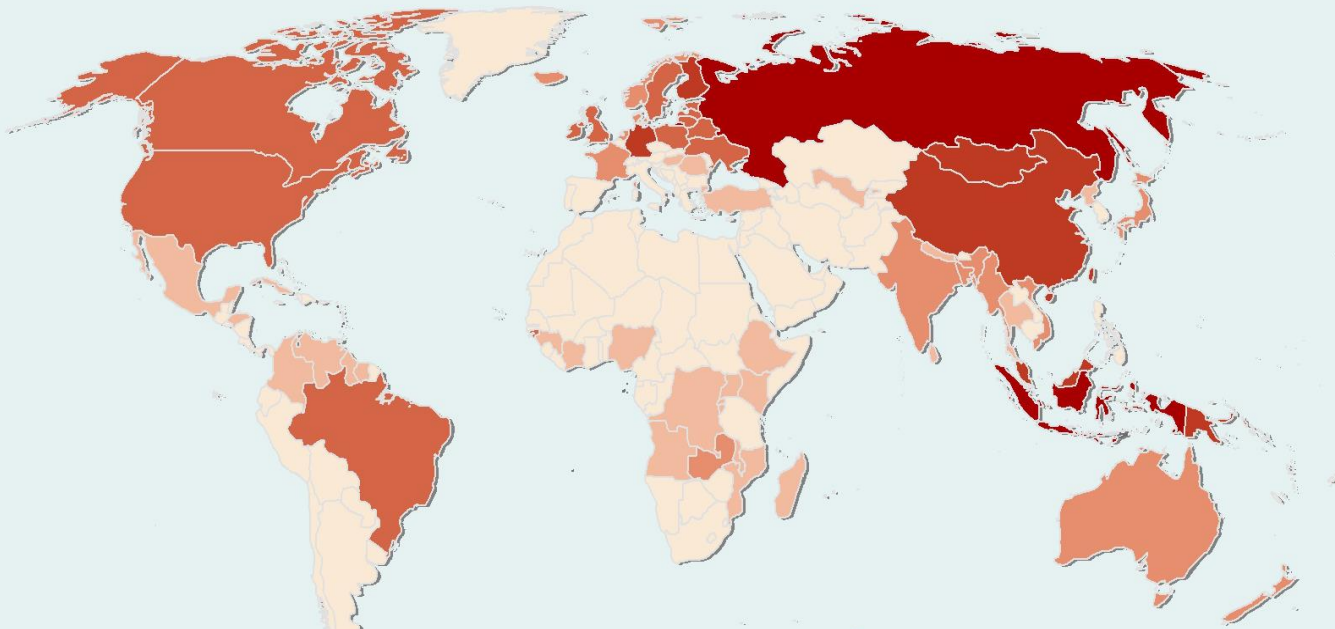




GREIFSWALD
MIRE
CENTRE

The contribution of drained organic soils to the globally emitted GHGs and emission hotspots



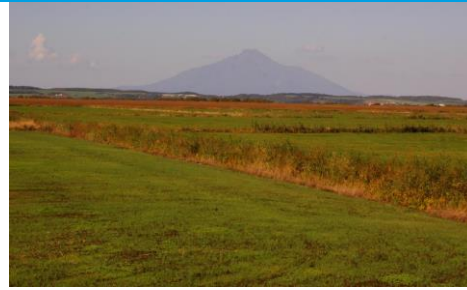
Alexandra Barthelmes, Cosima Tegetmeyer, John Couwenberg & Hans Joosten



GREIFSWALD
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CENTRE



Peatlands and Organic soils occur in almost all countries of the World.





GREIFSWALD
MIRE
CENTRE

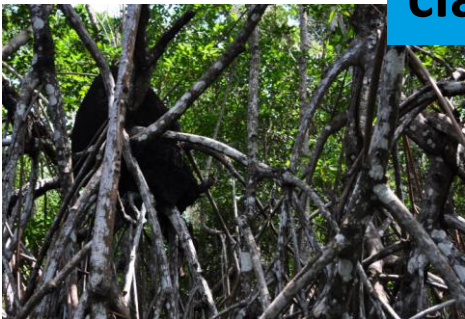


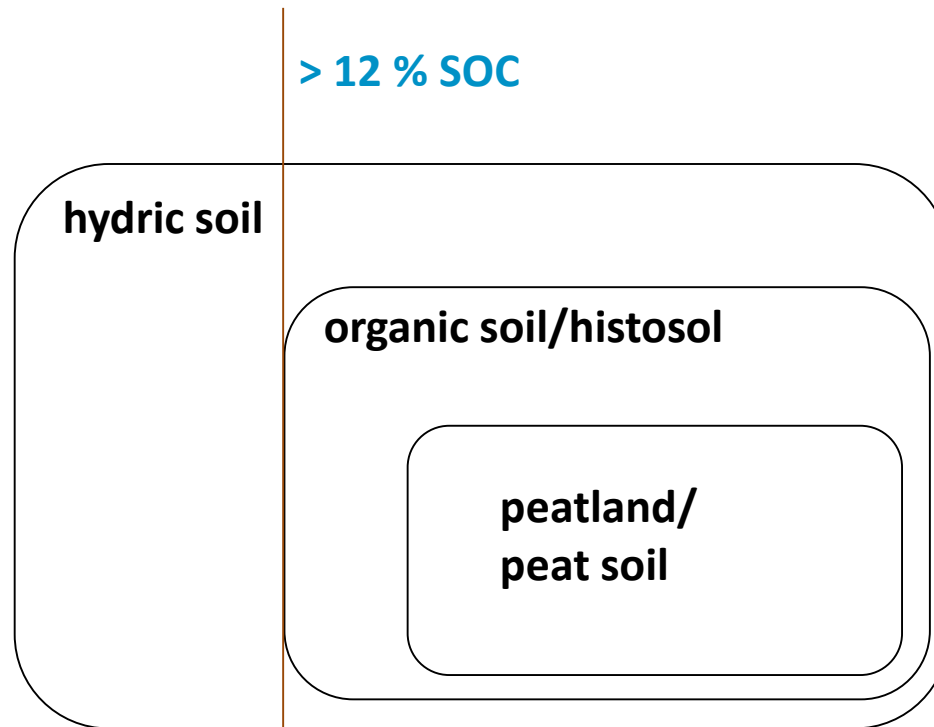
Peatlands and Organic soils occur in almost all countries of the World. They are enormously diverse.



