Protecting the Congo Peatlands for Climate Mitigation and Adaptation

A briefing from the CongoPeat international team of scientists

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GLOBAL IMPORTANCE OF THE PEATLANDS

- In 2017 we revealed that the world's largest tropical peatland is in the central Congo Basin[1].
- Our latest map published this year shows that peat covers 16.8 million hectares, 11.3 million hectares in Democratic Republic of the Congo (DRC), and 5.5 million hectares in Republic of the Congo (RoC)[2]. The total area is 15% greater than our 2017 map.
- The carbon stored in the peat is the same as the carbon stored in all the trees across the whole of the Republic of the Congo and Democratic Republic of the Congo combined, despite the peat only covering 6% of the two countries.
- The swamp forests that overlie the peat are some of the world's richest for wildlife. Major populations of forest elephants, lowland gorillas, bonobos, chimpanzees, Allen's swamp monkey and African dwarf crocodile live there.
- Today the peatlands are largely intact, and are used sustainably by local people. However, the carbon stored in the peat is directly under threat from oil exploration and exploitation, logging concessions, and industrial agriculture.
- New analyses published in *Nature* show that climate change is a further risk. Future droughts may tip the ecosystem from a major carbon store to a large carbon source, accelerating climate change.
- If the central Congo Basin peatlands became a large source of carbon to the atmosphere, whether by drainage or the impacts of climate change, this would threaten international commitments to limit global heating to 1.5°C.

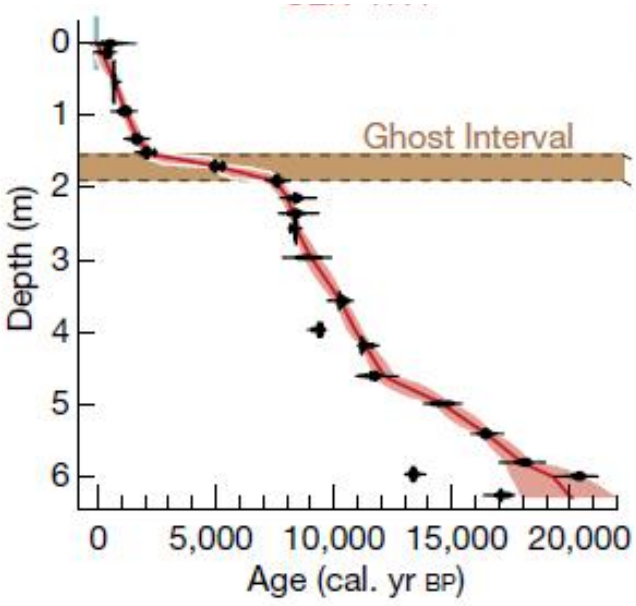
Green shows location of the world's largest tropical peatland in the central Congo basin

[1]Dargie *et al.* 2017. Age, extent and carbon storage of the central Congo Basin peatland complex. *Nature*.

[2]Crezee *et al.* 2022. Mapping peat thickness and carbon stocks of the central Congo Basin. *Nature Geoscience*.

IMPACTS OF CLIMATE CHANGE

- New analyses published in *Nature* show the vulnerability of the central Congo peatlands to drought[3].
- Sampled peat cores from the region show that there was a period of around 5,000 years when there was almost no build-up of peat, less than 0.1 mm per year (see Figure below).
- Analyses of the preserved plant remains in the peat – leaf waxes and pollen grains – show that the peatlands experienced a drying climate, starting 5,000 years ago, that got progressively drier until about 2,000 years ago, with swamp forest specialist plant species declining.
- The drought lowered the water table, resulting in peat decomposition, with 2 to 4 metres of peat lost from what is today a 6 metre thick column of peat. This resulted in a 'ghost interval' of very little peat build up, compared to the time before or after (see Figure below).
- The peatland changed from a carbon sink to a carbon source as the peat decomposed. This decomposition only stopped when the drought stopped about 2,000 years ago, when peat started accumulating again.
- The study is a warning from the past: if the peatlands dry beyond a certain threshold they will release carbon to the atmosphere, which would accelerate future climate change.
- In the modern-day climate, there is some evidence that dry seasons are lengthening in the Congo Basin. The latest climate models, while uncertain, suggest an increasing likelihood of extreme drought conditions in this region[4]. This highlights the need to avoid other causes of peatland drying such as drainage.
- Our study provides evidence that drier conditions have existed in the past and pushed the peatlands past a tipping point causing them to become a source of carbon to the atmosphere. This could happen again in the future if droughts increase.
- The central Congo peatlands store 29 billion tonnes of carbon. The release of this carbon, even slowly, will make the Paris Agreement harder to achieve.
- The sooner anthropogenic carbon emissions decline to net zero, the lower the likelihood of the Congo peatlands drought tipping point being breached.

