AMAZON WEEK

Science Panel for the Amazon
THE AMAZON WE WANT

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**Centro Nacional de Monitoramento e Alertas de Desastres Naturais**

**Theme : Just Transition in Amazon**

## Amazon Connectivity, Climate extremes and disasters

Dr. Jose A. Marengo
(jose.marengo@cemaden.gov.br)

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Cemaden
UNIDADE DE PESQUISA DO MCTI

MINISTÉRIO DA CIÊNCIA, TECNOLOGIA E INOVAÇÃO

GOVERNO DO BRASIL
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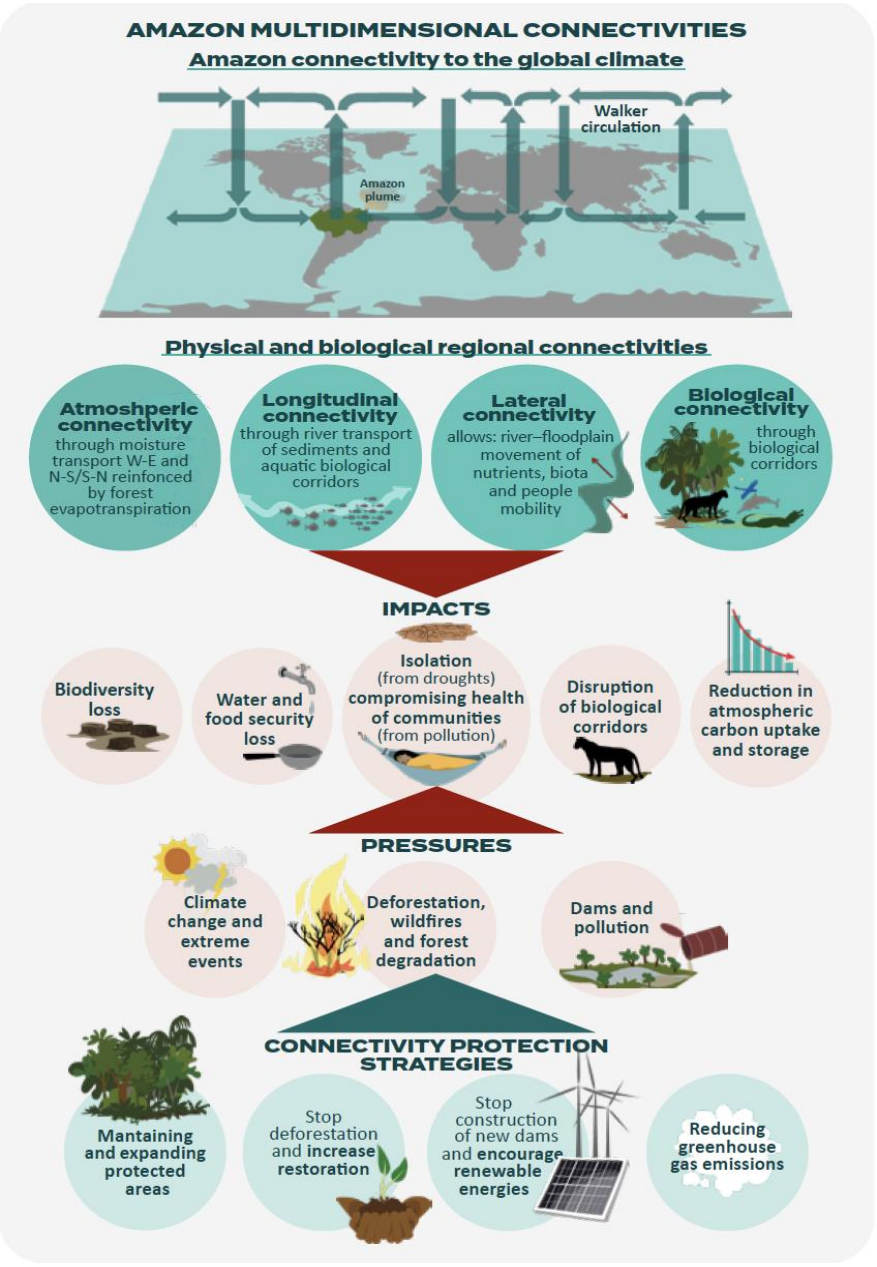
SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK
A GLOBAL INITIATIVE FOR THE UNITED NATIONS