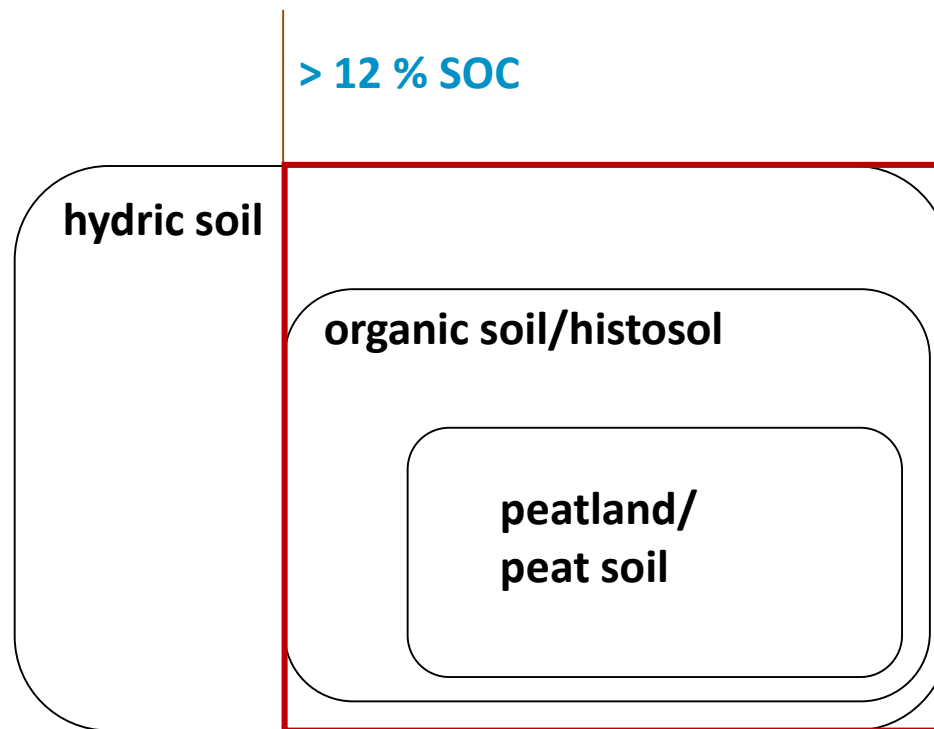


Peatlands and Organic soils occur in almost all countries of the World. They are enormously diverse. Concepts, definitions and terms to classify them are enormously diverse to...





For pragmatic global overview we use the broad IPCC concept of 'organic soils' with 12 % SOC, and without a depth criterion.



This covers almost all peatlands, Histosols and other organic soils, and allows the integration of heterogeneous, historically grown national and regional datasets.

Organic soils cover only 0.3% of the world's land area, but contain 30% of its soil organic carbon and as much carbon as all terrestrial biomass!



That means >500 Gigatons of carbon.



Germany

Undrained organic soils are not important re. GHG emissions

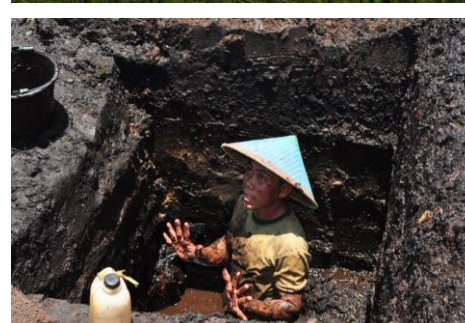
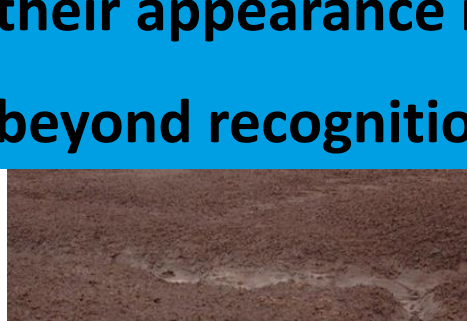
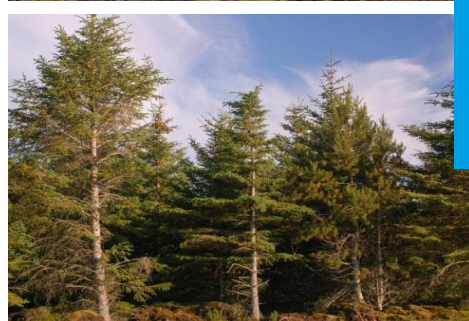


C-sequestration in organic soils globally compensates for less than 1% of the emissions from fossil fuel combustion.

The problem starts here: DRAINAGE



**Organic soils are manifold used and
their appearance is partly changed
beyond recognition...**



When talking about organic soils and climate protection, we need to question animal husbandry on drained organic soils...



... agriculture on drained organic soils...



... forest on drained organic soils...



...oil palm on drained organic soils...



When drained, organic soils become strong sources of GHGs



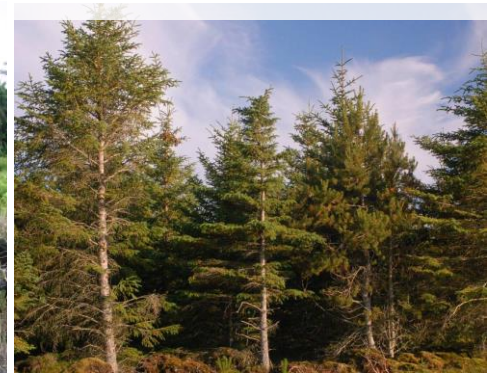
Moreover, drained organic soils are highly susceptible to fire.



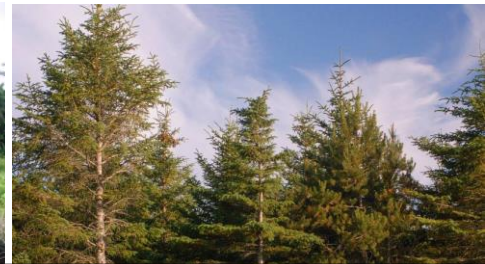
**Very large areas are regularly burning e.g. in SE-Asia
...and adding huge amounts of GHGs to the atmosphere.**



Meanwhile, the World's organic soils have turned from a carbon-sink to a carbon-source (through drained land use)...



...although 80% of them is still undrained.



These emissions need to be quantified at national scale to assess their impact on Climate Change.



**Offers default emission factors
for drained and rewetted peat
soils worldwide**

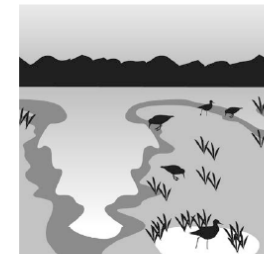
ipcc

INTERGOVERNMENTAL PANEL ON climate change

**2013 Supplement to the 2006 IPCC Guidelines
for National Greenhouse Gas Inventories:
Wetlands**

**Methodological Guidance on Lands with Wet and Drained Soils,
and Constructed Wetlands for Wastewater Treatment**

Edited by
Takahiko Hiraishi, Thelma Krug, Kiyoto Tanabe, Nalin Srivastava,
Baasansuren Jamsranjav, Maya Fukuda and Tiffany Troxler



Task Force on National Greenhouse Gas Inventories



**Needed are reliable area data on
drained organic soils at national
scale...**

**...but they are hardly available for
many countries of the World.**

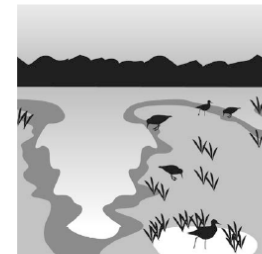
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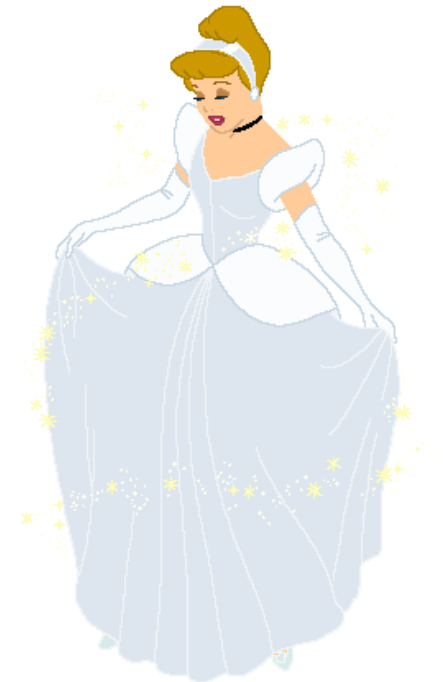
WHY?

