DROUGHT MONITORING IN JAMAICA:

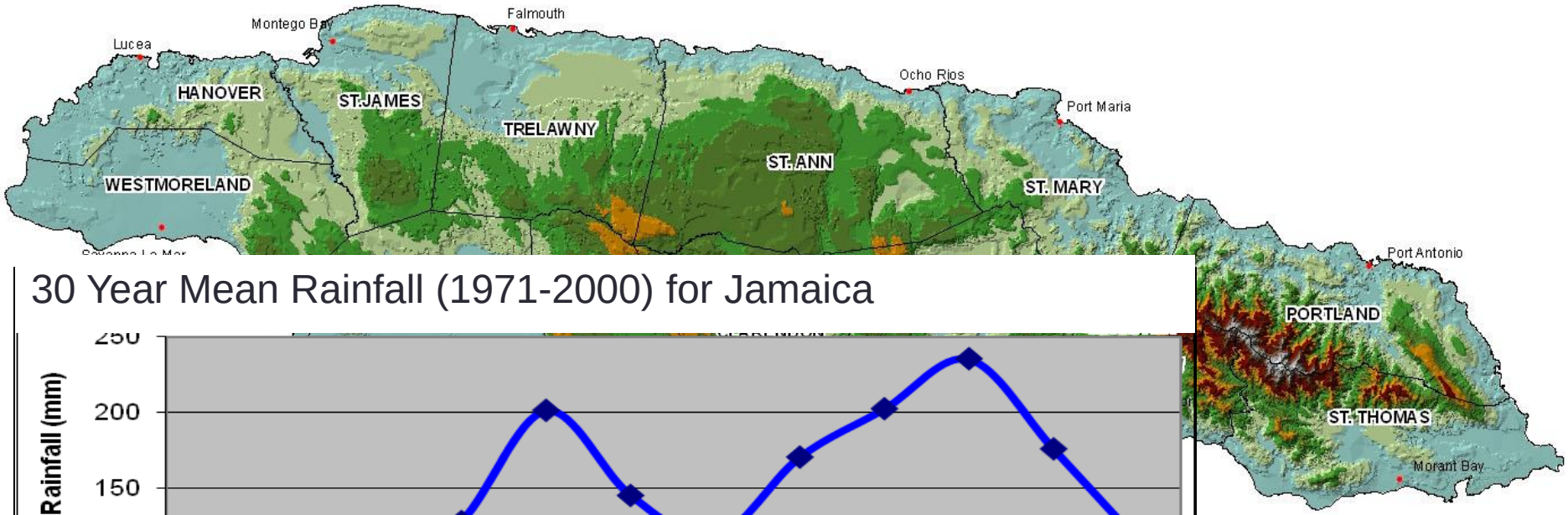
New approaches

Jacqueline Spence
Applied Meteorologist
Meteorological Service, Jamaica

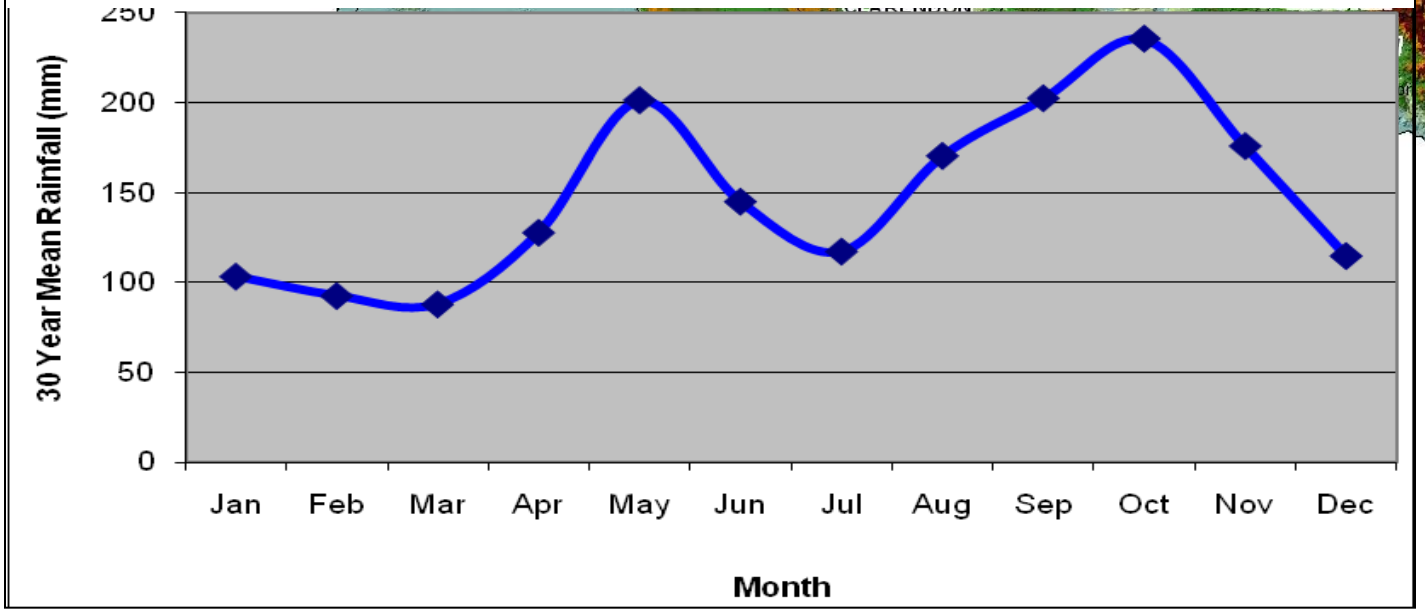
Outline

- A history of droughts
  - Frequency of drought events
  - 2005 case study
- National Drought Monitoring Process
  - Existing monitoring process
  - Drought monitoring network formation
- Drought Monitoring
  - Modified method
  - Use of the Standardized Precipitation Index
  - Comparison of the Indices
  - The Climate Predictability Tool and the SPI
- Further Steps and Conclusion

Jamaica: Relief



30 Year Mean Rainfall (1971-2000) for Jamaica



YEAR	DEC/ JAN	JAN/ FEB	FEB/ MAR	MAR/ APR	APR/ MAY	MAY/ JUN	JUN/ JUL	JUL/ AUG	AUG/ SEP	SEP/ OCT	OCT/ NOV	NOV/ DEC
1962			59									
1965			48	48								
1968				57								
1969			41									
1970				57								
1971						45						
1972	55											
1975		43	47	55	52	57						
1976						53	56					53
1977			54									
1979	38											
1983												50
1985	58					50	59					
1986								57				
1988												
1990						57						
1991	53	51										
1992											47	
1994							35	59				
1995					54							
1997	37			44	30	53						
