

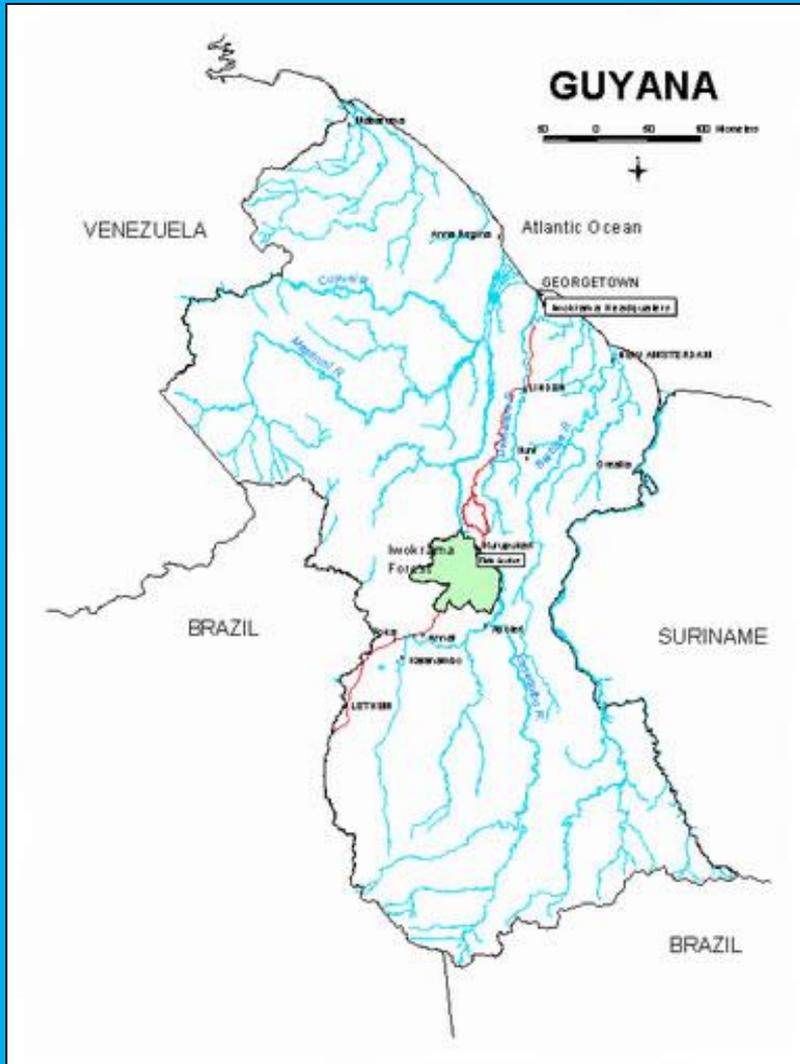
Drought Monitoring in Guyana



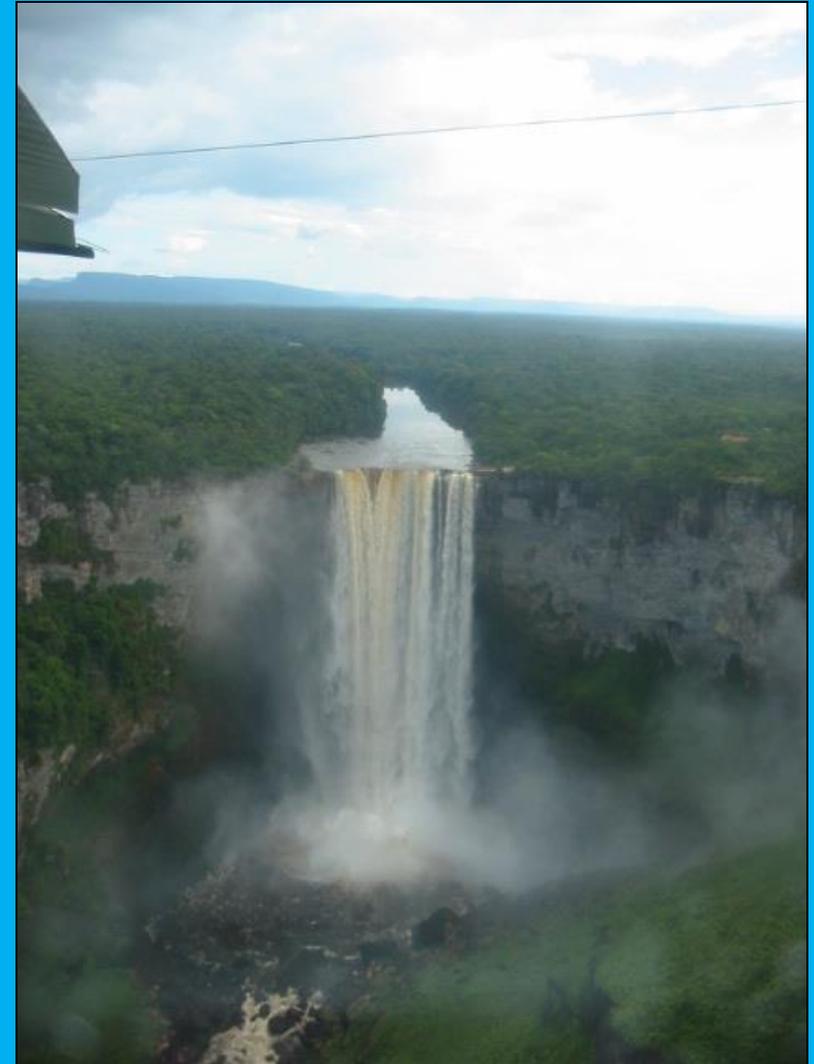
Bhaleka Seulall
Hydrometeorological Service, Guyana



