

# CEMADEN

National Center for Monitoring and Early  
Warning of Natural Disasters

## Drought Risk Monitoring

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INTEGRATED DROUGHT  
MANAGEMENT PROGRAMME

Virtual Exchange: Next-Generation Drought  
Monitoring and Early Warning Systems  
May 27, 2025



MINISTÉRIO DA  
CIÊNCIA, TECNOLOGIA  
E INOVAÇÃO





# CEMADEN DROUGHT RISK MONITORING

- Start of monitoring in 2012: Semi-arid region
- Expansion starting in 2014: Cantareira-SP, Três Marias, Serra da Mesa, etc.
- Nationwide monitoring: 2017
- Objective monitoring based on multiple data sources and indicators



# CEMADEN DROUGHT RISK MONITORING

## DATA

## INFORMATION

## PRODUCT

## TERRITORIAL DELINEATION

## APPLICATION



GRACE-US

SOIL MOISTURE



NOAA  
TERRA  
AQUA

NDVI Normalized Difference  
Vegetation Index

VHI Vegetation  
Health Index

VSWI Vegetation Supply  
Water Index



CHIRPS  
MERGE

ANOMALY

SPI Standardized  
Precipitation Index



ANA  
ON S

STREAMFLOW  
RIVER LEVELS

Short- and Medium-Term Droughts

IDI

INTEGRATED  
DROUGHT INDEX

PICS

DROUGHT  
PROPAGATION INDEX

Medium- and Long-Term Droughts

SSFI

STANDARDIZED  
STREAMFLOW INDEX

TSI

TWO-VARIATE  
STANDARDIZED  
INDEX

● CAR Rural Environmental  
Registry

● Land Use  
and Cover

● IBGE Socioeconomic

● Indigenous Land

● Settlement  
Project

● Drought Impact  
Analysis - Type of  
Rural Property

● RiSAF Drought Risk in  
Family Farming

● Drought Impact Analysis

● Drought Impact  
Analysis - Municipalities

● Fire Spread Risk

● Watersheds

● Reservoirs

● Impact on hydropower  
generation watersheds

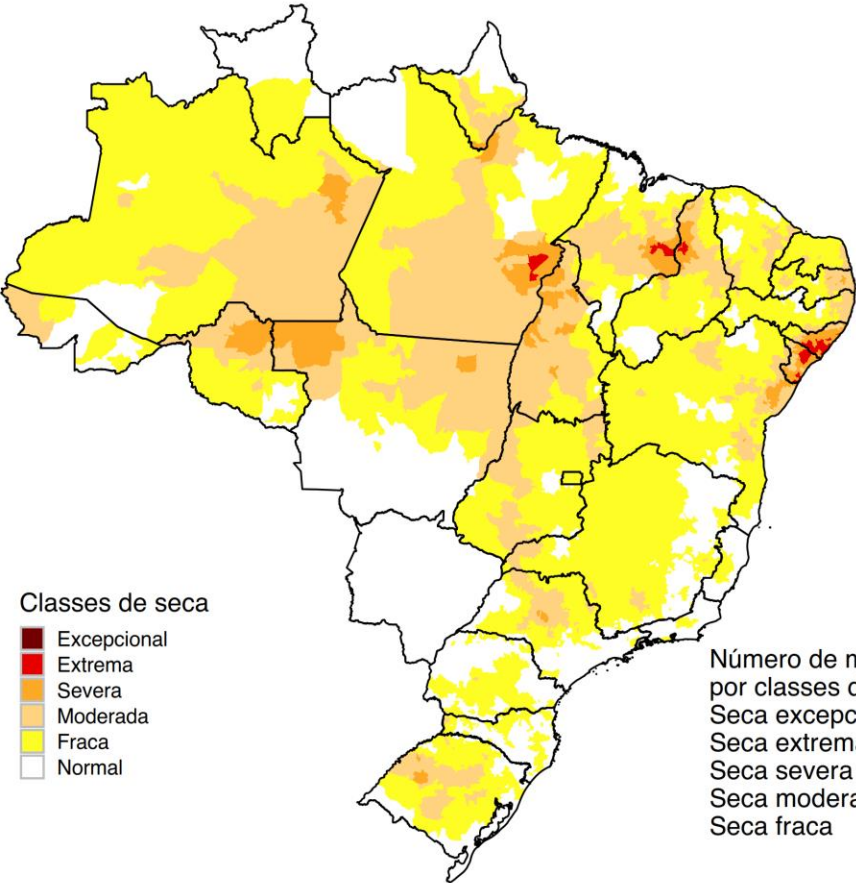
● Impact on watersheds  
for water supply

