

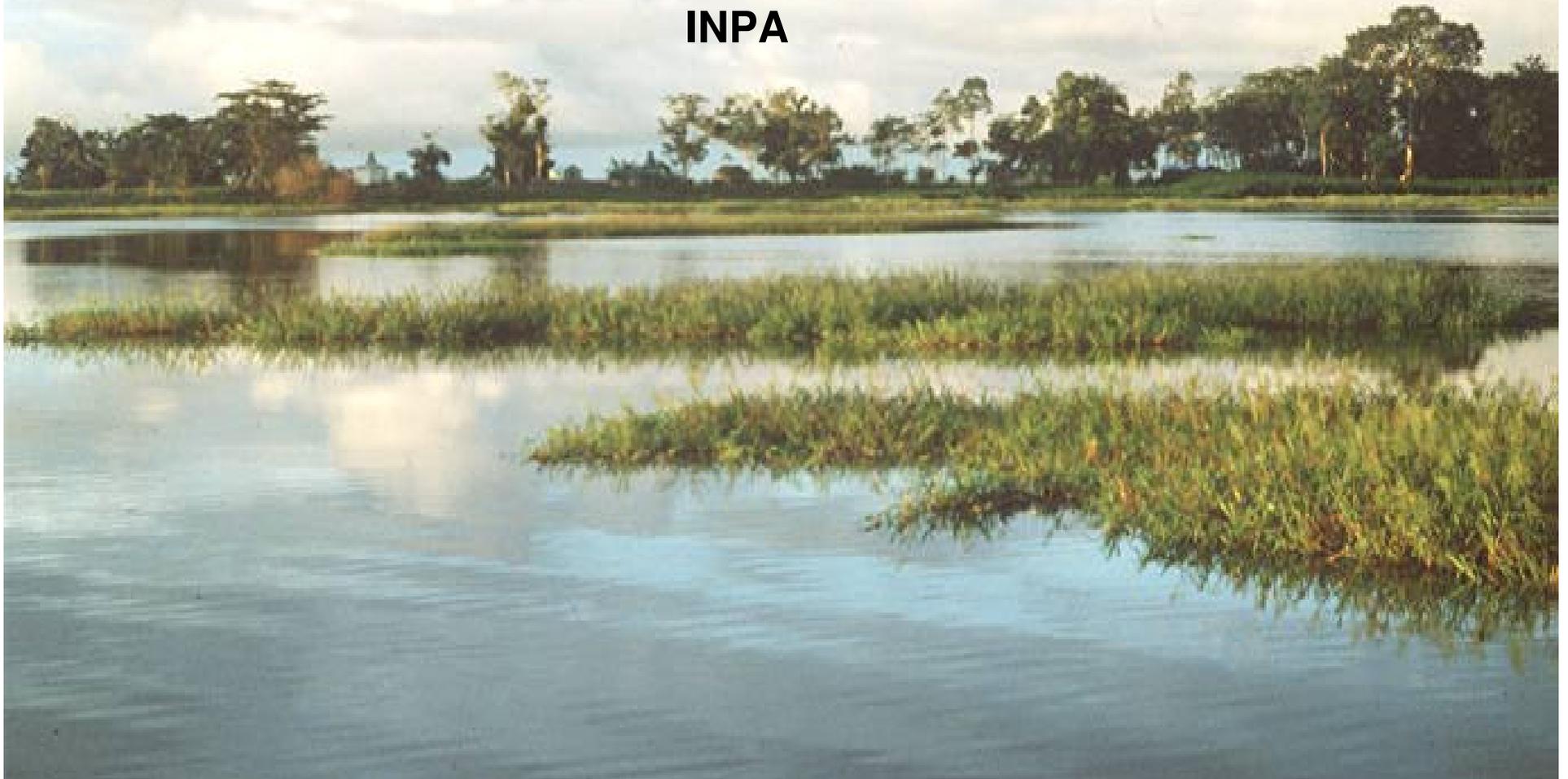
Carbon dynamics on Amazon floodplains

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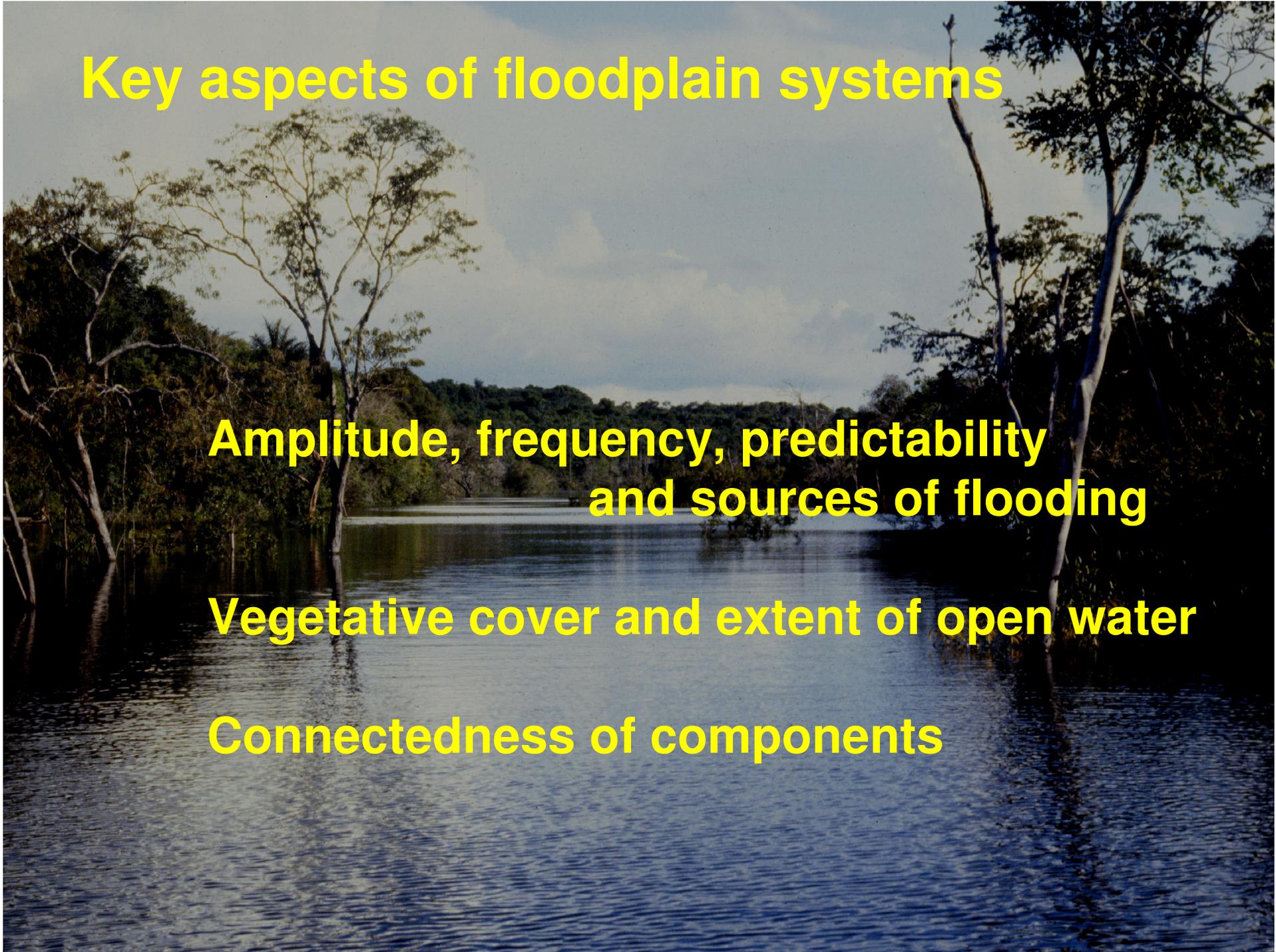


