

Monitoring peatland degradation: the case study of the Okavango River Delta, Botswana



Rosa Maria Roman-Cuesta, Thomas Gumbricht
Indonesian Pavilion, 9th November, COP23, Bonn

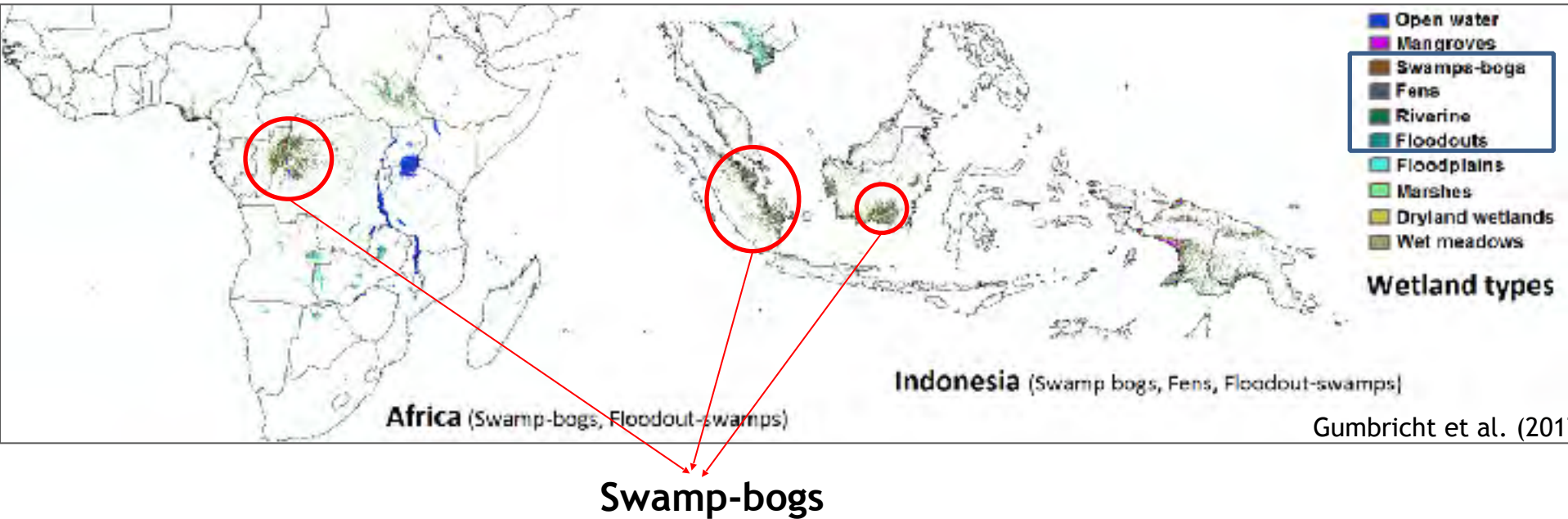
Karttur AB

Pantropical wetlands map: peatlands



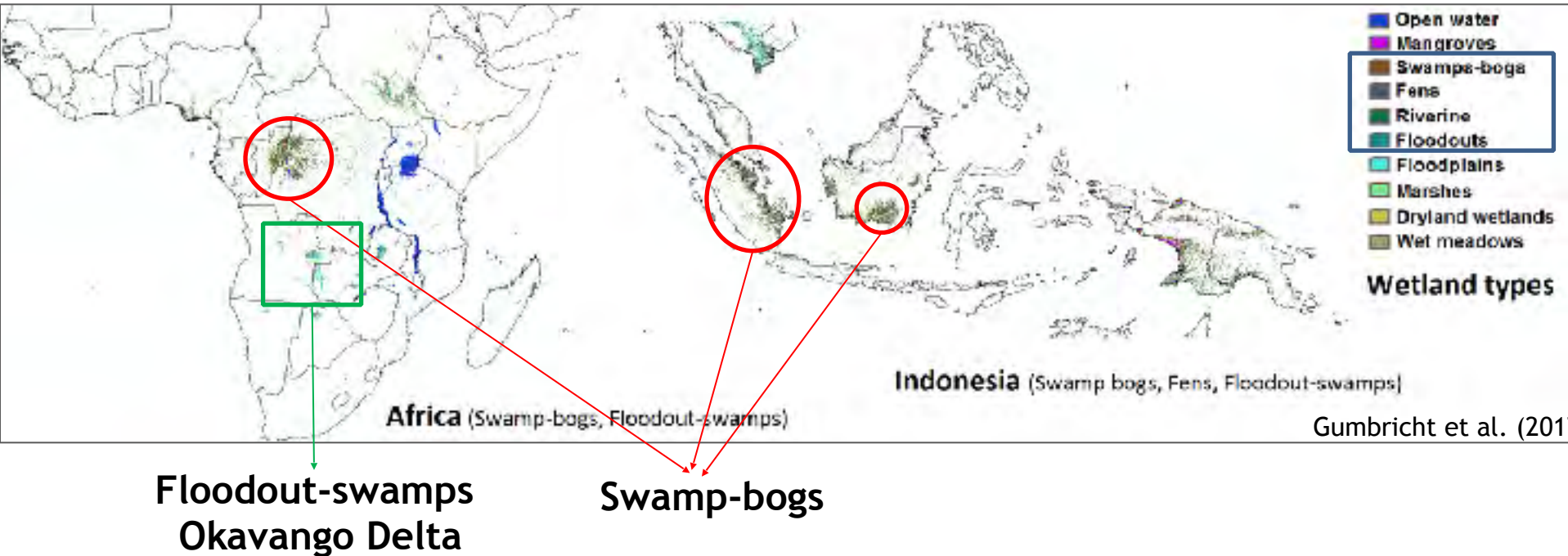
- There are different types of peatlands (swamp-bogs, fens, riverine, floodout-swamps): anaerobic conditions prevail long enough to promote peat formation.
- Degradation/restoration processes differ.
- Peatland changes all relate to a balance between **water availability** vs **soil moisture**.