● Impact on basins for  
fluvial transport

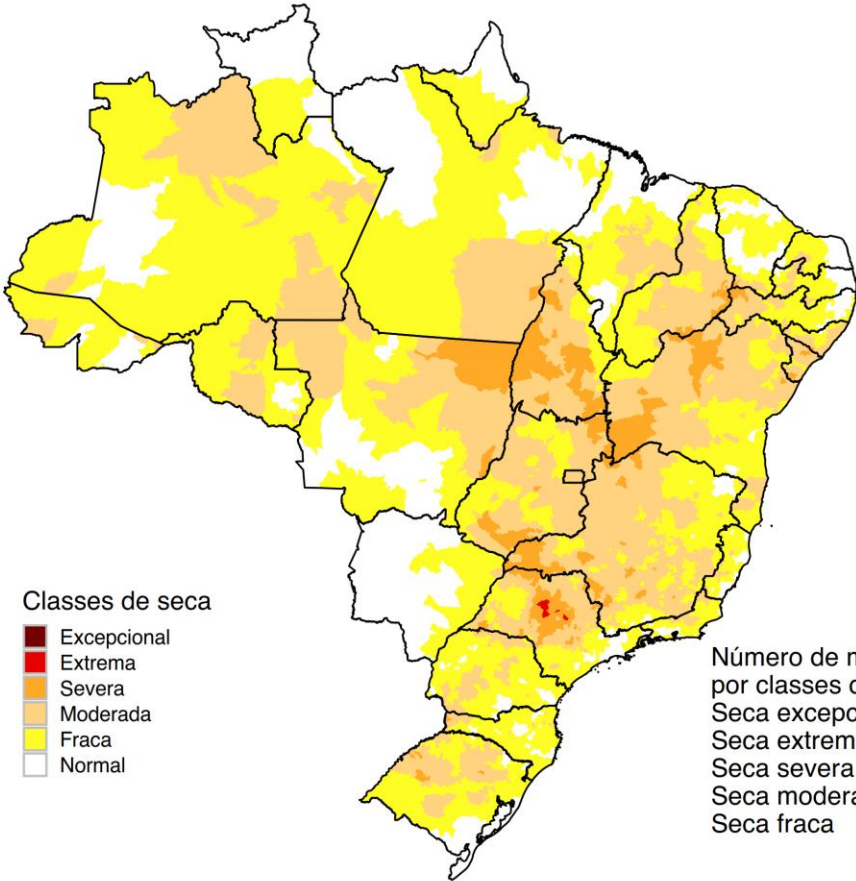
● Short- and Medium-Term Droughts  
● Medium- and Long-Term Droughts

