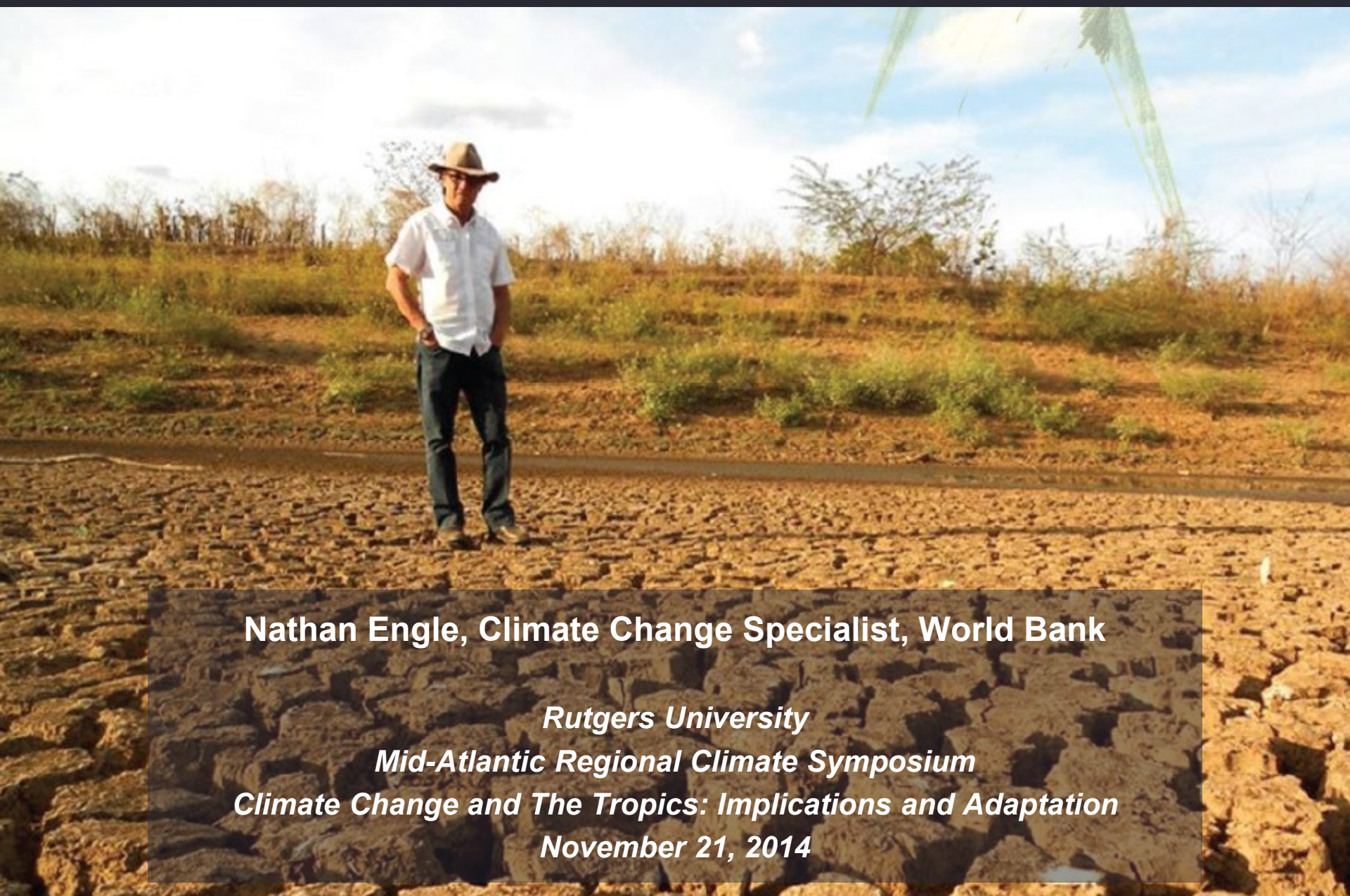


Building Drought and Climate Change Resilience in Development Projects and Planning



