

# NATIONAL WATER RESEARCH GROUP (NWRG)



*Final Consultative Meeting of the National Research Groups  
February 2<sup>nd</sup>, 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

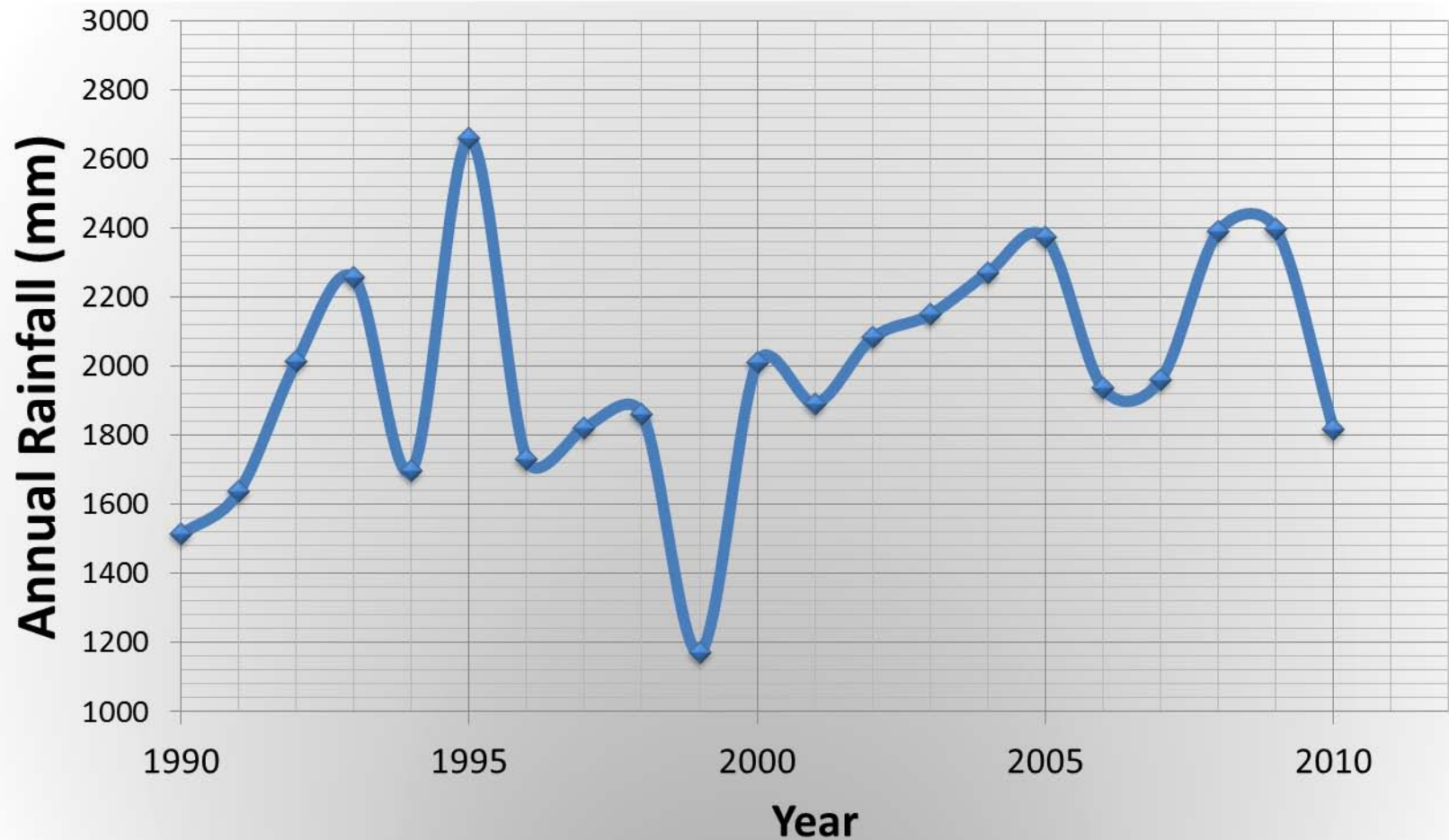
# Current Status

- Annual rainfall of about 2000mm - corresponds to an annual volume of about 3700 Mm<sup>3</sup>
- Over last century, rainfall data recorded in Mauritius shows a general decreasing trend
- ↓ groundwater recharge
- ↑ water demand