Key aspects of floodplain systems

**Amplitude, frequency, predictability
and sources of flooding**

Vegetative cover and extent of open water

Connectedness of components



Flooded forest, woodland and shrubs

Upper and lower left: high water

Lower right: low water



Aquatic macrophytes



Upper and lower left: high water
Lower center and right: low water



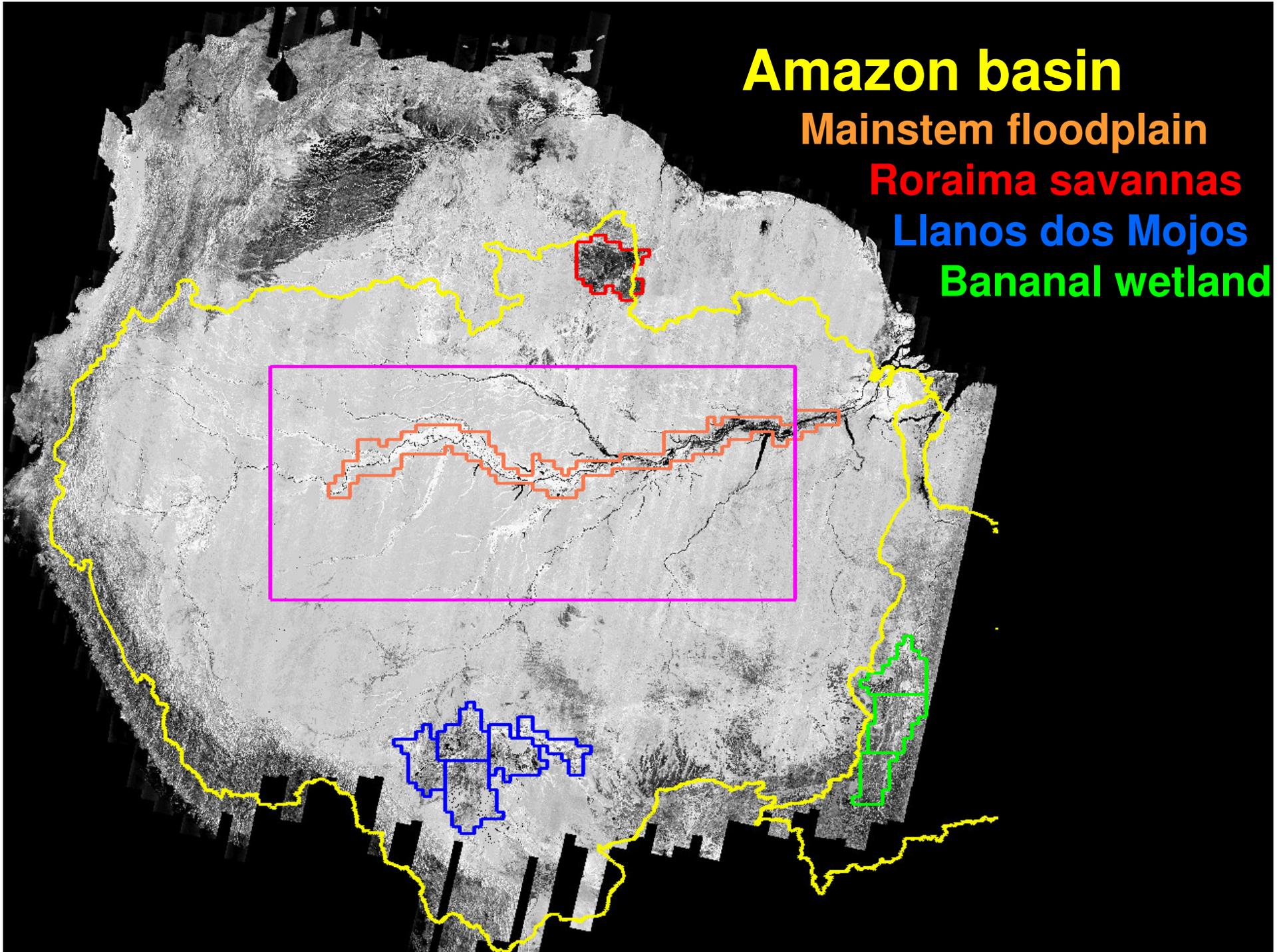
Amazon basin

Mainstem floodplain

Roraima savannas

