



HOKKAIDO UNIVERSITY

Title	Sustainable Water Supply and Demand in the U.S. Virgin Islands : Mandatory Law of Cistern Construction for Rainwater Harvesting and Desalination Lesson for Sustainable Freshwater Supply for the World
Author(s)	Solomon, Hossana
Relation	国際会議「持続可能な農業と環境」．平成20年7月2日～平成20年7月6日．札幌市
Issue Date	2008-07-04
Doc URL	https://hdl.handle.net/2115/34426
Type	conference presentation
File Information	31-039.pdf



Sustainable Water Supply and Demand in the U.S. Virgin Islands

**Mandatory Law of Cistern Construction for
Rainwater Harvesting and Desalination Lesson
for Sustainable Freshwater
Supply for the World**

**Hossana Solomon PhD
Humanities and Social Sciences Division
hsolomo@uvi.edu
University of the Virgin Islands (UVI)
St. Thomas, USVI**

USVI Water History

Since early 1930s the US Virgin Islands (USVI), have a mandatory law requiring private residence and businesses to construct cistern for the capture and storage of rainwater from rooftop or dig well for domestic water supply

USVI Building Code

The building code of the USVI reenacted in 1964 and revised in 1996 has a clause setting a mandatory cistern construction or well for all dwellings except those units that have connection to public water supply system

Objective of the Study

- **The objective of this study is to examine the economic effectiveness of the mandatory law of cistern construction on water demand and supply situation and pricing policy of public water in the islands.**

Materials and Methods

- The study examined the supply and demand for potable water in the US Virgin Islands, St. Thomas, St. Croix and St. John.
- Presents Economic valuation of production and distribution of private and public water supply.

Sources of USVI WATER SUPPLY

- Rainfall
- Desalinated water from the Caribbean Sea.