# Water Production

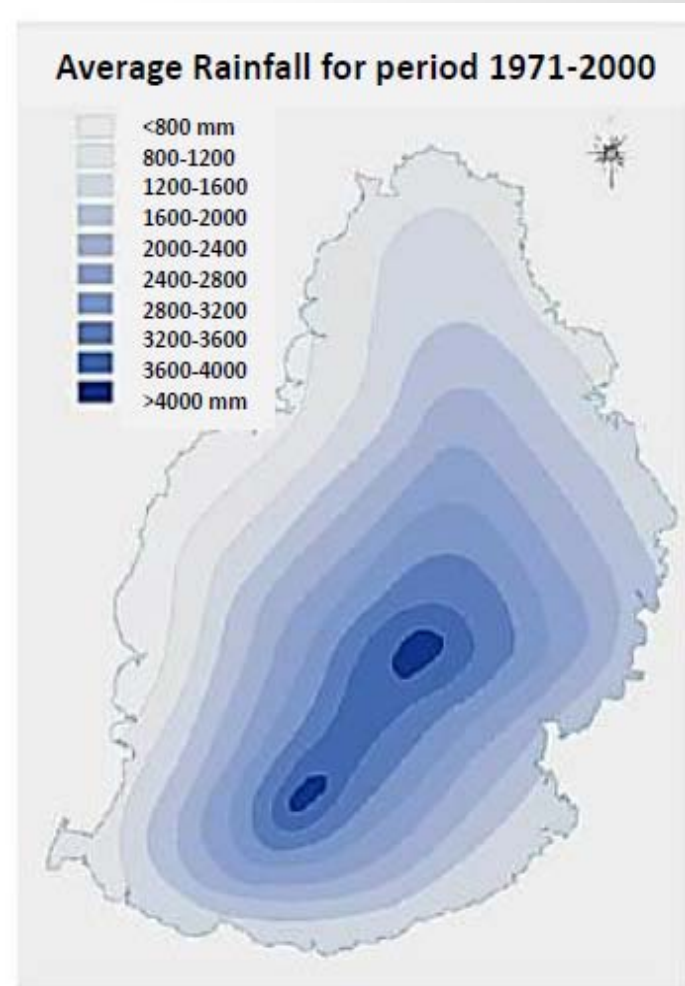
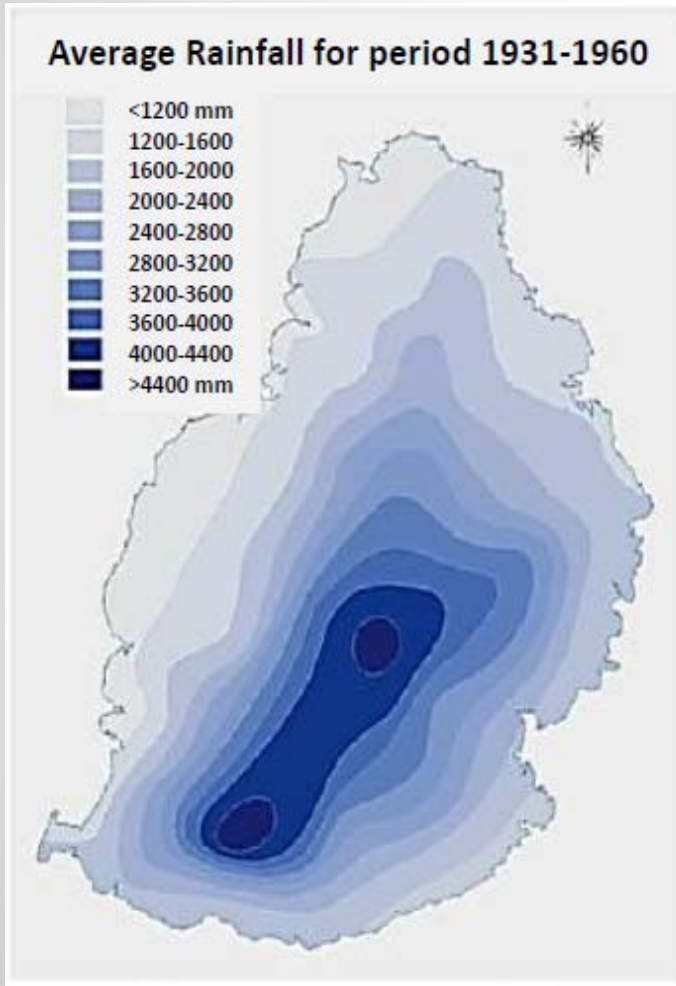
Zone	Normal Production/m <sup>3</sup> per day
Port-Louis	100,000
North	123,000
East	72,000
South	75,000
Mare aux Vacoas – Upper	114,000
Mare aux Vacoas - Lower	110,000
Total	594,000