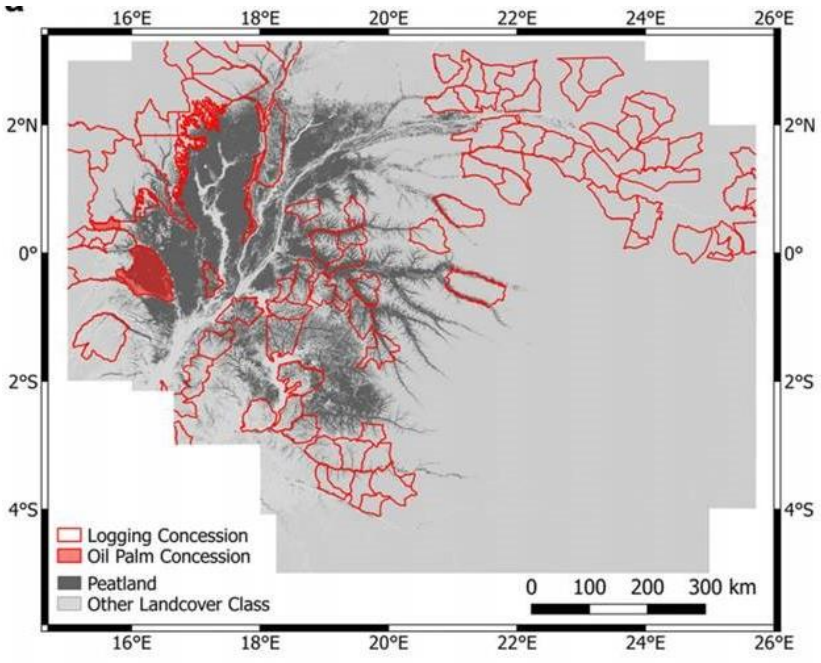


Age and peat depth from a central Congo peat core. Almost no peat accumulation was seen from 7,000 to 2,000 years ago, a 'Ghost Interval', in contrast to the fast accumulation before and after this period. The drier conditions led to peat decomposition, including the loss of peat older than when the drought started. From Garcin *et al.* 2022. *Nature*.

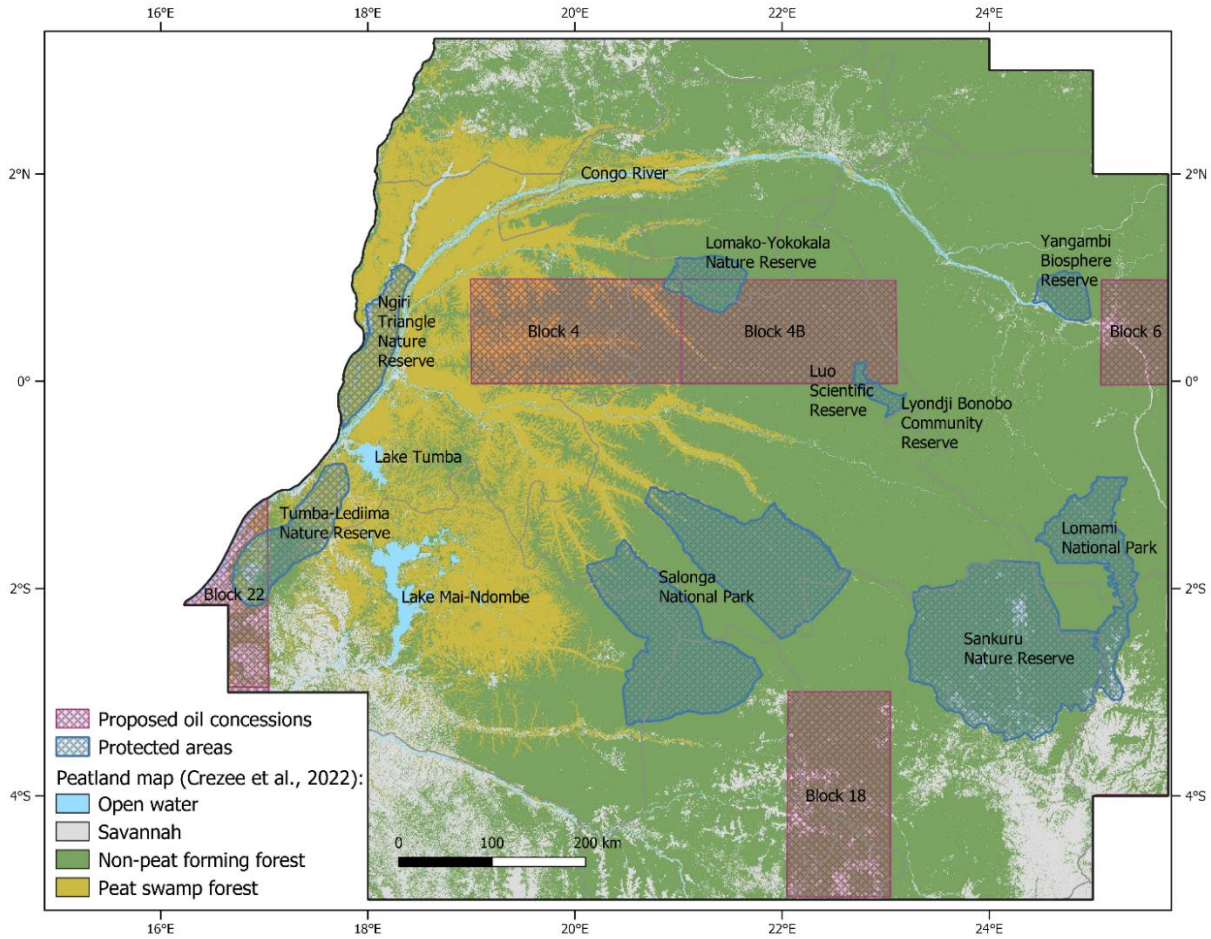
[3] Garcin *et al.* 2022. Hydroclimatic vulnerability of peat carbon in the central Congo Basin. *Nature*.

