

Thematic Session “Integrated Flood Risk Management
Through Appropriate Knowledge Sharing
And Capacity Building Systems”

Kobe, Japan

January 20, 2004

*Flood Forecasting and Hazard
Mapping in Jamaica*

Presenter

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Water Resources
Authority
Jamaica



Content

- **The cause and nature of flooding**
- **Flood warning systems/Hazard mapping as risk reduction instruments.**
- **Lessons Learned**
- **Way forward**

Caribbean Basin



Jamaica located; 161 km (100 miles) south of Cuba
Latitude 17°42' and 18°31' N
Longitude 76°10' and 78°22' W. .

Cause of Flooding

✓ Jamaica prone to flooding

✓ Topography

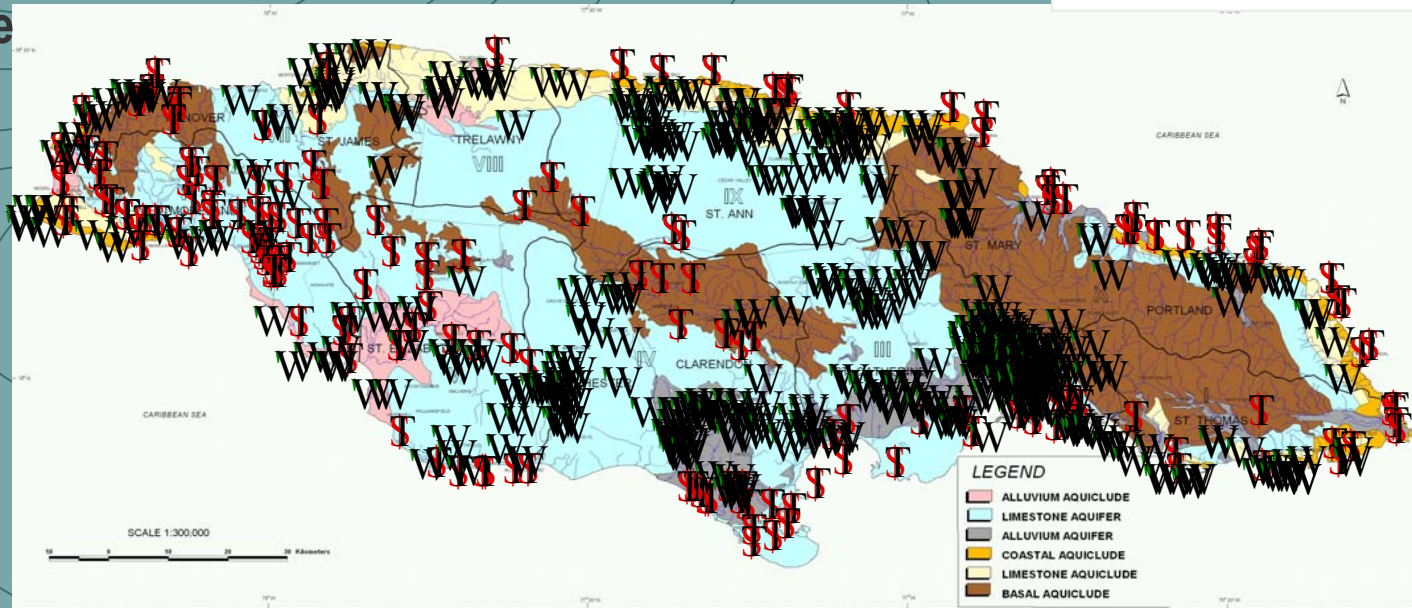
/geology determines the nature of flooding