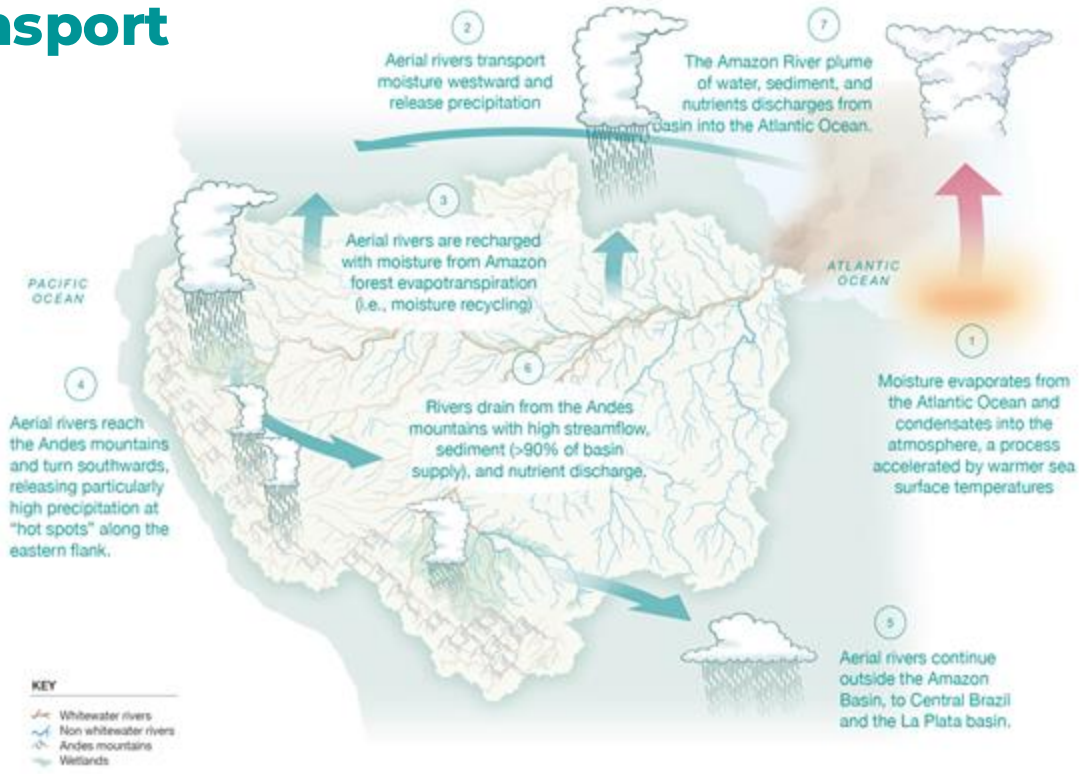
# Connections across the Amazon




- Increases in deforestation, extreme wildfires, and the frequency of compound drought-heat events.
- These changes exacerbate the climate crisis at local, regional, and global scales
- Amazonian connectivity is compromised
- The Amazon's climate both influences and is influenced by large-scale atmospheric phenomena
- The Amazon forest sustains other biomes and economic activities for regions
- Decreased river connectivity during extreme droughts determines isolation, food and water security
- Need to prevent further degradation to avoid risk of approaching critical environmental thresholds

