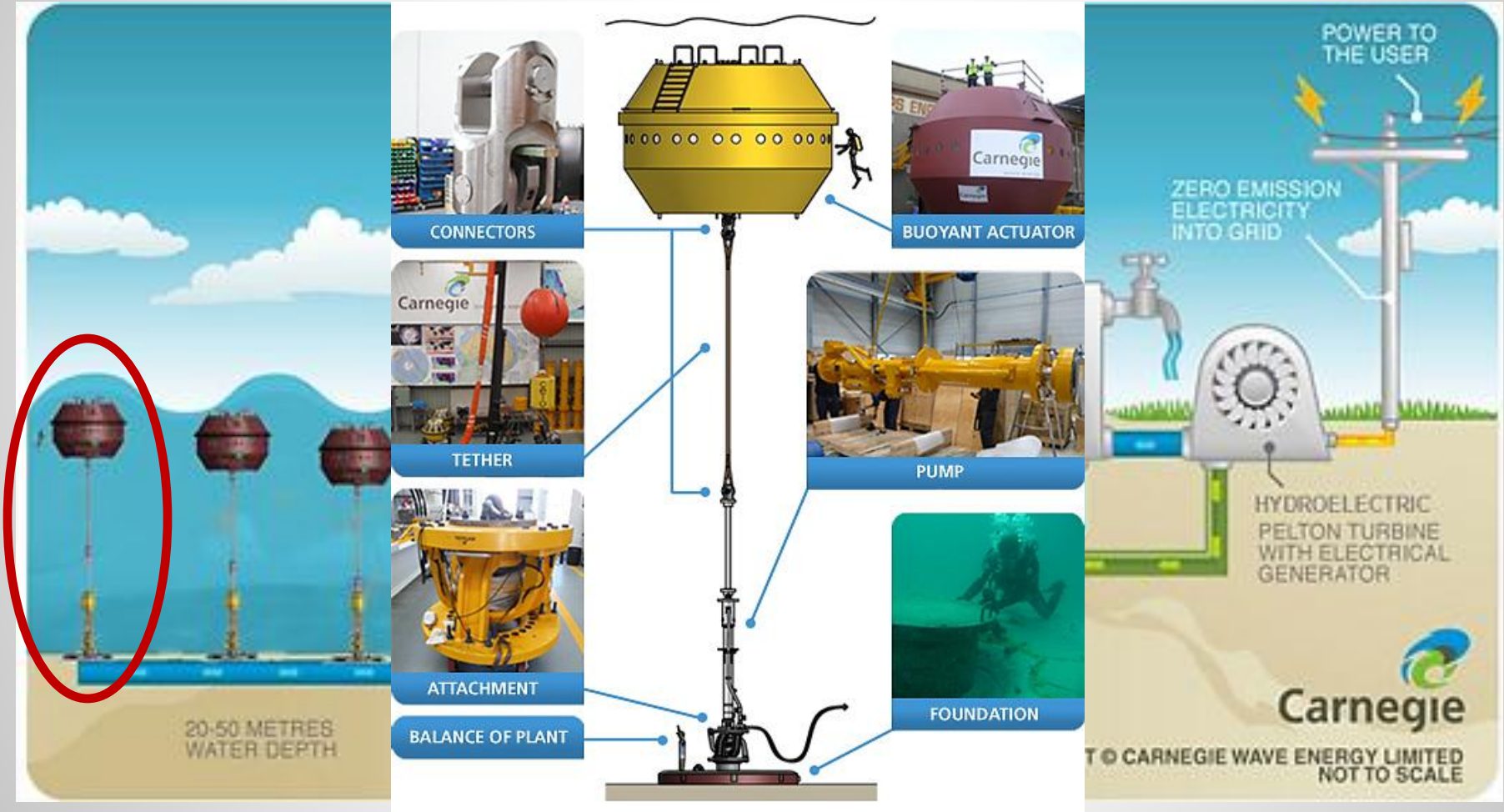
Electricity costs 60-65%

- 3 levels of energy recuperation strategy

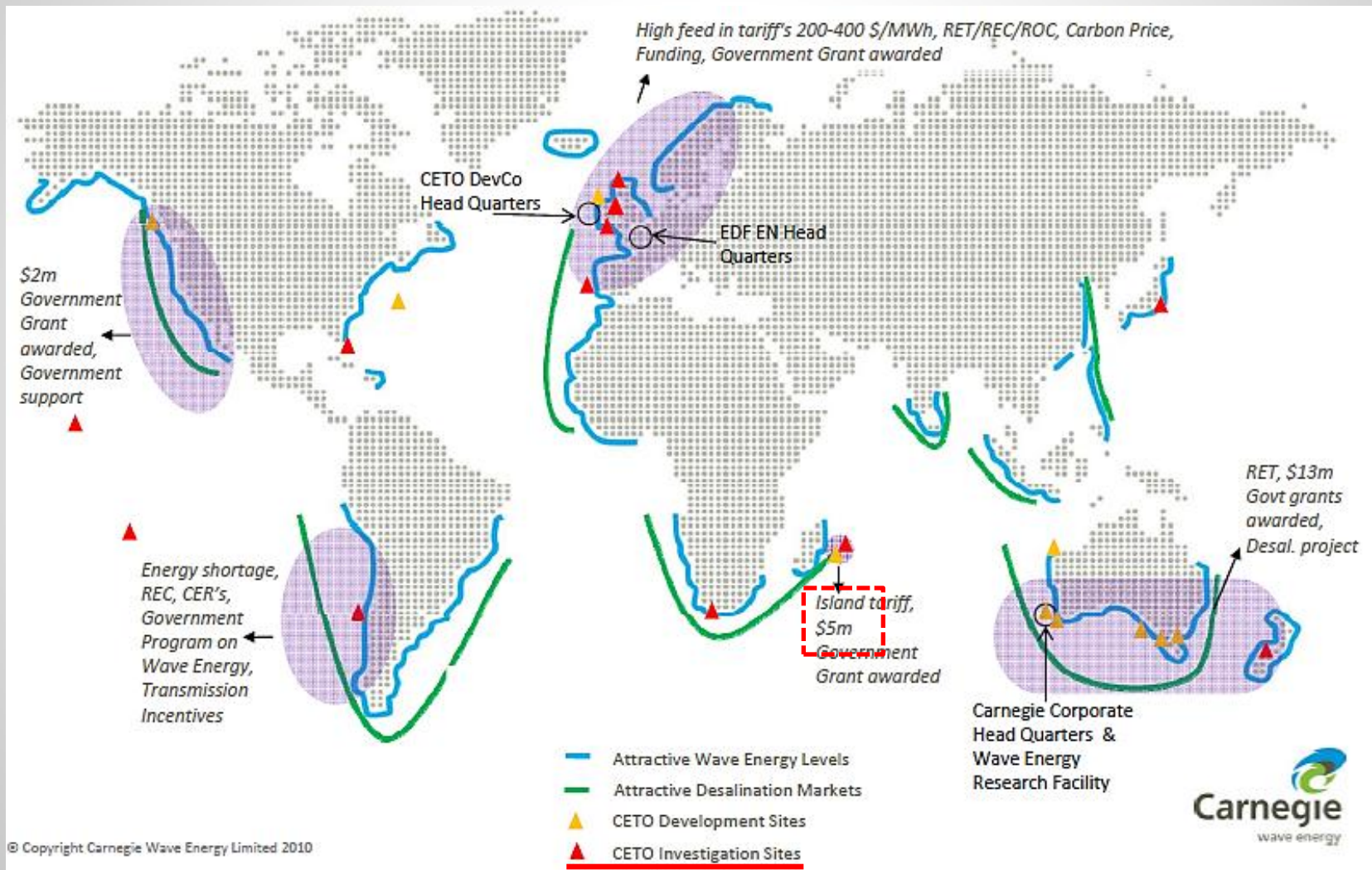
		Energy used (kWh/m ³)	Energy costs (MUR/m ³)	Total Cost per m ³ of water produced (MUR/m ³)
i)	No energy recuperation	7-8	43	58
ii)	Turbine energy recuperation	4-4.5	28	43
iii)	Pressure exchanger energy recuperation	2.2-2.5	14	29

