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THE HYDROLOGICAL PARADOX OF PEATLANDS: Mapping Flood Vulnerability In Indonesia's Drying Peatlands

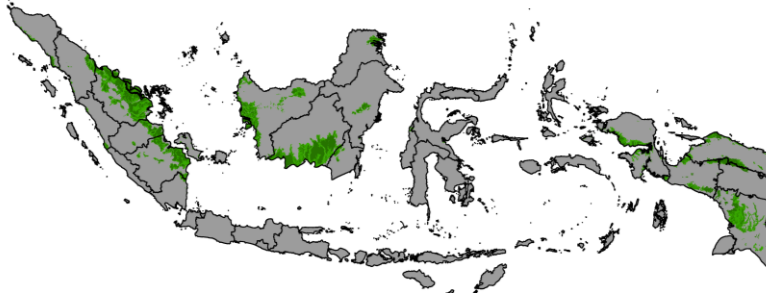
*Juma Maulana,
Salsabila K, Ryan P, Agiel P, Wahyu P, Iola A,*

Email: *Juma.maulana@pantaugambut.id*



Background

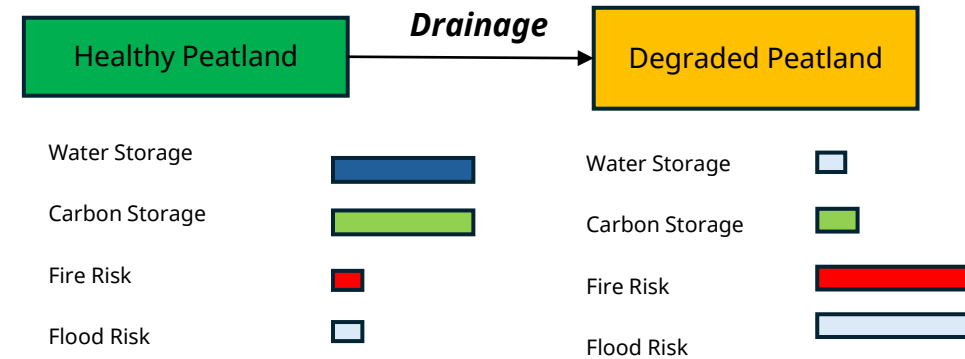
Indonesia's Largest Tropical Peatland 24.2 Million Hectares



- In Indonesia, peatland degradation is commonly associated with fires, but **flooding** is another major **disaster**, especially during the rainy season.
- Degraded peatlands can **become irreversibly dry**, which reduces their ability to absorb and retain water like healthy peatlands. When heavy rainfall occurs, this condition can increase **surface runoff** and eventually lead to **flooding**.

Why do degraded peatlands become more flood-prone?

Peatlands naturally function as large water reservoirs that absorb, store, and gradually release rainfall. However, drainage and land conversion fundamentally alter this hydrological system.



Natural Peatland (Wet Ecosystem)

- High water table
- High water storage
- Slow water release
- Natural flood buffer

Human Activities

- Drainage & canalization
- Deforestation
- Plantation expansion
- Land conversion

Peatland Degradation

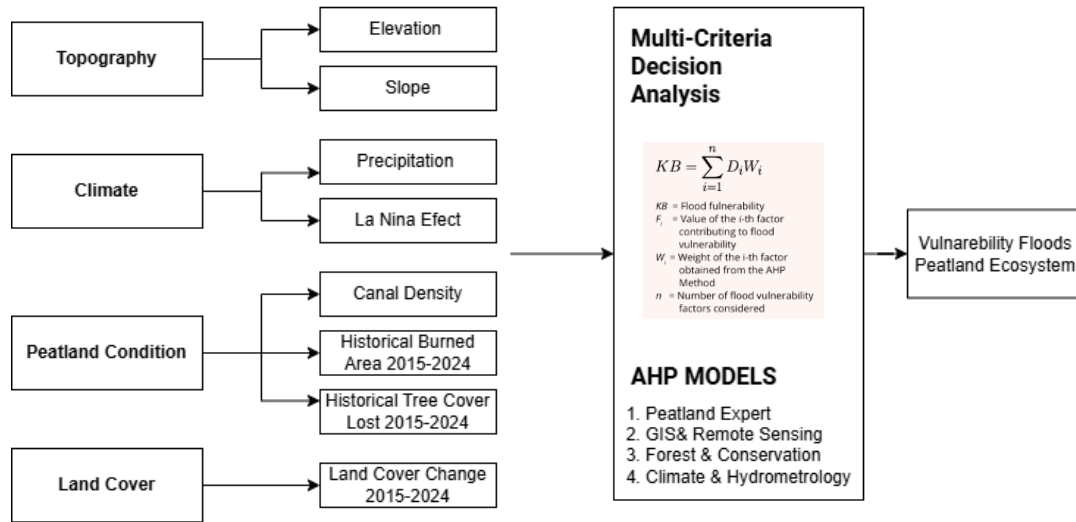
- Peat oxidation
- Subsidence
- Irreversible drying
- Hydrological disruption