# Amazon and moisture transport

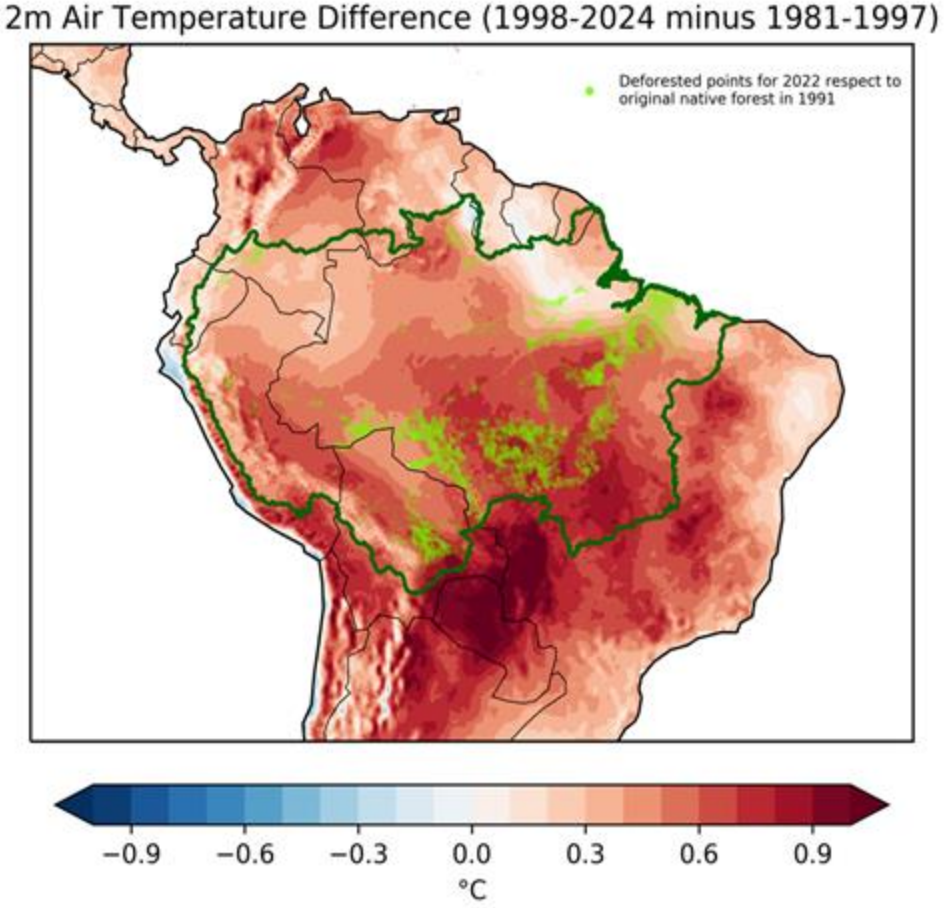
- Connectivity between Amazonia and regional climate system.
- Aerial rivers: N-S and W-E connectivity from Tropical Atlantic-Amazon-Orinoco-Andes-La Plata basin
- Aquatic and terrestrial connections: W-E connectivity from the Andes to the Atlantic
- Threats to the Amazon and promoting resilience