Organic soils are often not recognized:

- regarded as ‚waste land‘ and set aside in land & soil surveys
- no awareness of diversity of peatlands and organic soils

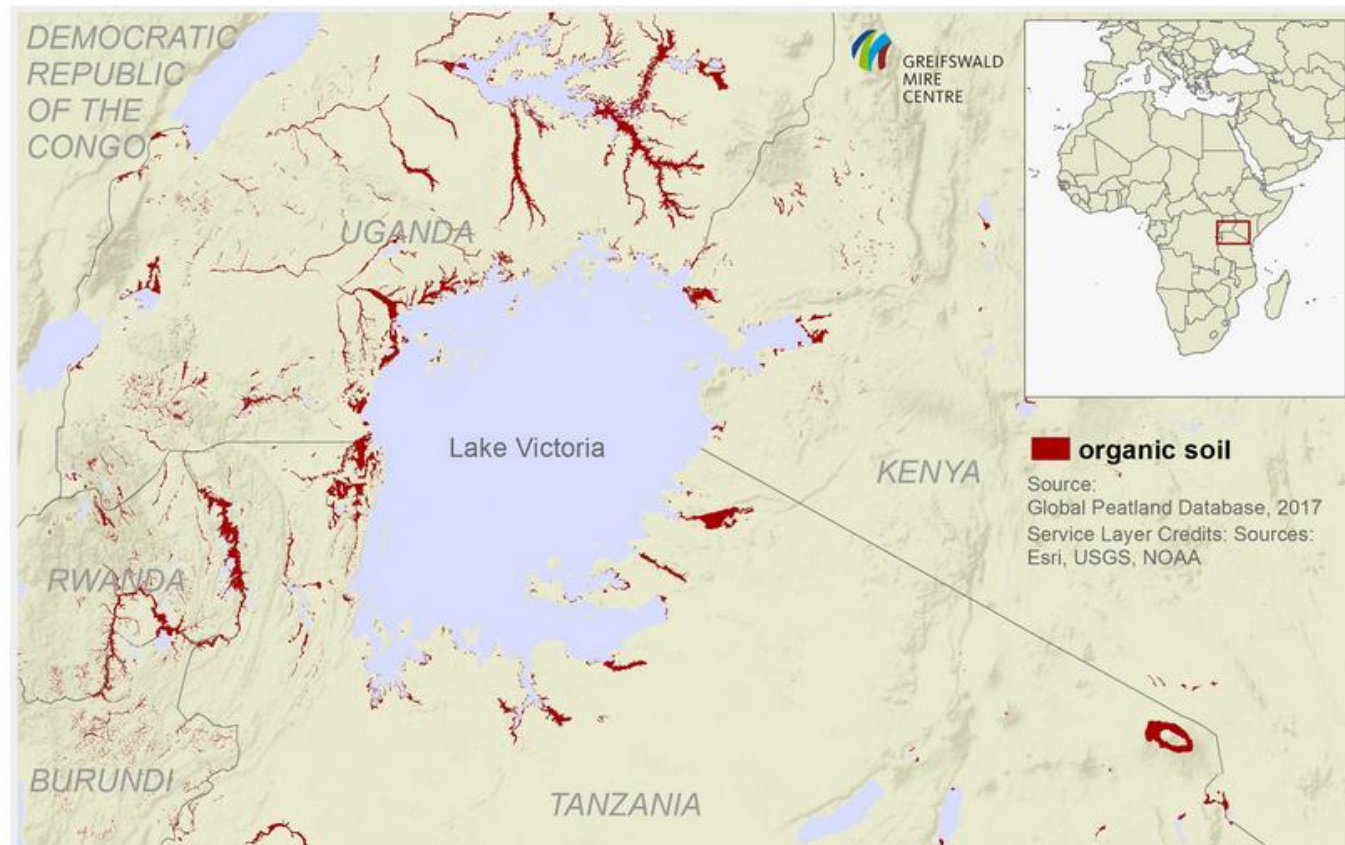
The resulting scarcity of ground data hampers remote sensing and modelling based mapping approaches.

Information on organic soils is often spread across sciences and authorities.



CINDERELLA SYNDROM

Global Peatland Database



Global Peatland Database

International Mire
Conservation Group



- is a project of the IMCG
- is hosted and maintained at the GMC
- contains an overview of the extent and drainage status of organic soils for all countries of the World.

Global Peatland Database

International Mire
Conservation Group



- data collated over 20 years by Hans Joosten
- since 2012 maintained by Hans Joosten & Alexandra Barthelmes
- since 2012 additional focus on geospatial information (GIS data)

Assessment of global emissions from organic soils

Area data elaborated during the 2015-update of the GPD

primary sources:

- divers projects of the Greifswald Mire Centre
- available data from peatland / soil research
- UNFCCC-reporting

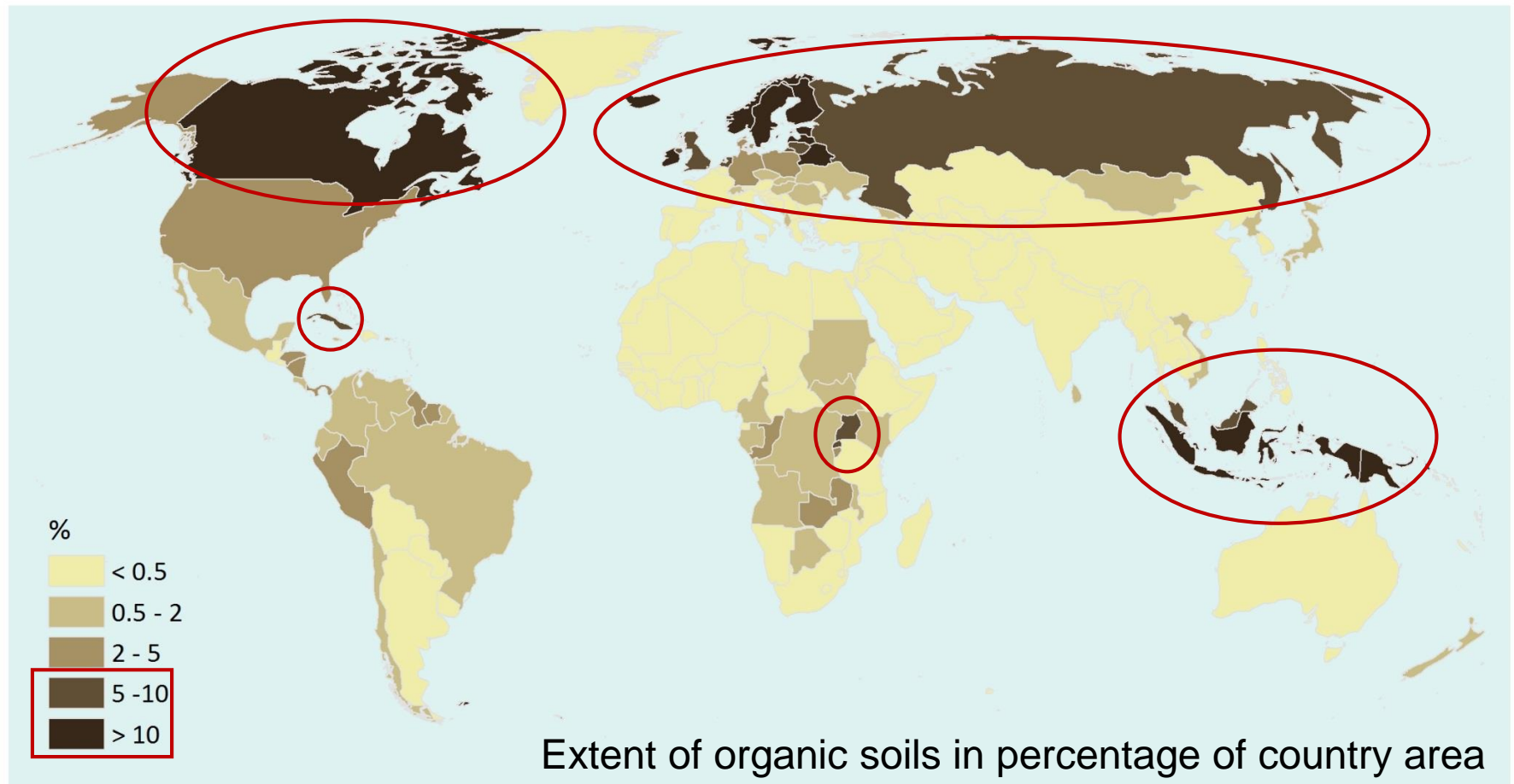
This information has been integrated to derive best estimates for organic soils and the extent of drained land use for each country.