Hydrological Consequences

- ↓ Water retention capacity
- ↑ Surface runoff
- ↑ Flood vulnerability



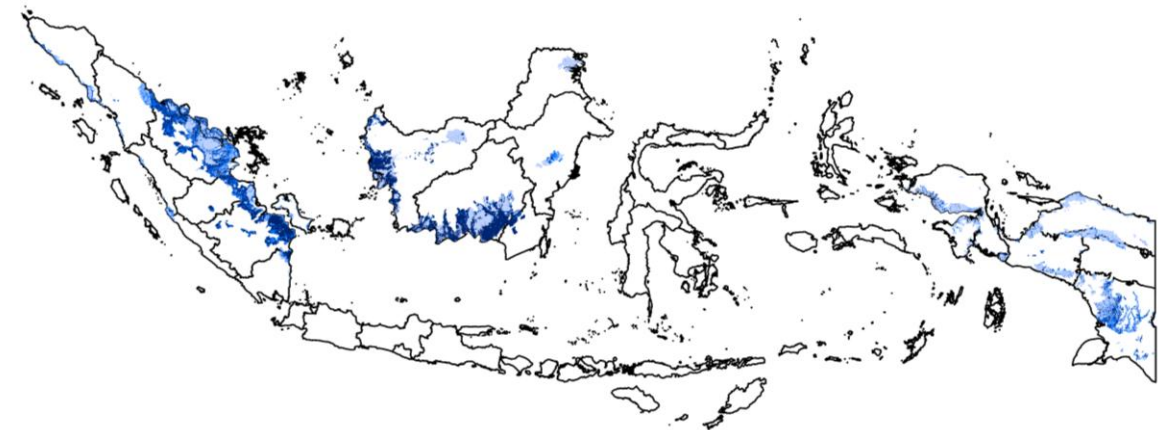
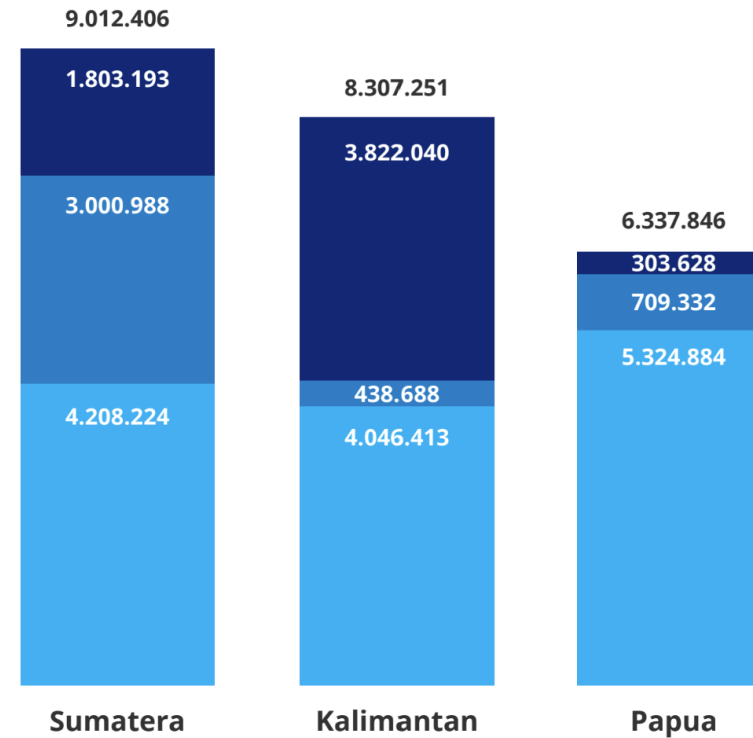
Method



- This research considers only **physical and environmental factors**.
- The analysis was conducted in **three regions** with extensive peatland distribution, as each region has unique topography, climate, and peatland conditions.
- The analysis uses an **expert adjustment approach**, with factor weighting calculated using the **AHP model**, followed by parameter weighting and spatial overlay using **MCDA**.