GUYANA – *“Land of Many Waters”*



Map showing the network of rivers

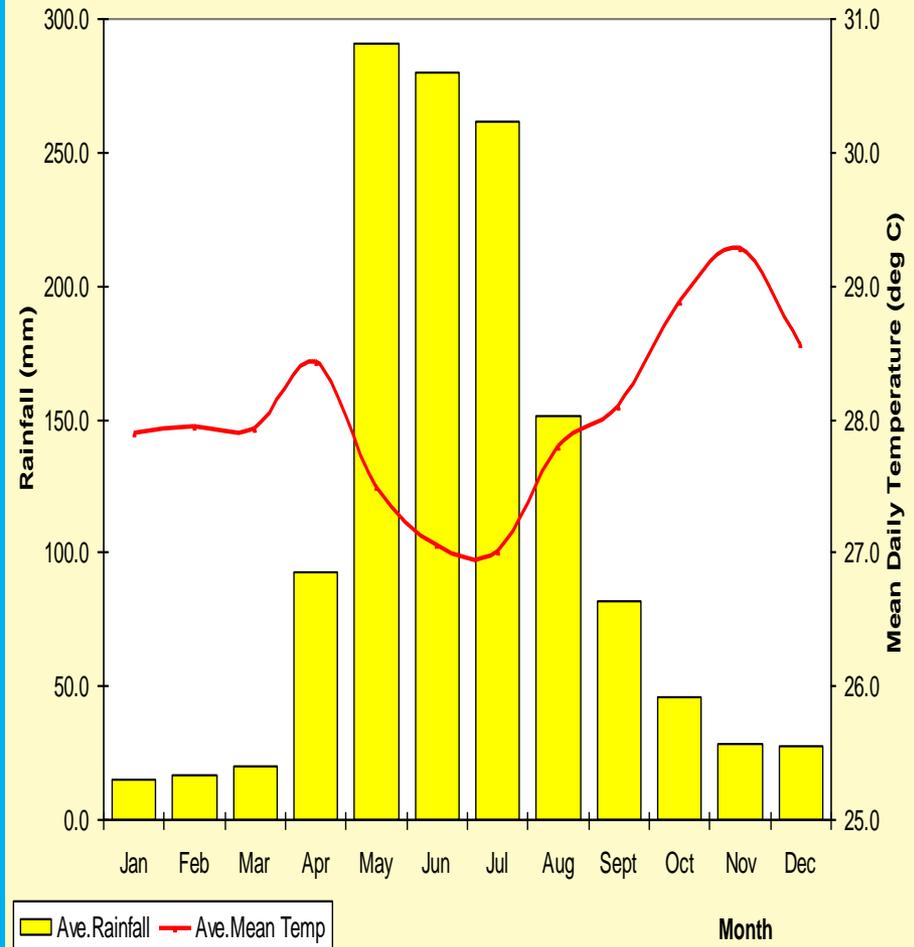
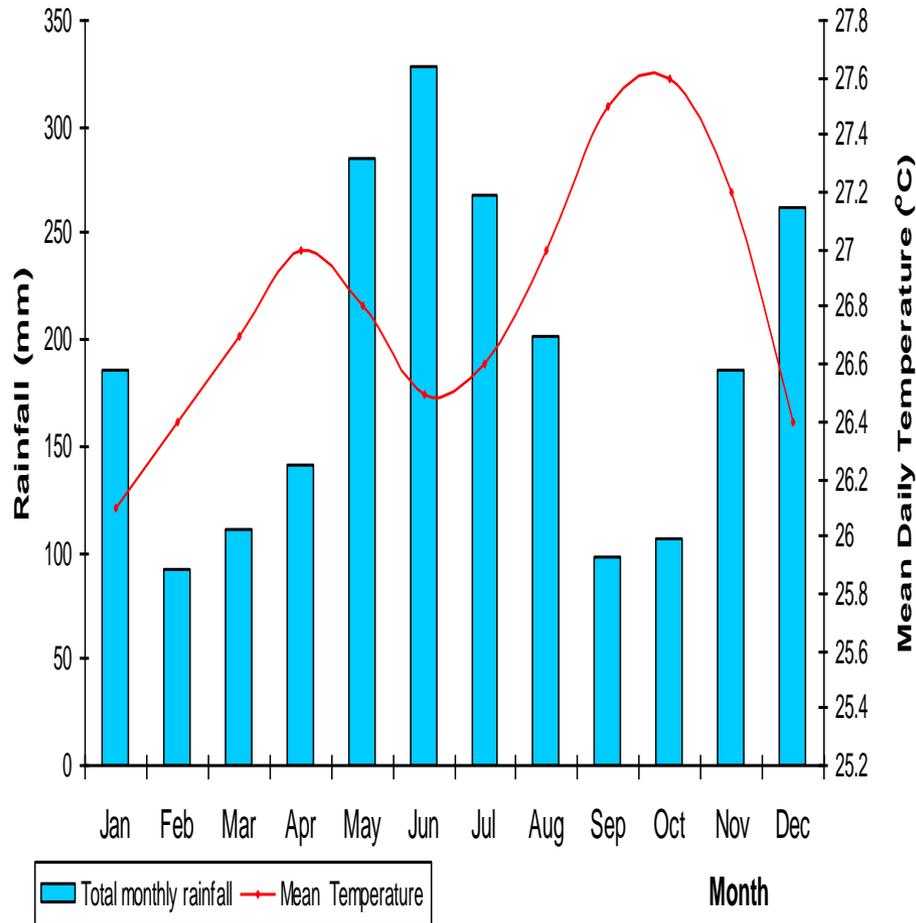