# Annual Rainfall Pattern (1990 - 2010)



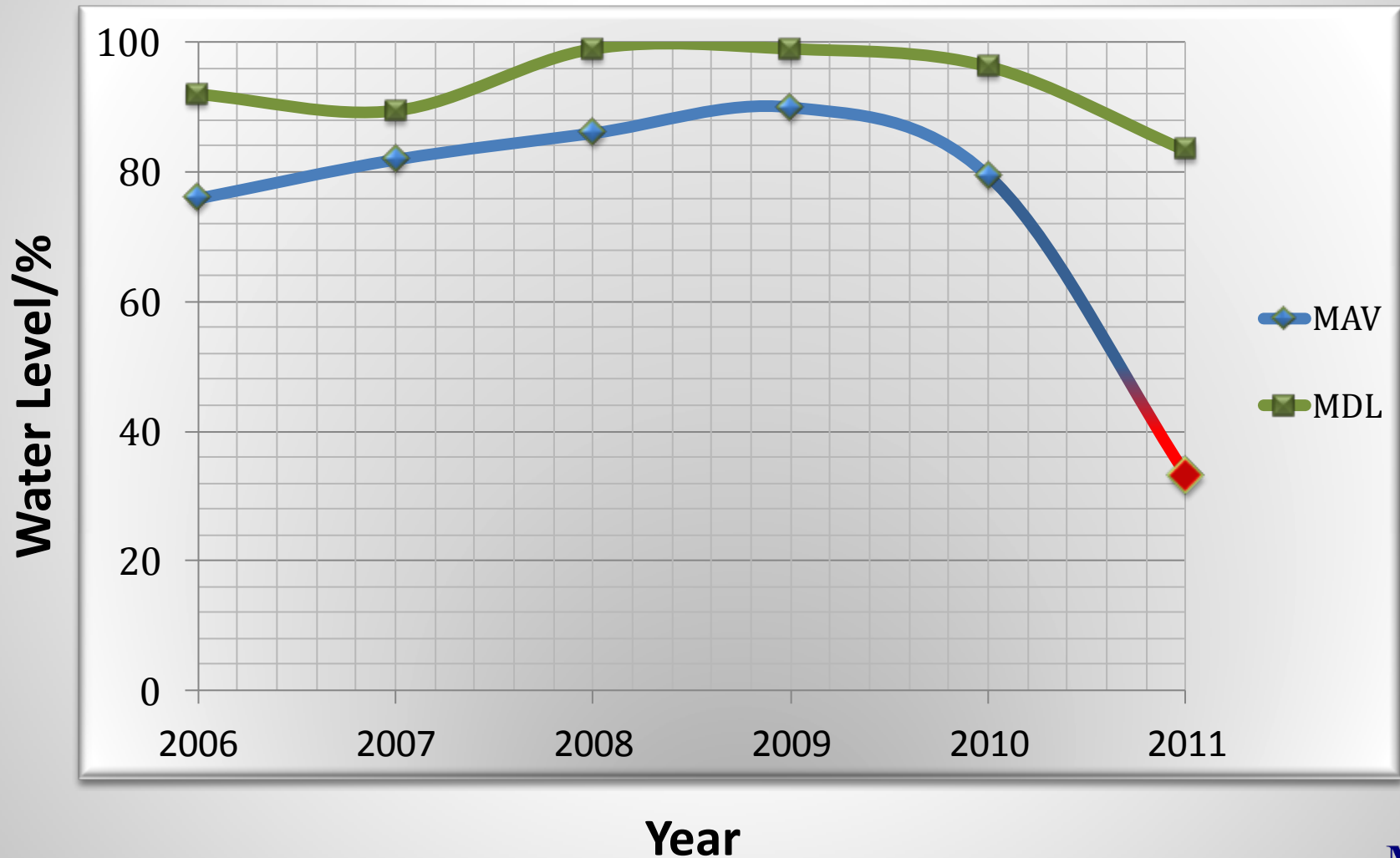
Courtesy: Mauritius Meteorological Services

# Rainfall Pattern



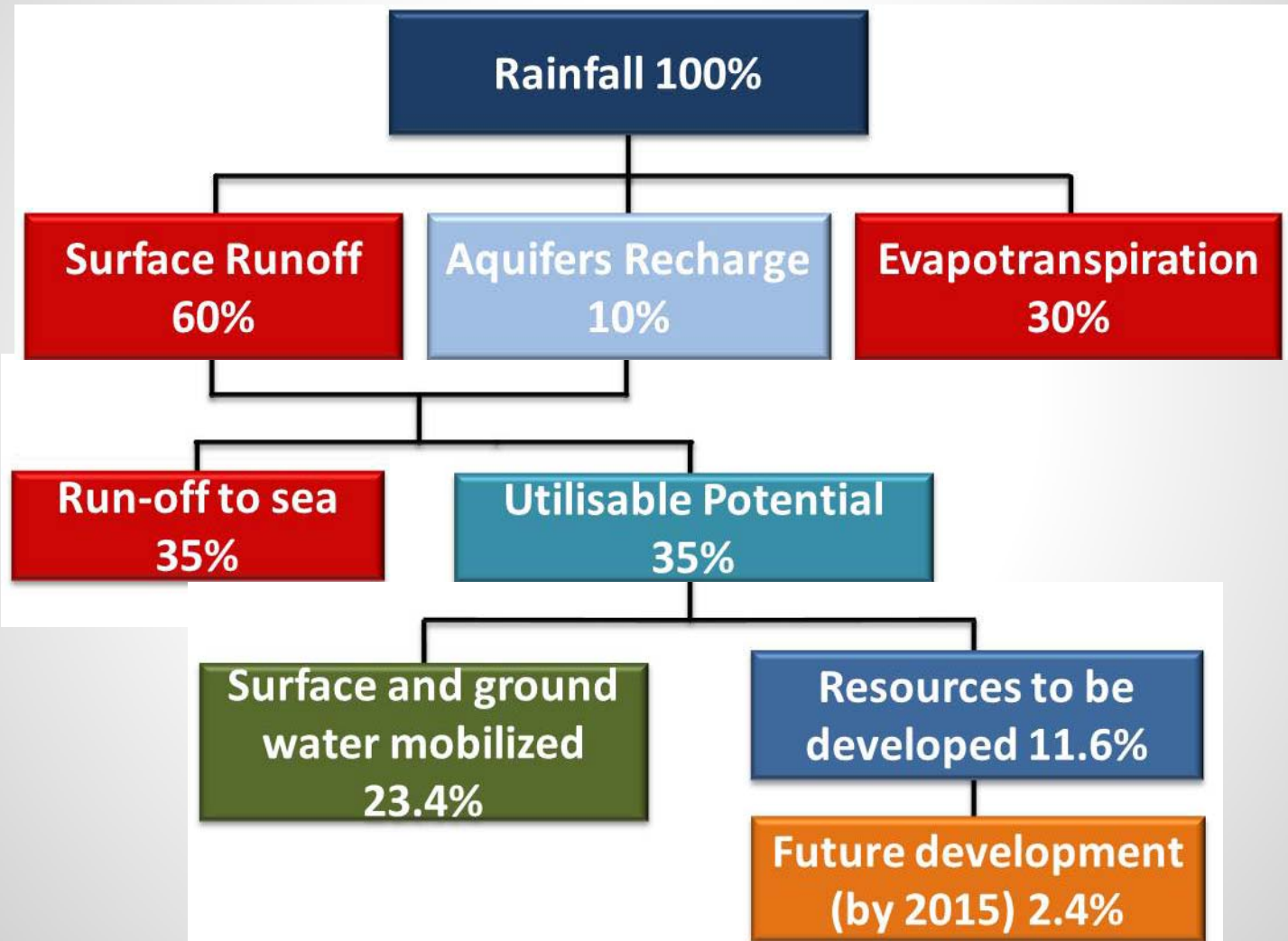
Courtesy: Mauritius Meteorological Services