1998					40	47						
1999					58							
2000	43	56	37	46								
2001			59						59			
2002			49								53	
2004		41										

% of Normal	Condition
20% or less	Extreme Drought
21% to 40%	Severe Drought
41% to 60%	Normal Drought
Above 60%	No Drought

2005 Drought Event

- Well below normal rainfall was experienced by all parishes from November 2004 to March 2005
- March 2005 recorded the second lowest ever rainfall. The lowest ever on record was March 1907.
- Dec 2004/Jan 2005, only 2 parishes were experiencing severe drought.
- By end of February 2005 parishes were now in extreme drought
- By end of March all parishes except St. James were in extreme drought conditions

PARISH	NOV04/ DEC04	DEC/ JAN05	JAN/ FEB05	FEB/ MAR05
HANOVER	47	50	12	15
WESTMORELAND	58	28	11	16
MANCHESTER	67	72	18	15
ST ELIZABETH	60	54	15	8
CLARENDON	52	39	19	2
ST. CATHERINE	76	104	53	7
TRELAWNY	73	99	33	11
ST. JAMES	67	98	49	30
ST. ANN	81	100	54	16
ST. MARY	59	124	69	5
PORTLAND	102	169	103	11
ST. THOMAS	31	44	28	3
KSA	79	157	84	11
JAMAICA	**71**	**102**	**54**	**12**

2005 Drought Event: Impacts

- Total losses in the agricultural sector of over J$261.5 million; with vegetables and pulses most severely affected.