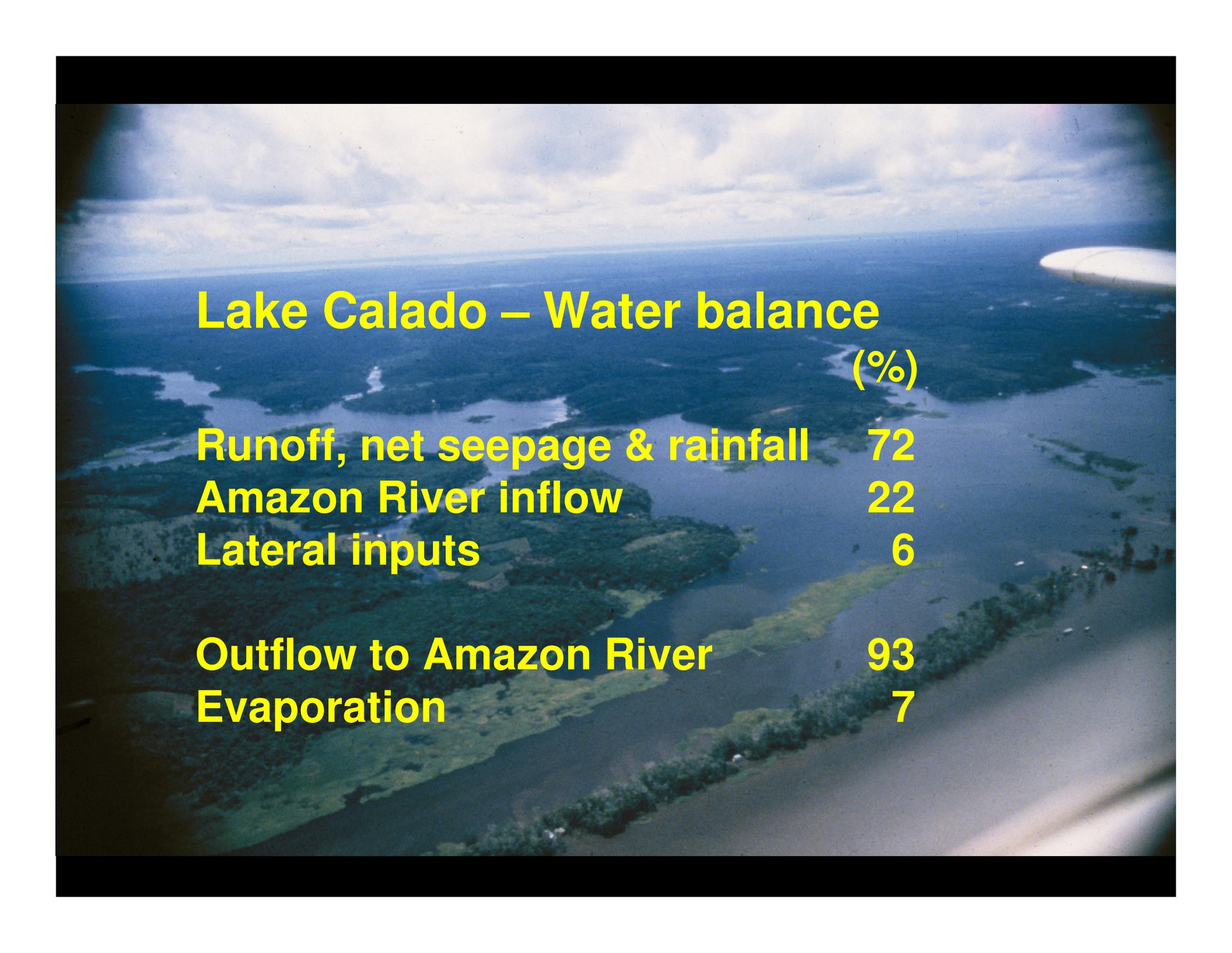
Llanos dos Mojos

Bananal wetland



Lake Calado

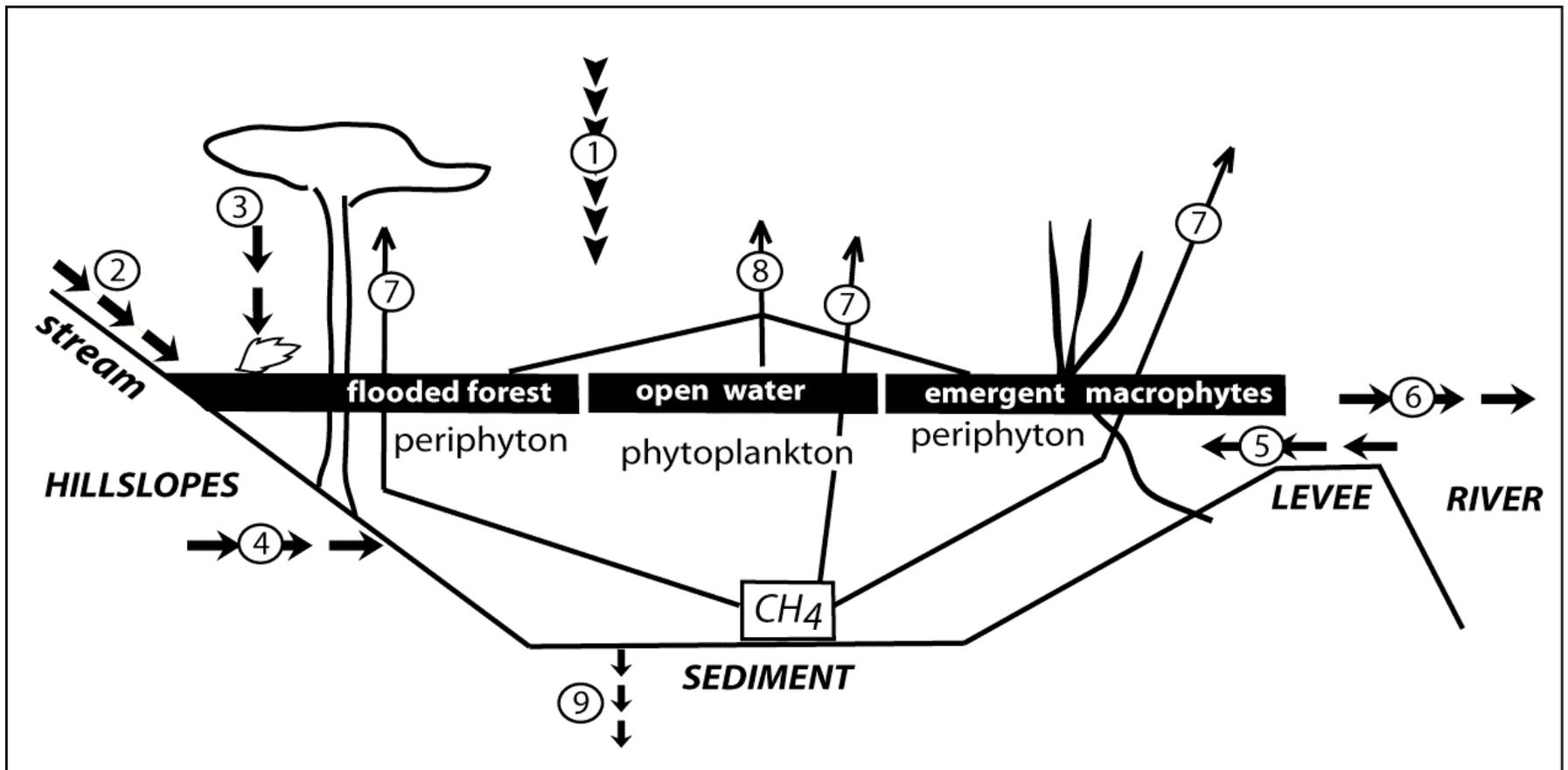


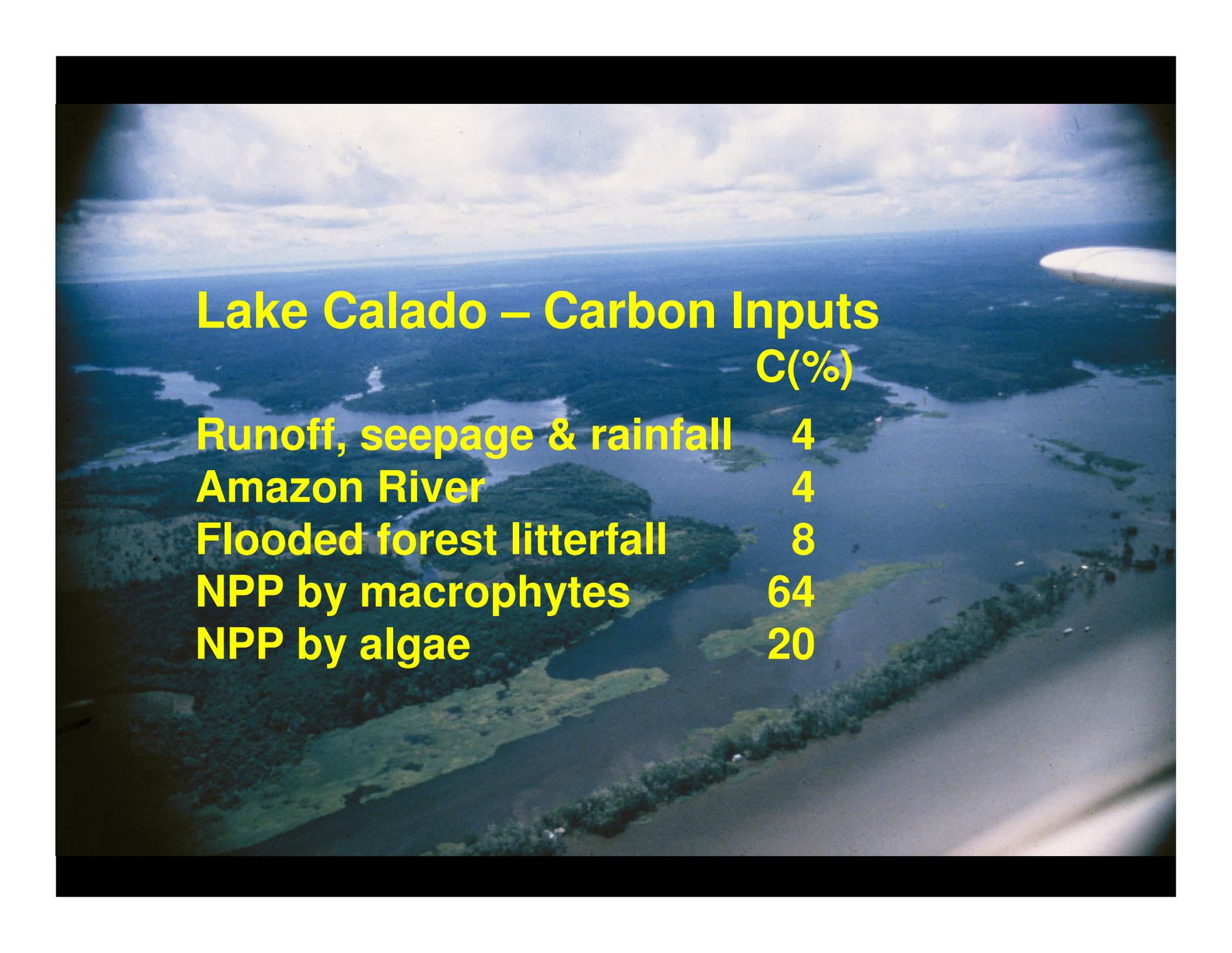
An aerial photograph of a large, dark blue lake system, likely Lake Calado, surrounded by green forested land. The sky is overcast with grey clouds. A white wing of an aircraft is visible in the upper right corner. Overlaid on the image is a table with yellow text providing water balance data for the lake.

