# Effectiveness of Mandatory Law of Cistern Construction for Rainwater Harvesting on Supply and Demand of Public Water in U.S. Virgin Islands

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# USVI Water History

- Since early 1930s the 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.

# 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**

- 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.

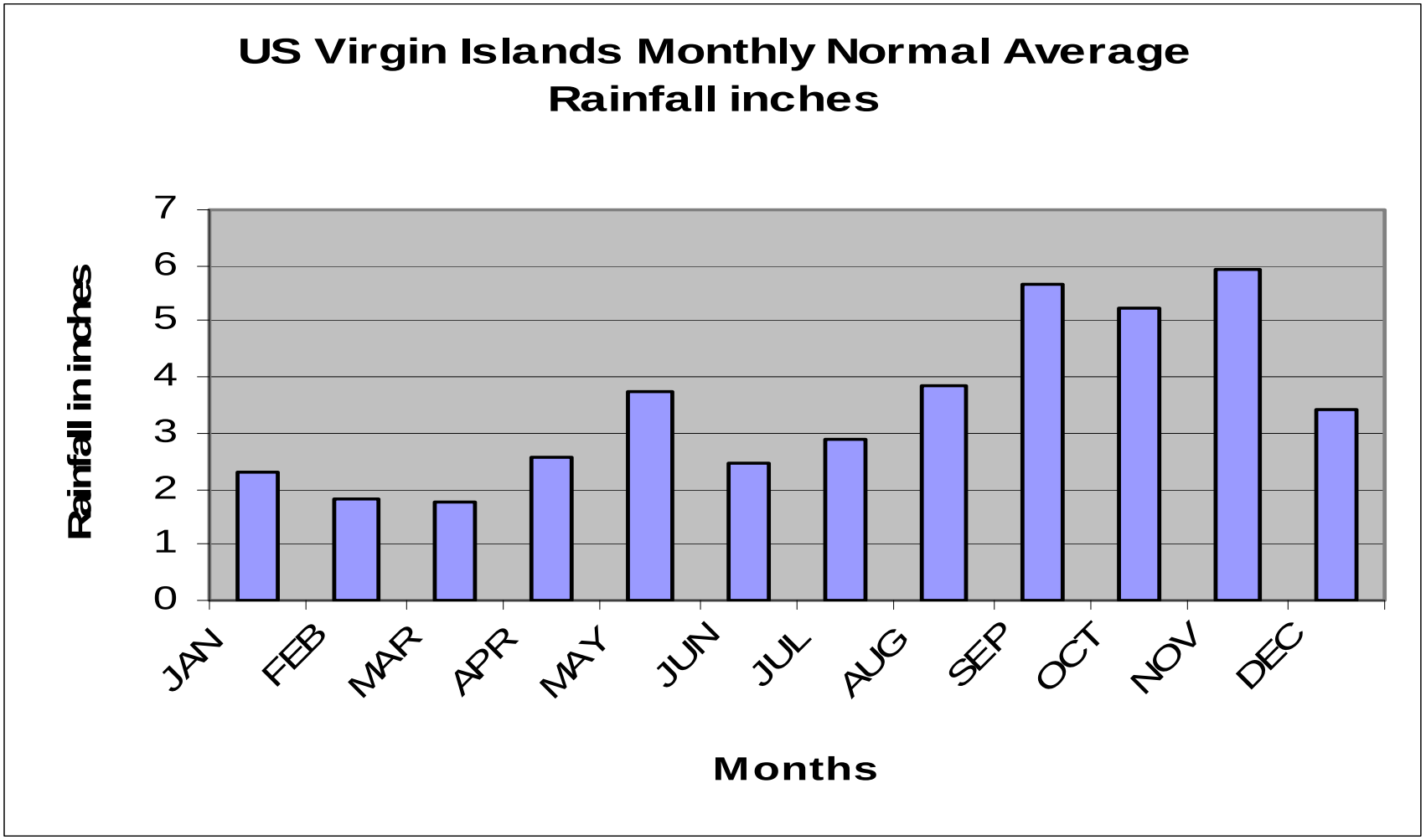
# Sources of USVI WATER SUPPLY

- 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



# USVI Meteorological data

- **Annual normal average rainfall of 42 inches**
- **Monthly average of 3.48 inches**
- **The monthly mean average ranges**
- **1.78 inches in March during the dry season**
- **5.67 in September during the wet season.**