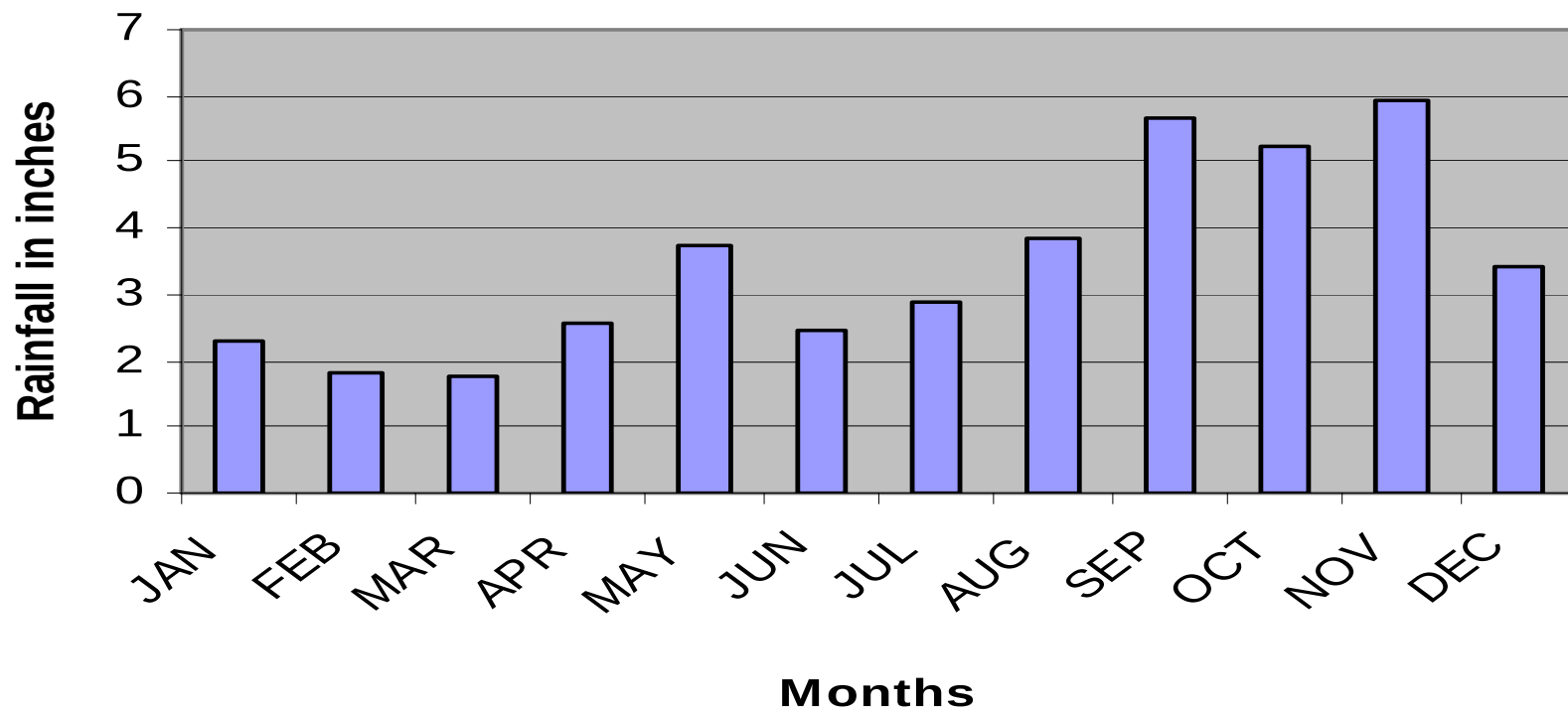
Rainwater affects water supply sources



- Harvest from rooftops stored underground or aboveground storage facility or cistern
