



Managing scarce water resources and climate change for sustainable agricultural production in the Caribbean

By

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Importance of Agriculture in the Caribbean

- Agriculture is essential to economic survival as the Caribbean still depends on agriculture for:
 - providing employment for a large proportion of its population,
 - providing safe, nutritious foods for its people,
 - foreign exchange earnings, and
 - overall rural development.

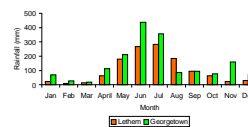
- Agriculture's contribution to GDP varies widely from over 20% for Haiti, Guyana and Dominica to less than 5% for Trinidad and Tobago, Antigua and Barbuda and Barbados.

Caribbean soils in relation to scarce water resources

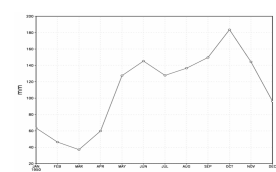
| Soil groups | Origin | Relation proportion (%) | Susceptibility to scarce water resources |
|-------------------------------|---|-------------------------|---|
| Sedimentary soils | <ul style="list-style-type: none"> • Soils derived from recent marine and freshwater sediments • Soils derived from pre-Quaternary marine and fresh water sediments • Soils derived from older fresh water sediments (Pliocene to Pleistocene) | 20 | Not susceptible because of their fine texture and low lying nature |
| Soil developed in-situ | <ul style="list-style-type: none"> • Soils derived from calcareous parent materials. <ul style="list-style-type: none"> ◦ Soils formed on rocks such as chalk, marl and calcareous claystone, silt stone and shale ◦ Soils derived from coralline limestone • Soils derived from volcanic parent materials • Residual soils derived from igneous and Metamorphic acid to basic rocks. | 65 | Highly susceptible because of their topography and propensity to erosion which accentuates the droughty nature of the soil. |
| Problem soils | <ul style="list-style-type: none"> • Acid sulphate soils of Guyana and to a lesser extent Trinidad. • Peats of Guyana, • Sands of Guyana, Belize and Trinidad. • Petroleum polluted soils of Trinidad and Barbados. • The reclaimed bauxite soils of Jamaica. | 15 | Highly susceptible because of their chemical makeup, coarse texture and shallowness of topsoil |

Climate in the Caribbean

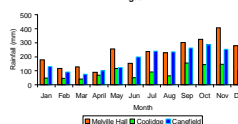
Mean monthly rainfall (mm) for Georgetown and Lethem in Guyana



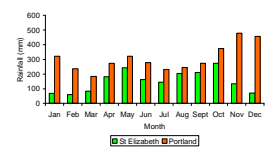
Average rainfall conditions across the Caribbean averaged over the area 10o – 20 o N, 65o – 83o W between 1958 – 1998



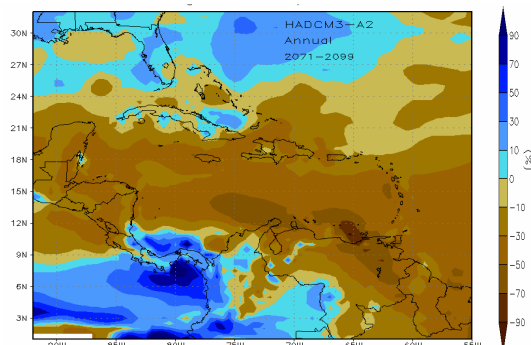
Mean monthly rainfall (mm) for Dominica and Antigua



30-year mean monthly rainfall (mm) for Portland and St Elizabeth parishes in Jamaica



Future projected % changes in precipitation



Managing scarce water resources for sustainable agricultural production in the Caribbean

Soil and water management systems in use

- Rainwater harvesting and storage
- Re-cycling of drainage water
- Use of effluent and waste water
- Soil and water conservation systems
- Increased use of trickle/drip irrigation

Enhancing capacity to manage scarce water resources

- Improved watershed management
- Enhanced surface water storage
- Enhanced soil water infiltration and storage

Rain water harvesting and storage

- Simple structures for concentrating rainfall water from a catchment into sunken tank
- The Ferro cement Water Tank used to store water collected from house roofs



Re-cycling of drainage water

- Re-cycling of water from drainage to irrigation canals is practiced during times of low water flows in the irrigation system.
- In this process the drainage water must first be tested for salt levels, as this can preclude its use for irrigation.
- In some cases the drainage water has to be pumped back to the irrigation system



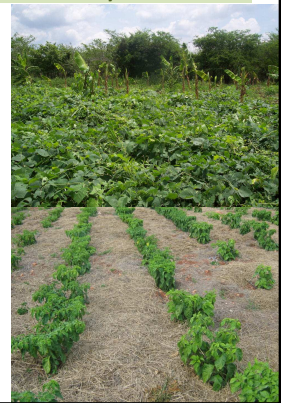
Use of waste water and effluents

- In domestic water supply systems it is also possible to re-cycle the water from the effluent for use in agriculture.
- Benefits to be derived from utilizing this domestic waste water in agriculture include:
 - Reducing the effluent discharge
 - Releasing additional water for domestic use
 - Savings in the application of inorganic fertilizers
 - Recharging of the aquifers



Soil Water Conservation systems

- This includes live mulches as well as straw mulches and plastic mulches



Mulch farming in South St Elizabeth, Jamaica

- Rainfall in South St Elizabeth is low - 1450 mm [57 inches] per annum.
- Land clearing provides the mulch for the planting area
- Crops are introduced directly into plant holes dug through the mulch.
- Increases water use efficiency and decreases risk to drought



Increased use of trickle/drip irrigation

- Uniform water distribution
- Efficient water use
- Easy installation, operation and maintenance
- Possibility of fertigation
- Decreases risk to drought



Improved watershed management

- The need for improved watershed management is well recognized in the region as a prerequisite to providing reliable and adequate supplies of clean water.
- Major issues are:
 - illegal tree cutting.
 - poor hillside farming methods, including use of fire.
 - poor domestic sanitation practices and facilities in some areas, causing downstream contamination.
 - pesticide and fertilizer run-off causing downstream contamination.
 - Mining and construction of buildings and roads on steep slopes
- Some management and rehabilitation works have started in major watersheds.

Northern Range in Trinidad



Blue Mountains in Jamaica



Enhanced surface water storage

- There is need for more river damming and water catchment in the Caribbean.
- The Roseau Dam in St Lucia which was commissioned in 1996 is perhaps the last relatively large water catchment project developed in the Caribbean.
- Surface water catchment does not have to be all of the size of the Roseau dam and territories can look towards the building of numerous smaller water catchment facilities.



Enhanced soil water infiltration and storage

- Increasing soil water infiltration and retention by more use of organic manures in integrated plant nutrient systems (IPNS)
- Experimentation has also begun in the use of Biochar as a means of retaining soil moisture and helping plants through periods of drought.



Conclusion

- A computerised regional inventory of water resources in the Caribbean is needed by assessing the resources of individual territories in terms of:
 - annual rainfall,
 - total water volumes,
 - surface storage facilities and their capacities and
 - aquifer capacity and maximum extraction rates.
- After the inventory, water as an important input in agricultural production must be appropriately priced, paid for and more efficiently used in the system for maximum returns.



Negril, Jamaica

Thank you