# Comparison between Mare aux Vacoas reservoir and Midlands Dam

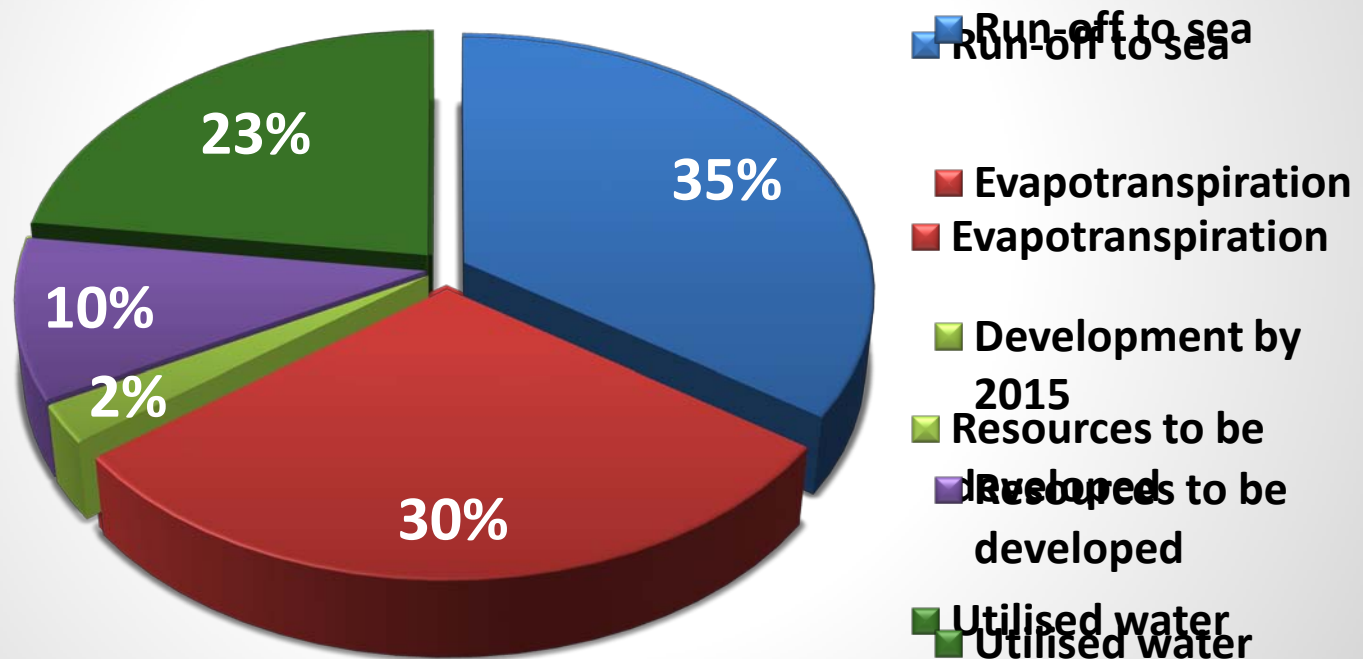


Courtesy: Mr Prem Saddul

# 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

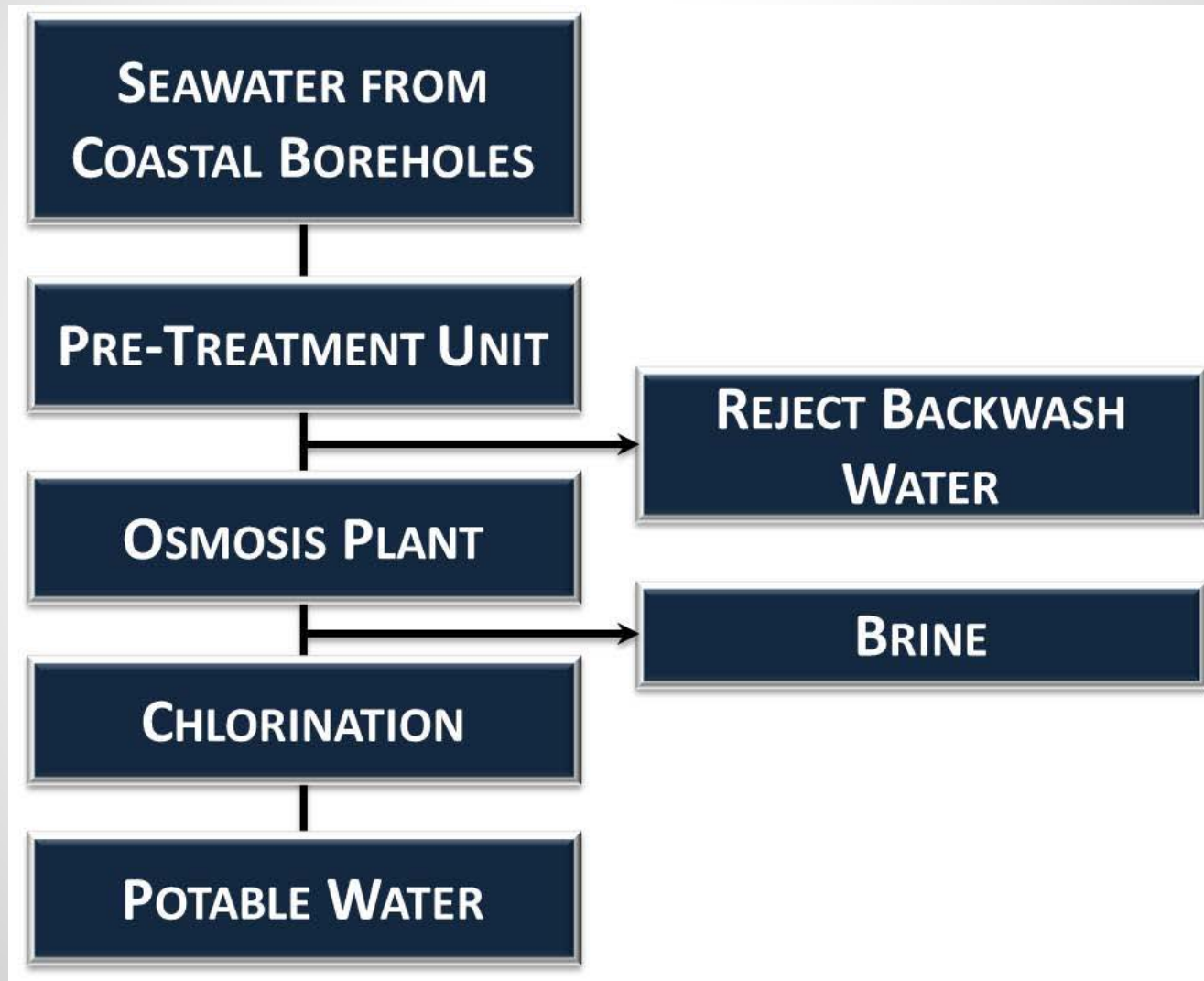
## UNDP Funded Project

- 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](http://sgp.undp.org/download/SGP_Mauritius.pdf)