- Well water from surface water and ground water supply.

USVI Monthly Normal Rainfall 1970-2000

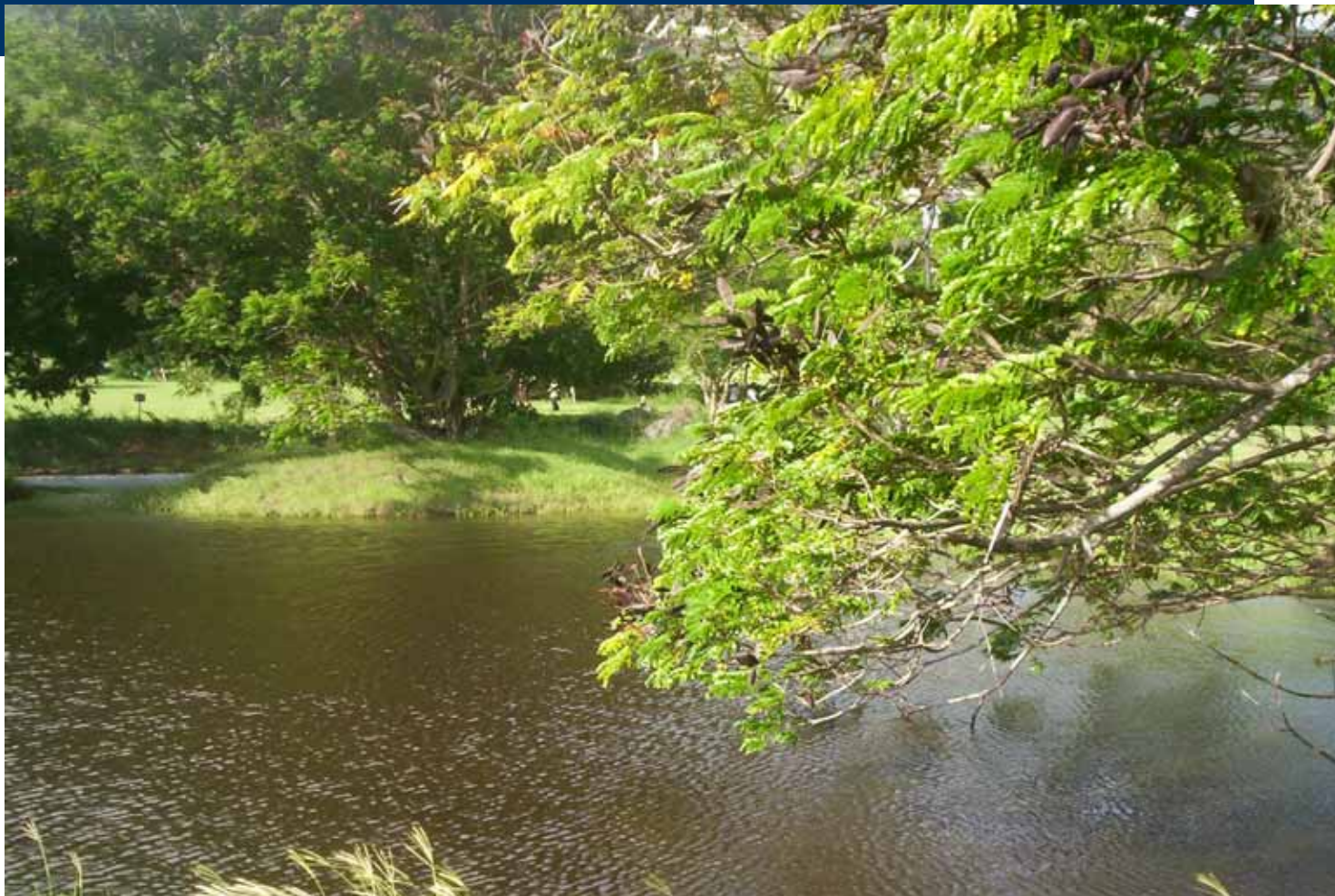
US Virgin Islands Monthly Normal Average Rainfall inches