Nathan Engle, Climate Change Specialist, World Bank

Rutgers University

Mid-Atlantic Regional Climate Symposium

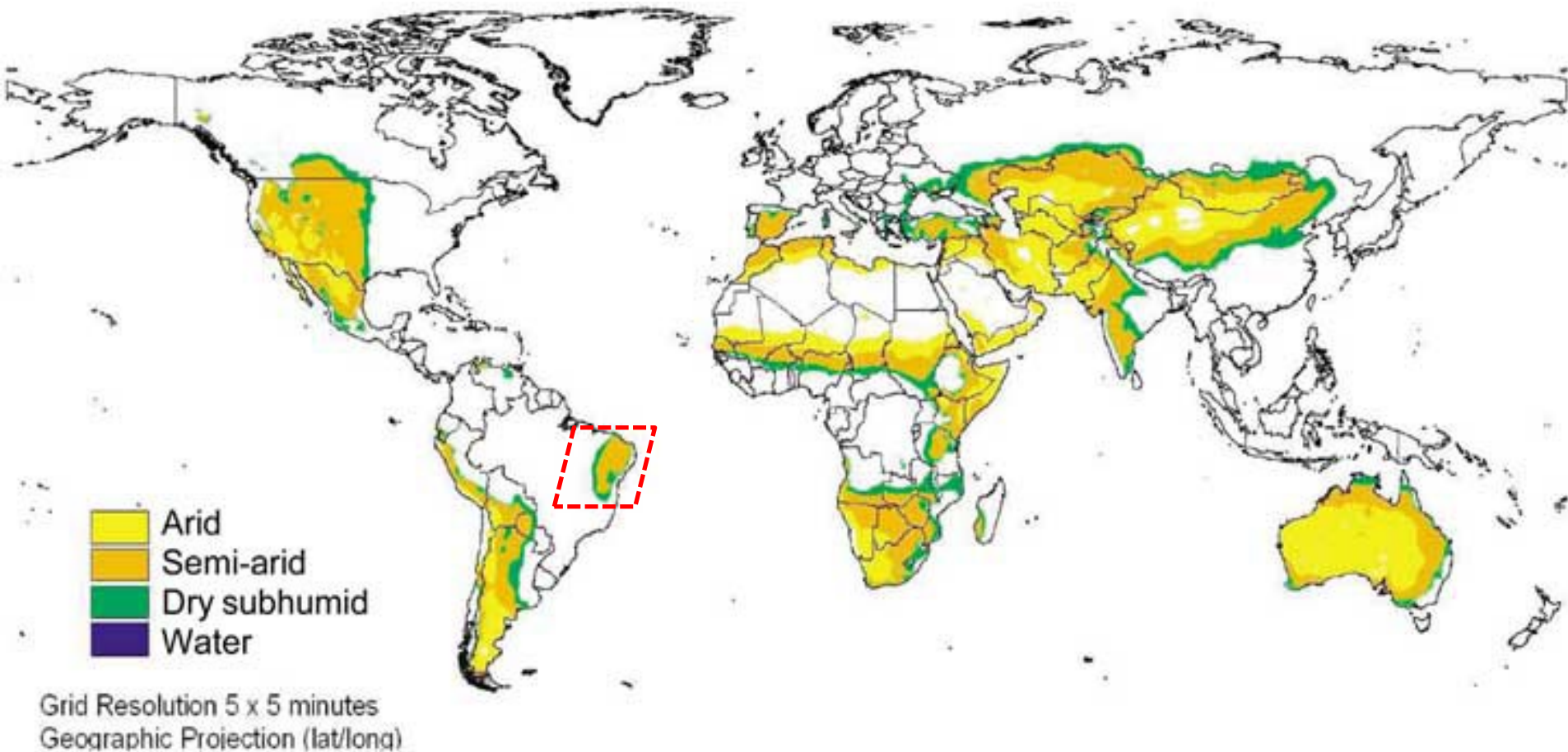
Climate Change and The Tropics: Implications and Adaptation

November 21, 2014

Two topics

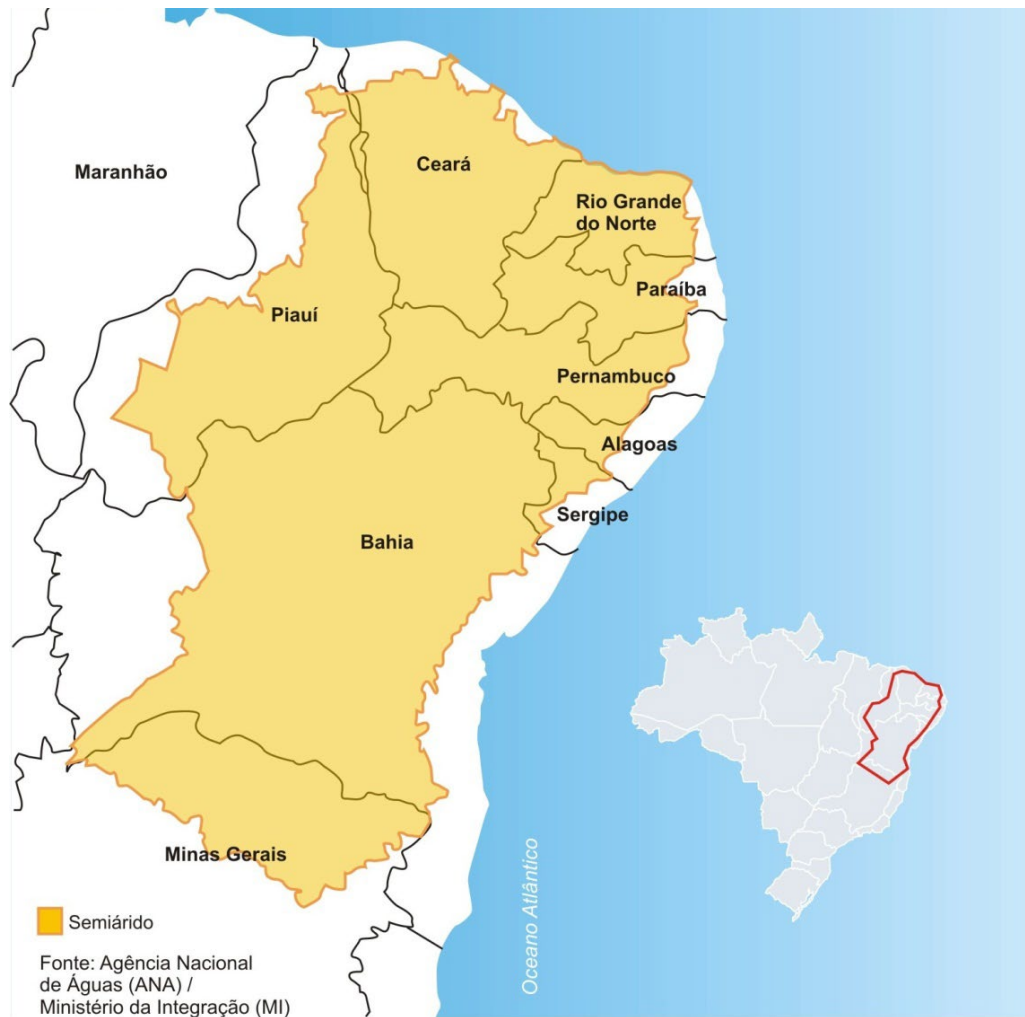
- **Brazil engagement on climate change and drought resilience**
- **Climate and disaster risk screening and management**