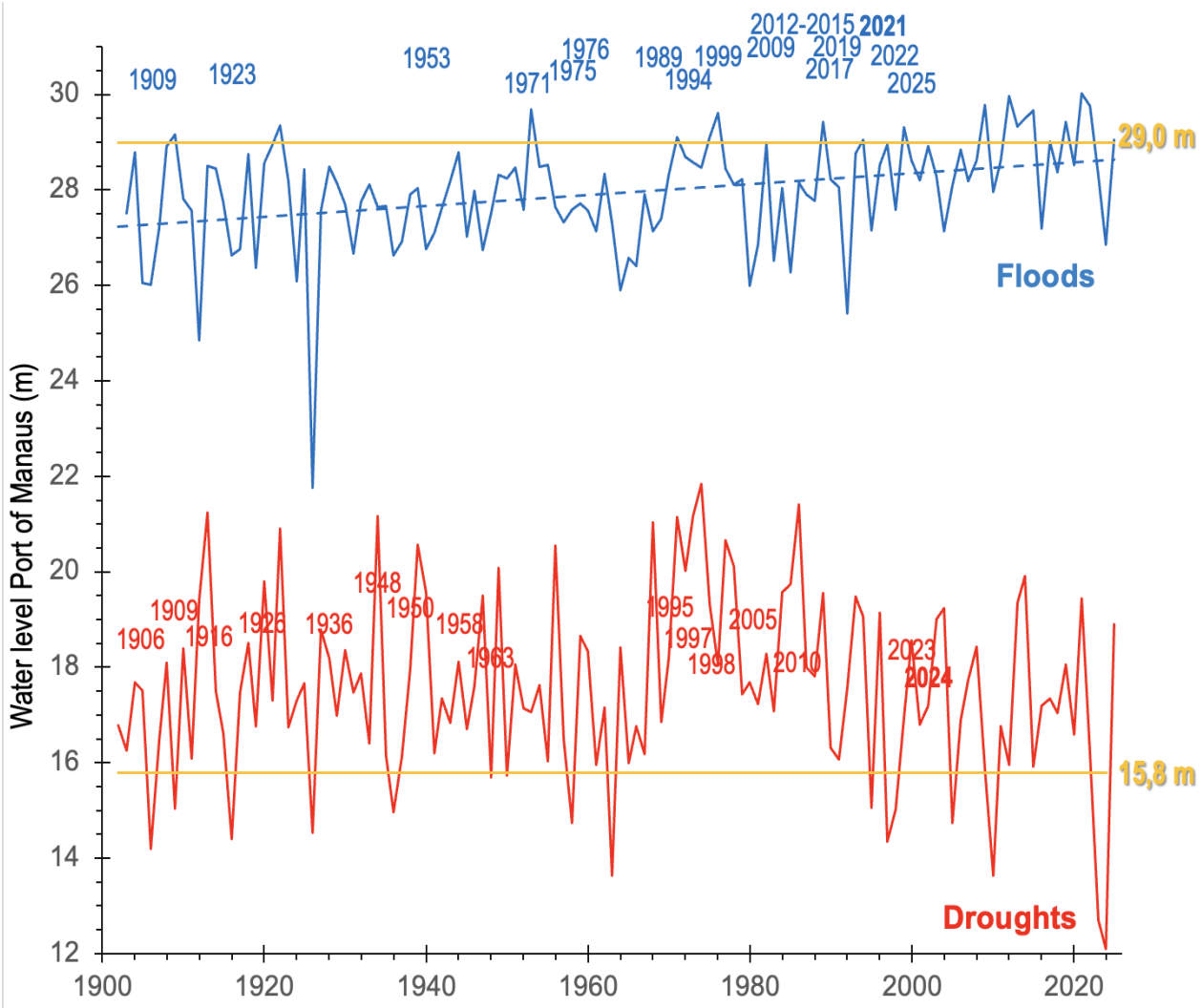

Key processes along the Andean-Amazon-Atlantic (AAA) hydroclimate pathway, reflecting how the regional water cycle is linked through continental hydrology, moving water vapor by the trade winds from the tropical Atlantic to the Amazon and the Andes (N-S connectivity) and then from the Andes to southern Amazon and the La Plata basin (E-W connectivity), through regional-scale atmospheric circulation by the aerial rivers east of the Andes. (Source: Beveridge et al[1])

# Deforestation, climate change and warming

- There is now evidence of large-scale loss of resilience of the Amazon forest since the early 2000's with faster resilience being lost in drier regions and in less remote areas with increased human land use.
- Thus, in the driest and most deforested areas of the Amazon, the warming trend is intensified.
- There is a risk that the large area (38%) of the already degraded Amazon forest, due to extreme drought, fire, logging and edge effects, remains in a degraded state due to feedbacks with climate, biotic and abiotic factors and processes such as fire.