Kaieteur Falls

Guyana's Climate

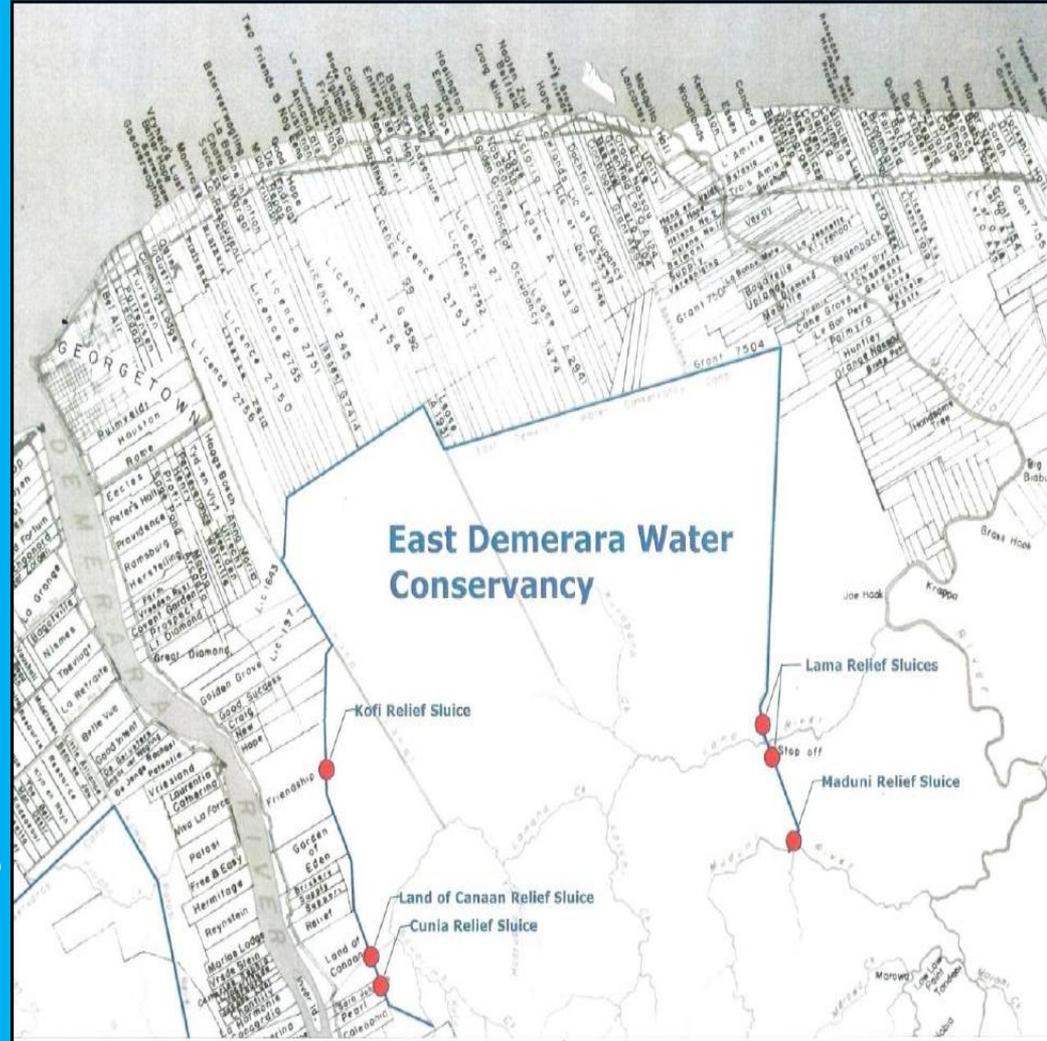
Equatorial climate that is characterized by seasonal rainfall, high humidity and small variations in temperature

Most of Guyana has generally two peak rainfall seasons and two dry seasons, while southern most parts have one peak period of rain



Sources of Water

- Rainfall (rainwater harvesting)
- Ground water (deep & shallow wells)
- Rivers and creeks (most important in the interior regions)
- Conservancies (coast)
- Storage in irrigation canals (coast)





Drought in Guyana

Recent episodes of dry spells or droughts experienced in Guyana were in:

- 1997-1998: this drought was one of the most severe, if not the most severe, in Guyana's history.
- May 2009 - Feb 2010: meteorological drought also caused concerns in agriculture community
- Sept 2012 - Jan 2013 dry spells: some agriculture areas in Guyana were water stressed



Major Drought events in Guyana

El Niño main phenomenon is known to in most cases results in deficit in rainfalls in Guyana

- During the 1997/1998 El Niño event, rainfall was 50% - 85% below normal across the country. In March 1998, the then President of Guyana declared a state of national emergency as this meteorological drought resulted in severe water stress that affected 80% of the population and had adverse effects on the economy, throughout Guyana.