Courtesy: Scene-ries

Carnegie CETO Wave Energy Desalination



Global Potential Site Pipeline



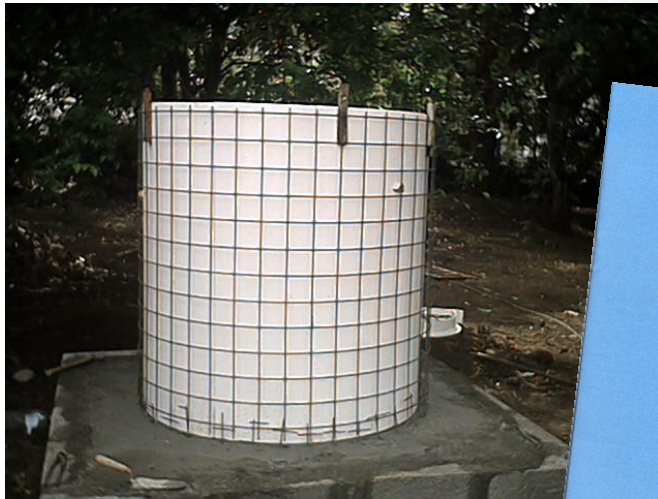
Rainwater Harvesting (RWH)

RWH – Initiative of the MRC

- Small-scale rainwater collection systems to provide individual households or single communities with a primary or supplementary water supply



RWH – Initiative of the MRC



RWH Potential in Mauritius

- Can be considered as a short-term solution
- Both public and private buildings in Mauritius offer high surface exposure for rainwater capture
- Water collected to be used primarily for cleaning and irrigation purposes
- Water treatment is required to obtain potable water, which would entail additional cost

aquapura Water Treatment Systems



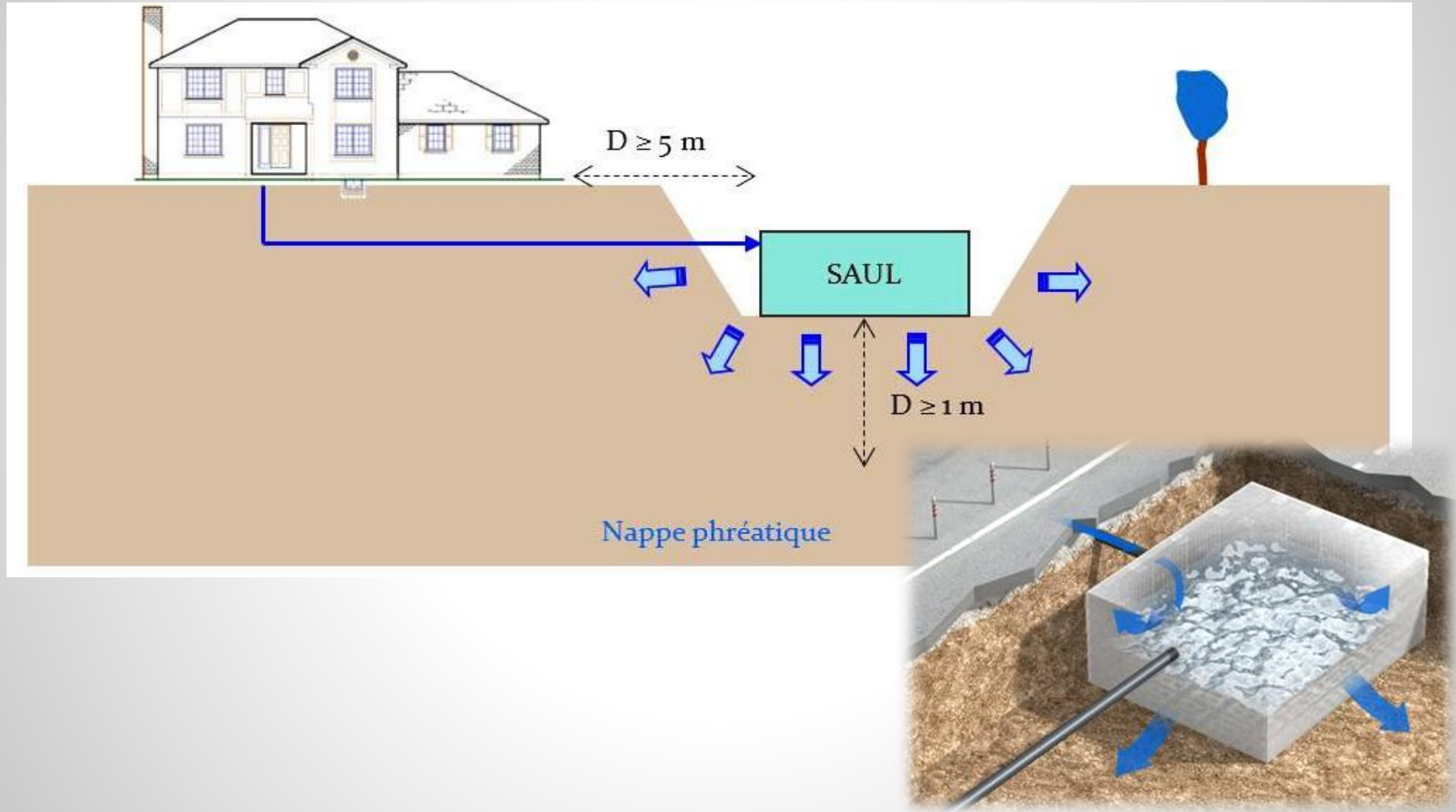
Implementation at Yusuf Meherally Centre, Tara Village, District Raigad, Maharashtra