Topic 1: Drought and Climate Change Resilience in Brazil

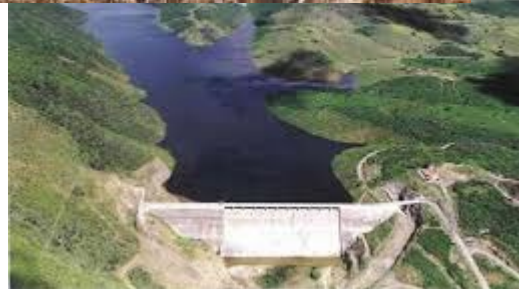


While many associate drought principally with the world's drylands, **DROUGHT** occurs in virtually **ALL** climate regimes

Northeast Brazil and the Semi-Arid Region



Northeast Brazil and the Semi-Arid Region



Northeast Brazil and the Semi-Arid Region

Seca no Nordeste
é a maior em 50 anos

SECA

NORDESTE VIVE PIOR ESTIAGEM EM DÉCADAS

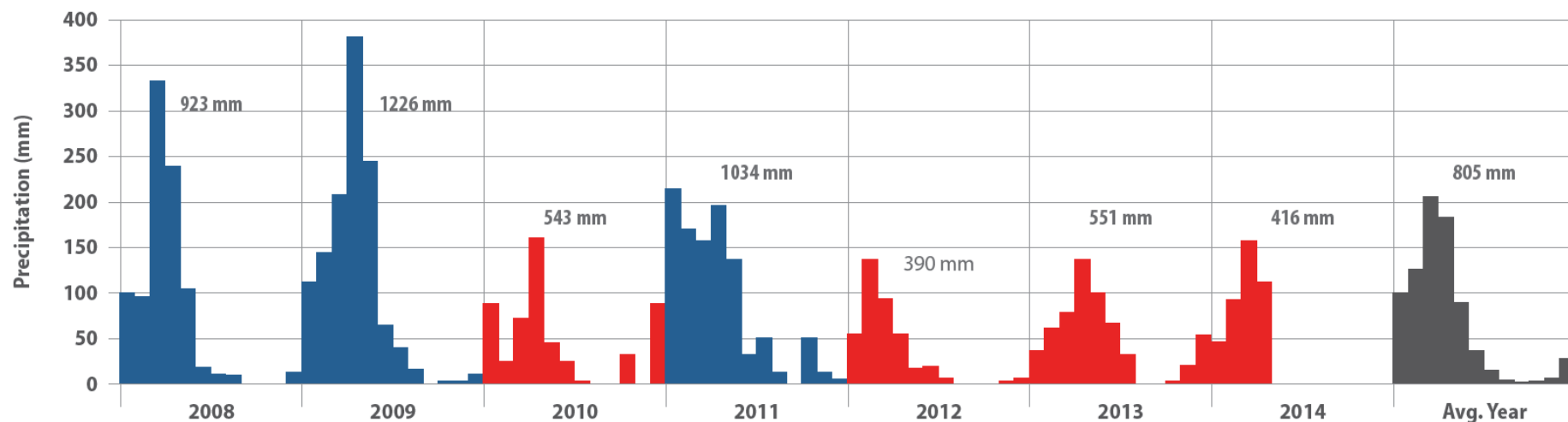


PT DEZ ANOS DE GOVERNO 10 ANOS DE PROMESSAS



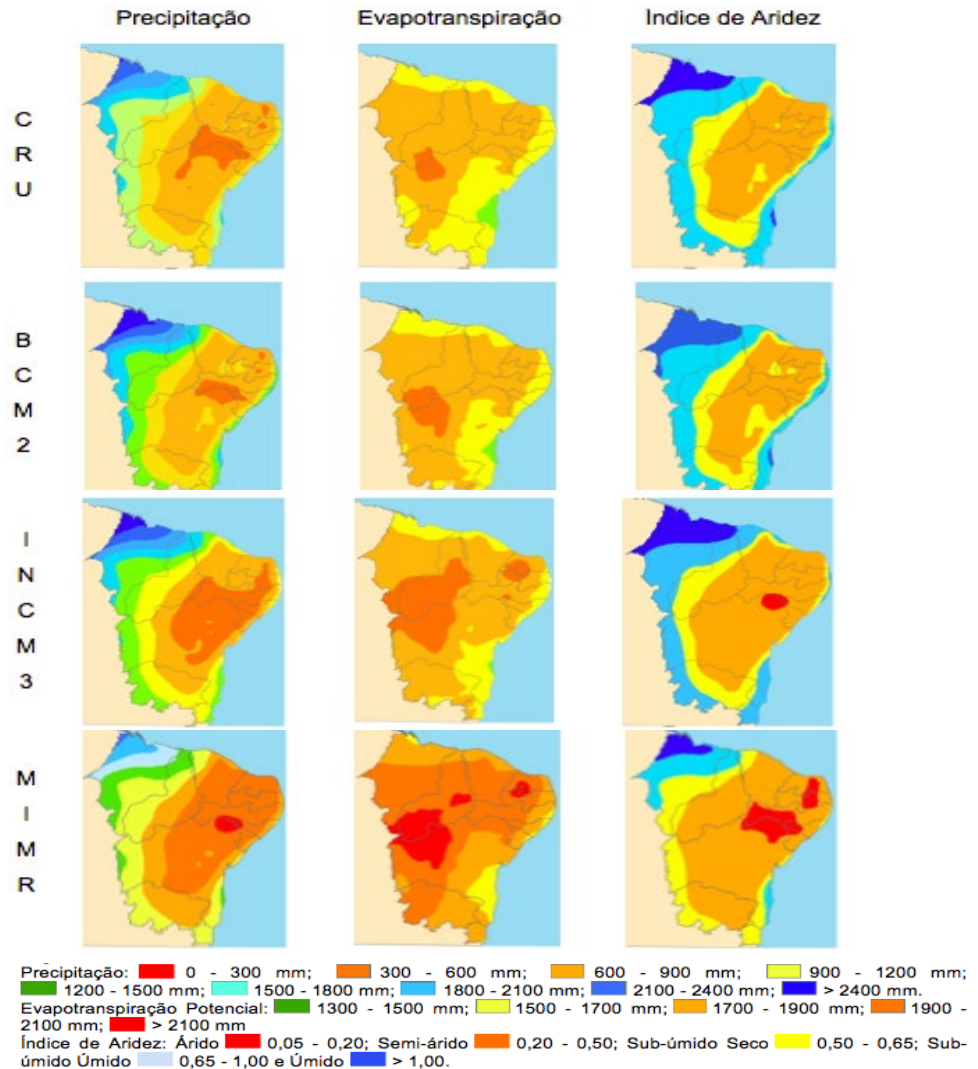
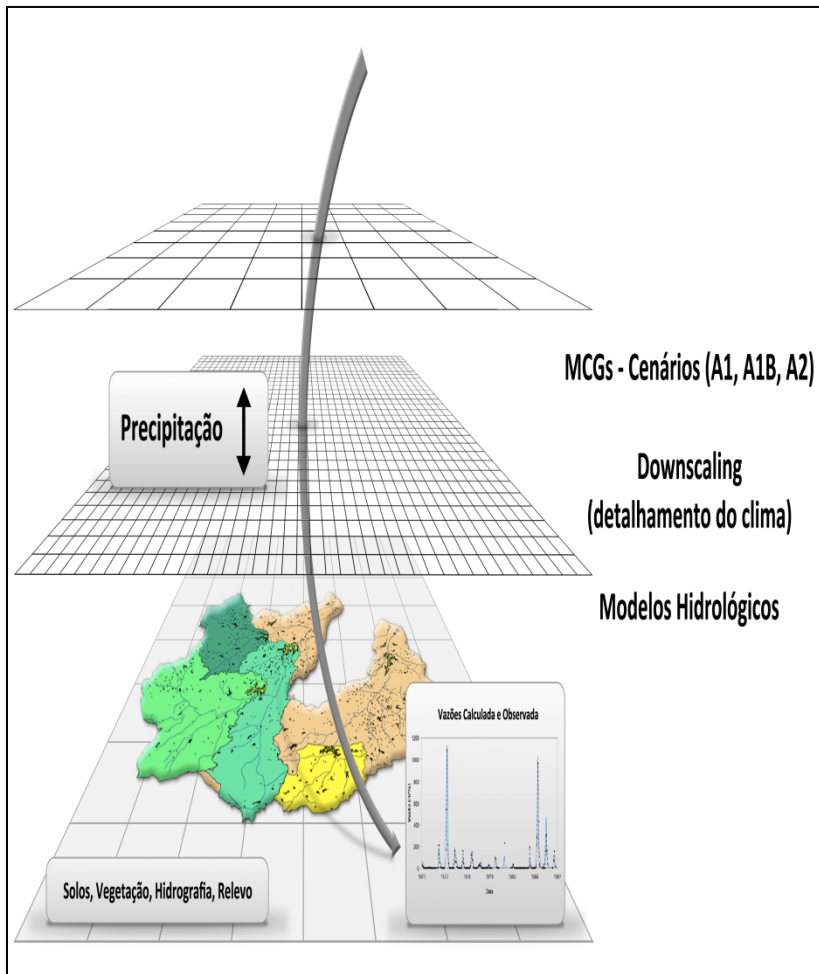
Recurrent Droughts