Ongoing research may result in considerable area changes especially for parts of Africa, Asia, Central and South America.

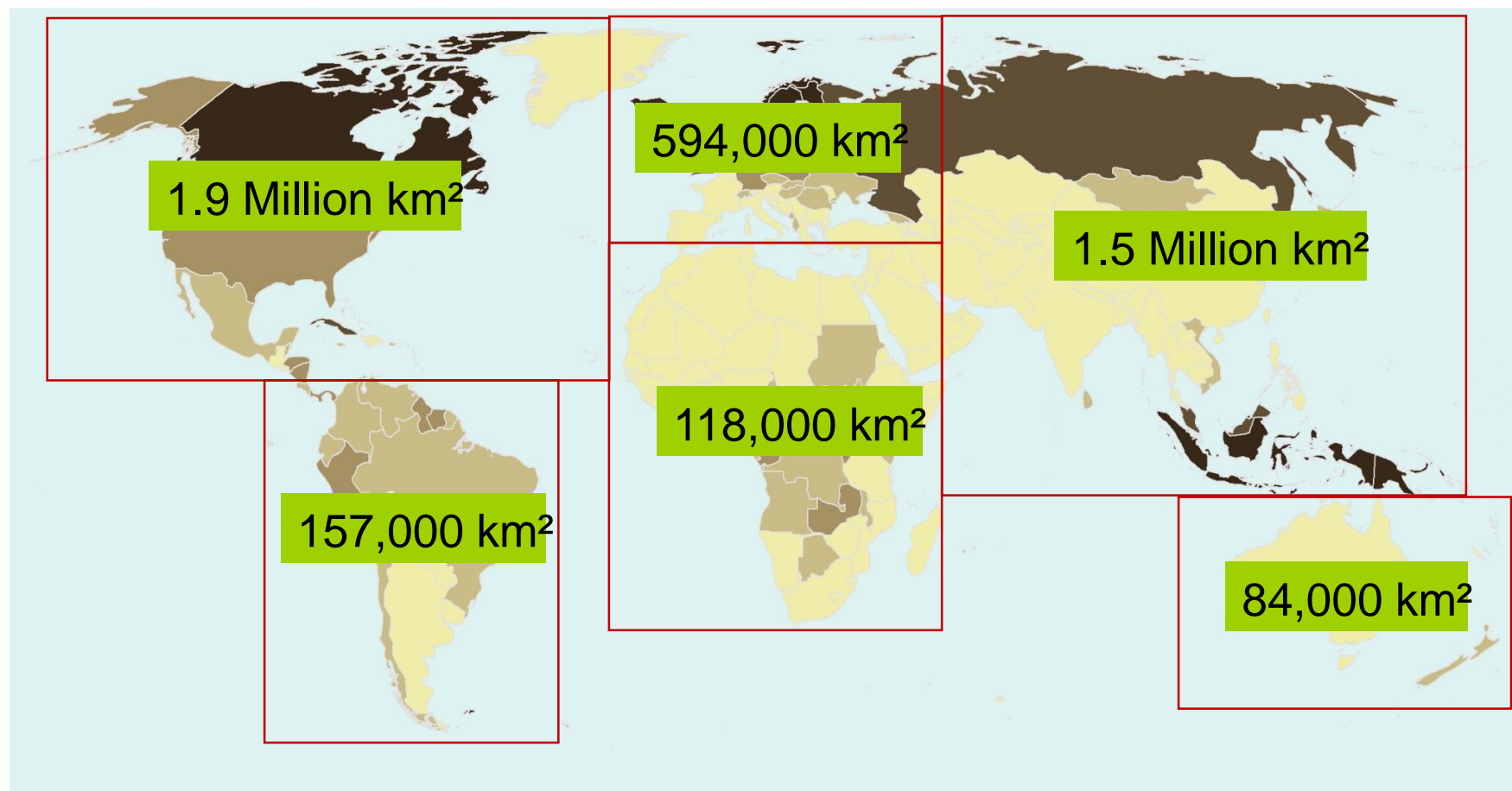
Worldwide very few countries without organic soils...



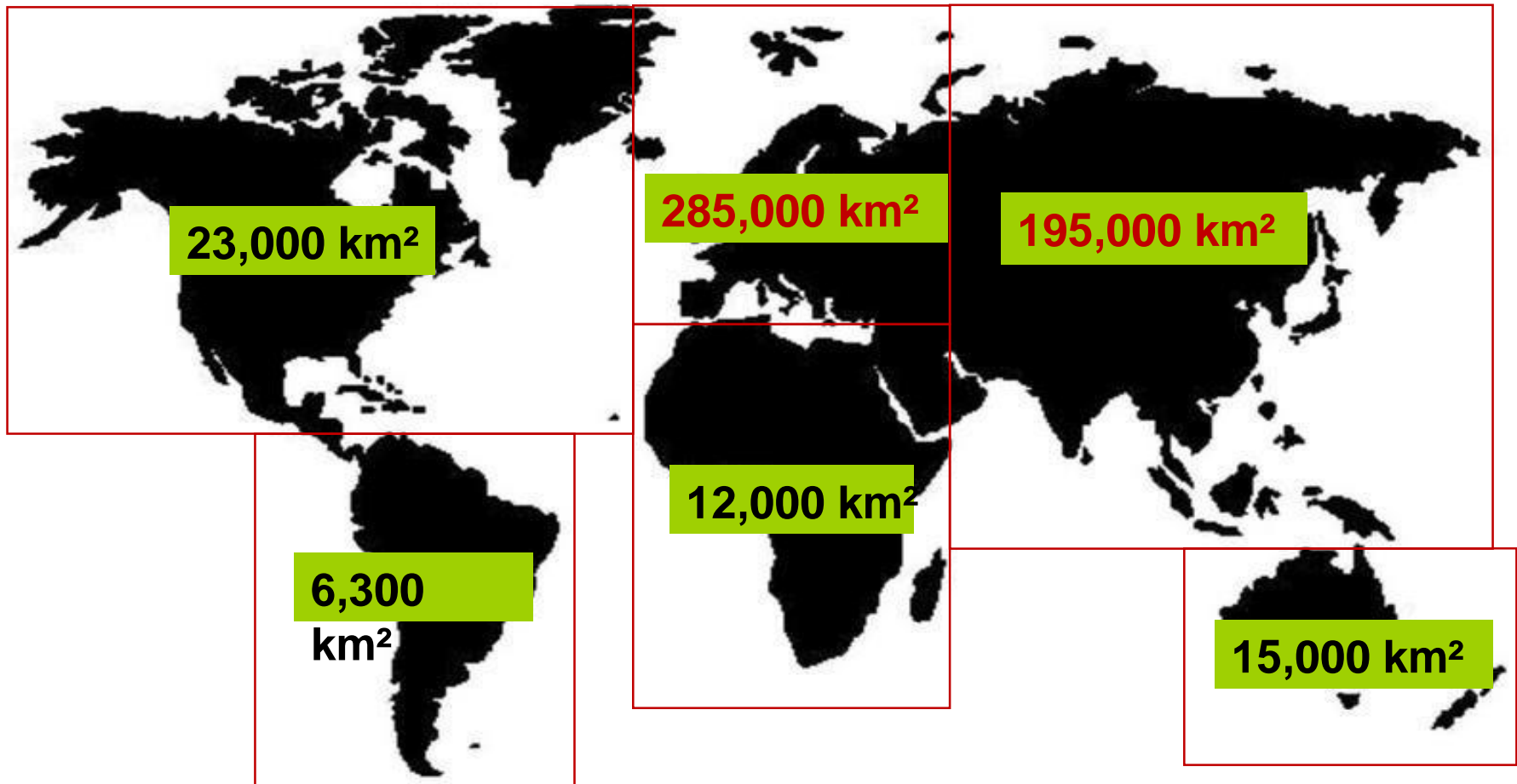
...but also few countries that have very much of it!