✓ Climate also impacts

✓ Man's impact aggravate the flooding

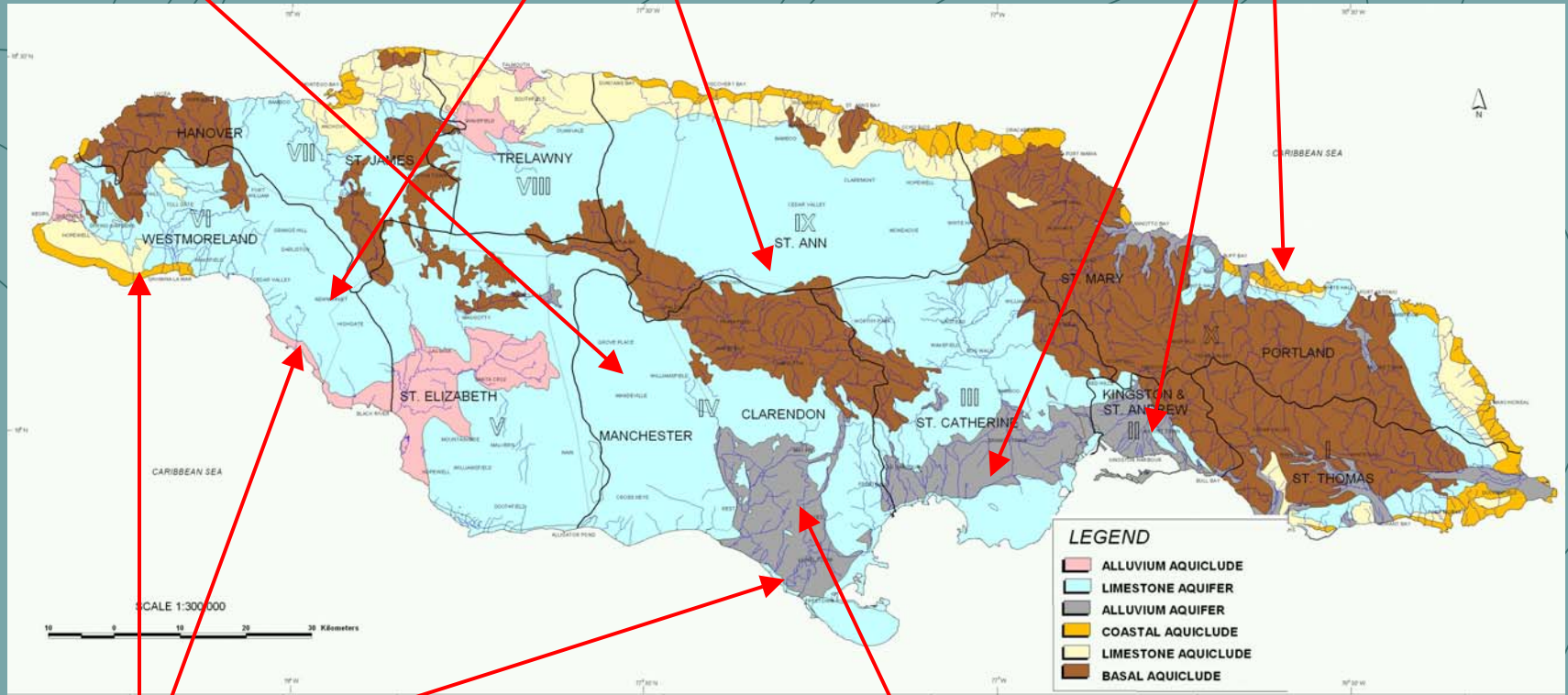
▲ Flood prone areas

● Housing areas



Nature of the flooding

- Groundwater induced
- Depression