# Typical Seawater Desalination Facility within Coastal Zones



# Financial Investment

## Capital Costs

500m <sup>3</sup> -600m <sup>3</sup> /day plant (with top-of-range pressure exchanger energy recuperation)	MUR 22-25 million
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## Operating Costs

% of overall cost

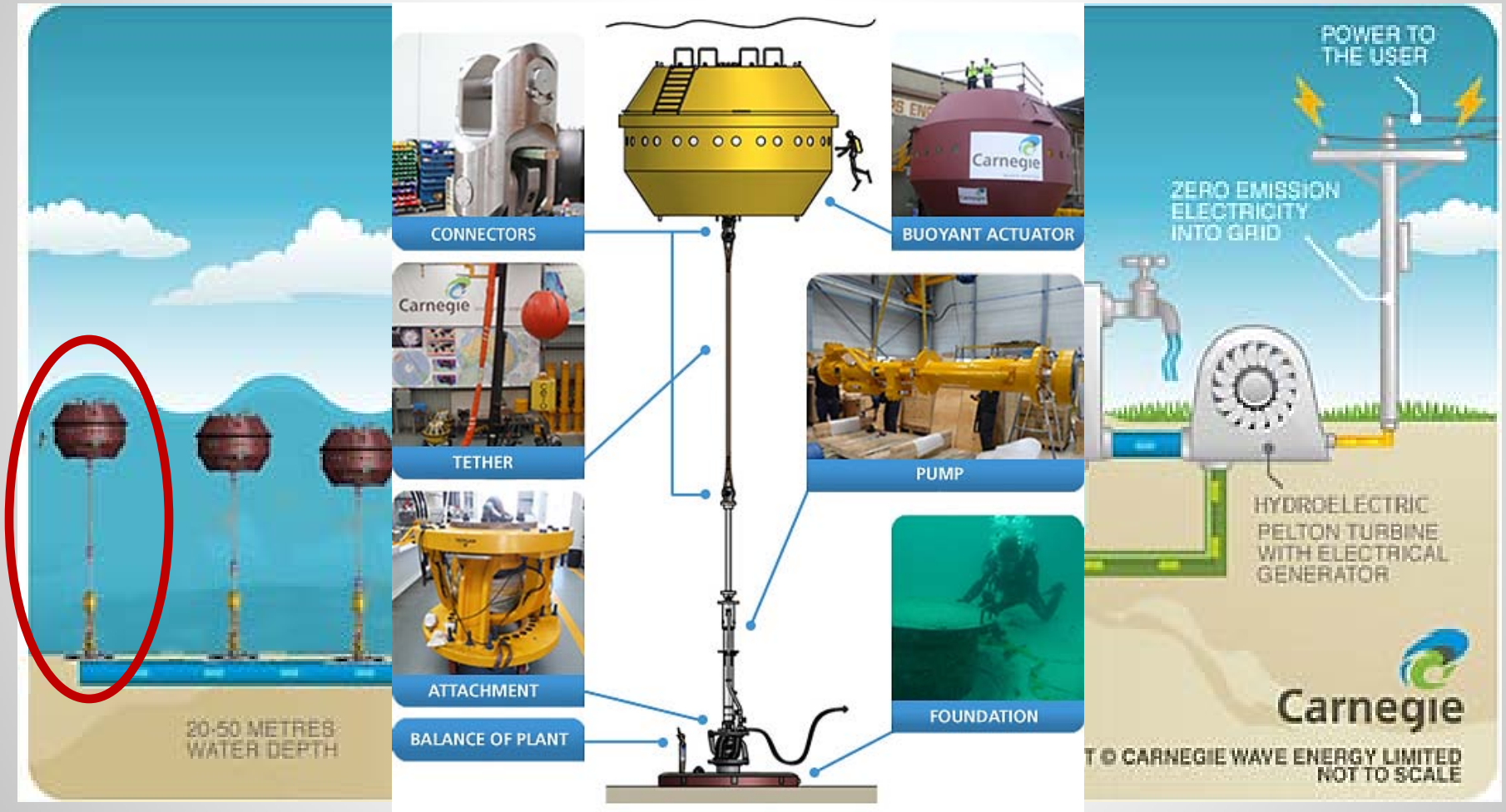
Costs of chemicals	20-25%
Costs of cartridges and membranes	15-20%
Electricity costs	60-65%