Pantropical wetlands map: peatlands



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Pantropical wetlands map: peatlands

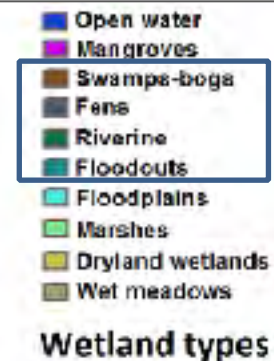
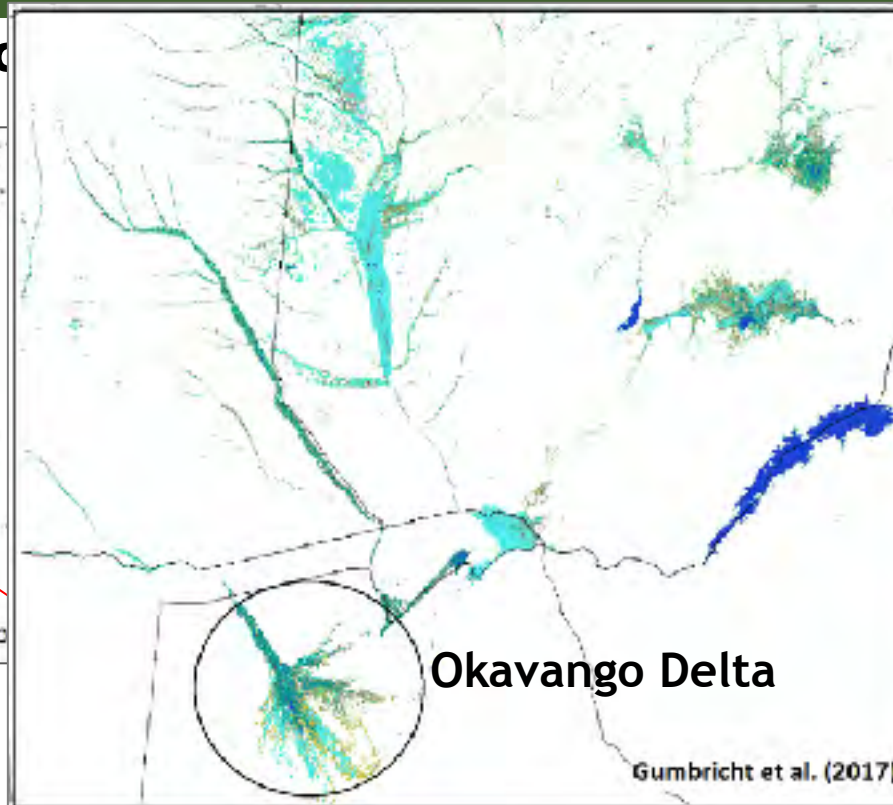


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Pantropic



Floodout-swamps
Okavango Delta



[swamps]
Gumbricht et al. (2017)

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The Okavango River Delta case study



- A very large, swampy inland delta with marked seasonality (UNESCO world heritage).
- All the water reaching the Delta is ultimately evaporated and transpired.
- Each year approximately 11 cubic kilometers of water spreads over the 15,000 km² area.

The Okavango River Delta case study



Floodout water supply:
Two rivers originating in southern Angola supply nearly all the water that flows into Botswana's Okavango Delta (Cuito River and Cubango River)

Threats:

- ✓ **Conservation of water supply sources:**
 - Cubango River is affected by fast development and poor management.
 - Rainfall variability
- ✓ **Extensive human-set fires** in the delta and catchment area.

<https://www.nationalgeographic.org/projects/okavango/water>

Monitoring peatland degradation

- The focus is on peat soil changes, rather than on peatland forest ecosystems
- Disaggregation between climate variability (drought/enhanced flooding) and human action (drainage/rewetting/fire)
- **Peatland degradation**: soil moisture decreases independently of rainfall trends.
- **Peatland regeneration**: soil moisture increases independently of rainfall trends.