Effects of the 1997-98 Drought

•Damage to Agricultural Production

Rice and sugar, the main export crops, were the most severely impacted. An estimated USD 22 million was lost in rice production and USD 7 million in sugar. In addition, losses of livestock and crops such as cassava, coconut and coffee, while not quantified, were numerous.

•Damage to Water Systems

Drinking water shortages occurred throughout the country, and particularly in the capital, Georgetown. Rivers, creeks and ponds shrunk and in some instances dried up completely and were contaminated by sea (salt) water. Many coastal wells suffered salt water intrusion, while wells and springs ran dry in hinterland areas.



Damage to Mining

It was estimated that gold export, Guyana's most lucrative export, dropped by 40%. Gold was mainly mined in rivers, and many of which had dried up. Rivers used by miners and loggers to transport equipment were also dry, forcing companies to close and miners to leave their families to seek employment in neighbouring countries.

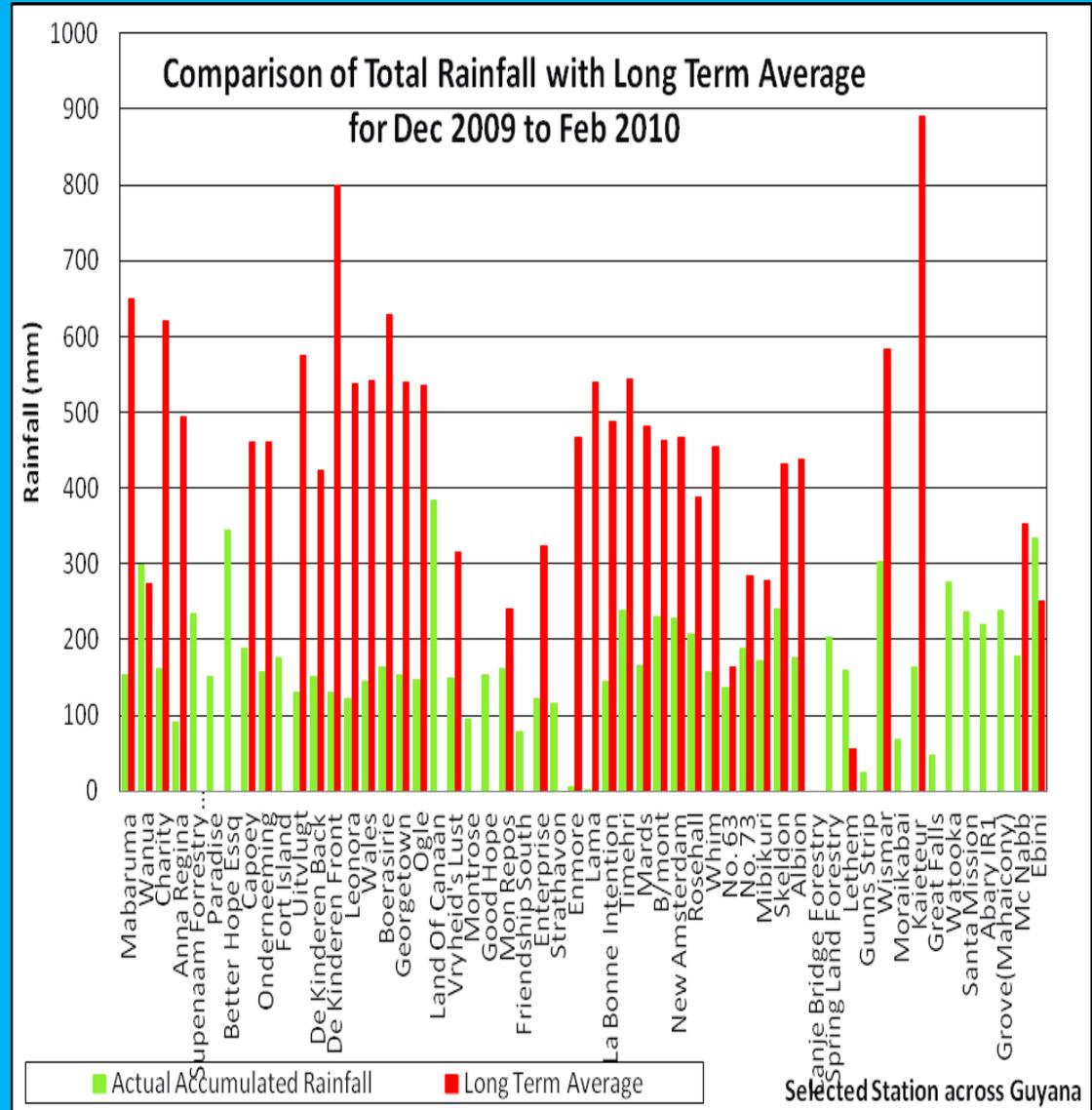
•Damage to Forestry

Forest fires swept across the country for weeks, destroying state forests, farmland and other assets.