# 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.**

# 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

- **The cost of construction of above ground concrete cistern ranges 10-15% of the total 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.**
- **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

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

# USVI DEMAND FOR WATER

WAPA monthly average sale of water is about $ 2 million;

50% USVI Government,

27% Commercial,

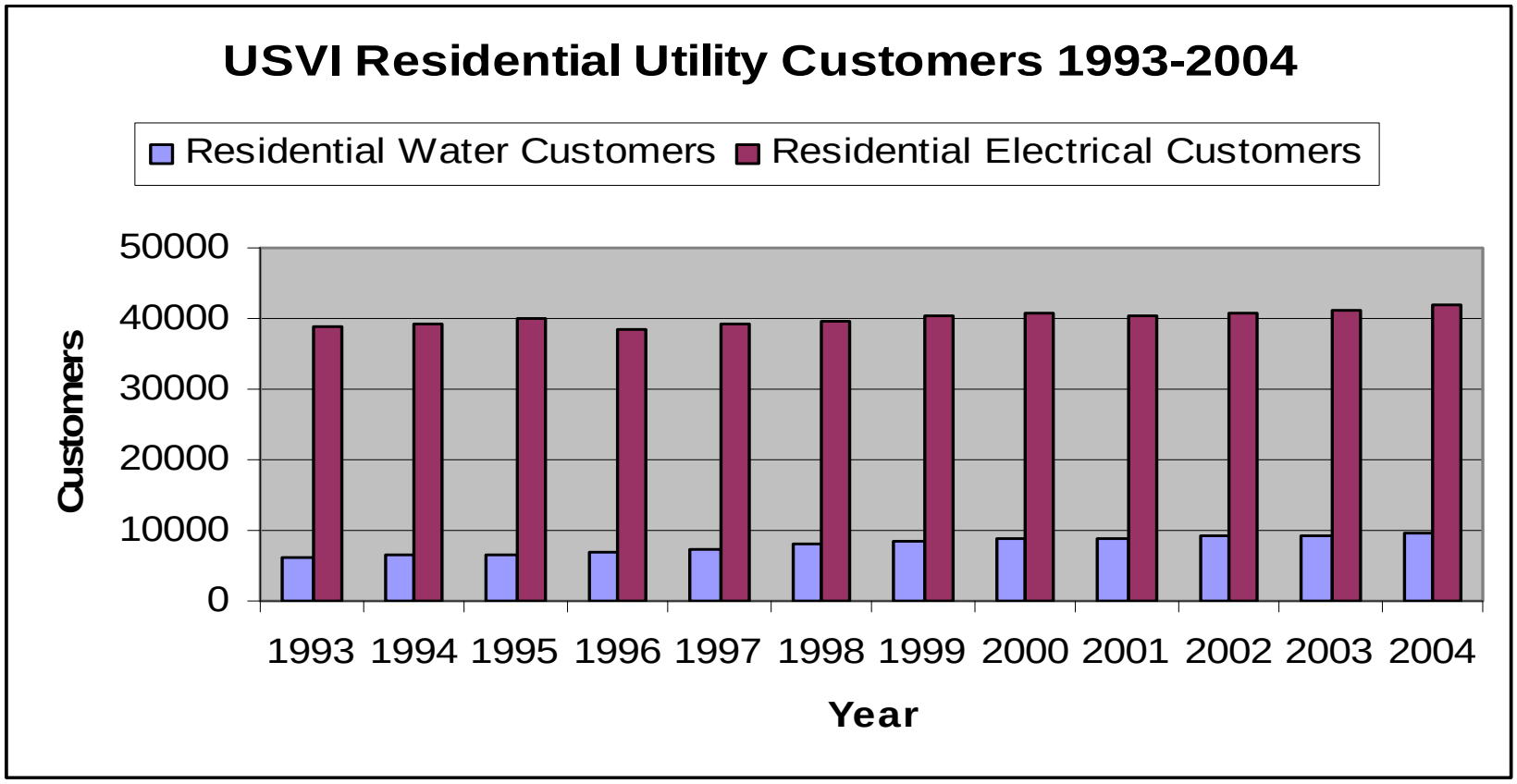
18% Residential

5% to Standpipe customers.