- Riverine



- Storm Surge
- Urban Runoff

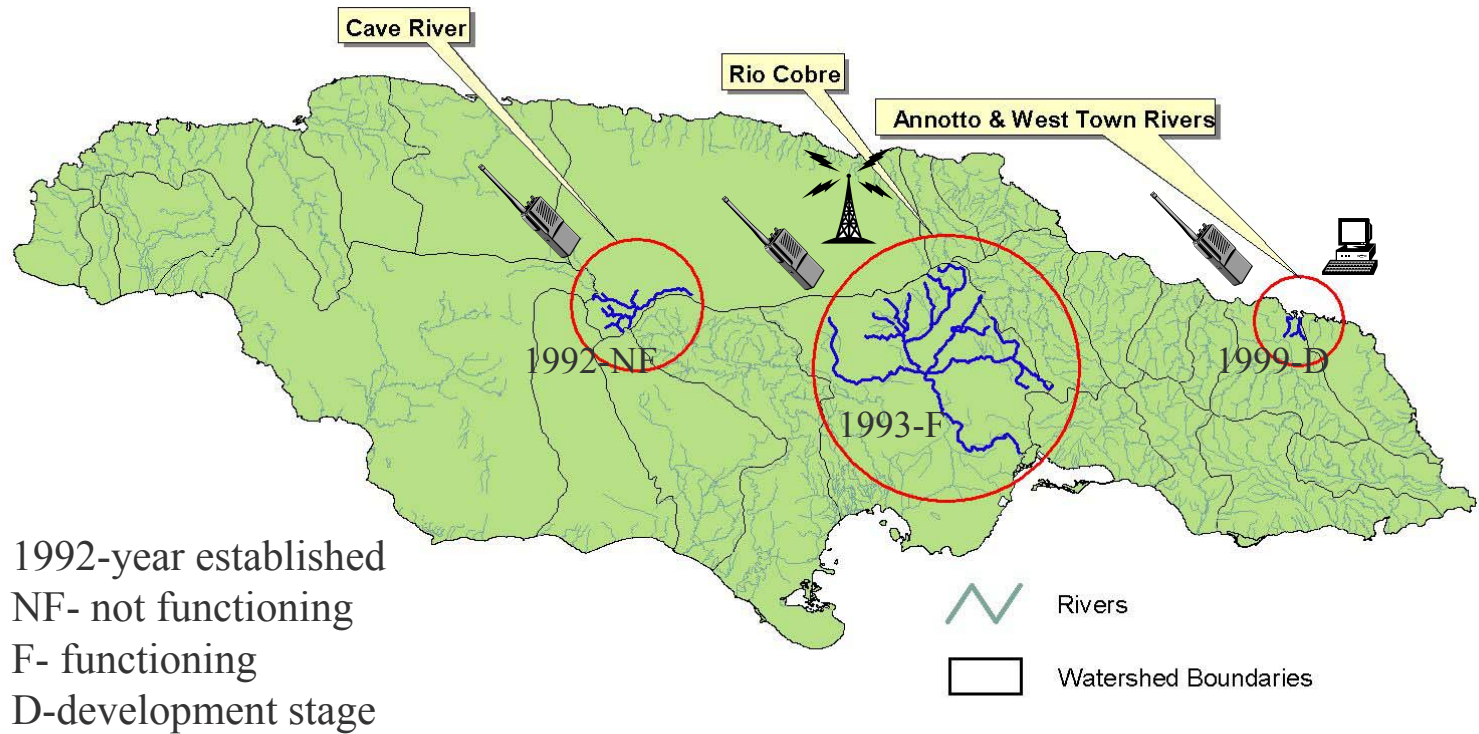
Minimising the Flood Risk



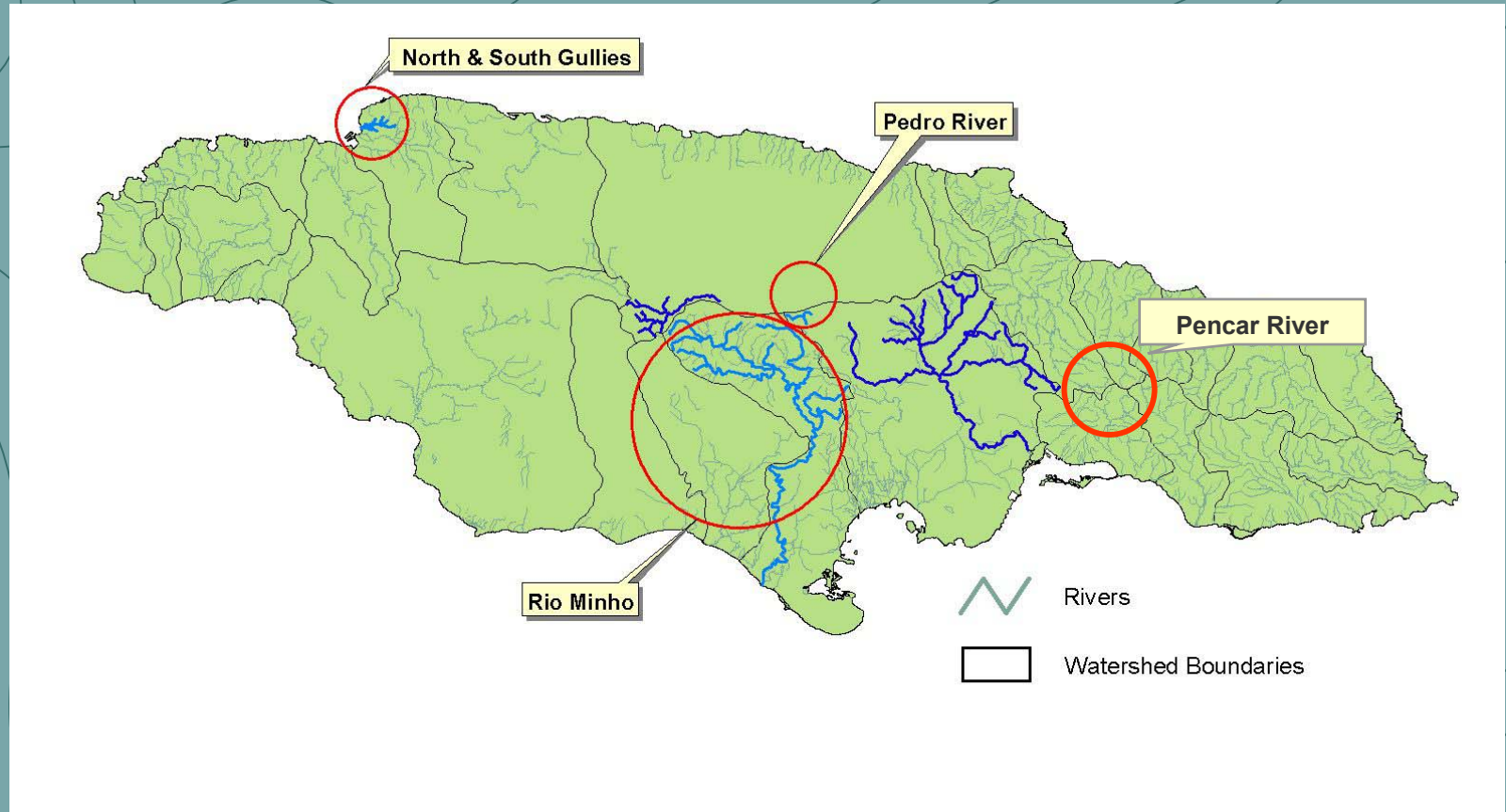
What is the Jamaican Experience ?