2009/2010 Drought

- Guyana also suffered noticeable losses as a result of the El Niño phenomenon in 2009/2010. From May 2009 to April 2010, Guyana experienced rainfall below the long term average in all its Administrative Regions
- The impacts were felt mainly from the last quarter of 2009 and into the second quarter of 2010.
- The impact was greatest on the agriculture sector where accessibility to irrigation water for rice and sugar farms was the major constraint





Policy Directives for Drought under the Water and Sewerage Act*

- Part 1V of this Act covers Drought Order
- The Hydromet Service has the mandate to advise policy makers of any drought which has occurred or which is likely to occur;
- Minister of Agriculture has the power to issue a drought order in Guyana
- A drought order may have effect for a period of up to three months beginning with the day on which the order comes into force, unless extended by the Minister by subsequent order for an additional period

*[http://www.oas.org/dsd/environmentlaw/waterlaw/documents/Guyana-Water_and_Sewage_Act_\(2002\).pdf](http://www.oas.org/dsd/environmentlaw/waterlaw/documents/Guyana-Water_and_Sewage_Act_(2002).pdf)



- In addition Government of Guyana also will be embarking on constructing Hydropower Plants, hence it is important that systems are put in place now for monitoring and forecasting droughts

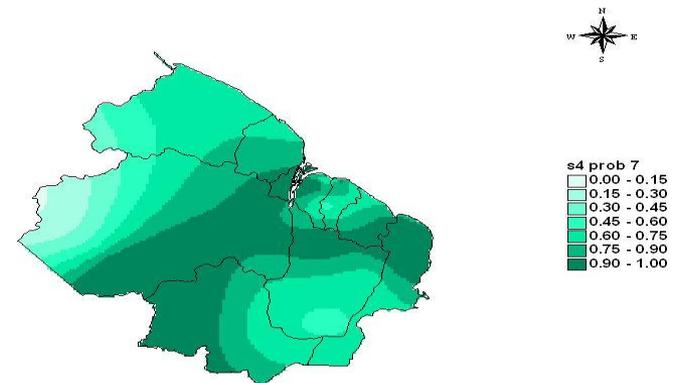


Current initiatives.

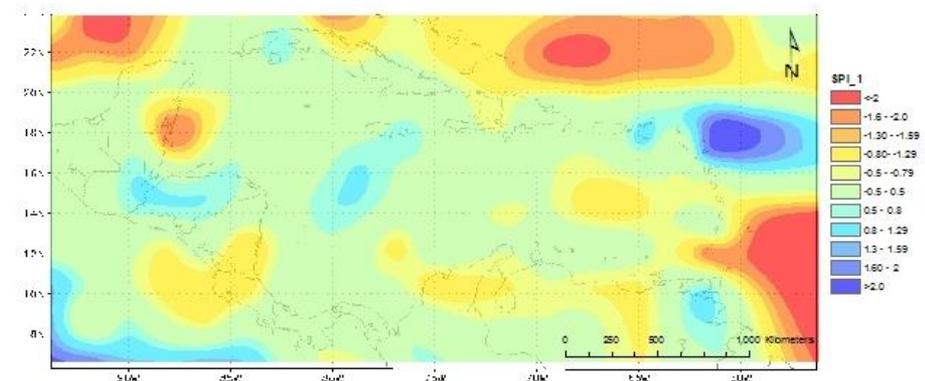
•Guyana is a member of the Caribbean Drought and Precipitation Monitoring Network (CDPMN) which was established as part of the Caribbean Water Initiative (CARIWIN) Project

•Information is shared with our National Drainage and Irrigation Authority, Civil Defence Commission, all of the agencies that reports to Ministry of Agriculture, extensions officers

The probability of a dry spell of at least 7 days during November to January in northern Guyana