WORLD: 4.46 Million km² of organic soils



**Approx. 655,000 km² of global organic soils are drained
(91% are found in Asia and Europe)**

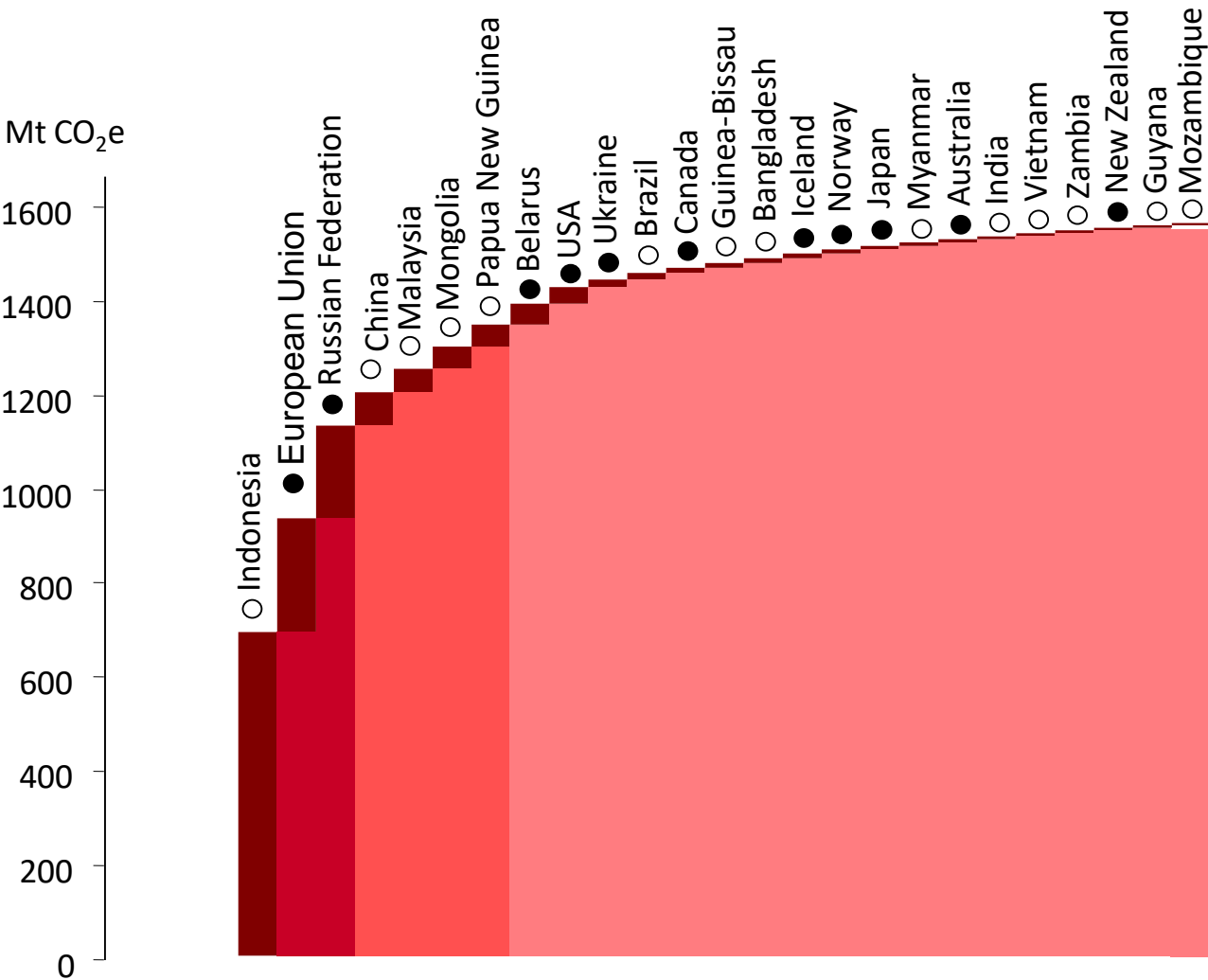


Emission calculation

applied emission factors include CO₂, CH₄, N₂O and DOC and are primarily based on IPCC (2014).

Based on this, the annual emissions from drained organic soils (without peat fires) have been calculated to 1,600 Mt CO_{2e}. This would almost double the amount of CO₂ emissions from aviation.

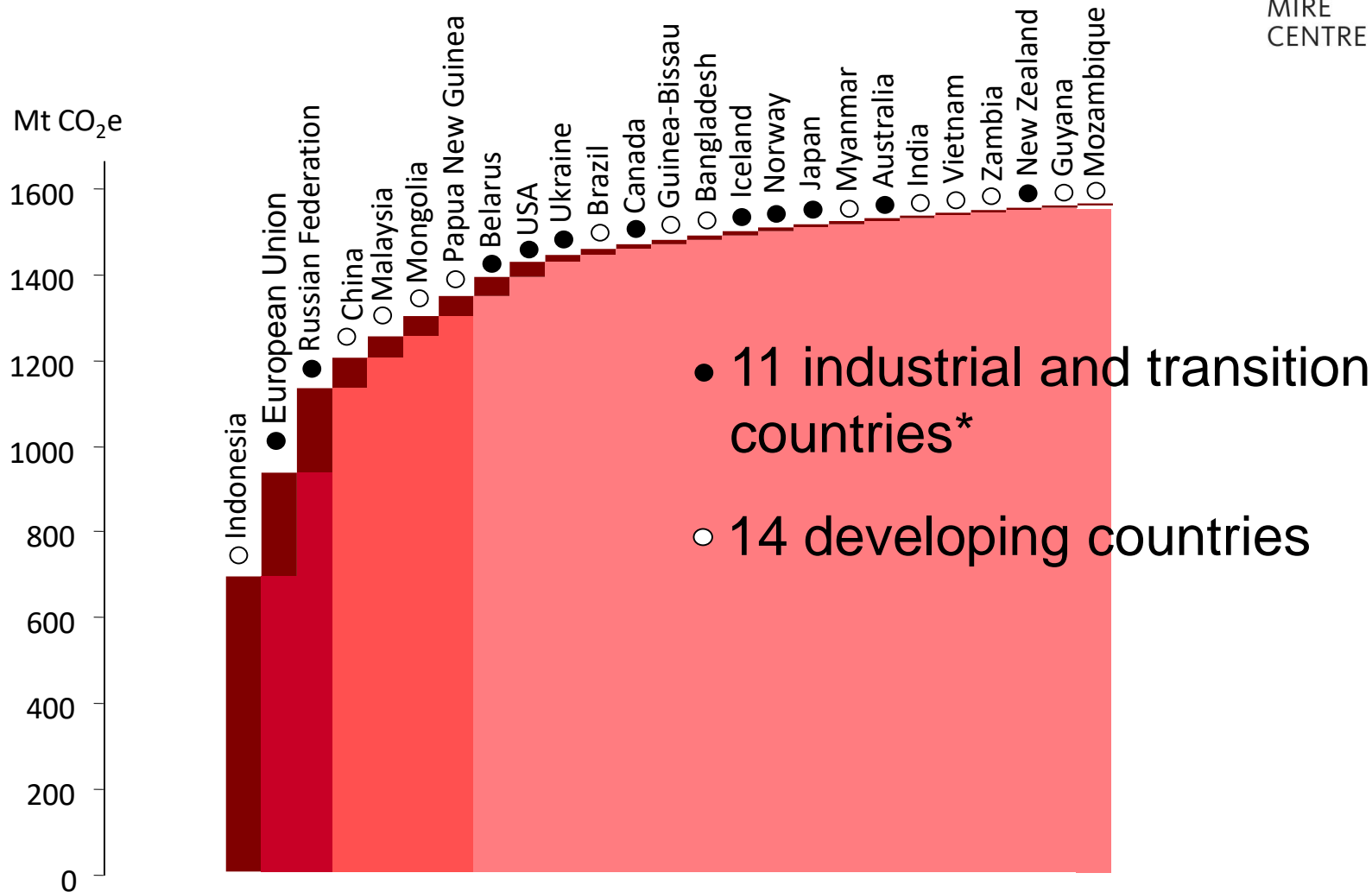
Assessment of global emissions from organic soils