Waterloc – Storm Water Collection



Courtesy: waterloc-nicoll

Waterloc – Storm Water Collection



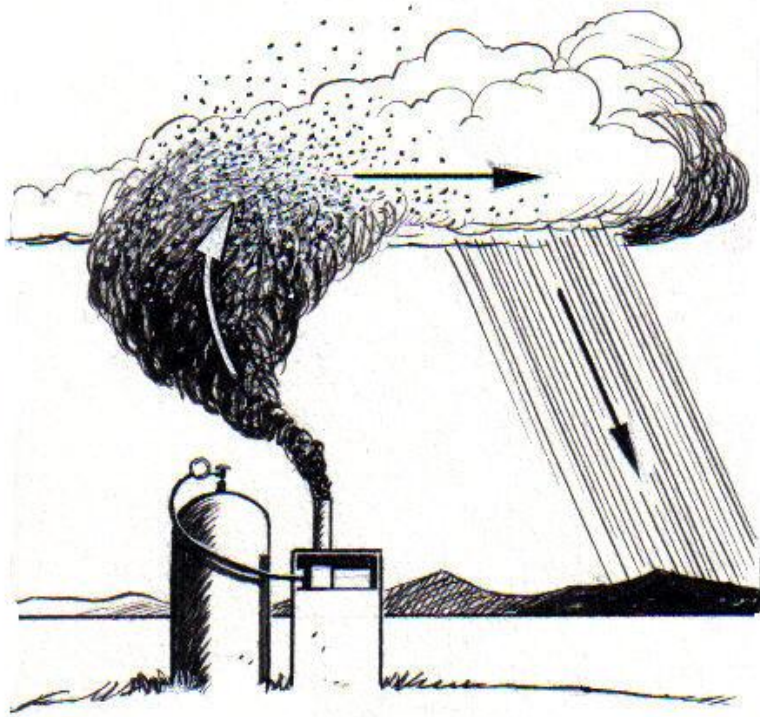
Courtesy: waterloc-nicoll



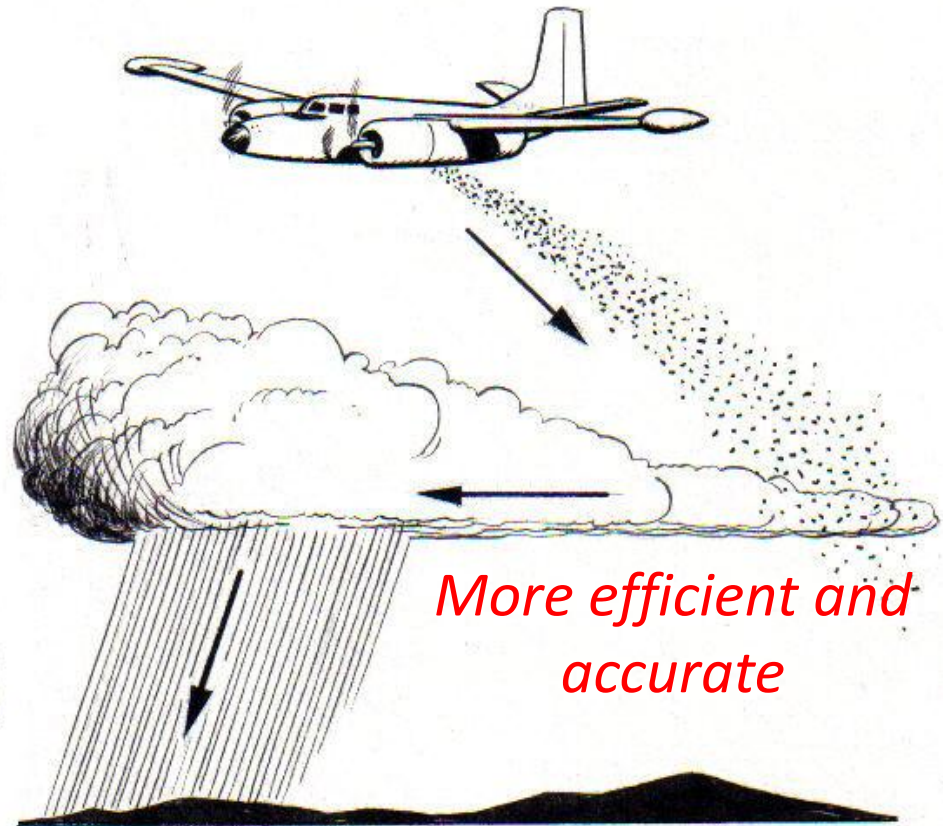
Cloud Seeding

Cloud Seeding Overview

Ground-Based Cloud Seeding



Aerial Cloud Seeding



Scope for Cloud Seeding in Mauritius

- Feasibility study carried out by MRC, 1999
 - 10 to 20 % increase in seasonal rainfall can be expected through a well-designed seeding program
- Priority 1: Dynamic cloud seeding
 - Designed to make the most significant rain
- Priority 2: Hygroscopic cloud seeding
 - Can allow Mauritius to seed warm clouds ($>0^{\circ}\text{C}$) and can beneficially modify colder clouds

Solid Rain

- Captures water in a solid for irrigation
- **Potassium Polyacrylate** – Chemical substance capable of adhering to plant roots that stores water by transforming it into a gel
- Each kilogram can gel 500 liters of water
- Blocks of water placed underground and they replenish themselves after each shower
- Useful lifetime of between 8 and 10 years
- Enables development of more economical new irrigation systems, particularly in drought zones



Potassium Polyacrylate

Concluding Remarks

- ↑ water footprint per capita in Mauritius – water-stressed nation
- Each and every citizen should contribute towards alleviating the water problem
- Requires education, mobilization and involvement of the Mauritian society

Recommended measures to facilitate research activities:

- Improving and sharing knowledge and information on climate, water and adaptation measures
- Investing in comprehensive and sustainable data collection and monitoring systems
- Advocating for enhanced funding towards optimal use and management of water resources

Acknowledgement

(Steering Committee NWRG)

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THANK YOU FOR YOUR ATTENTION

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