Lake Calado – Water balance

	(%)
Runoff, net seepage & rainfall	72
Amazon River inflow	22
Lateral inputs	6
Outflow to Amazon River	93
Evaporation	7

Inputs and outputs of organic carbon

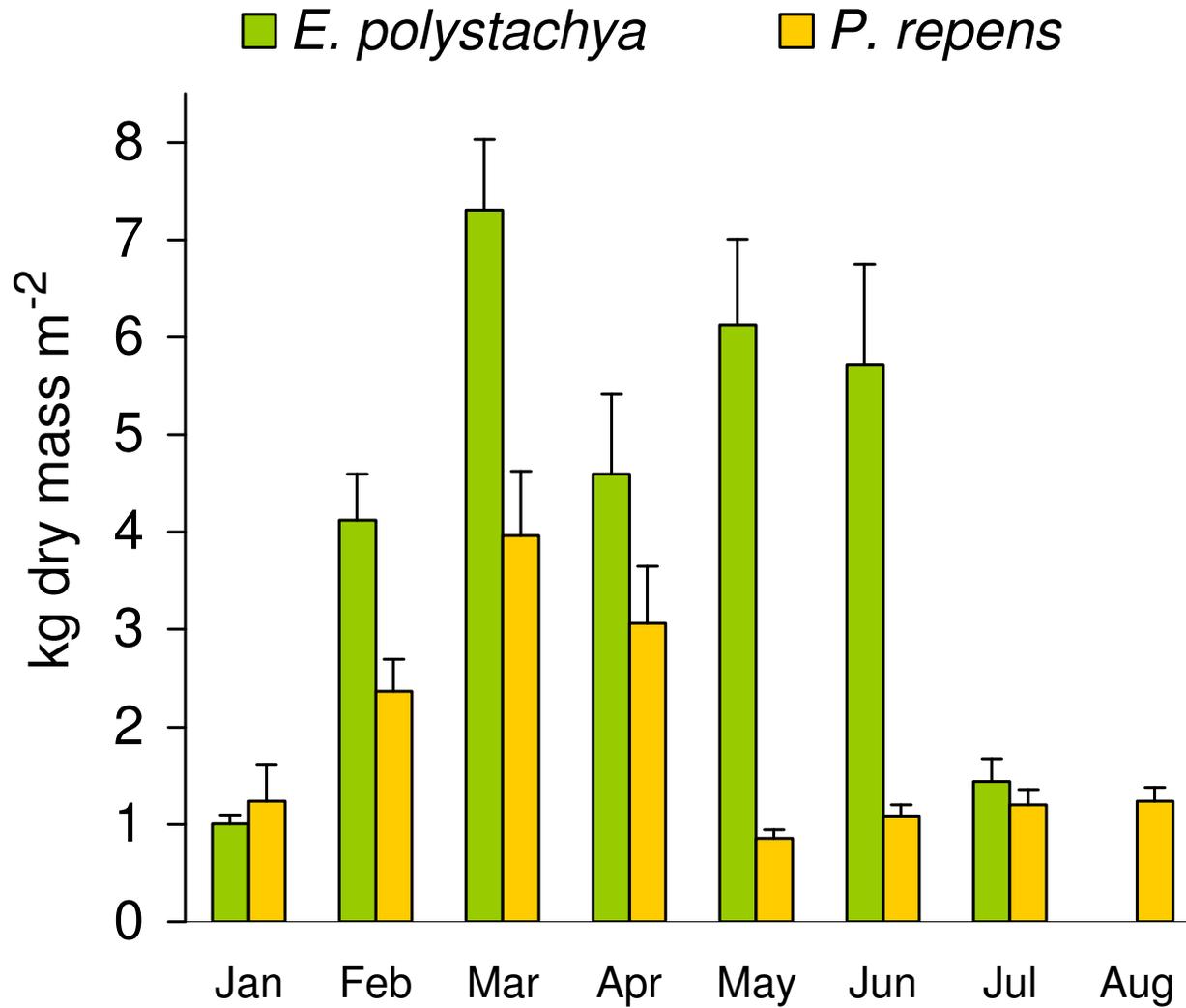


An aerial photograph of a large, dark blue lake system with numerous smaller channels and islands. The surrounding land is green and forested. The sky is overcast with grey clouds. A portion of a white aircraft wing is visible in the upper right corner. Overlaid on the left side of the image is a table with yellow text.