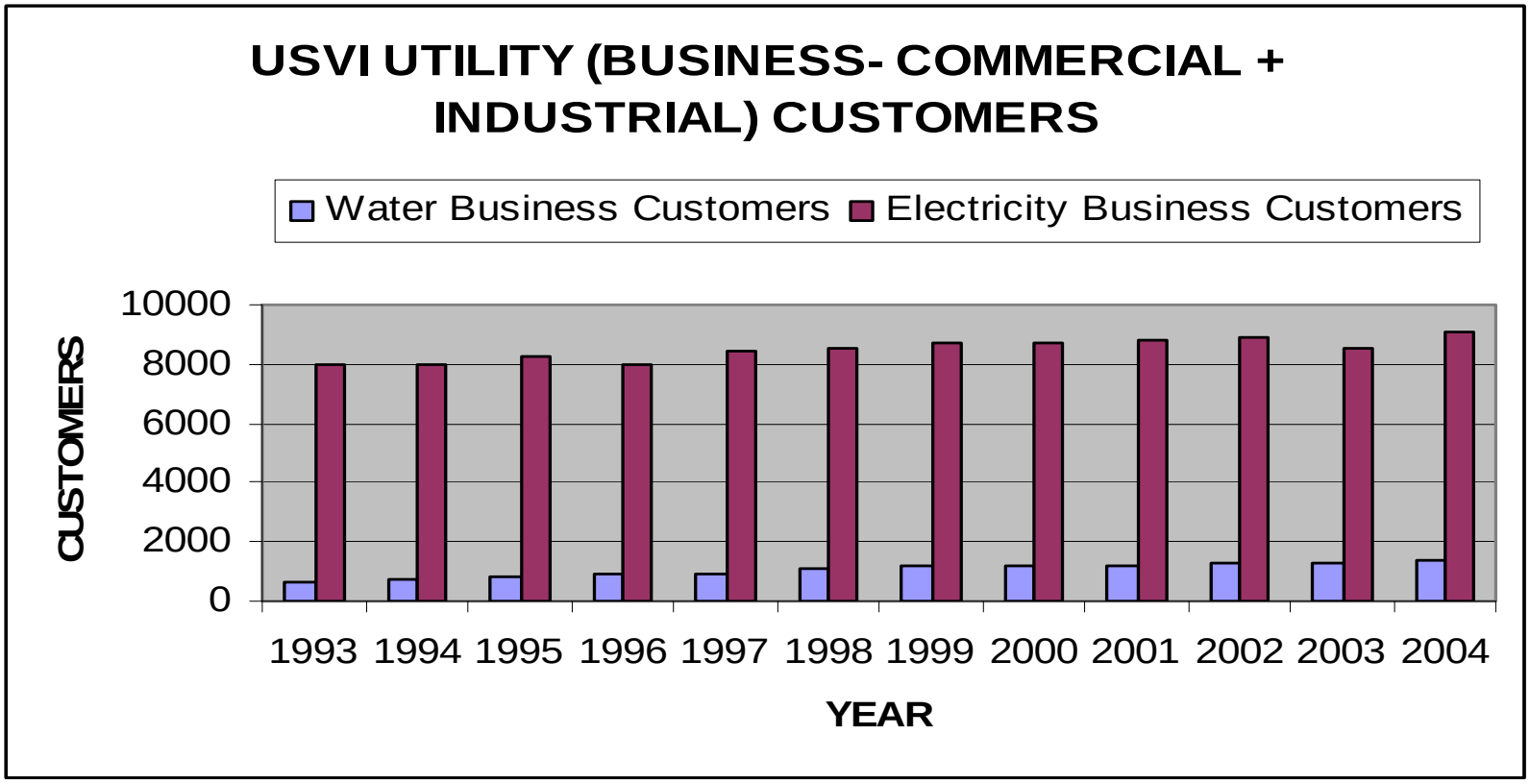
# Water Delivery

- 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

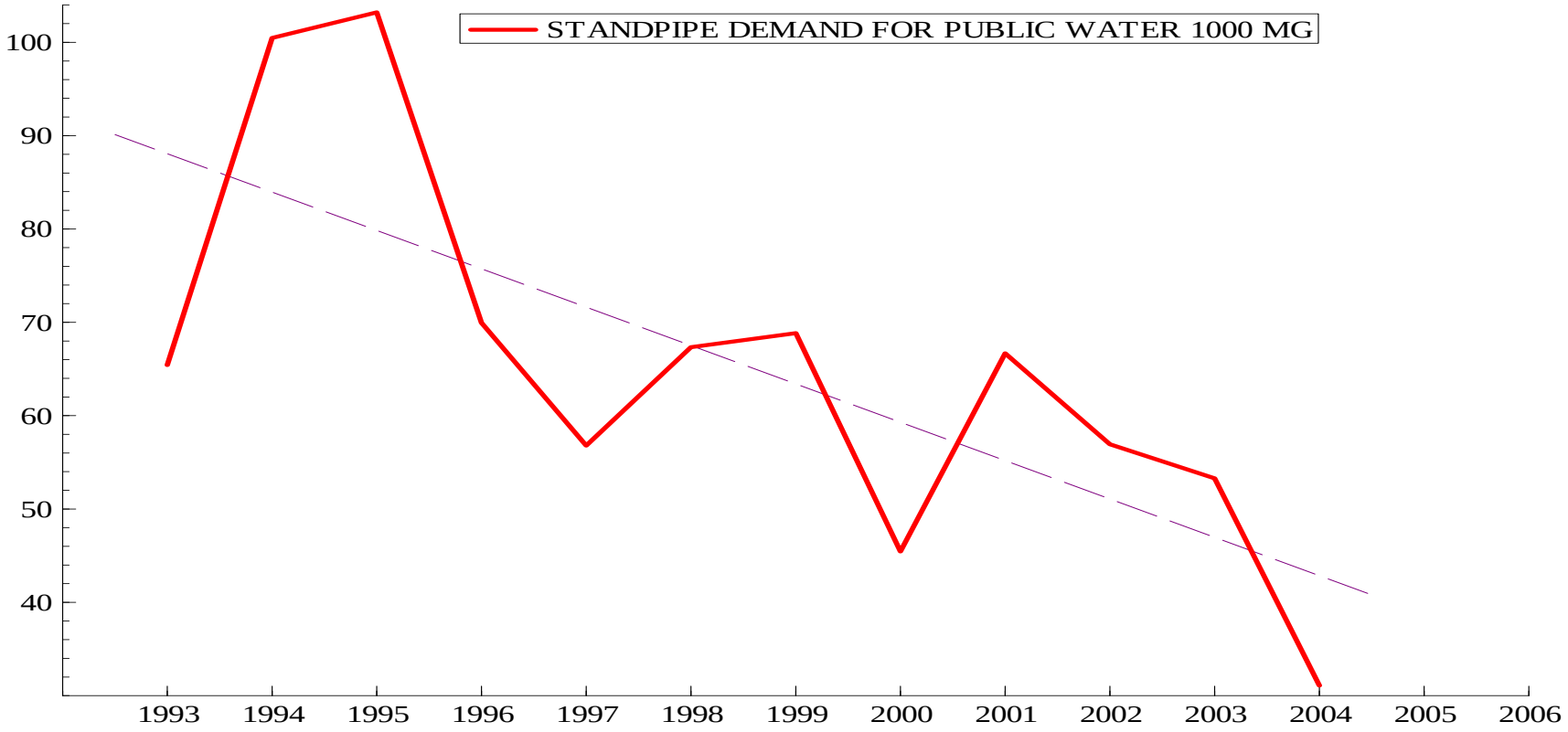


# USVI Business-Commercial-Industrial Utility Customers



# Standpipe Water Delivery St. Thomas

# Standpipe public water demand 1993-2004



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