Results

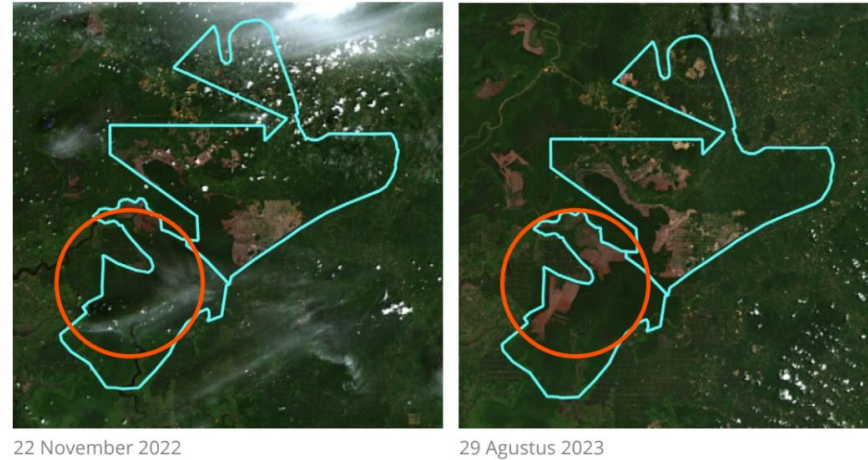
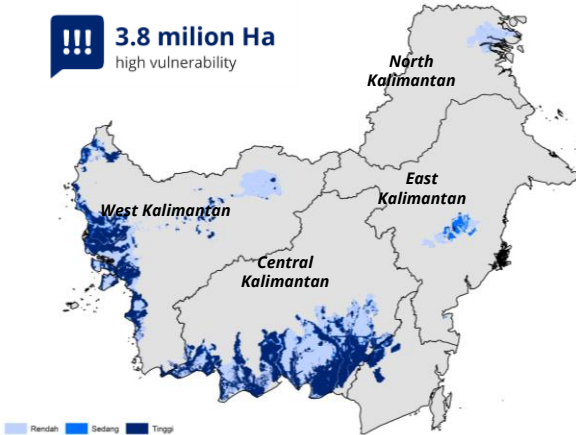
6 million hectares of peat ecosystems have high flood vulnerability



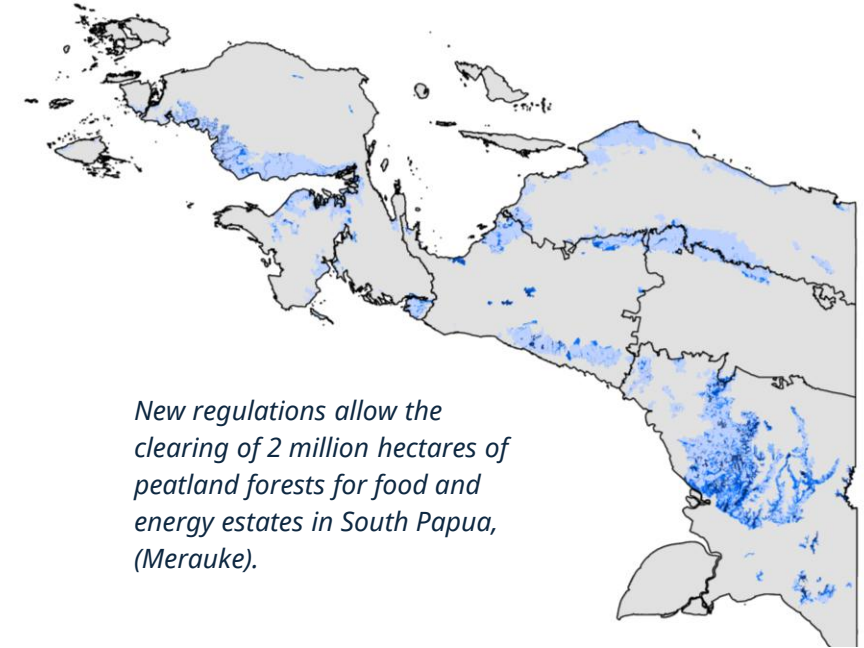
High vulnerability Medium vulnerability Low vulnerability

Flood vulnerability is not controlled by rainfall, but by long-term degradation of peat hydrological systems

The Greatest Vulnerability



The last remaining tropical virgin peatlands in Indonesia are now being degraded. 😞



New regulations allow the clearing of 2 million hectares of peatland forests for food and energy estates in South Papua, (Merauke).

M news - Mongabay

World's biggest deforestation project gets underway in Papua for sugarcane

A total of 2 million hectares (5 million acres) of forests, wetlands and grasslands in Merauke district will be razed to make way for a cluster of giant...

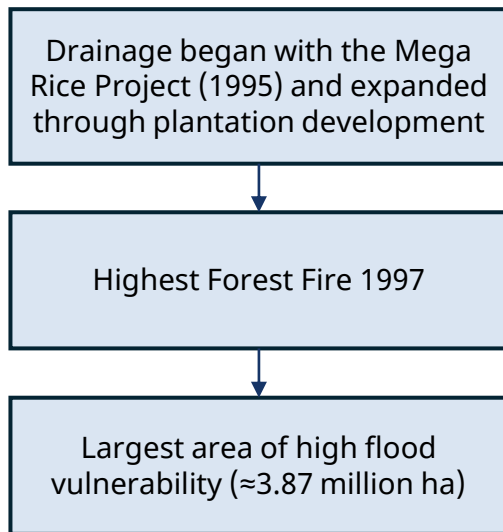
19 Sept 2024



After 2023, deforestation in peatlands in West Kalimantan may have increased the risk of recurring floods during the rainy seasons of 2024 and 2025

Historical degradation

Consequence



Contact

If you need further guidance or consultation, please contact us at:

Website : pantaugambut.id
Email : ask@pantaugambut.id
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