# INTEGRATED DROUGHT INDEX – IDI 1 AND 3 MONTHS

APRIL/2025



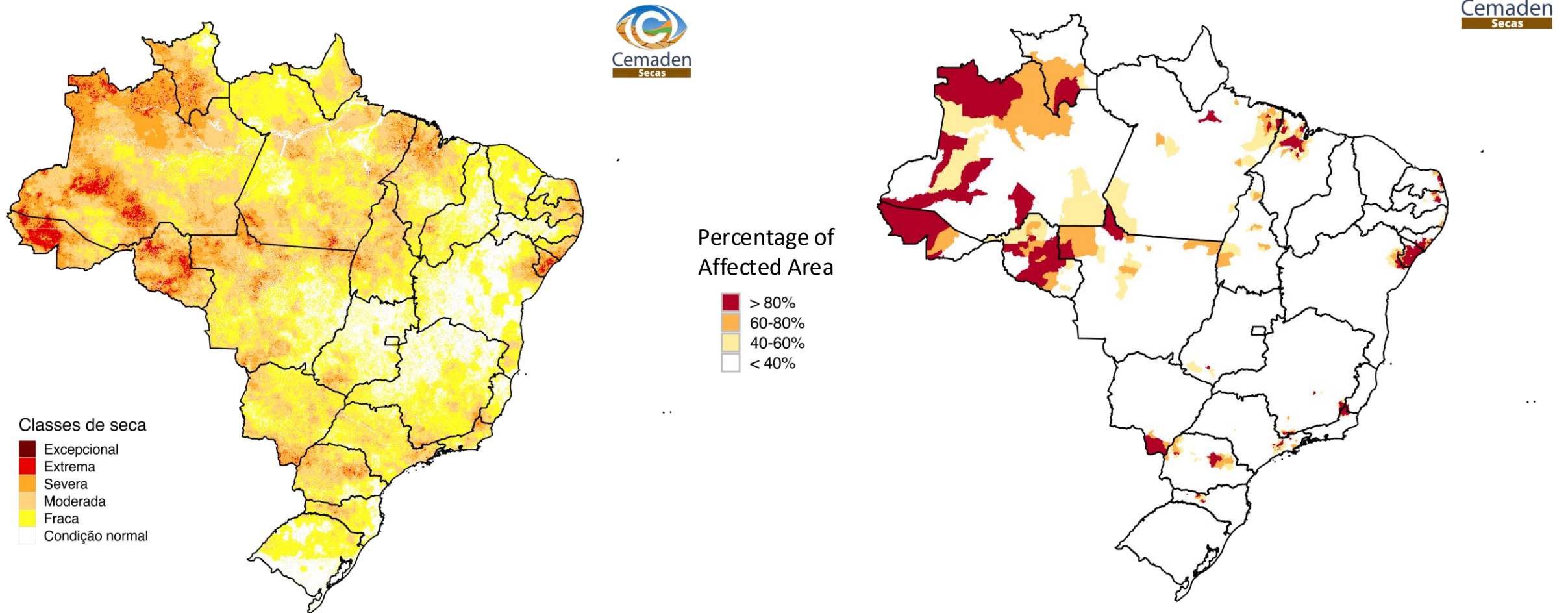
Abril 2025  
Índice Integrado de Seca (SPI1, VHI, US)  
Fonte: Cemaden/MCTI.



Abril 2025  
Índice Integrado de Seca (SPI3, VHI, US)  
Fonte: Cemaden/MCTI.