# Drought in Amazonia

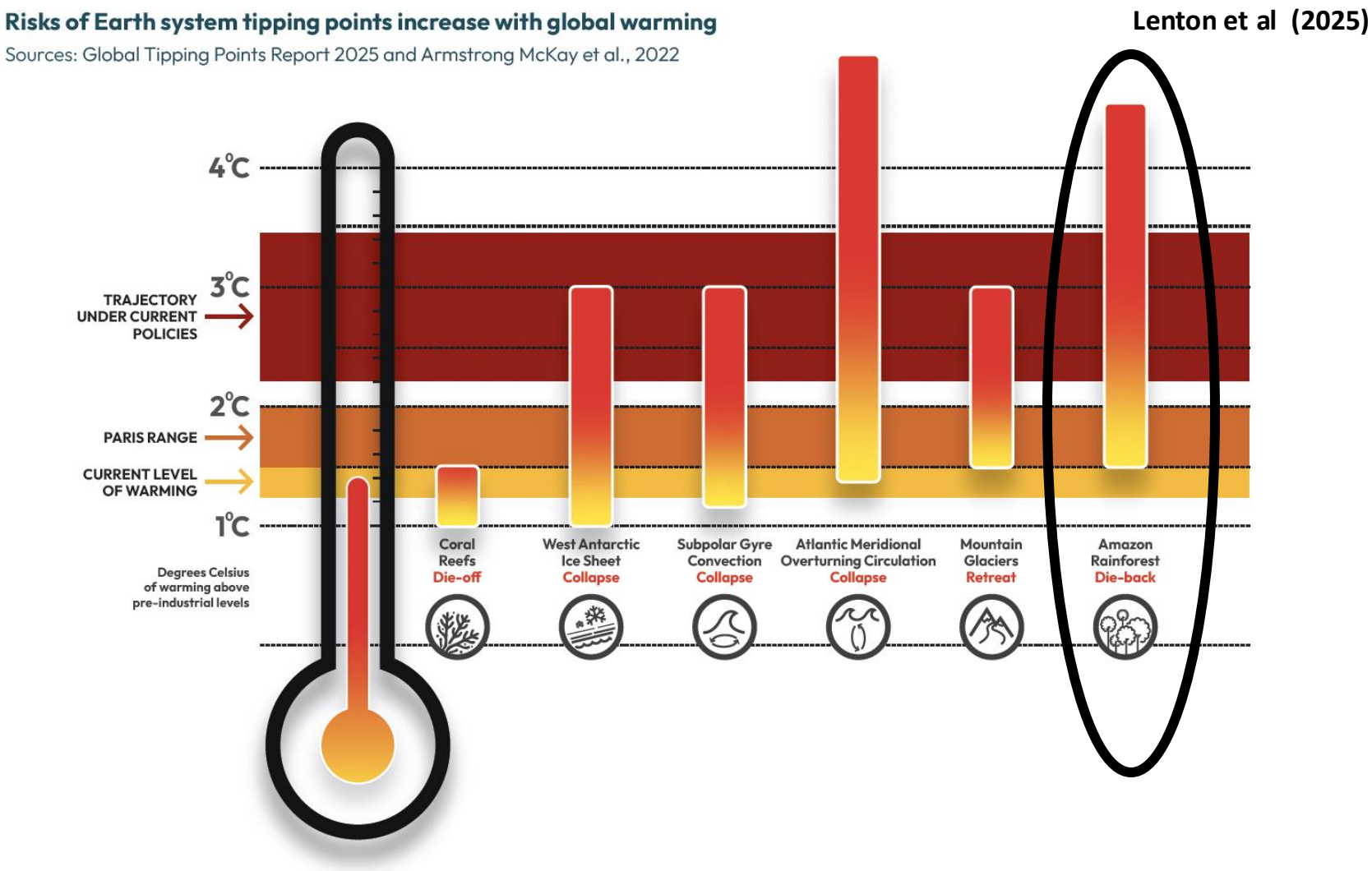



The Amazon rainforest has faced years of intense drought, **warm TNA or El Niño-induced drought (2005, 2010, 2015-16, 2023-24) and the combined effects of deforestation and climate change put it at risk below 2°C of global warming (climate change).**

During past El Niño Years, the Amazon region was affected by severe droughr and inten se heat waves, and in some regions, as in eastsren Amazon ia, the forest behave as source of CO2. During La Nina years the forest recovered its role as sink of CO2 (clima variability)

**Marengo et al (2024, 2025)**

# Risk of Amazon tipping points




Lenton et al (2025)

# Amazon forest dieback

Lenton et al (2025)


TNA

# Key messages from the SPA (2025)

- The Amazon forest is a complex system of extremely rich and interconnected ecosystems and human cultures that contributes to the well-being of people regionally and globally.

- The Amazon forest also allows other biomes and economic activities to thrive in regions by means of atmospheric moisture transport by the “aerial rivers” to the Pantanal wetlands and the La Plata River basin and the Orinoco and Magdalena River basins (N-S connectivity) and other regions, such as the Northeast region of Brazil which is connected to the Amazon’s hydroclimatic system Andes-to-Amazon connectivity (W-E connectivity)—facilitated by rivers.

- Many of the rivers in the Amazon Basin act as conduits for sediment and nutrient transport and aquatic species migration. These systems have also allowed cultural exchange and the development and maintenance of the livelihoods of millions of riverine people for millennia. Andean-origin rivers contribute roughly half of the Amazon mainstem’s annual flow and export massive quantities of sediment, organic matter, and nutrients.

# Recommendations

- Preserving the Amazon ecosystem ensures its role as a continental-scale corridor, connecting the Andes, Cerrado, and other biomes, facilitating species migration and adaptation to climatic and anthropogenic pressures. This connectivity is crucial for maintaining biodiversity, ecological functions, and the stability of the region's carbon and hydrological cycles.
- Protecting river connectivity between the Andes and the Amazon is essential for preserving ecosystems and cultural heritage. Safeguarding Andean rivers will help sustain biodiversity, cultural exchange, and livelihoods. The disruption, fragmentation or complete loss of this vital connection implies a cascading effect that diminishes the stability of many species' populations and the maintenance of ecological functions.
- Recognize the importance and maintain Indigenous territories and protected areas in Amazonia that are crucial for regional connectivity. Amazon Indigenous Lands sustain rainfall that supports 80% of southern Amazonia's agriculture, with up to 30% of this precipitation directly linked to their water recycling. This moisture, transported by aerial rivers, plays a vital role in agriculture and food security.