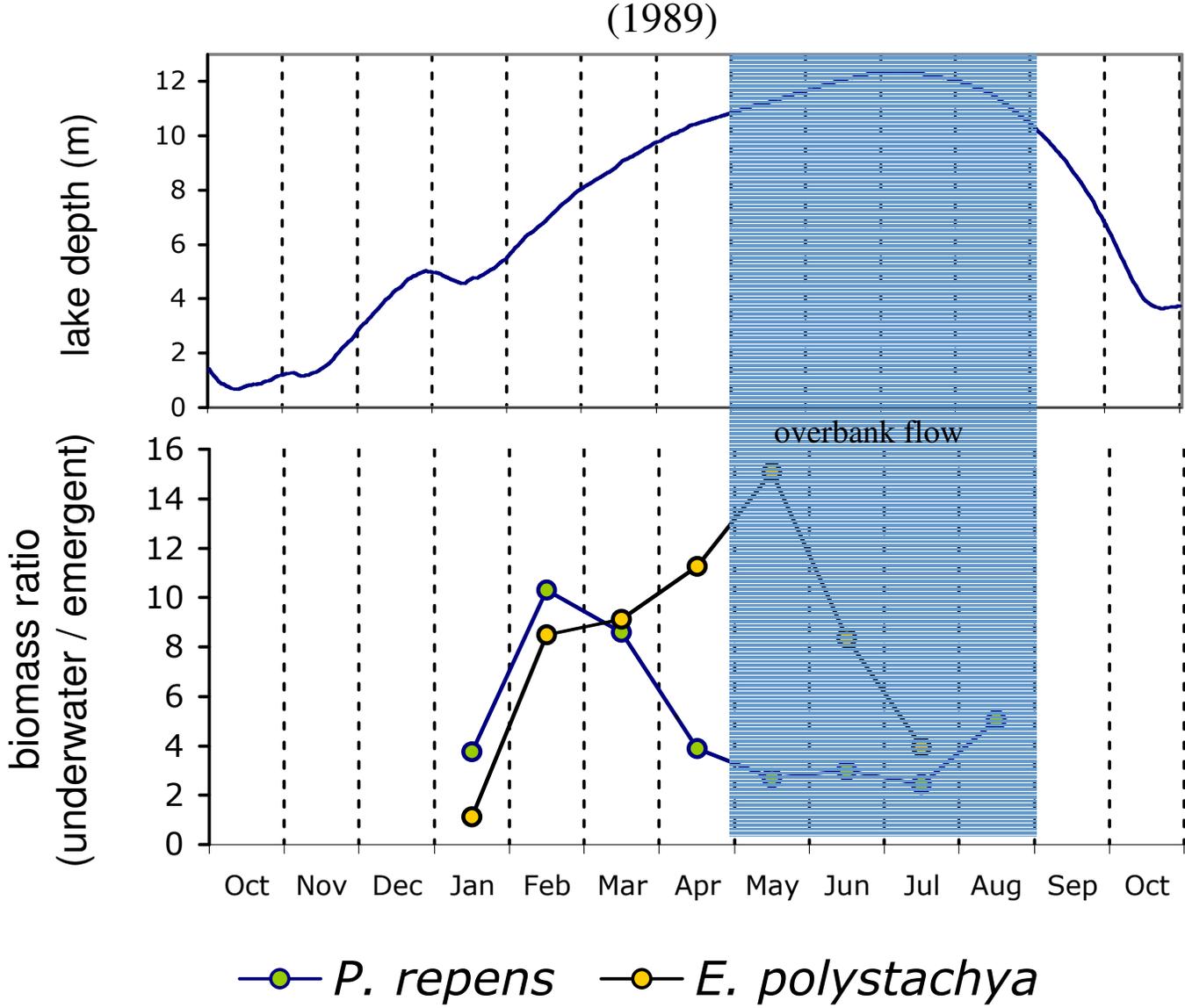
Lake Calado – Carbon Inputs

	C(%)
Runoff, seepage & rainfall	4
Amazon River	4
Flooded forest litterfall	8
NPP by macrophytes	64
NPP by algae	20

Biomass per unit area (submerged + emergent)



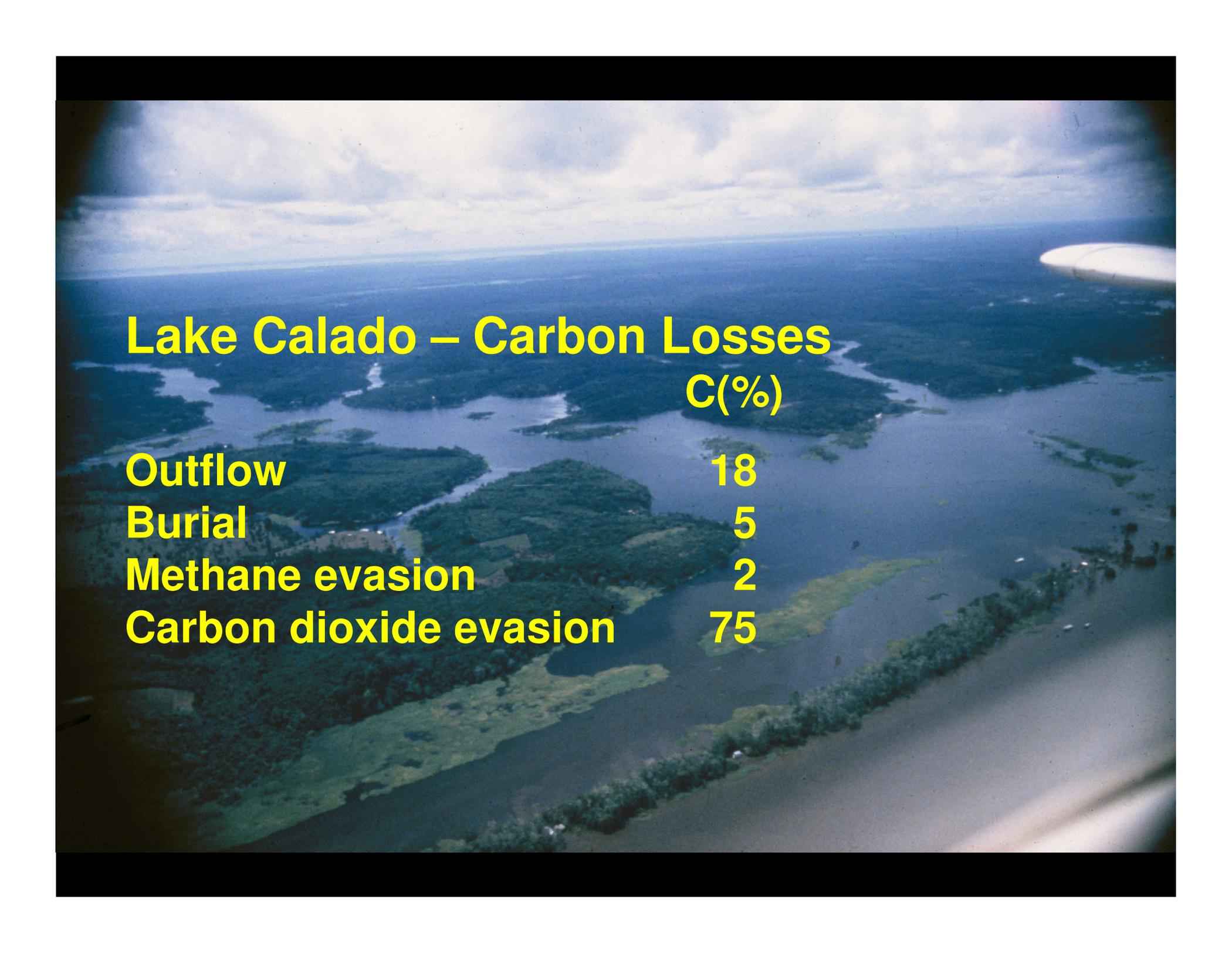
Biomass ratio (underwater/emergent) vs lake depth



Monthly loss rates for aquatic grasses in L. Calado

Mean 49%

	Areal extent of grasses (km ²)	Lakewide Biomass Mg dry mass		Percent lost
		Observed	Predicted	
March	0.329	1817	3120	42%
April	0.340	1324	2246	41%
May	0.425	996	2169	54%
June	0.496	1156	1668	31%
July	0.366	479	1869	74%
August	0.396	560	1180	53%

An aerial photograph of Lake Calado, showing a large body of water with several islands and peninsulas. The water is a deep blue, and the surrounding land is green with trees. The sky is overcast with grey clouds. The text of the table is overlaid on the left side of the image.

Lake Calado – Carbon Losses

C(%)