25 key parties with their emissions from organic soils = 95% of global emissions
(figure shows amount of greenhouse gas emissions in a cumulative way)

* countries of the European Union are aggregated

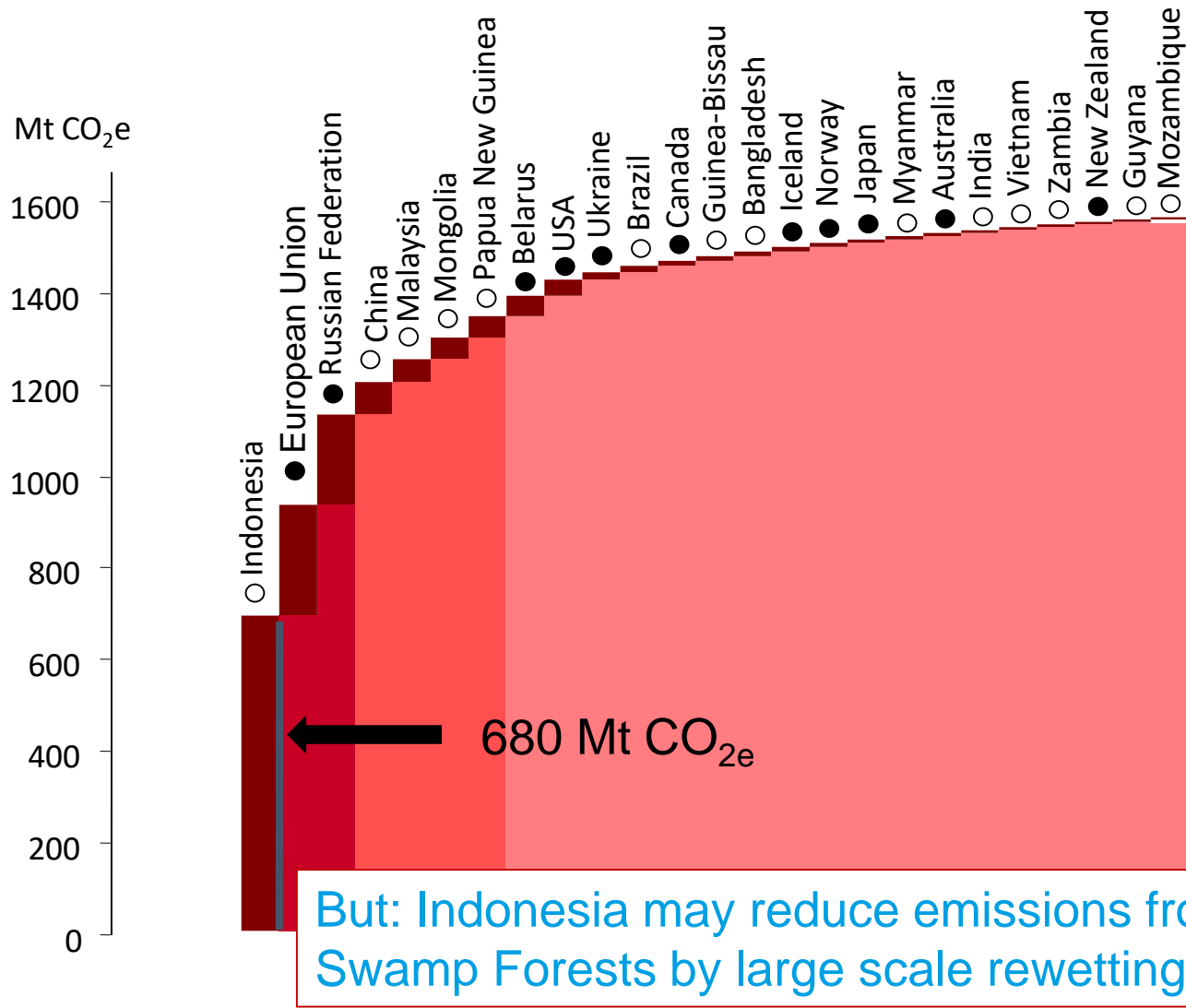
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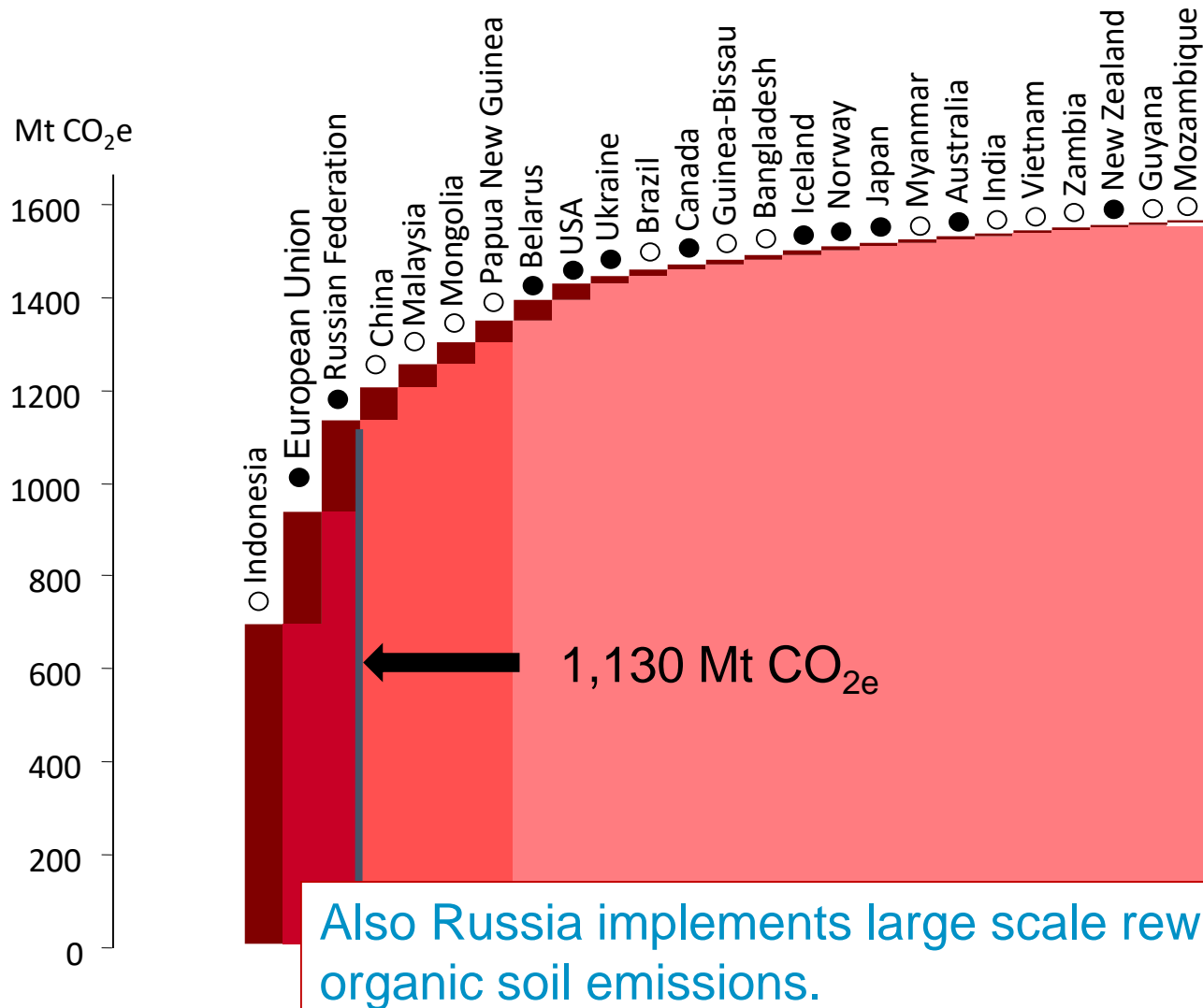
Assessment of global emissions from organic soils