Existing early warning systems in Jamaica



Future Early Warning Systems



Cave River



Flood Forecast table

CAVE RIVER COMMUNITY FLOOD WARNING SYSTEM

PREDICTION TABLE SHOWING THE TIME TO FLOODING IN AENON TOWN FROM THE BEGINNING OF THE STORM (HRS.)

TOTAL RAINFALL DEPTH (IN)	RAINFALL DURATION FROM THE BEGINNING OF THE STORM (HRS.)																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1.0	10																							
1.5	8	13																						
2.0	7	10	14																					
2.5	7	8	11																					
3.0	7	8	10	13																				
3.5	7	7	9	11	14																			
4.0	6	7	8	10	12	14																		
4.5	6	7	8	9	11	13	14																	
5.0	5	7	7	8	10	11	13																	
5.5	5	7	7	8	9	11	12	14																
6.0	5	7	7	7	8	10	11	13	14															
6.5	4	7	7	7	8	9	11	12	13	14														
7.0	4	7	7	7	8	9	10	11	13	14	14													
7.5	x	7	7	7	8	8	9	10	12	13	14													
8.0	x	6	7	7	7	8	9	10	11	12	13	14												
8.5	x	6	7	7	7	8	8	9	10	11	13	14	14											
9.0	x	6	7	7	7	8	8	9	10	11	12	13	14	15										
9.5	x	6	7	7	7	8	8	9	F	F	F	F	F	F	F									
10.0	x	5	7	7	7	7	8	F	F	F	F	F	F	F	F	F								
10.5	x	5	7	7	7	7	8	F	F	F	F	F	F	F	F	F	F							
11.0	x	5	6	7	7	7	8	F	F	F	F	F	F	F	F	F	F	F						
11.5	x	5	6	6	7	7	F	F	F	F	F	F	F	F	F	F	F	F	F					
12.0	x	5	6	6	7	7	F	F	F	F	F	F	F	F	F	F	F	F	F	F				
12.5	x	5	6	6	7	7	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F			
13.0	x	5	6	6	7	7	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
13.5	x	5	6	6	7	7	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
14.0	x	4	6	6	7	7	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
14.5	x	x	6	6	7	7	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
15.0	x	x	5	6	6	7	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
15.5	x	x	5	6	6	7	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
16.0	x	x	5	6	6	7	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
16.5	x	x	5	6	6	7	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F