Outflow	18
Burial	5
Methane evasion	2
Carbon dioxide evasion	75

Major **inputs and **outputs** of organic carbon:
Lake Calado**

NPP of floating macrophyte and algae

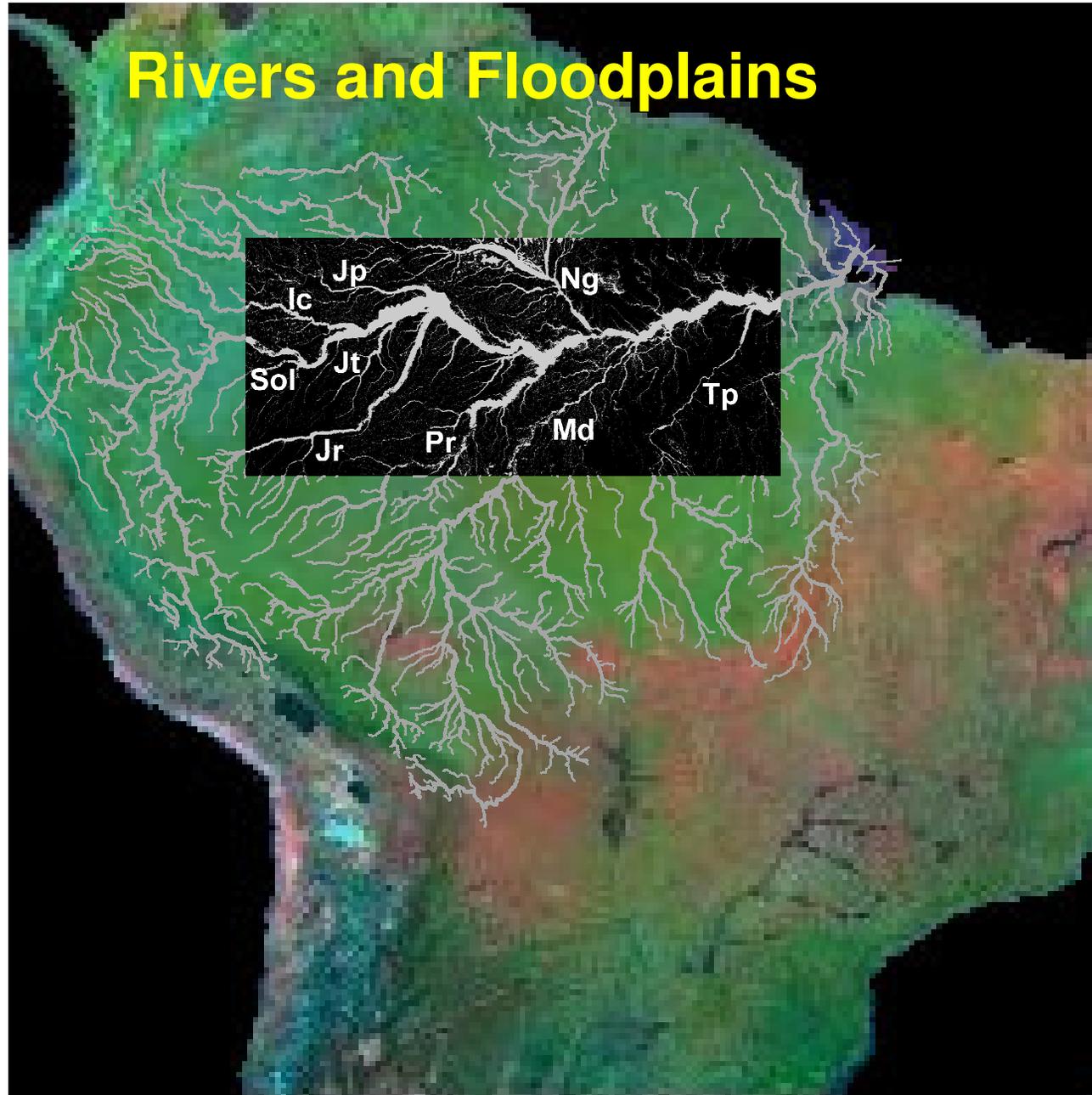
Carbon dioxide evasion

Net output to river

An aerial photograph of a floodplain. A dark, winding river flows through the landscape, surrounded by lush green vegetation. The water is dark, and the surrounding land is a vibrant green, indicating a healthy ecosystem. The perspective is from a high angle, looking down on the river and the surrounding land.

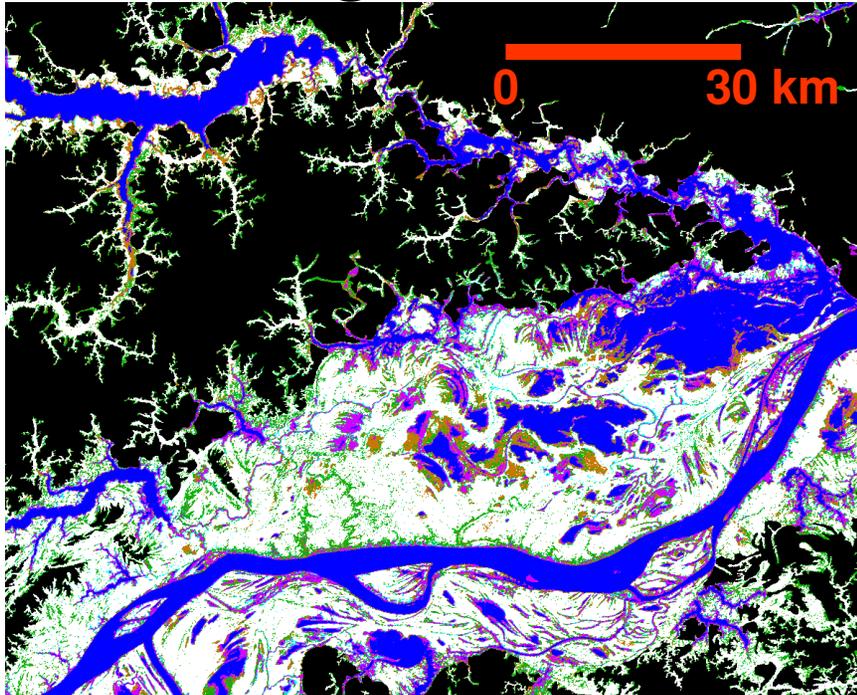
What are regional fluxes of carbon associated with floodplains?

Rivers and Floodplains

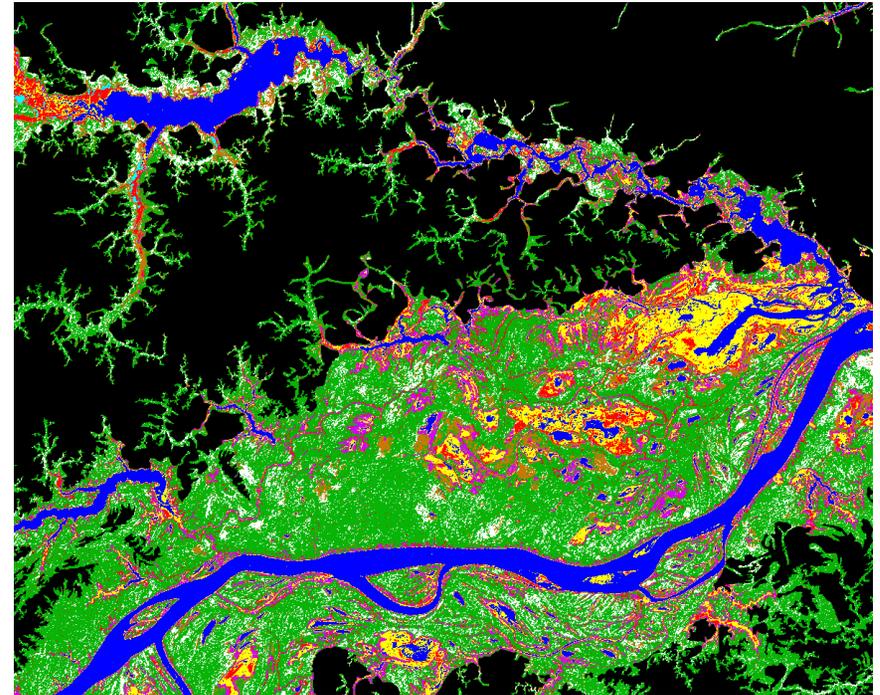


Cabaliana Floodplain (from JERS)

High Water



Low Water



Water



Bare/herbaceous, non-flooded



Herbaceous, flooded



Shrub, non-flooded



Shrub, flooded



Woodland, flooded



Forest, non-flooded



Forest, flooded



River channels and floodplains

(> 100 m wide):