[4] Caretta *et al.* 2021. Chapter 4, Water. IPCC Working Group II, Sixth Assessment Report.

DIRECT IMPACTS ON THE PEATLANDS: OIL EXPLORATION AND LOGGING



- While the peatlands are largely intact today, and sustainably managed by local people, overlaying our peat map on areas permitted for logging and industrial agriculture shows that oil palm (red shading) threatens RoC peatlands, and logging concessions (red outlines) threaten DRC peatlands.
- Overlaying our peat map onto the oil blocks proposed for auction in DRC shows 1 million hectares of peatland within three oil blocks. Oil exploration opens new access routes into forests and peatlands, typically leading to ecosystem degradation and deforestation through hunting, logging, and agriculture expansion, whether oil is found or not[5].
- There are 1.6 billion tonnes of carbon in peat inside the three oil blocks. Should the peat carbon be released to the atmosphere, the peatland oil would be among the most carbon-intensive oil ever produced[6].



Peat swamp forests and DRC oil exploration blocks. Blocks 4, 4B and 22 contain peat[6].

[5]Lawson *et al.* 2022. The vulnerability of tropical peatlands to oil and gas exploration and extraction. ***Progress in Environmental Geography.***

[6]For further details see our CongoPeat briefing on oil exploration, https://congopeat.net/briefings/

THE PEATLANDS ARE HIGHLY SENSITIVE TO ENVIRONMENTAL CHANGE

- Our research has shown that between 5,000 and 2,000 years ago substantial amounts of peat decomposed, as the climate dried beyond a threshold. It is likely that other types of change will impact the peatlands.
- The photos opposite show the building of a road for access to a logging camp, which altered the drainage of the peat swamp, and killed all the trees, well within two decades.
- More severe than this would be deliberate drainage for agriculture. This occurred extensively in Southeast Asian tropical peatlands, leading to out-of-control fires in drought years, coupled with the decomposition of peat, and enough carbon being emitted that it could be detected in levels of carbon dioxide in the atmosphere. This should be avoided in the central Congo.

Photo taken in 1989, light green is inundated swamp forest, which we identify as peat swamp forest; dark green is rainforest; logging camp and access road are brown coloured.

***Photo taken in 2018**, at the same location, where the road appears to have changed the drainage and has killed the peat swamp trees, releasing carbon to the atmosphere*.

NEXT STEPS

- CongoPeat funding ends in 2023, so resources are needed for data collection, analysis and modelling to understand future of the peatlands, whether from climate change or the impacts of oil development, logging, or industrial agriculture, to avoid irreversible changes to the peatland system. Expanding the search for peatlands across the Congo Basin is also needed.
- Beyond science, new programmes are needed to assist countries and communities to pursue development pathways that improve lives and protect the peatlands and their biodiversity.

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