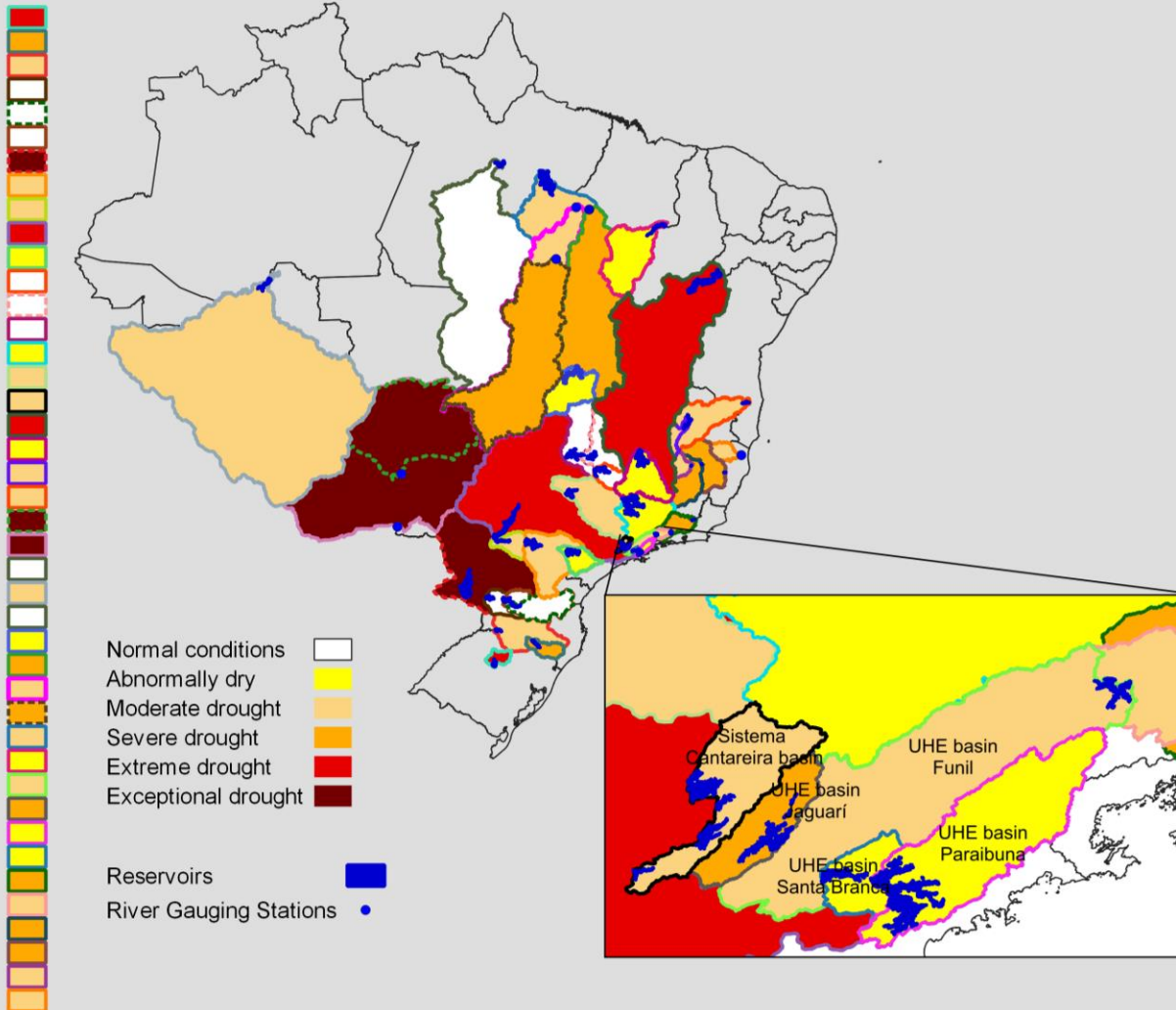
## Droughts Impacts on Agro-productive Areas of Municipalities and Rural Properties



## TWO-VARIATE (PRECIPITATION-STREAMFLOW) STANDARDIZED INDEX - TSI

TSI- April 2025

UHE basin Passo Real  
UHE basin Barra Grande  
UHE basin Foz Chapecó  
UHE basin Salto Caxias  
UHE basin Segredo  
UHE basin Salto Santiago  
UHE basin Itaipu  
UHE basin Capivara  
UHE basin Rosana  
UHE basin Porto Primavera  
UHE basin Jurumirim  
UHE basin Nova Ponte  
UHE basin Emborcação  
UHE basin Itumbiara  
UHE basin Furnas  
UHE basin Marimbondo  
Sistema Cantareira basin  
UHE basin Sobradinho  
UHE basin Três Marias  
UHE basin Jequiti Irapê  
UHE basin Jequiti Itapebi  
Ladário station basin  
Porto Murtinho station basin  
UHE basin Belo Monte  
UHE basin Sto Antônio  
UHE basin Belo Monte  
UHE basin Serra da Mesa  
Descarreto/TO basin (UHE Tucuruí)  
Araguaia basin (UHE Tucuruí)  
Conc. Araguaia basin (UHE Tucuruí)  
UHE basin Tucuruí  
UHE basin Boa Esperança  
UHE basin Funil  
UHE basin Jaguarí  
UHE basin Paraibuna  
UHE basin Santa Branca  
UHE basin Ilha dos Pombos  
UHE basin Santa Cecília  
UHE basin Baguari  
UHE basin Mascarenhas  
UHE basin Porto Estrela  
Boca da Vala station basin