- Current drought in the Northeast (since 2010) is the **worst in the past decades**. *Ex. situation for Ceará state:*



- Requests from key Brazilian partners:**
 - 2010 - *National Water Agency* concern to include climate change impacts in river basin planning
 - 2013 - Political will of the *Ministry of National Integration* to better prepare for prolonged drought events

Climate Change & Water Demand Scenarios for Northeast Brazil

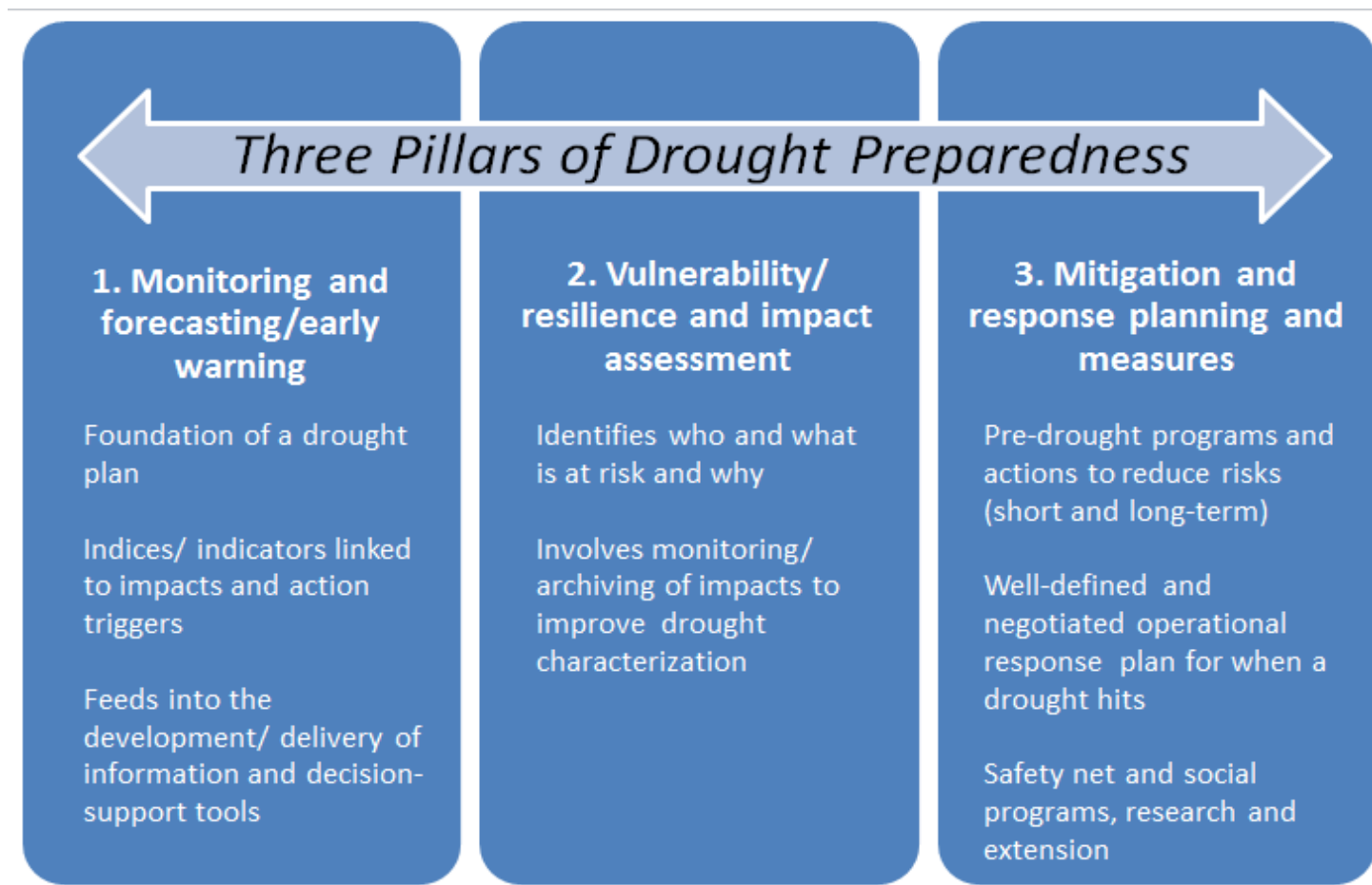


Shaping the Landscape beyond the Northeast

- **Water Crisis in São Paulo**
 - Extremely dry winter for Southeast Brazil
 - Economic heart of the country
 - Main reservoir system for São Paulo, Cantareira, dropped to a low 3.2% in October
- **Federal entities being audited on required drought contingency plans**
- **Getting the attention of decision makers** at a nationwide level



Building Drought Resilience



National Drought Policy Dialogue Convening Support

- **Ministry of National Integration (MI)** led a series of consultation seminars in the Northeast in March & April, 2014, titled “**Living with the Semi-arid and Drought Preparedness**”
- 11 states (3-4 at time) **culminating in a regional seminar in Fortaleza, Ceará**
- **Discussing issues such as:**
 1. Relevance and goals of a national drought policy
 2. Functions and responsibilities of various institutions involved in drought management
 3. Northeast Drought Monitor and the associated technical/professional networks and insitutional integration
 4. Financing drought policies and management
 5. Drought preparedness plans
 6. Measures to mitigate long-term risk and structural issues
 7. Drought committees/councils and communicating drought risk and responses