- Increased number of Bushfires:
  - Over 400 ha of forest natural reserves and forest plantation estimated at J$12.4M, was lost.

- Shortage in domestic water supply
  - Over 400 water supply systems affected

Sector	Estimated Loss (J$Million)
Environment (Forest and bush fires)	32.387
Agriculture	261.5
Drought Response (Govt. allocation)	52
Total	**345.887**

National Drought Monitoring Process

- Meteorological Service responsible for alerting island about drought conditions
  - Meteorological drought used as the trigger for other forms of drought that is hydrological and agricultural drought
- National Drought Committee meets as needed
  - Vulnerability Assessment and Mitigation team
  - Response Recovery team
- Drought monitoring network being established
  - Fall under the Early Warning
  - Technical advice to the National Drought Committee
  - TOR being finalised

Methodology and Indices

TWO INDICES CALCULATED:

1. Modified Index

- Calculated using a methodology similar to that used by the Australian Bureau of Meteorology

- Calculated for a bi- monthly period on a Parish and station basis
  - Included in a monthly weather summary publication

2. Standardized Precipitation Index (SPI)

- Calculated using SPIs
- Calculated for 3 and 6 month periods
  - Published in a monthly CAMI bulletin

Modified Drought Index

PARISH INDICES

- The onset and the duration of a meteorological drought is determined by comparing the average rainfall over a period of two consecutive months with the 30-year mean for a similar bi-monthly period for each parish and the island.

$$\frac{\text{RR month 1 + RR month 2}}{\text{Normal month 1 + Normal month 2}} \times 100$$

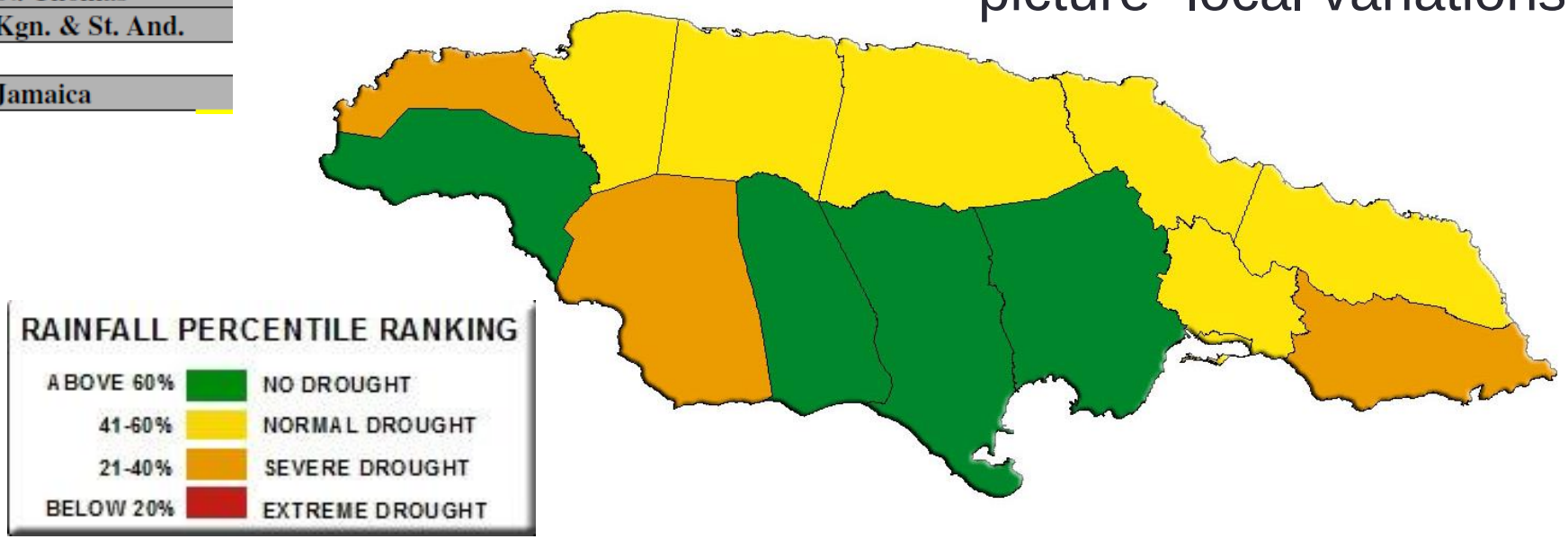
- The percentage value that is generated is used to quantify the thresholds of the drought index that is presented.