USVI Meteorological data

- Annual normal average rainfall of 42 inches (107 cm)
- Monthly average of 3.48 inches (8.84 cm)
- The monthly mean average ranges
- 1.78 inches (4.52 cm) in March during the dry season
- 5.67 inches (14.4 cm) in September during the wet season.

Surface Rain Water Harvesting at UVI Golf court St. Thomas Campus



UVI Water Plant St. Thomas Campus



Rain Water Harvesting (CISTERN)

- The USVI building code specifies cistern capacity for dwellings of not less than 10 gallon for every square foot of roof area for one story building and 15 gallons per square foot for buildings of two or more stories. For all other buildings except churches and warehouses are also required cisterns of a minimum 4 ½ gallons for each square foot area.

Aboveground Cistern construction St. Thomas USVI



Above Ground Cistern and Pump



Plastic Water Tank



CISTERN WATER SUPPLY

- 1800 square foot roof area has a potential
- 7,500 gallons during the dry season
- 25000 gallons during the wet season

Based USVI Code for Cistern Capacity

- Dwelling of 1,800 square roof areas must have
 - 18,000-gallon capacity for single story
 - 27,000-gallon capacity for two or more story house

Cistern Cost of Construction

- A house valued at \$300000 may spend 30000-45000 for cistern construction, on the average \$1.25 to \$ 1.50 per gallon of water stored.
- The cost of construction of above ground concrete cistern ranges 10-15% of the total cost of construction
- All homes using cisterns must also have a pump to pump the water into the house

Private home Cistern St. Thomas, USVI



DESALINATED WATER SUPPLY

- **WAPA produces over 2 million MG of water annually from its plants located in St. Thomas and St. Croix**
- **Over 95% of the water production, come from desalination plants**
- **Less than 5% come from well located in St. Croix**