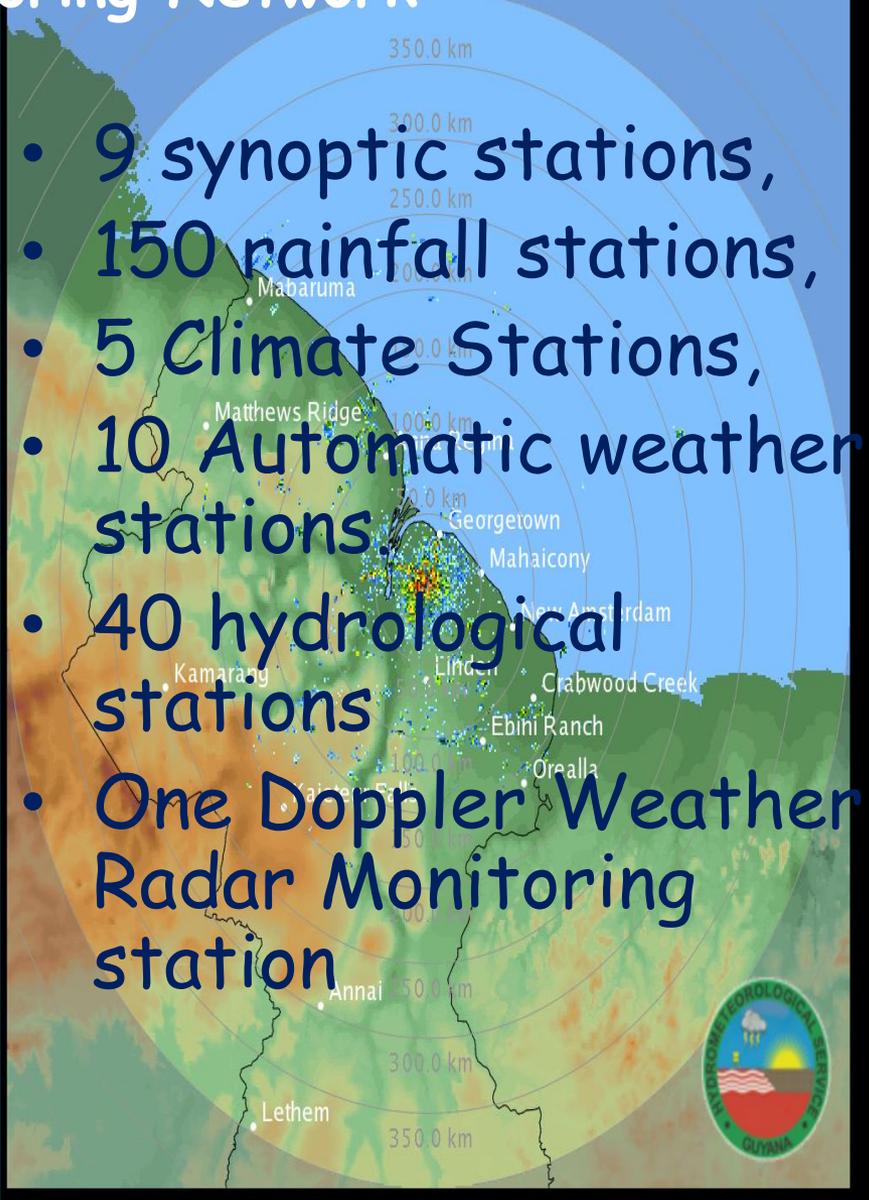


SPI March 2013





Maintaining and Strengthening of meteorological and hydrological Monitoring Network



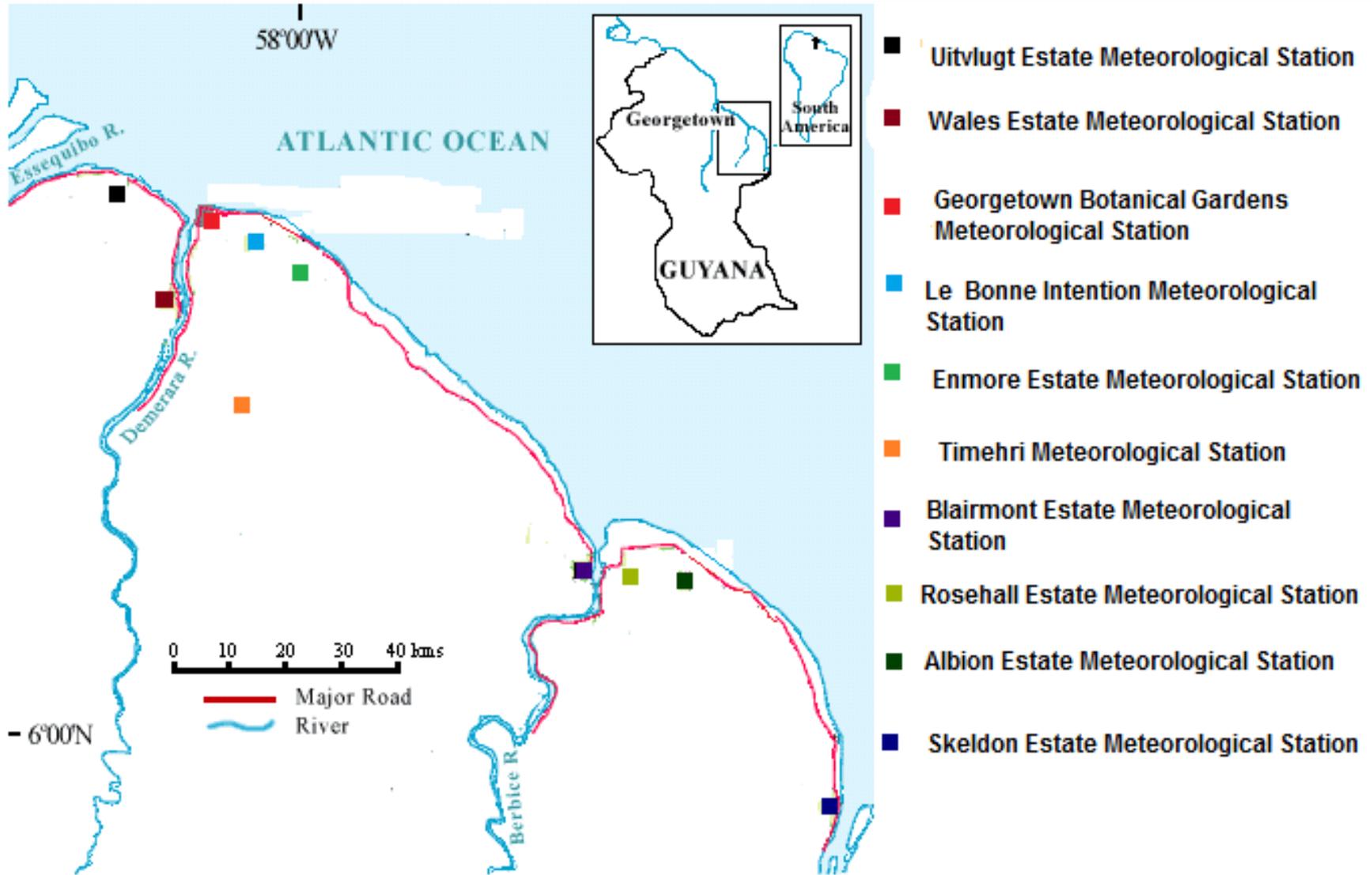
- 9 synoptic stations,
- 150 rainfall stations,
- 5 Climate Stations,
- 10 Automatic weather stations,
- 40 hydrological stations
- One Doppler Weather Radar Monitoring station