Percentage of Normal	Drought Condition or Status
20% or less	Extreme Drought
21% to 40%	Severe Drought
41% to 60%	Normal Drought
Above 60%	No Drought

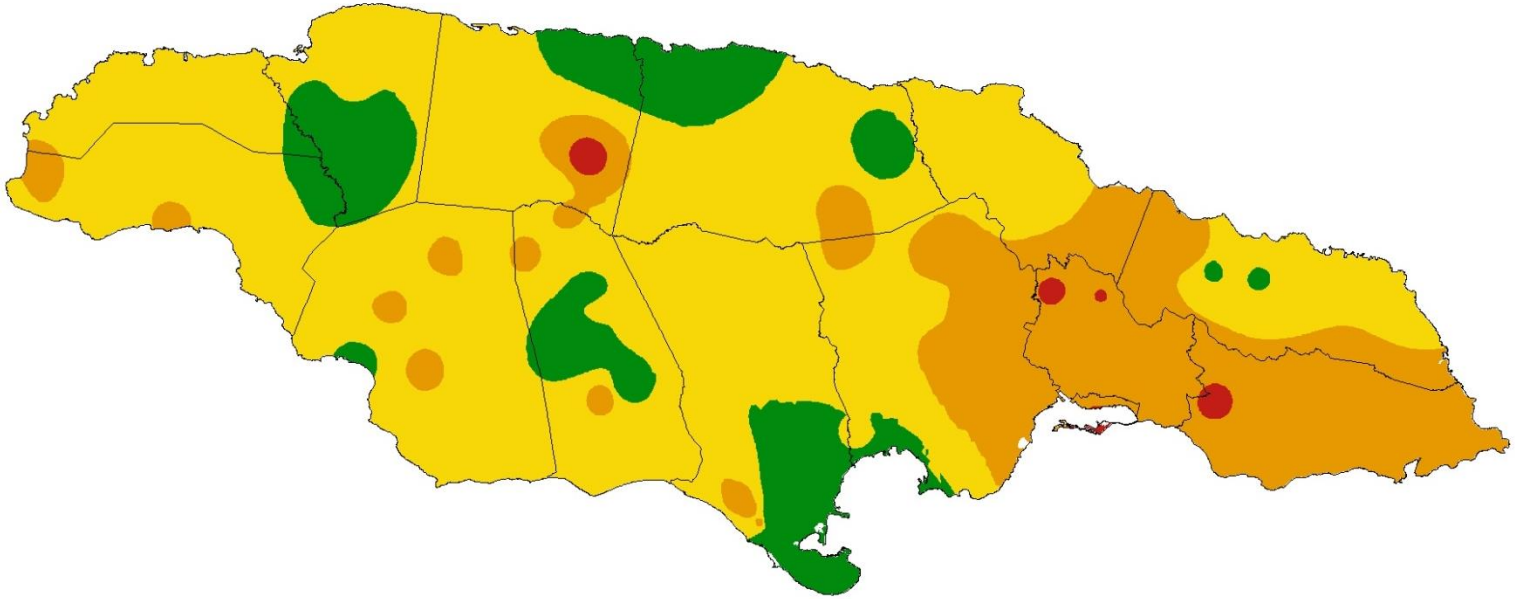
Parish Drought Indices

Drought Indices for October 2007 to January 2008			
Parishes	Oct/Nov 2007	Nov/Dec 2007	Dec07/Jan08
Hanover	109	92	39
Westmoreland	144	108	63
Manchester	128	123	61
St. Elizabeth	134	100	34
Clarendon	216	199	73
St. Catherine	201	158	83
Trelawny	160	144	46
St. James	130	87	46
St. Ann	153	100	53
St. Mary	132	84	43
Portland	154	117	78
St. Thomas			
Kgn. & St. And.			
Jamaica			

- Calculated using parish averages
- Coarse representation of drought conditions
- Obscures the Intra- Parish picture- local variations.