NO FLOODING EXPECTED
WITHIN 24 HOURS
FROM THE
BEGINNING OF
THE STORM

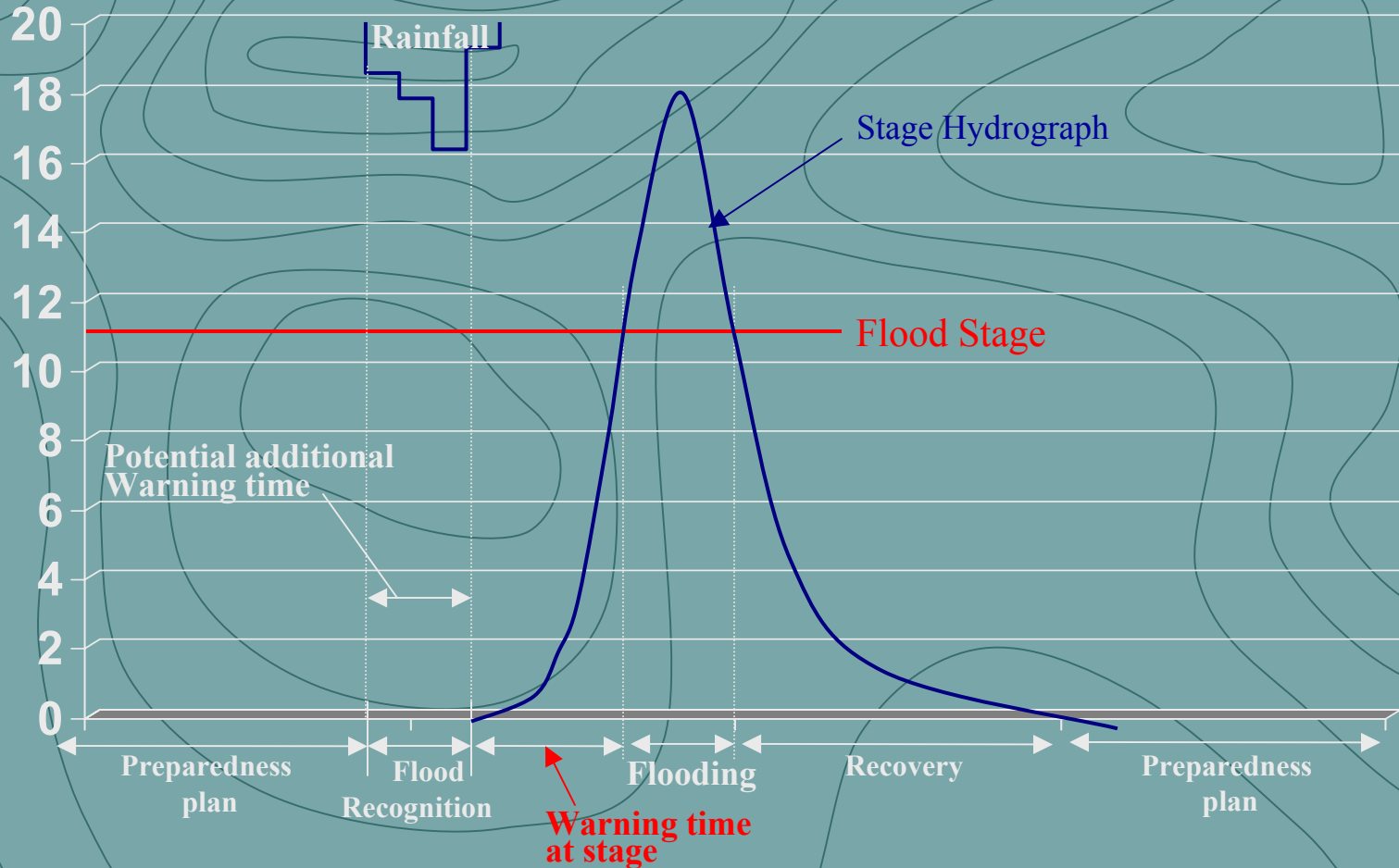
KEY:

F Flooding is expected at this time

6 Hours to flooding from the beginning of the storm

x Unlikely rainfall condition

Flood Forecasting



Community Based Early Warning Systems in Jamaica



FLOOD GAUGES

- Blue = Watch mode
- Orange = Alert mode
- Red = Critical

Value FEWS to Community

Communities		Reliability	Loss Reduction	Is System still being used
Rio Cobre	Rivoli	97% yes	97% yes	100%
	Thompson Pen	93% yes	100% yes	98%
Cave River (Aenon Town)		44% yes 16% no	28% yes 39% no	60% yes 6% no