- 3 levels of energy recuperation strategy

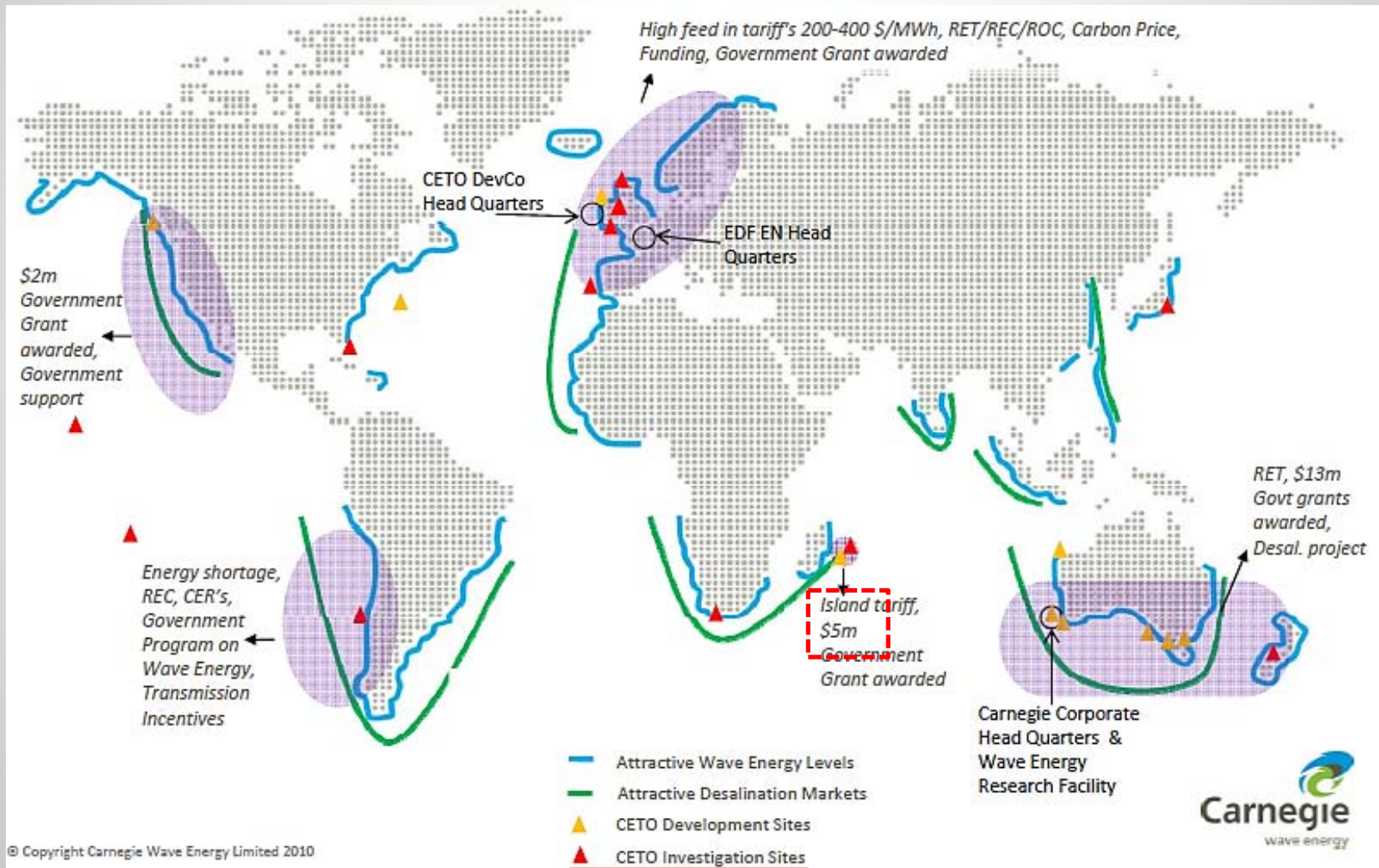
		Energy used (kWh/m <sup>3</sup> )	Energy costs (MUR/m <sup>3</sup> )	Total Cost per m <sup>3</sup> of water produced (MUR/m <sup>3</sup> )
i)	No energy recuperation	7-8	43	58
ii)	Turbine energy recuperation	4-4.5	28	43
iii)	Pressure exchanger energy recuperation	2.2-2.5	14	29