PPI (dBZ)
14:45 / 26-Nov-2009
Guyana

60.0 dBZ
56.7 dBZ
53.3 dBZ
50.0 dBZ
46.7 dBZ
43.3 dBZ
40.0 dBZ
36.7 dBZ
33.3 dBZ
30.0 dBZ
26.7 dBZ
23.3 dBZ
20.0 dBZ
16.7 dBZ
13.3 dBZ
10.0 dBZ

Pdf File: ppi_400km_0deg.ppi
Clutter Filter: Doppler Num 6
Time sampling: 31
PRF: 375 Hz
Range: 400 km
Resolution: 1.600 km/pixel
Elevation: 0.0 deg
Data: Radar Data
National Weather Watch Centre
Rainbow@Gematronik

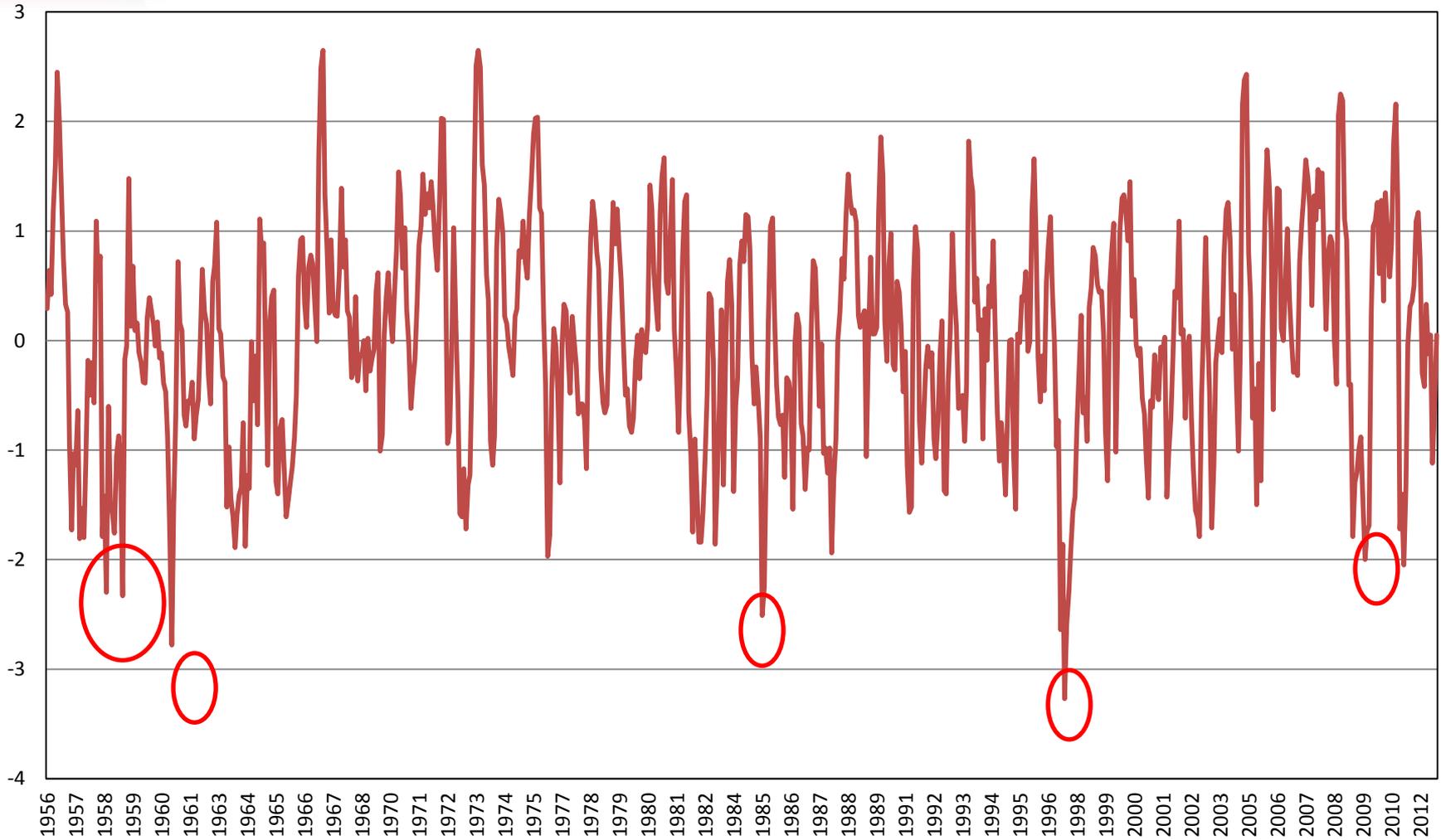
• In Jan 2013, CIMH trained staff members in using SPIs and Feb we commenced computing Standardized Precipitation Index (SPI) for Guyana Coast





Preliminary Results

Georgetown Botanical Gardens 3 Month SPI (1956-2012)