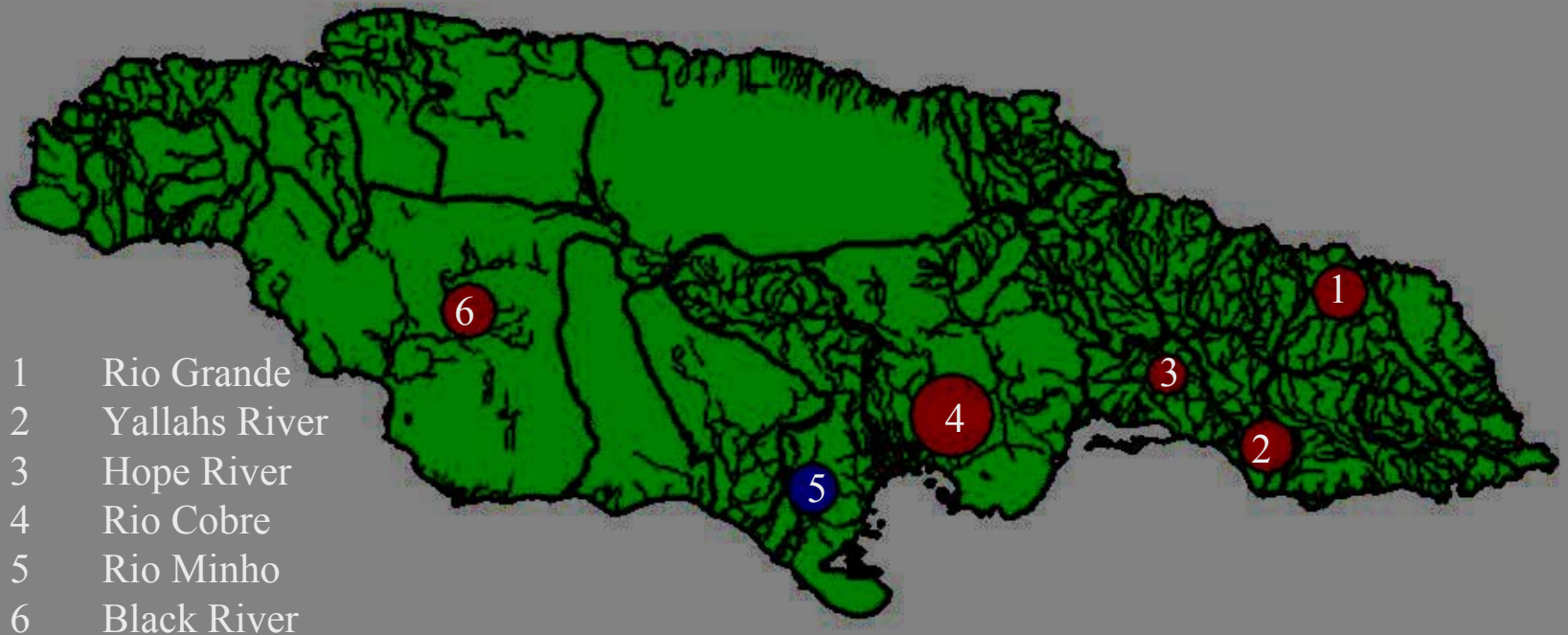


RECOMMENDATIONS

- Get local govt involved and designate a Lead Agency
- Revive communication process within communities
- Improve equipment and monitoring
- Institute annual drills
- Upgrade /Maintenance of systems
- Dedicated Budget
- Strengthen institutional capacity

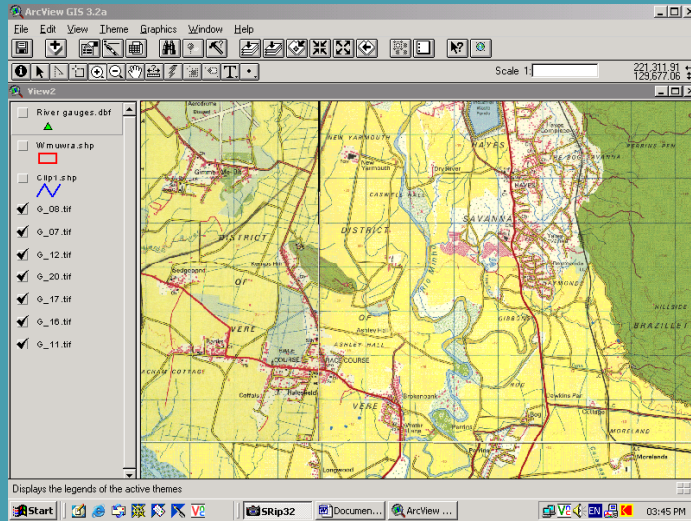
Flood Plain Mapping

- Flood plain mapping Project, WMO 1980s
- Hydrologic Support Unit Project UNDP 1990s
- Community Disaster based management Projects UNDP, USAID, DIPECHO, 2000s - to date