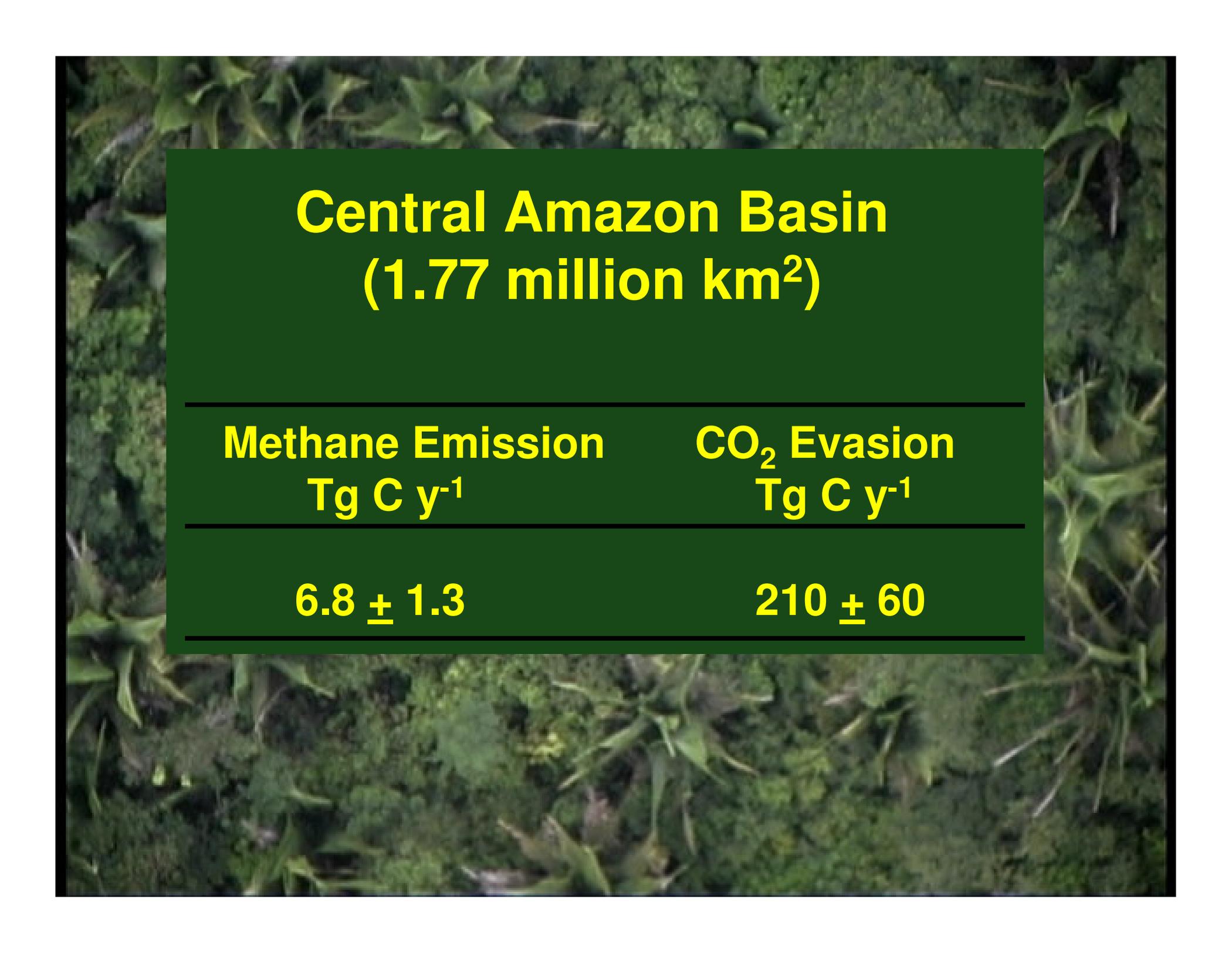
79,000 to 290,000 km²

Streams and small rivers

(< 100 m wide):

21,000 to 51,000 km²

**Amazon-basin river and floodplain waters
are highly supersaturated in dissolved CO₂**



Central Amazon Basin (1.77 million km²)