Emissions from Indonesia are the largest single source.

* countries of the European Union are aggregated

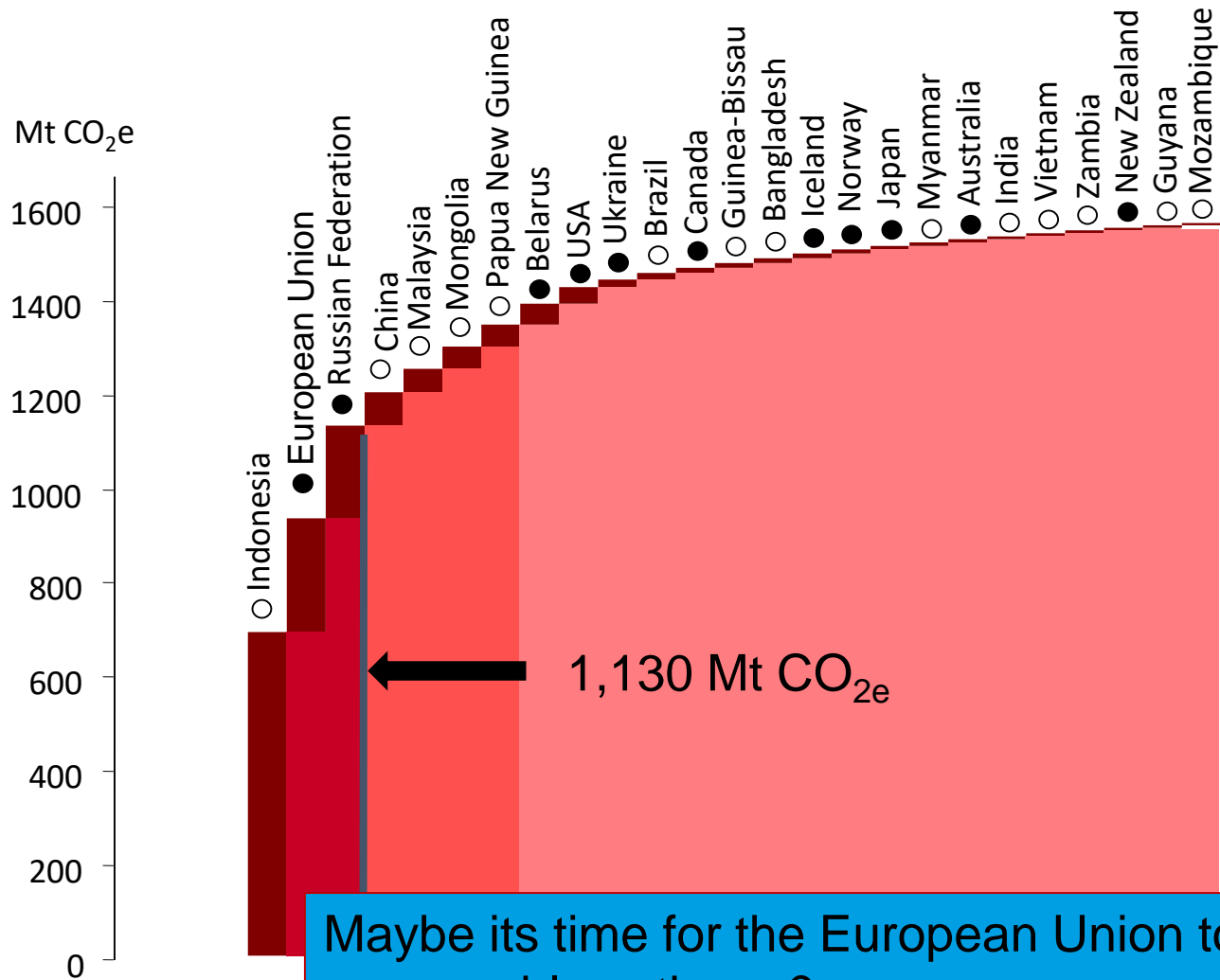
Assessment of global emissions from organic soils



Emissions from Indonesia, EU and Russian Federation account for 70% of global organic soil emissions.

* countries of the European Union are aggregated

Assessment of global emissions from organic soils



Maybe its time for the European Union to take comparable action...?

Emissions from Indonesia, EU and Russian Federation account for 70% of global organic soil emissions.

* countries of the European Union are aggregated

Assessment of global emissions from organic soils



EUROPE country	drained organic soil km ²	%
Russia	90,600	35
Finland	48,710	72
UK	18,090	67
Belarus	16,970	66
Sweden	15,460	23
Germany	12,550	98
Ireland	11,970	82
Poland	10,090	84



Assessment of global emissions from organic soils



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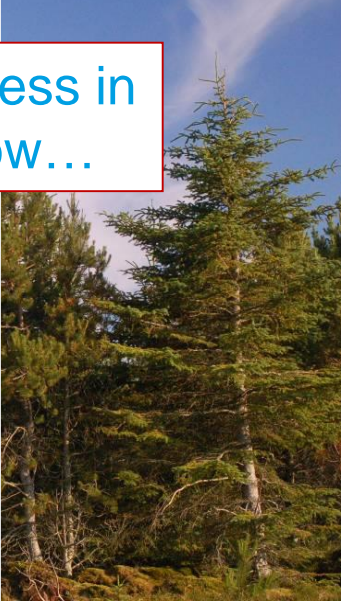