ISLAND DROUGHT CONDITIONS: JANUARY to FEBRUARY 2013



RAINFALL PERCENTILE RANKING

ABOVE 60%	NO DROUGHT
41-60%	NORMAL DROUGHT
21-40%	SEVERE DROUGHT
BELOW 20%	EXTREME DROUGHT

JAMAICA DROUGHT ANALYSIS

Map produced from a comparison of eight week rainfall
(January 01 to February 28) with the mean (1971- 2000) for each station.

Kilometres 10 5 0 10 20 30

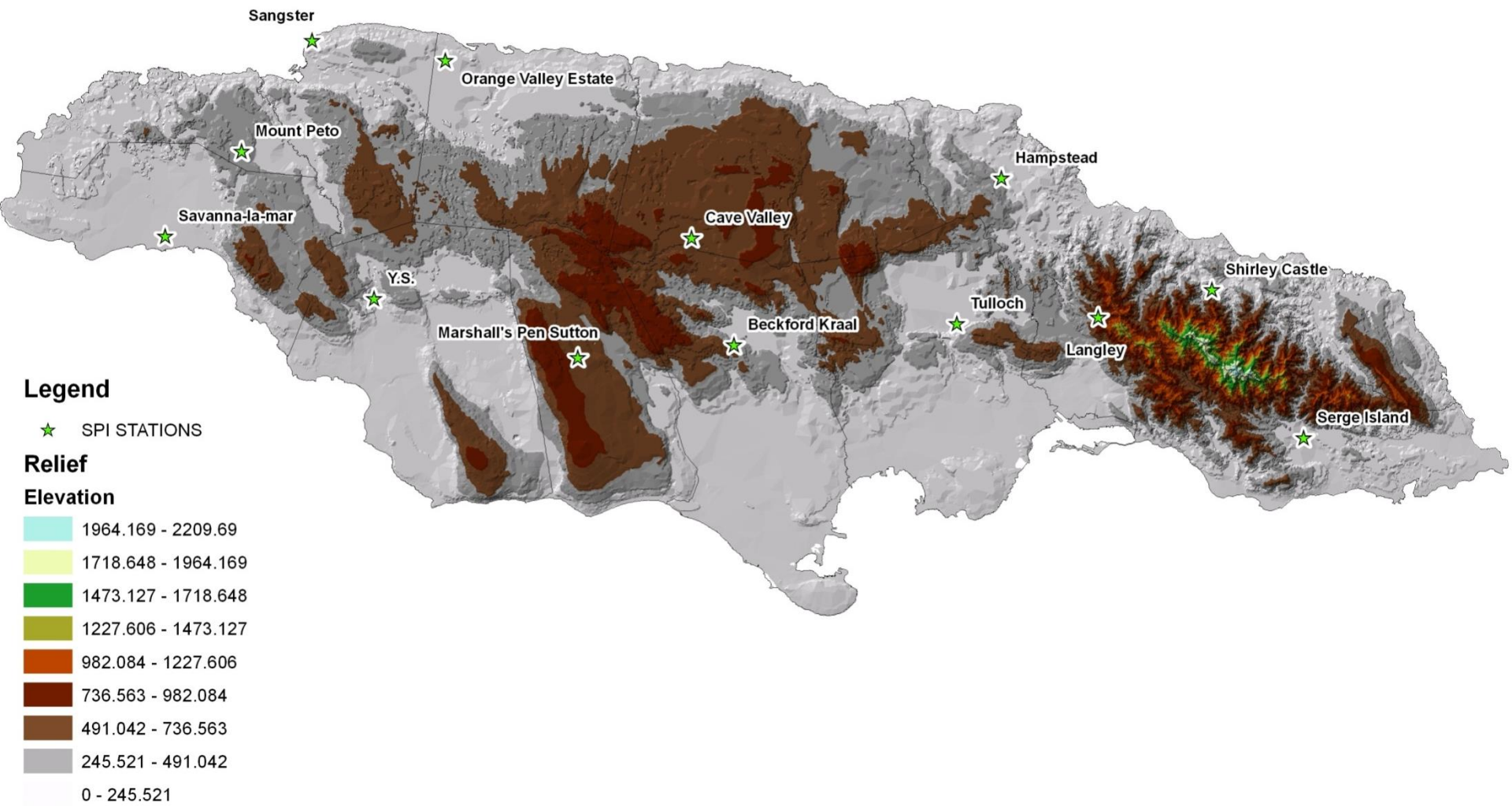
Climate Branch, Metorological Service- April 09, 2013