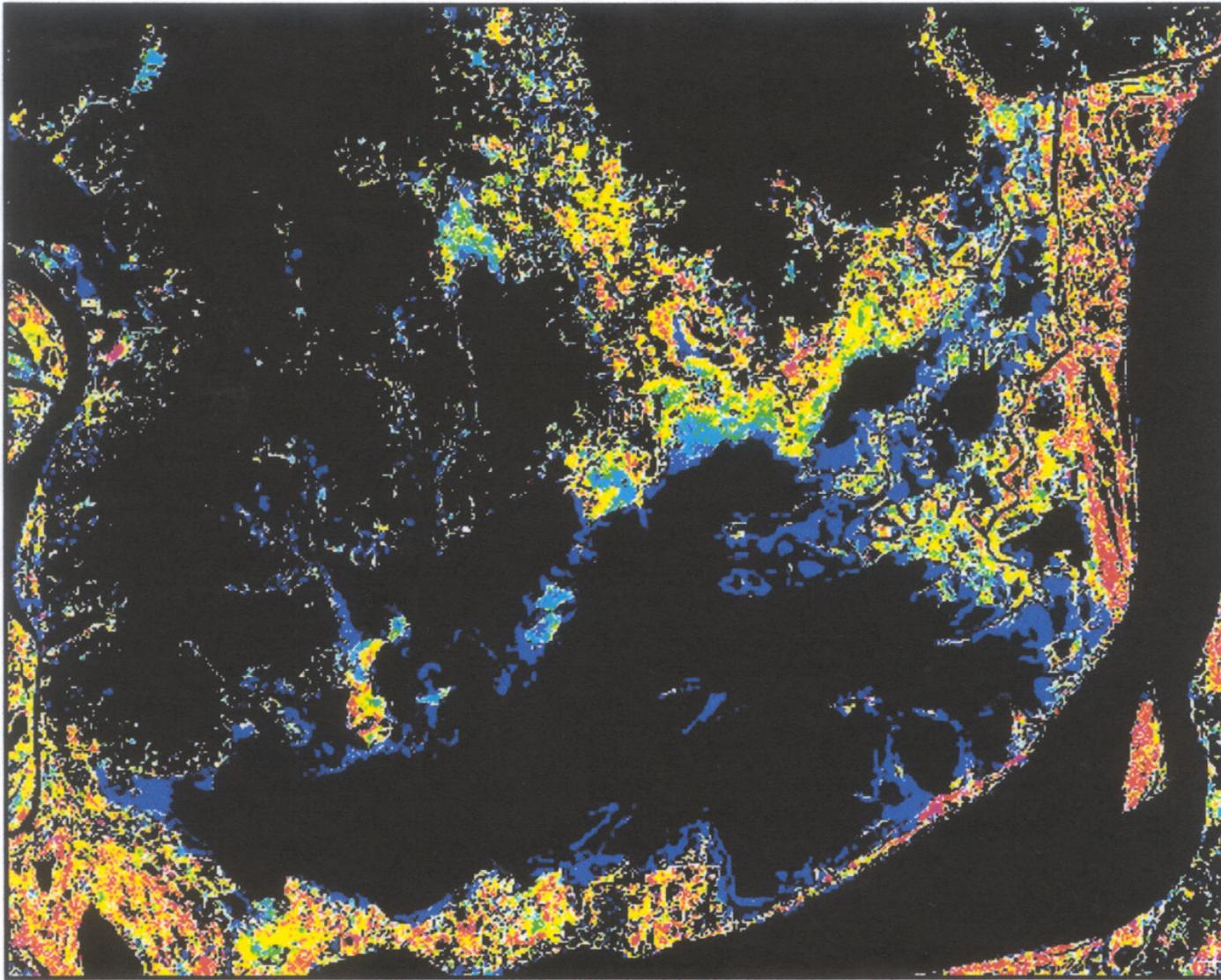
Methane Emission
Tg C y⁻¹

6.8 ± 1.3

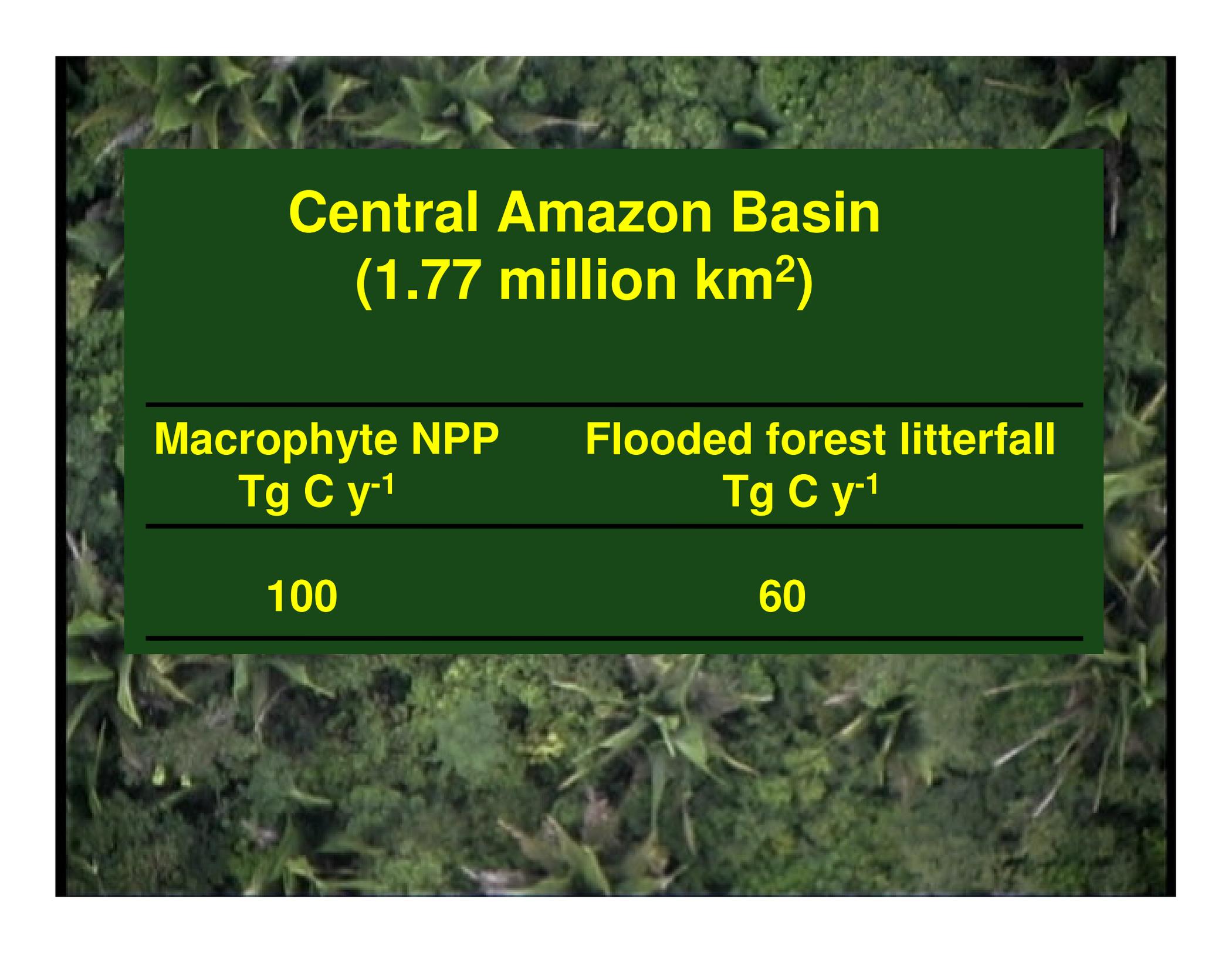
CO₂ Evasion
Tg C y⁻¹

210 ± 60

Net Annual Primary Productivity of Floating Macrophytes



M. Costa 2000, 2005



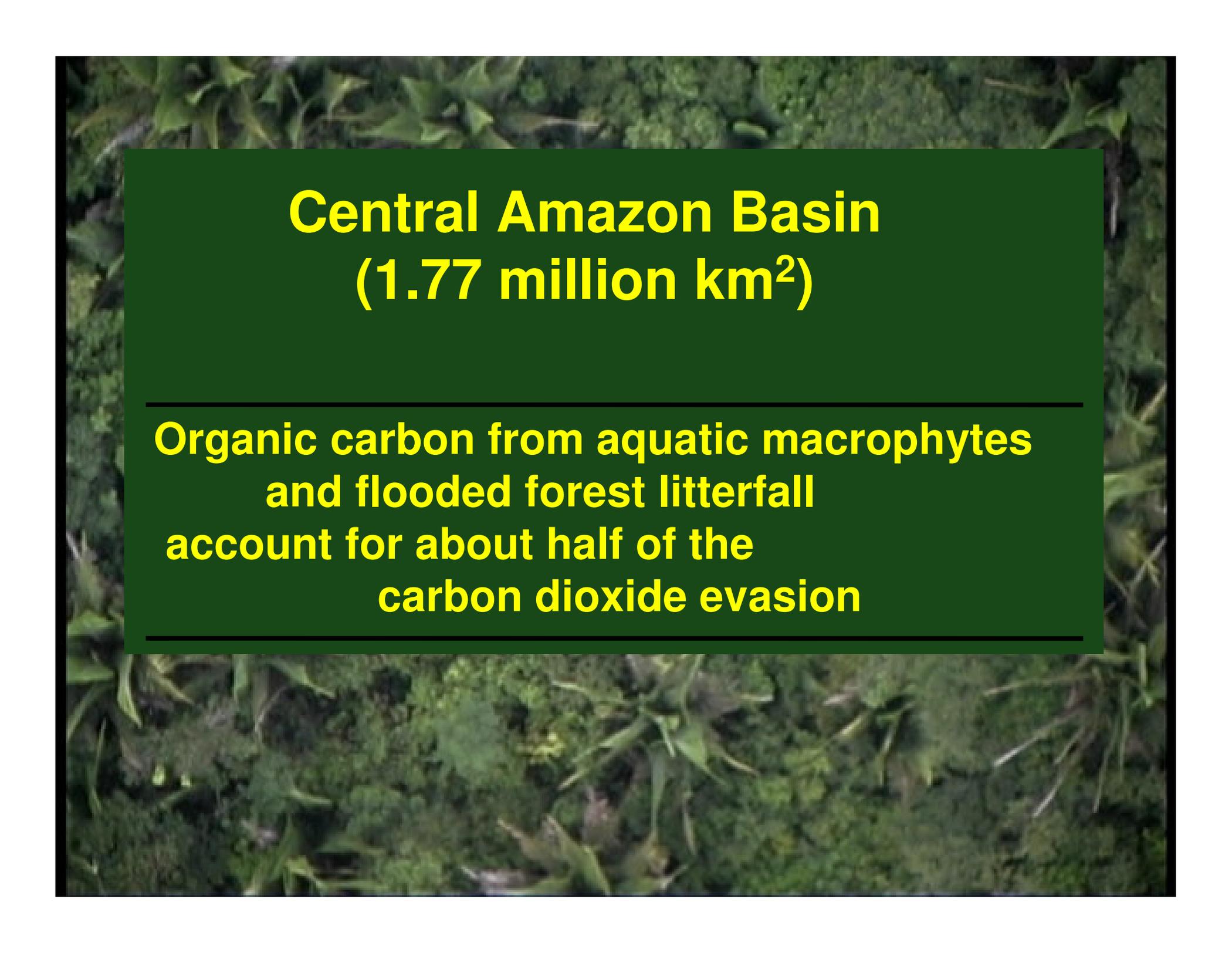
Central Amazon Basin (1.77 million km²)

Macrophyte NPP
Tg C y⁻¹

100

Flooded forest litterfall
Tg C y⁻¹

60



Central Amazon Basin (1.77 million km²)

**Organic carbon from aquatic macrophytes
and flooded forest litterfall
account for about half of the
carbon dioxide evasion**