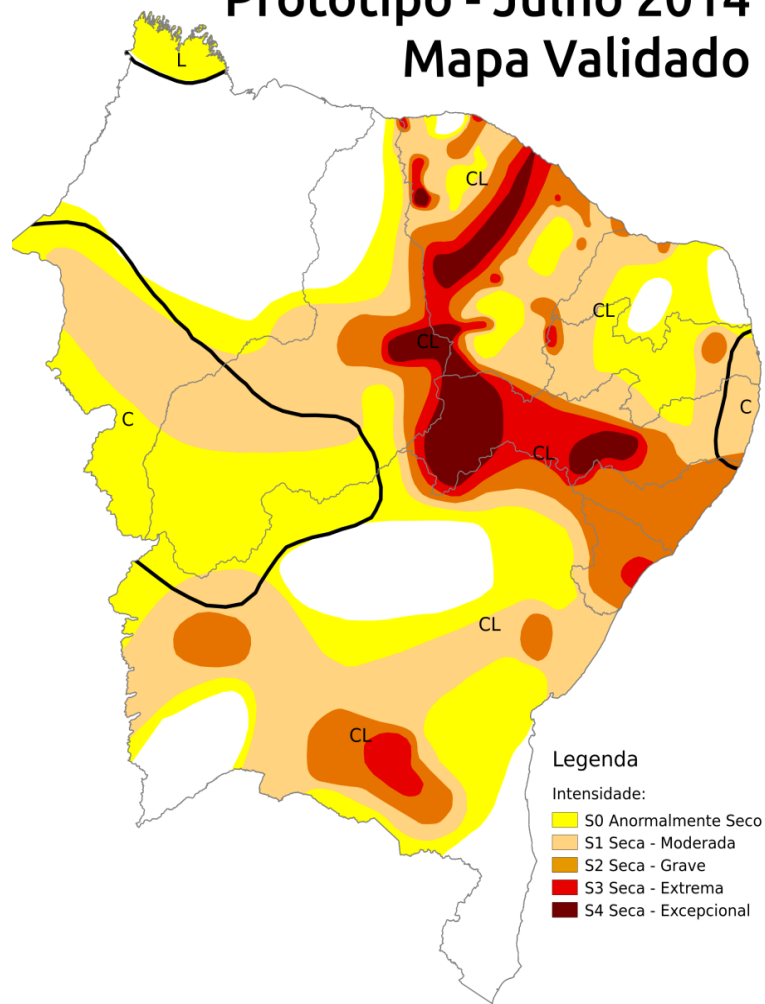
Northeast Regional Pilot Project(s)

1. **Monitor de Secas do Nordeste (The Monitor)**
2. **Operational Drought Preparedness Plans**