Standardized Precipitation Index (SPI)

- Since October 2012 started using SPI to calculate drought for inclusion in CAMI bulletin for farmers
  - SPI calculated for 13 stations (one per parish)
  - Also used as an indicator for hydrological drought

- Why choose SPI?
  - Only parameter required is precipitation
  - Allows for missing data in dataset
  - Can provide early warning for drought and assesses severity of drought
  - Allows for both short (agricultural) and long term (hydrological) applications
  - Puts drought in historical context

Stations used in the SPI



SPI indices for 2005 & Comparison with Aus. Method

JAN/FEB YS	Mod AUS	SPI
	44	-1.03

YS had a SPI of -3.85 (2005)

JAN/FEB Shirley Castle	Mod-AUS	SPI
	70	-0.55

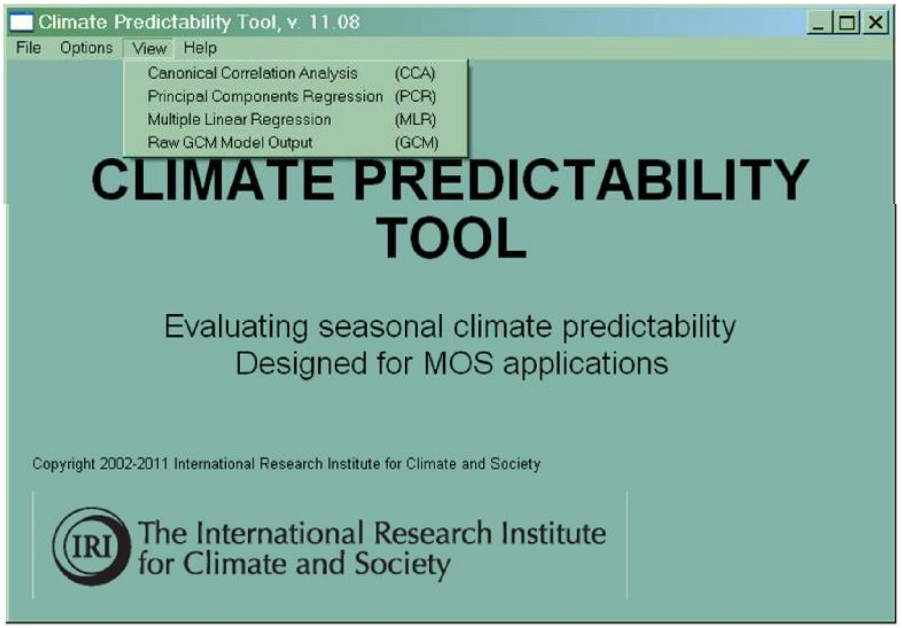
Shirley Castle had SPI of -2.14 (2005)