Preliminary Results

Using categories by McKee et al 1993

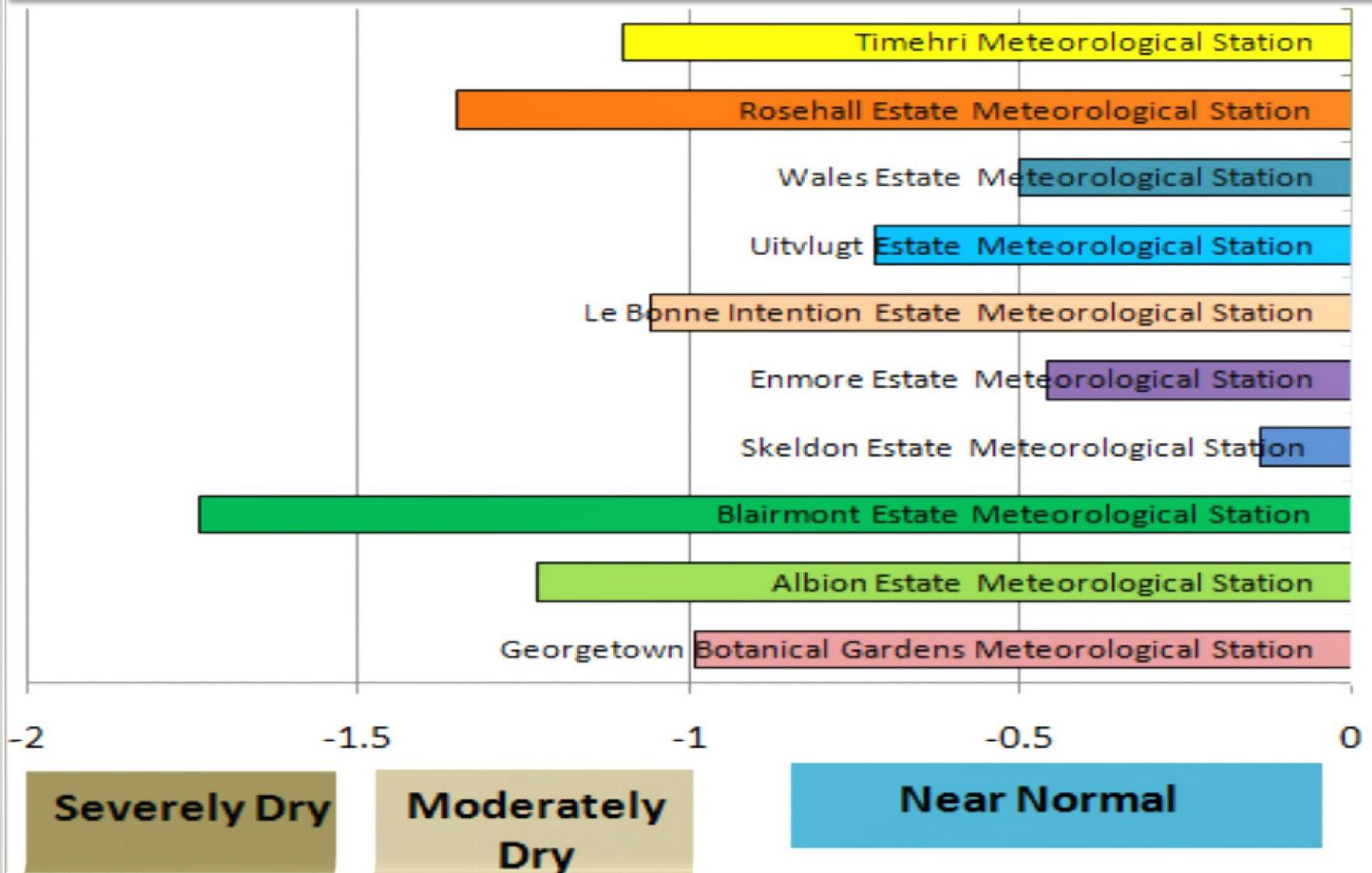
3 month SPIs for March 2013

Station Name	3 Month SPI for March 2013	SPI Category
Georgetown	-0.65	Near Normal
Albion	-0.85	Near Normal
Blairmont	-0.98	Near Normal
Skeldon	0.29	Near Normal
Enmore	-0.55	Near Normal
Le Bonne Intention	-0.42	Near Normal
Uitvlugt	-0.22	Near Normal
Wales	-0.18	Near Normal
Rosehall	-0.68	Near Normal
Timehri	-0.48	Near Normal

6 month SPI for March 2013

Station Name	6 Month SPI for March 2013	SPI Category
Georgetown	-0.38	Near Normal
Albion	-0.05	Near Normal
Blairmont	-0.86	Near Normal
Skeldon	-0.02	Near Normal
Enmore	-0.52	Near Normal
Le Bonne Intention	-0.55	Near Normal
Uitvlugt	-0.34	Near Normal
Wales	-0.35	Near Normal
Rosehall	0.05	Near Normal
Timehri	-0.76	Near Normal

One month Standardized Precipitation Index(SPI) For March 2013





Main Challenges

- Years of data for various stations that are not digitized.
- Training is needed in the use of other drought monitoring indices that will compliment the SPI and also in GIS.
- Validating the SPI computed - historical records of impacts cannot be easily located



Future Plans for Drought Monitoring in Guyana

Short term goals

- By the end of 2013, establish the use of the Standardized Precipitation Index (SPI) for stations that have more than 30 years of historical data .
- Represent spatially, by the use of the relevant software the Standardized Precipitation Index, for Guyana
- Strengthen Public awareness
- Continue to build capacity of staff



Future Plans for Drought Monitoring in Guyana

Medium term goals

- Use tools and indices available to support drought monitoring and forecasting in both short and long term.
- Published research
- Develop and implement a National Drought Strategy for Guyana
 - science must be use supporting basis for drought decisions
 - ensure systems in place for measuring impacts



Thank You! Any Questions ?