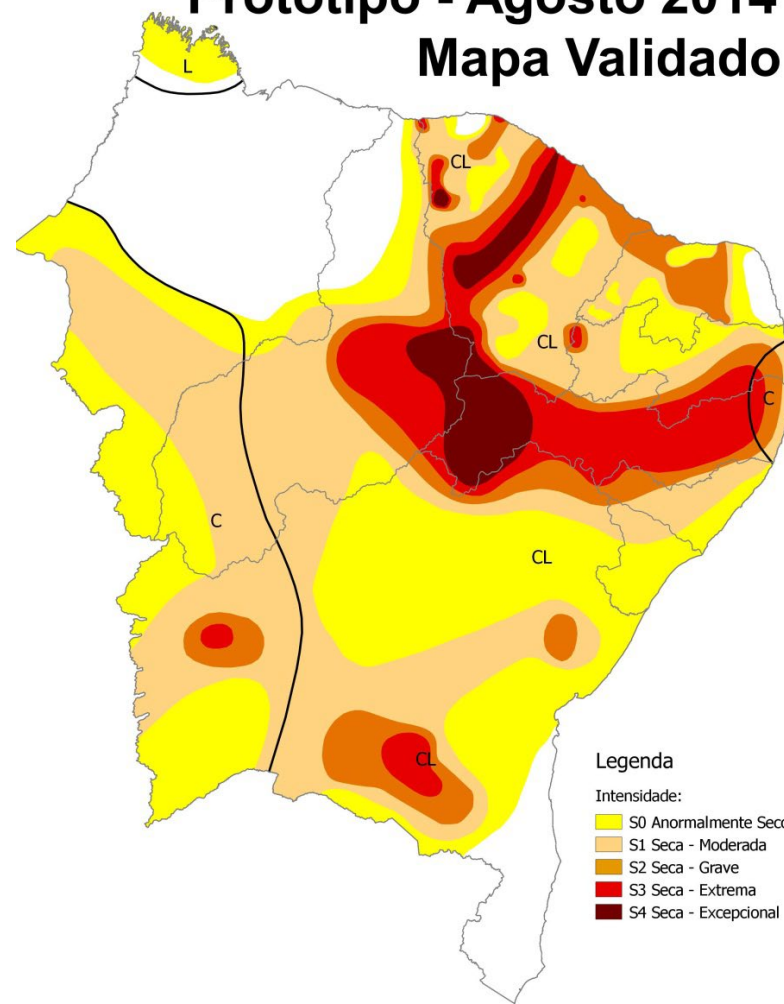


Experimental Northeast Drought Monitor Map

Monitor de Secas do Nordeste
Protótipo - Julho 2014
Mapa Validado



Monitor de Secas do Nordeste
Protótipo - Agosto 2014
Mapa Validado



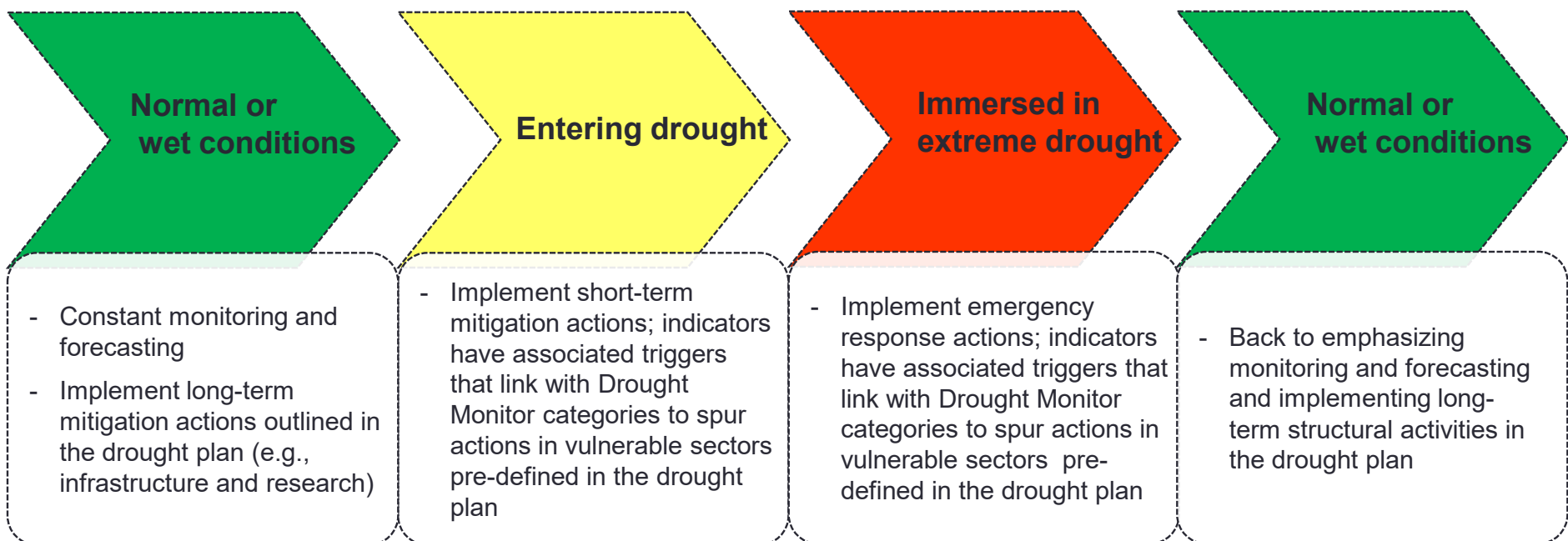
The Monitor Lays the Foundation

- Helping to **convene a transparent and open forum** for the Northeast
- Provide a more common, **objective**, and nuanced understanding of drought
- Develop a **process for systematically monitoring**, forecasting, and reporting/verifying droughts and their impacts
- **Links with** national policy dialogue and the drought preparedness plans
- Operational Monitor in **early 2015**



Drought Preparedness Plans

- Grounded in the **three pillars framework**
- **Diverse types of communities** (i.e., river basin, collective managed small dam, urban water supply systems, and rural rainfed agriculture at community level)
- **Operational in those communities**
- Illustrate **utility** and examples of “**what could be**”



Topic 2: Climate and Disaster Risk Screening

- **IDA17 Policy Commitments: Climate Change Theme (3 out of 5)**
 - **All IDA Country Partnership Frameworks incorporate climate and disaster risk considerations** into the analysis of the country's development challenges and priorities and, when agreed with the country, incorporate such considerations in the content of the programs and the results framework.
 - **Screen all new IDA operations for short- and long term climate change and disaster risks** and, where risks exist, integrate appropriate resilience measures.
 - **Scale up support to IDA countries to develop and implement country-led, multi-sectoral plans and investments** for managing climate and disaster risk in development in **at least 25 additional IDA countries**.

World Bank's Screening for Climate & Disaster Risks

- Applying early stage due diligence to screen for climate and disaster risks against a project development context will ensure a more climate resilient design.

WHAT DOES SCREENING OFFER (AND NOT OFFER)?