WAPA Electricity generators and Desalination Plant St. Thomas VI



WAPA Distillation Plant St. Thomas USVI



WAPA Water Storage Tanks St. Thomas USVI



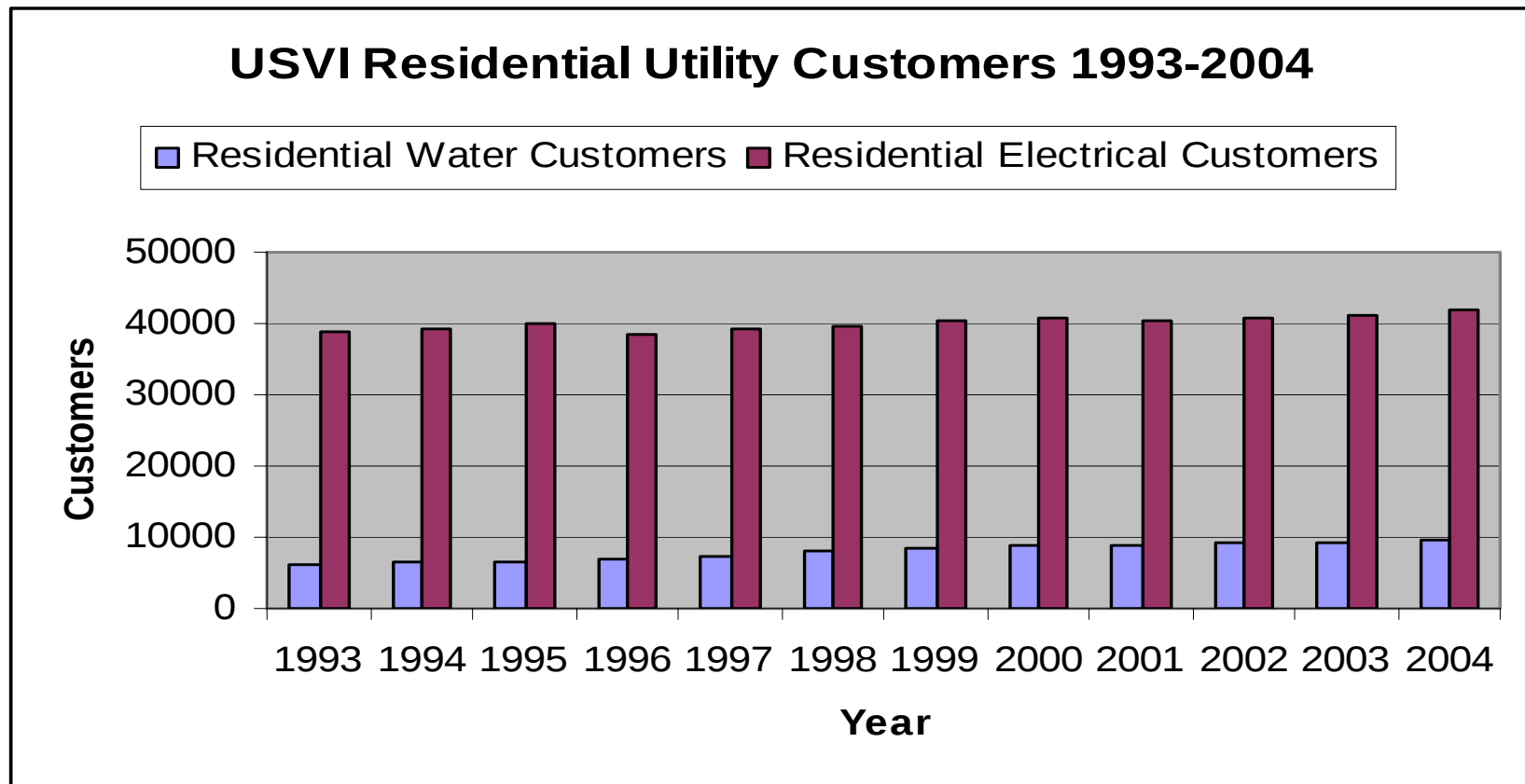
USVI Water Pipe Connections

- **15% of the businesses**
- **20% of residential household**

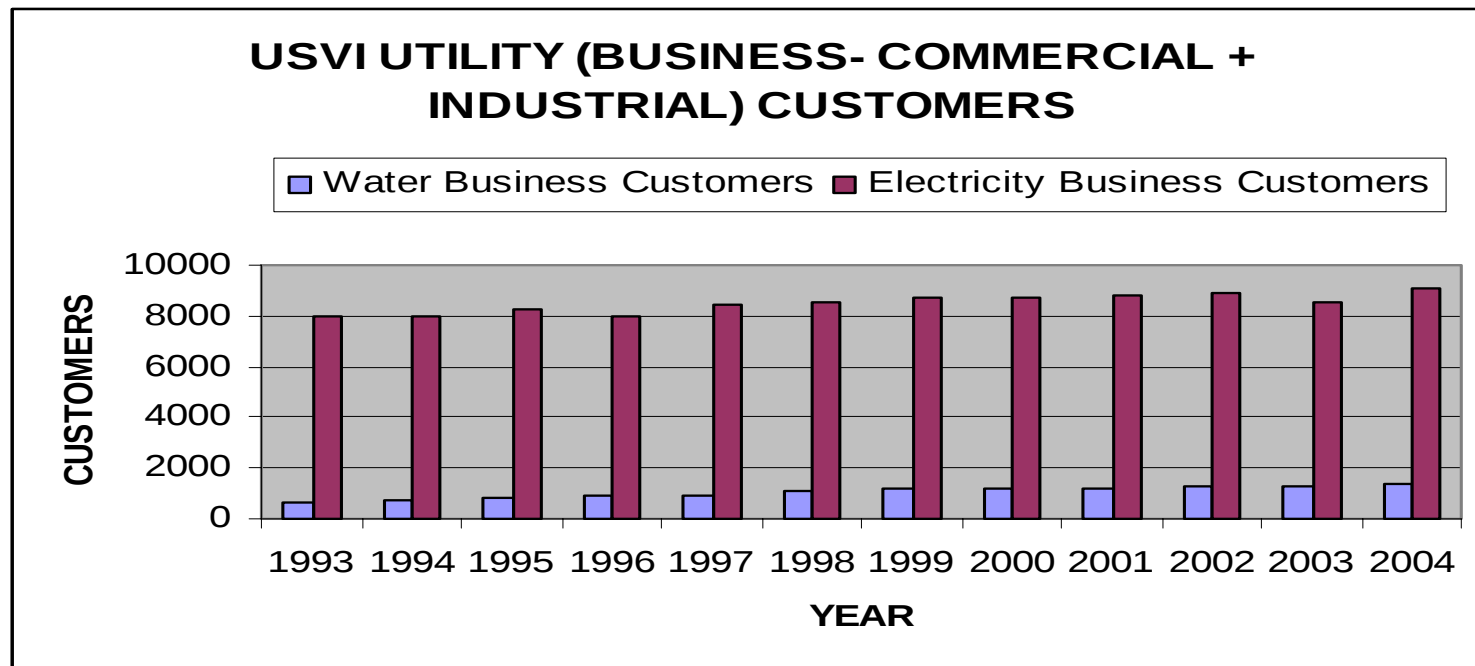
Water Delivery

- Based on the survey
- 79% residents never run out of water
- 21% of the respondents run out of water once or twice a year and have to order water