**38 RIVER BASIN MONITORED**  
— EXPANSION UNDERWAY TO  
COVER ALL OF BRAZIL



Water supply



Hydropower



Waterway transport

Data: Precipitation (CHIRPS) and Streamflow (ONS and ANA)

# Applied Research: Technical Support to “Garantia-Safrá Programme”

The Garantia-Safra Programme is an initiative under the **Ministry of Agrarian Development (MDA)** in Brazil. Its primary goal is to provide a financial safety net for smallholder families in municipalities that are systematically affected by severe crop losses due to droughts or excessive rainfall. The program ensures a minimum level of income for farmers facing these adversities, enabling them to sustain their livelihoods during challenging agricultural seasons.

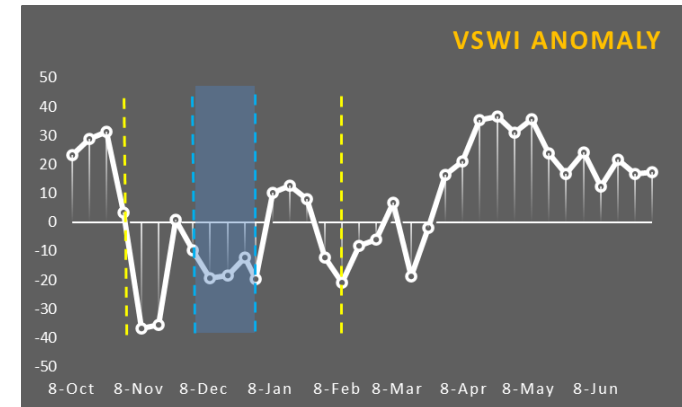
**The Ministry of Agrarian Development (MDA) uses different indicators to assess crop failure in municipalities:**

Sample reports;

Agroclimatic modeling by the National Institute of Meteorology (INMET);

Systematic Survey of Agricultural Production by the Brazilian Institute of Geography and Statistics (IBGE);

Vegetation Water Supply Index (VSWI – 250m) by CEMADEN/MCTI.