Rainfall trends:
TRMM satellite
data

Moisture trends: MODIS satellite data
(soil reflection calibrated with ground
moisture)

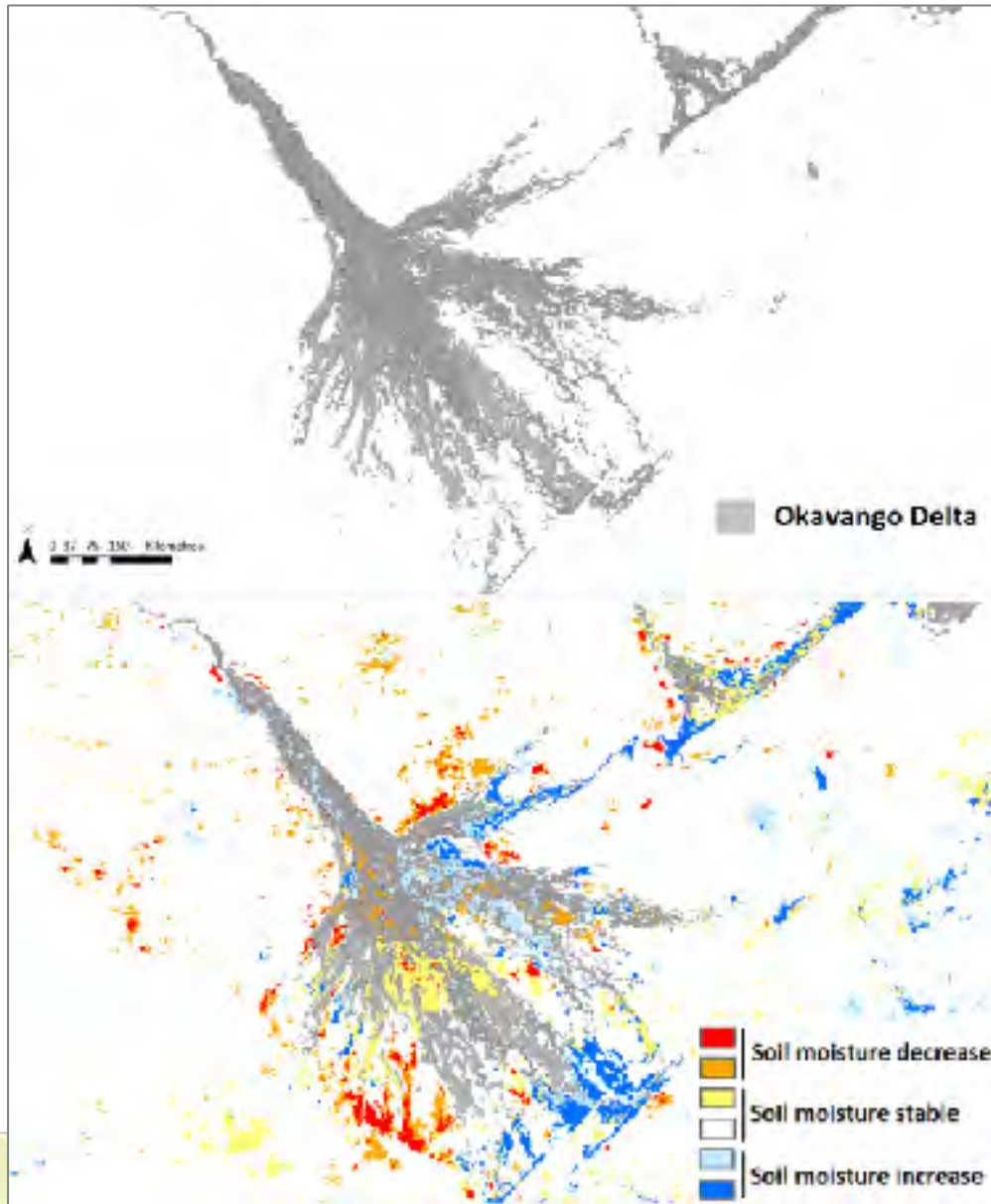
Trend relation between
rainfall and soil moisture



TWI (SOIL MOISTURE)

		Decrease	No change	Increase
RNTWI (RAINFALL)	Decrease	1	2	X
	No change	4	5	6
	Increase	7	8	9

Monitoring peatland degradation in Okavango(2001-2016)



- Increased soil moisture-rainfall trend in the southern and eastern sides of the Okavango River Delta
- Decreased soil moisture-rainfall trend in the western sides
- Research on drivers: ground validation of fire, rainfall, and drainage, and effect Peat status.



<https://www.nationalgeographic.org/projects/okavango/>

- **National Geographic Expeditions** (annually since 2015-present) to understand the ecology and threats of the Okavango River Delta and Catchment area.
- **Research on Water, Biodiversity, and Human communities** in the area.
- **Identification of threats:** fire among the most extended problems. Poor management and unsustainable development
- **Relevant findings:** new species of flora and fauna, and **peat** in the Cuito River and supply Lakes

Next steps

- Validating Okavango peat trends (i.e. cooperation with National Geographic funded researchers and data access)
- Expanding research to Indonesia and Peru case studies.
- Developing a pantropical map of peatland degradation/regeneration





Questions



<https://www.nationalgeographic.org/projects/okavango/>