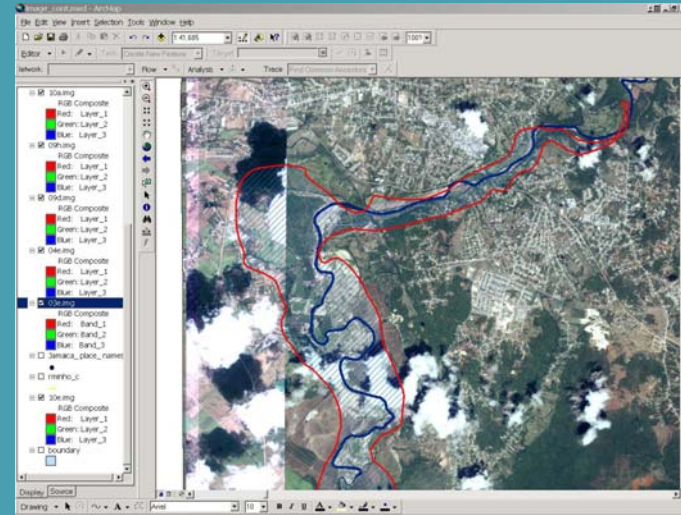


Overview of the Mapping Process

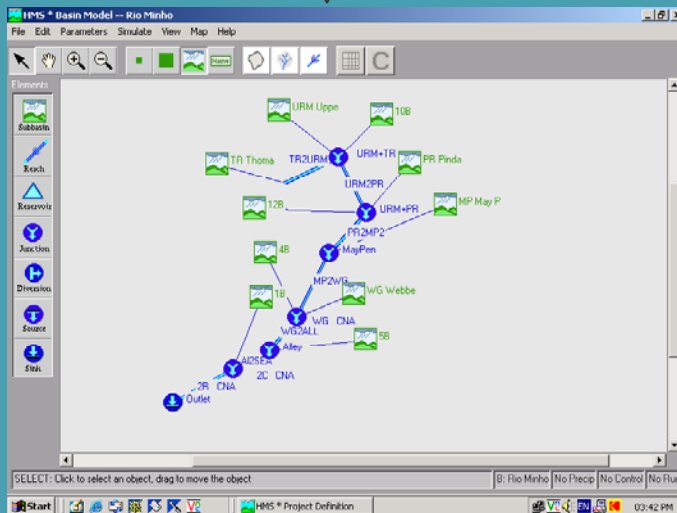
ArcView
Input Data
DEM



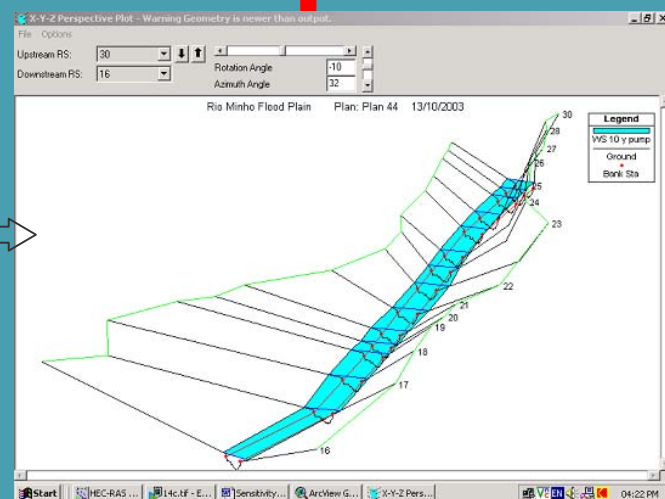
ArcView
Flood
plain maps

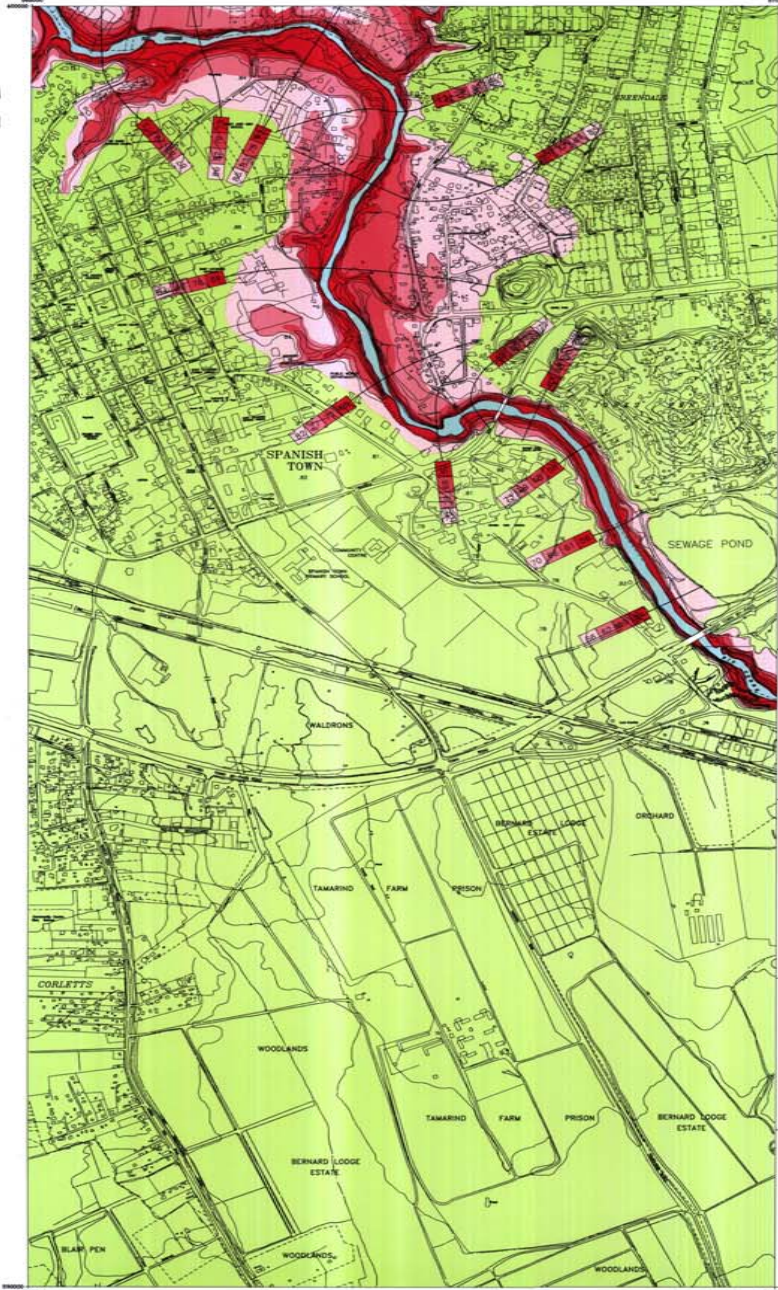


HEC-HMS
Flood
discharge



HEC-RAS
Water
surface
profiles





LEGEND

T-YEAR INUNDATION

- 100 yr Inundation
- 50 yr Inundation
- 25 yr Inundation
- 10 yr Inundation

Return Period (years)	Discharge (cubic feet/sec)
10	19,400
25	30,500
50	41,600
100	55,800

Elevation of water surface along cross section (ft. above M.S.L.) corresponding to T-year floods

DEFINITION OF T-YEAR FLOOD

A flood with a Return Period of T-years is the flood which is expected to occur on the average once in every T-years.

Scale: 1:4000

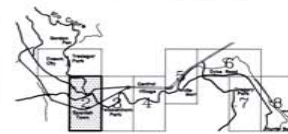
Projection: Lambert Conformal Orthomorphic
 Central Meridian: 77°W
 One Parallel: 18°N
 Spheroid: Clark 1866
 False easting: 250 000 m
 False Northing: 150 000 m

Topographic base map: 1:25,000 (source: topographic map series provided by the Survey Department, Jamaica and the assistance of the Geomatics Survey Division)

LOCATION MAP



INDEX TO RIO COBRE FLOOD PLAIN MAP SHEETS



NOTES

Prepared by: H. Thomas *Hydrologist / Watershed Engineer*