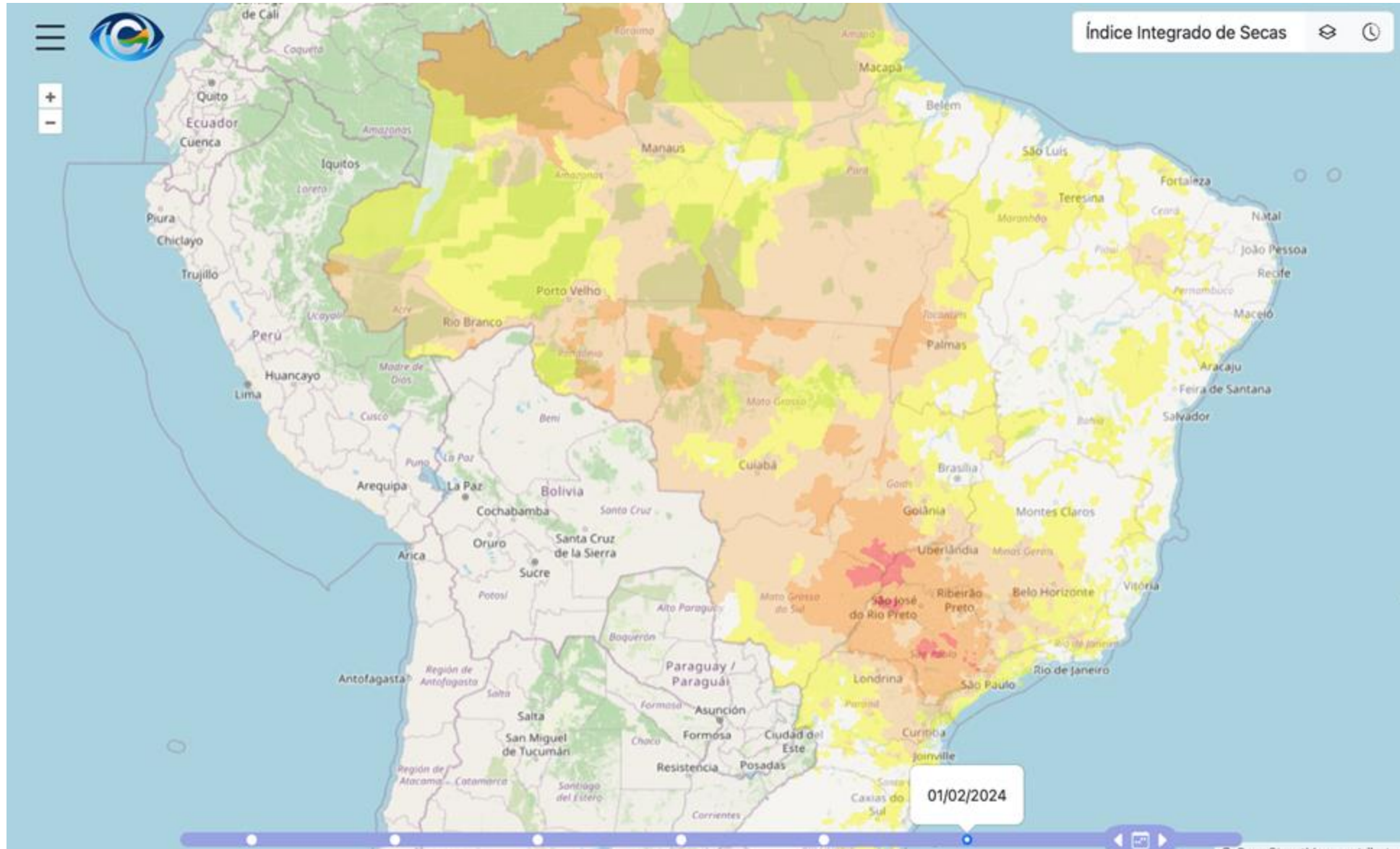
Verification by municipality according to crop period



If the VSWI indicates drought condition during the critical period: possibility of reducing the agricultural yield



# INTERACTIVE MAP OF DROUGHT IN BRAZIL



<https://mapasecas.cemaden.gov.br>



# COMMUNICATION OF HYDROLOGICAL DROUGHT RISK

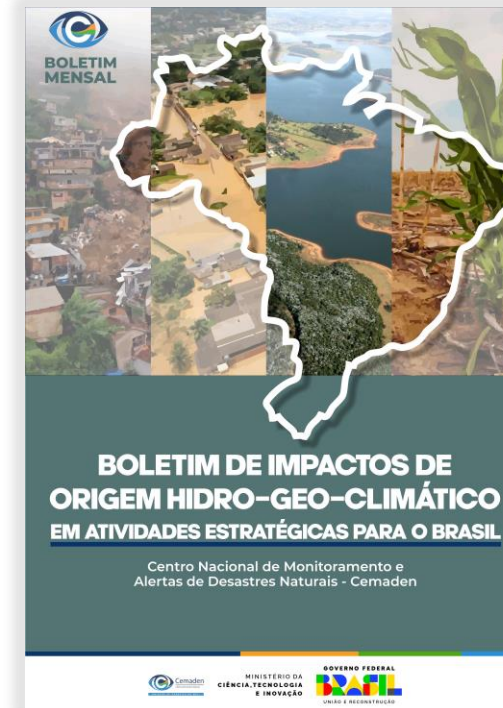
- Monthly Briefings and Bulletins on Hydro-Geo-Climatic Extreme Events and Their Impacts on Brazil's Strategic Activities.
- Situation and Monitoring Room Meetings of the National Water and Basic Sanitation Agency (ANA)
- Monthly bulletins

<https://www.gov.br/cemaden/pt-br/assuntos/monitoramento/>

## USERS



State Water  
Agencies





**Thank you!**

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