Courtesy: Scene-ries

# Carnegie CETO Wave Energy Desalination



# Global Potential Site Pipeline



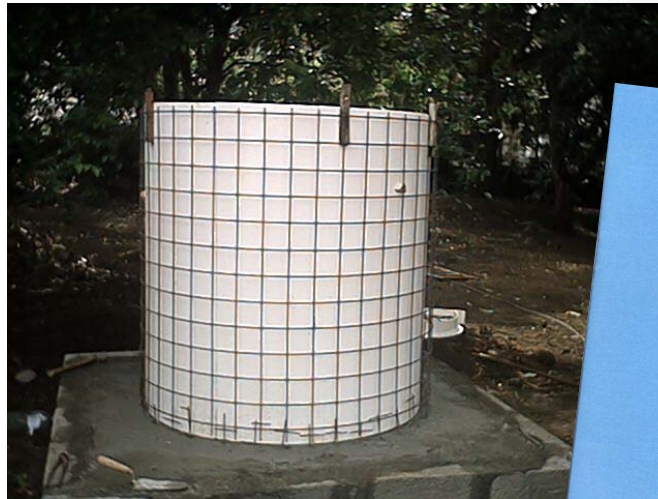
# **Rainwater Harvesting (RWH)**

# 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

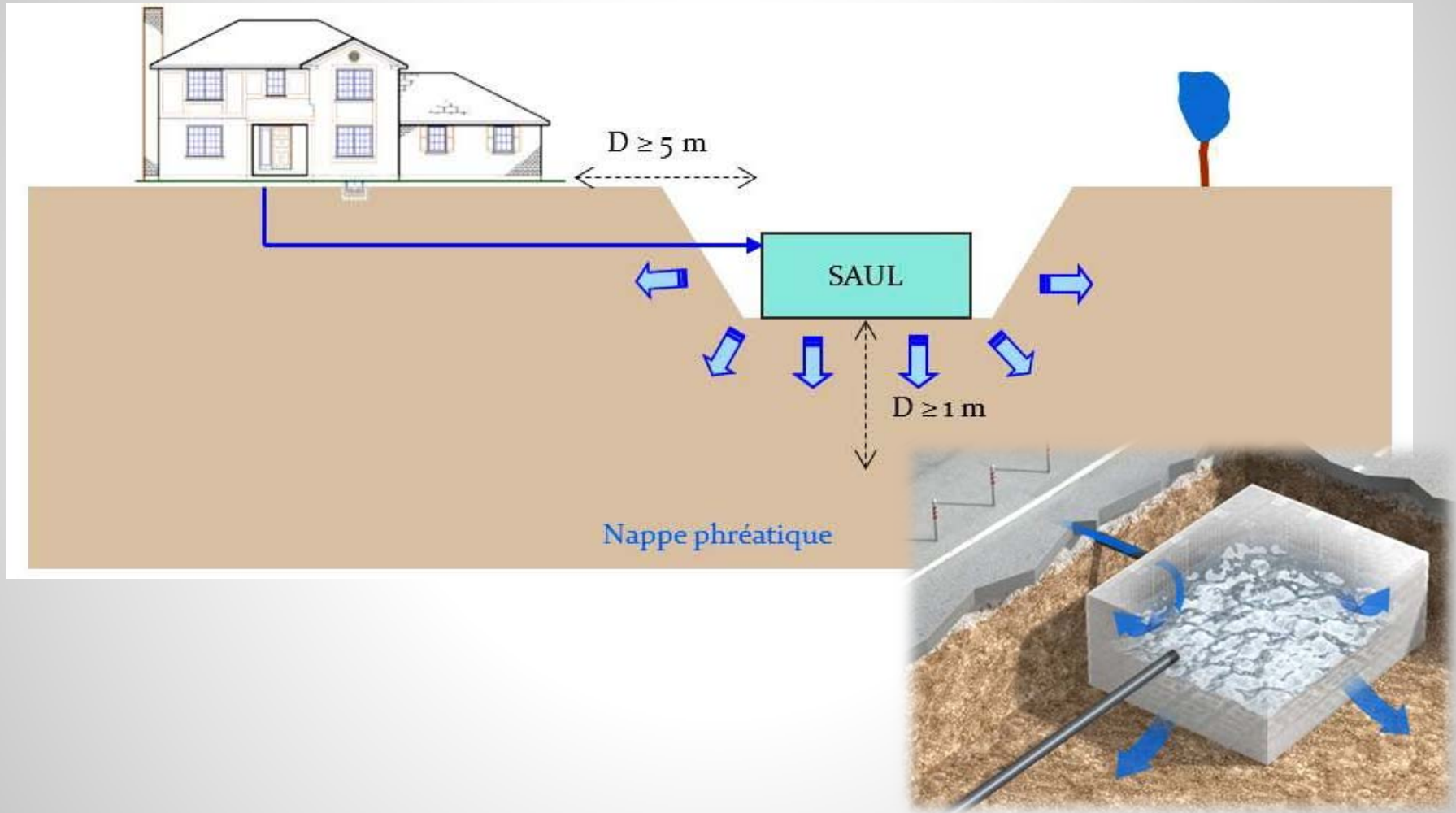


Implementation at Yusuf Meherally Centre, Tara Village, District Raigad, Maharashtra