- **Facilitates** a high-level screening of various sectors across a country and/or of selected priority sectors within a country
- **Flags key risks for further studies**, consultation, planning, and dialogue at a strategic level
- **Not** a detailed risk assessment tool
- Does **not** suggest specific adaptation options





Climate & Disaster Risk Screening Tools

National Tool



Project Tools



The Climate Change Knowledge Portal (CCKP)

Future Climate Projections

Future Climate Changes

Temperature	Mean annual temperature
Rainfall	Mean annual precipitation ▼
Extreme	'hot' days and nights exp

Future Trends

- ➔ Increased temperatures and evapotranspiration c increasingly erratic rainfall may lead to increased d
- ➔ Reduced agricultural yields and crop failures from
- ➔ Lower mountain snowfall and, consequently, incr
- ➔ Changes to the Canary Current potentially threat
- ➔ Coastal erosion from sea level rise.
- ➔ Decreasing resilience of forest resources, leading threats to endemic biodiversity.

Mozambique Dashboard

Risk Screening Overview

Overview | Risk Screening Overview | Climate Baseline | Natural Hazards | Climate Future | Impacts & Vulnerabilities | Adaptation | Print | References

Historical Climate Variability and Change

Historical Climate Trends

Mean rainfall	2.5 mm/mo	▼
Mean temperature	0.6 °C	▲
'Hot' days per year	25 days	▲
Heavy rainfall events	25 days	▲

Key Precipitation Trends

- Some unusually high rainfalls have occurred in the dry season in recent years (2000-2006), but this has not been part of a consistent trend.
- Sahelian rainfall is characterized by high variability on inter-annual and inter-decadal timescales, which can make long-term trends difficult to identify. A period of particularly high rainfall occurred in the early 1960s, while the early 1980s were particularly dry. Statistically significant decreases of around 10 to 15 mm per decade have, however, been observed between 1960 and 2006 in the southern regions of Senegal (during the wet season of June through September).

Key Temperature Trends

- Mean annual temperature has increased by 0.9°C since 1960, an average rate of 0.20°C per decade. Of that region and season) increased by 25 in the last 40 years, and much of this has occurred during the southern hemisphere autumn. This corresponds to the first harvest cycle of many major grains across the country, with significant implications for agricultural pests and yields.

For detailed climate information on available country weather station data, please see the [Historical Variability Tool](#).

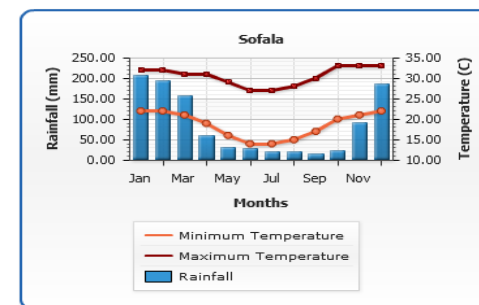
Disaster Risk Impacts and Vulnerabilities

- Mozambique faces an array of natural hazards, the most prominent being flooding, droughts, and cyclones.
- With more than 2,700 kilometers (km) of coastline, nine international river basins, a high dependence on agricultural yields, a high level of poverty, and an inadequate infrastructure, Mozambique is extremely sensitive to such exogenous shocks.
- With most Mozambicans living along the low-lying coast, facing chronic poverty, inadequate health services, and heavy reliance on subsistence agriculture (80%), any changes to the nation's ecosystems have an immediate impact on its population.
- There is a high risk of increased-intensity storm surges along soft coastlines, which are already vulnerable to coastal erosion.
- The duration and timing of the rainy season are expected to change. It would start earlier over most of the country, though it is also expected to end earlier in the south and later in the far north, leading to longer rainy seasons in the north as well as southern regions near the coast. There could be, however, decreases in seasonal rainfall duration over the central regions and Zambezi valley, which could have major implications for agriculture.
- Hydrological modeling indicates that some areas in the north will experience floods more frequently.
- The central region requires greater monitoring for all types of natural hazards, and weather-related parameters in this region need to be extended and improved as a matter of urgency as climate change intensifies.

Mozambique

Historical Climate Data

Click on the map to view climate charts for your location of interest.



Click on the map to view climate charts for your location of interest.

Select a Layer Then Zoom to Explore.

HAZARDS

EXPOSURE

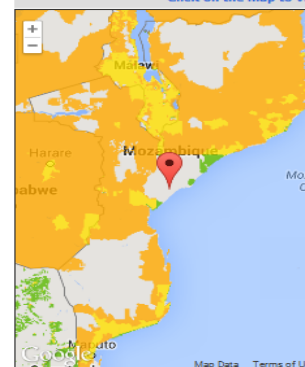
RISKS

Risk Index

- 1 Low
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 High

Layers

- ☐ Flood Mortality Risk
- ☐ Earthquake Mortality Risk
- ☐ Cyclone Mortality Risk
- ☐ Drought Mortality Risk
- ☒ Multi-Hazard Risk



Data description: This multi-hazard risk index was calculated by combining the single-hazard mortality risks of cyclones, drought, earthquakes, floods,



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Contact Information

World Bank Team Co-Leads

Erwin De Nys, Sr. Water Resources Specialist

Carmen Molejón, Water Resources Specialist

Paula Freitas, Sr. Water Resources Specialist

Thadeu Abicalil, Sr. Water and Sanitation Specialist

Diego Arias, Sr. Agricultural Economist

Kanta Kumari, Sr. Environmental Specialist

Ana Bucher, Climate Change Adaptation Specialist

Nathan Engle, Climate Change Specialist (nengle@worldbank.org)