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 Consultations: S. Lawrence *Project Director*
 P. Brown *Hydro-Geomorphologist*
 B. Williams *Information Systems Engineer*
 E. Douglas *Assistant Hydrologist*

Based on HEC 2
 Copies of this map are available from:
 Underground Water Authority, Kingston 6, Jamaica



HYDROLOGICAL SUPPORT PROJECT
 JAM/90/003
 UNITED NATIONS DEVELOPMENT PROGRAMME
 GOVERNMENT OF JAMAICA
 UNDERGROUND WATER AUTHORITY

DATE: May 1992

Rio Cobre Flood Plain Map

Problems with usage

- 1. *No guidelines for their interpretation and use.*
- 2. *No national standard for regulatory flood*
- 3. *No national guideline prohibiting/permitting flood plain uses.*
- 4. *No national standard for the level of protection – depth/or flow velocity*
- 5. *Very limited number of flood plain maps available.*
- 6. *No flood zoning done - hence need for rigorous analysis to assess cumulative impacts*

Legislative Amendments

- Amendment of the Water Resources Act 1995
- Repeal of the Floodwater Control Act 1958

The Water Resources (Amendment) Act, 2003 has been drafted.

- **Floodwater Control Areas**
- **Floodwater Control Plans** for those areas.

Flood Control Policy to be implemented
(regulatory flood, usage regulation, zoning, etc)

THE END



**THANK YOU
FOR YOUR ATTENTION**