# Waterloc – Storm Water Collection



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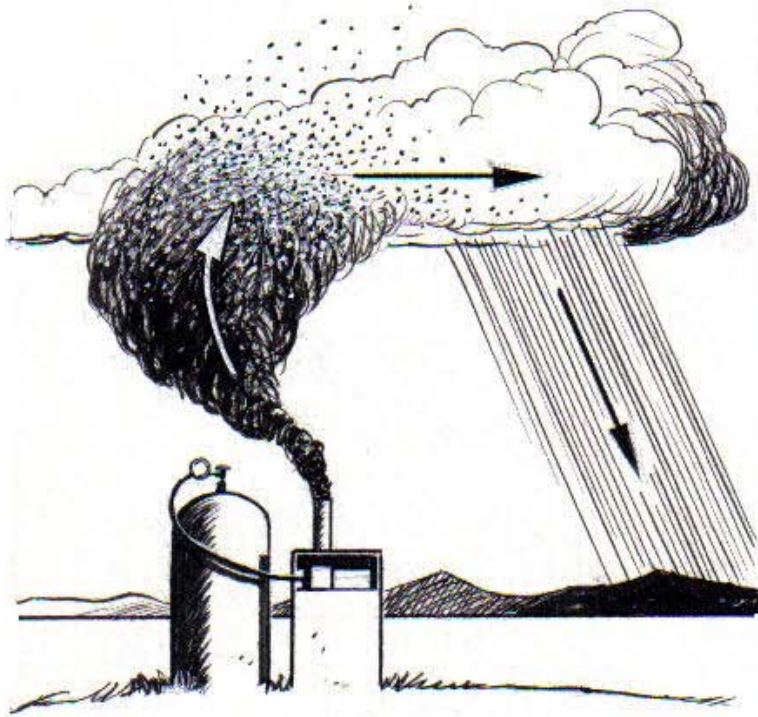
Courtesy: waterloc-nicoll



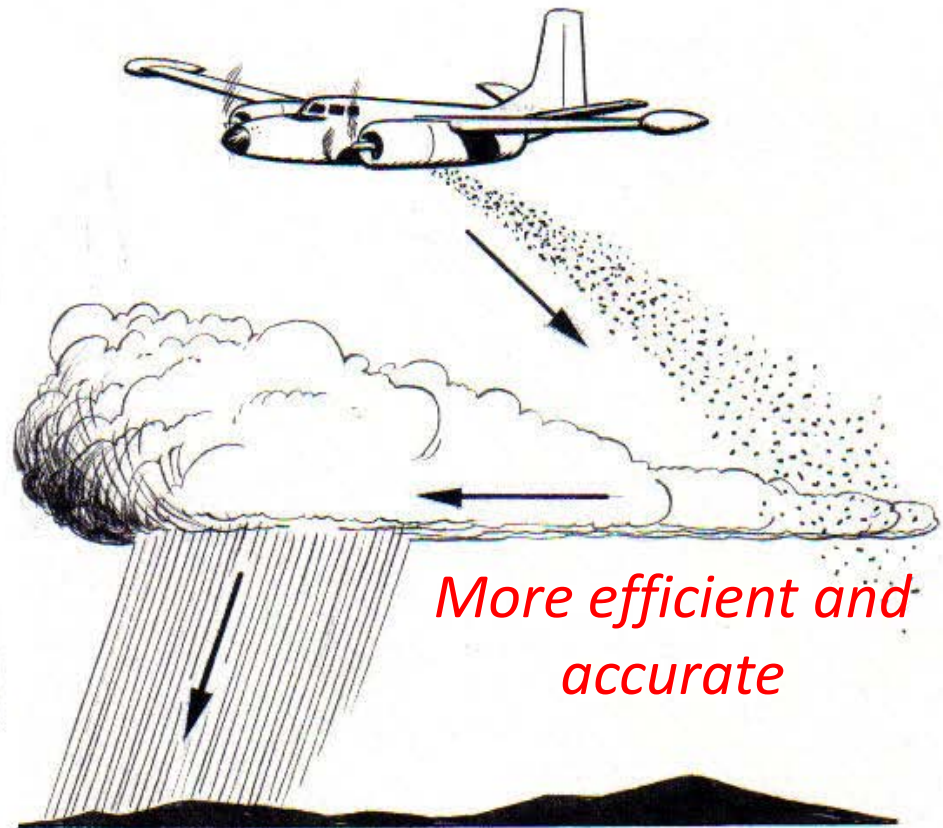
# Cloud Seeding

# 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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