JAN/FEB B. Kraal	Mod AUS	SPI
	42	-0.83

B. Kraal had SPI of – 2.52 (2005)

Climate Predictability Tool and SPI

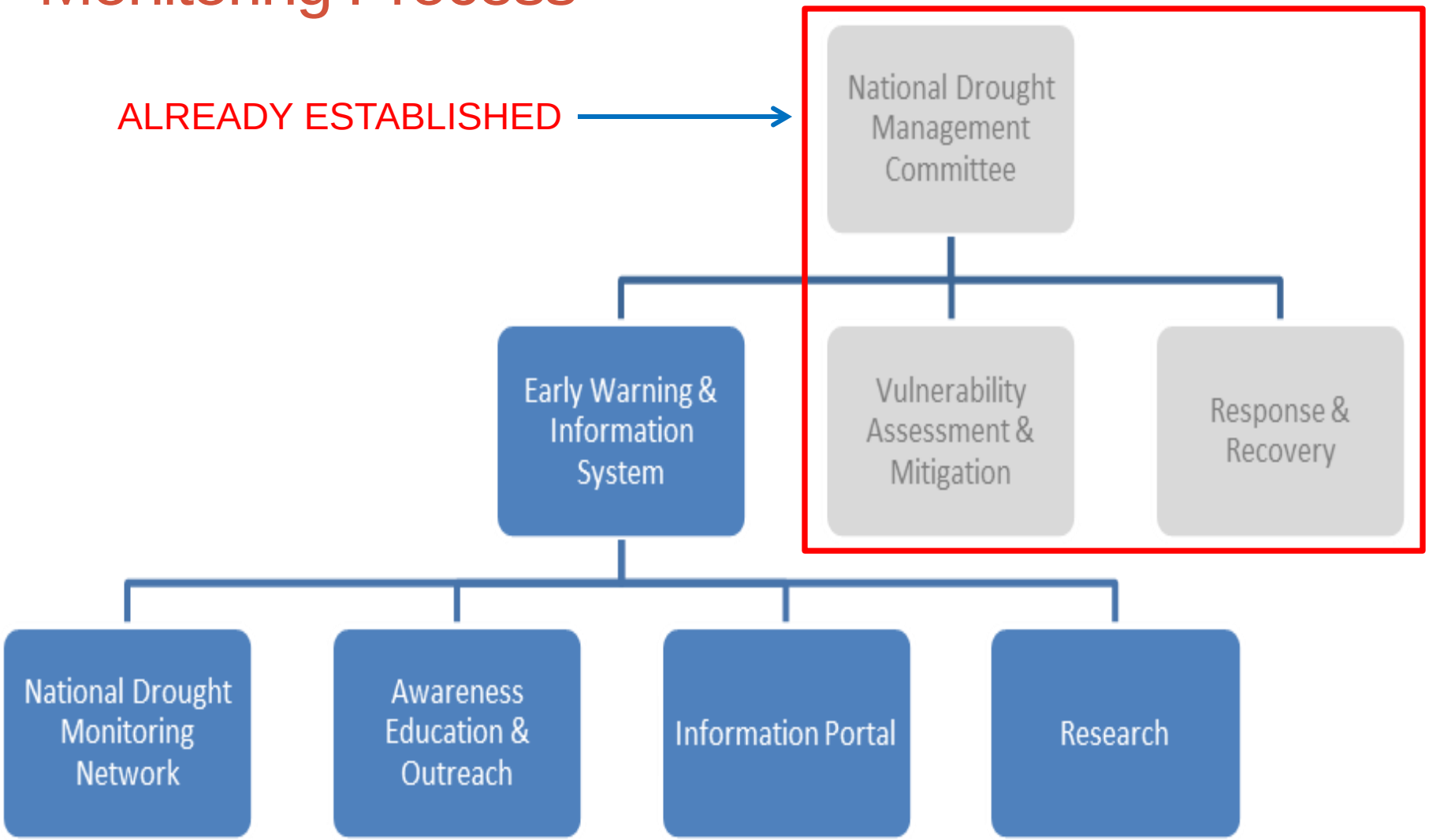
- The Climate Predictability Tool (CPT) developed by the International Research Institute (IRI) also assists in our drought monitoring.
- It can be used in tandem with the SPI to determine drought forecasts
- Based on the precipitation outlook for the forecast period a decision can be taken regarding the direction the drought indices will go and therefore if intervention will become necessary over the coming month/s.



Further Steps

- Use of SPIs in predictive mode
- Increase the number of stations per parish in the SPI calculation
- Investigate using other drought indices
- Increase public education especially for the farming community to available products and applications to farming.
- Change to the Drought Plan is also necessary for which the Office of Disaster Preparedness and Emergency Management (ODPEM) has responsibility.
- Change in the structure of the Drought Management Framework

Proposed Structure of National Drought Monitoring Process



Websites

- www.metservice.gov.jm
- www.jamaicaclimate.net

THANK YOU