USVI Residential Utility Customers



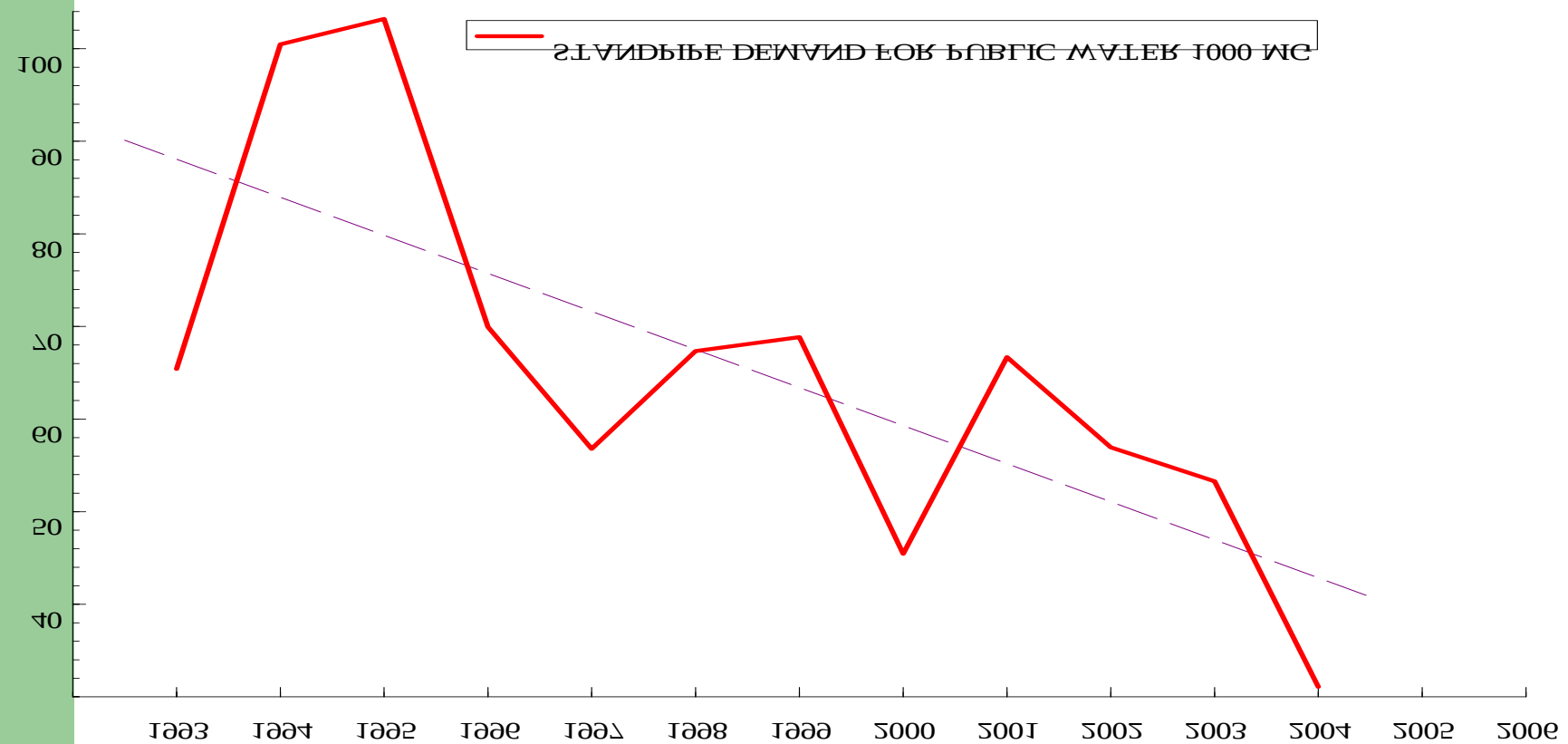
USVI Business-Commercial-Industrial Utility Customers



Standpipe Water Delivery St. Thomas



Standpipe public water demand 1993-2004



CONCLUSION

- **USVI the only place in the modern world where citizens are required by law to be directly responsible for their own domestic water supply**
- **The majority residents depend on cistern water and use the public source as insurance whenever they run out of their cistern.**
- **Citizens of USVI with adequate cistern capacity never run out of water all year round**
- **Developing and Developed countries can learn from the experience of the USVI in solving water shortages to their citizens**

Lindbergh Bay Beach USVI Caribbean Seawater Resource