Assessment of global emissions from organic soils

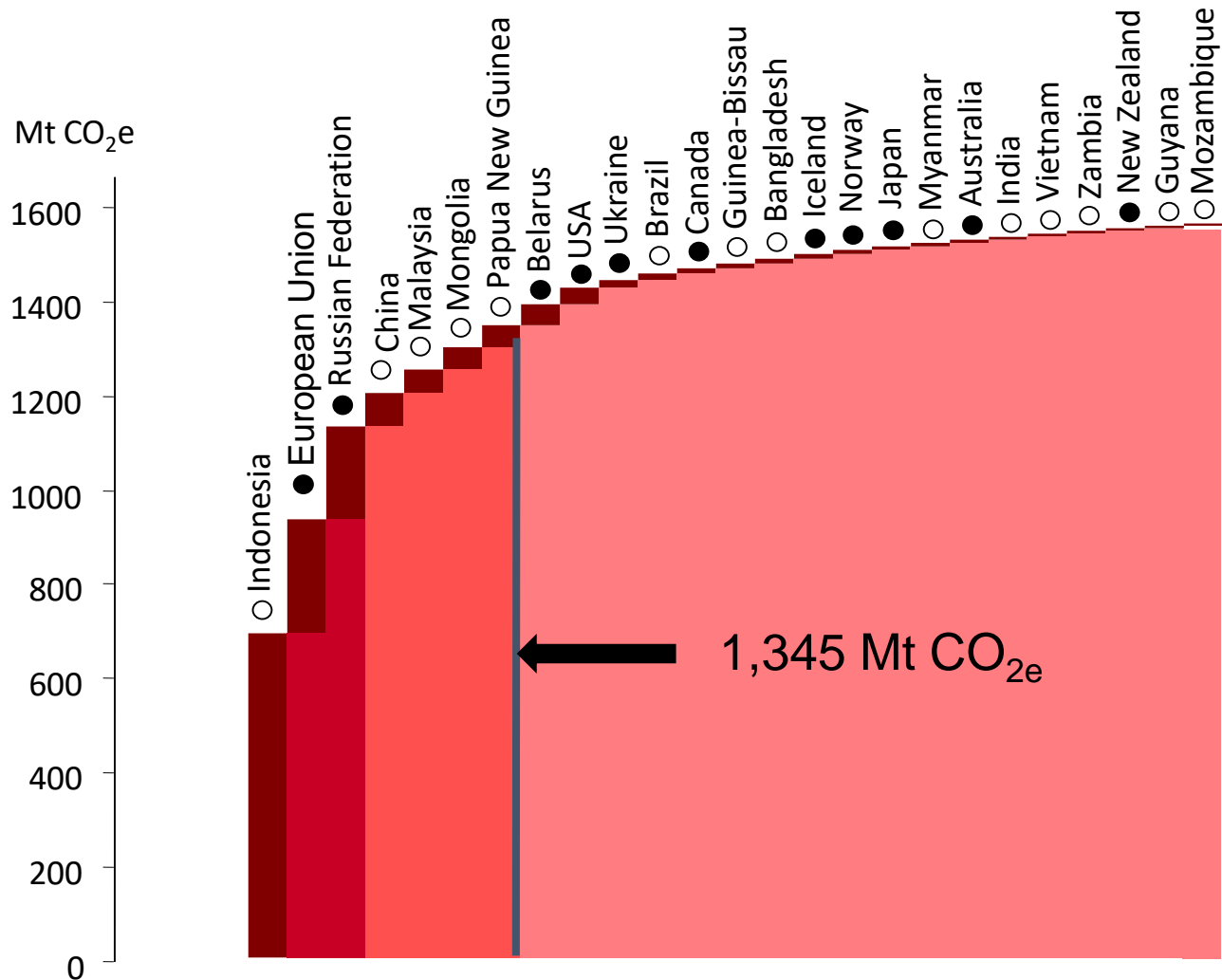


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probably less in
Russia now...



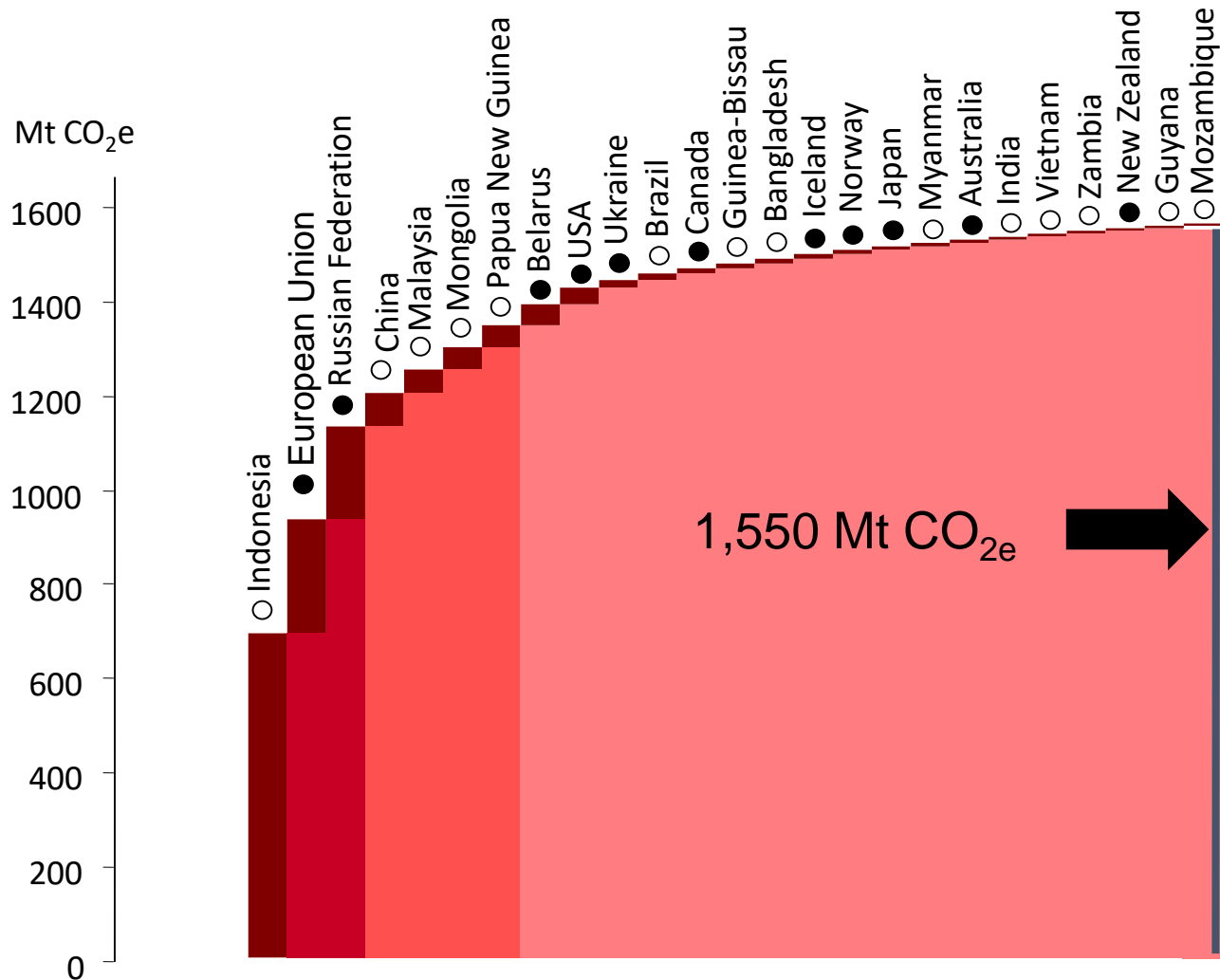
Assessment of global emissions from organic soils



Including 4 further countries, 80% of the global emissions from drained organic soils are reached.

* countries of the European Union are aggregated

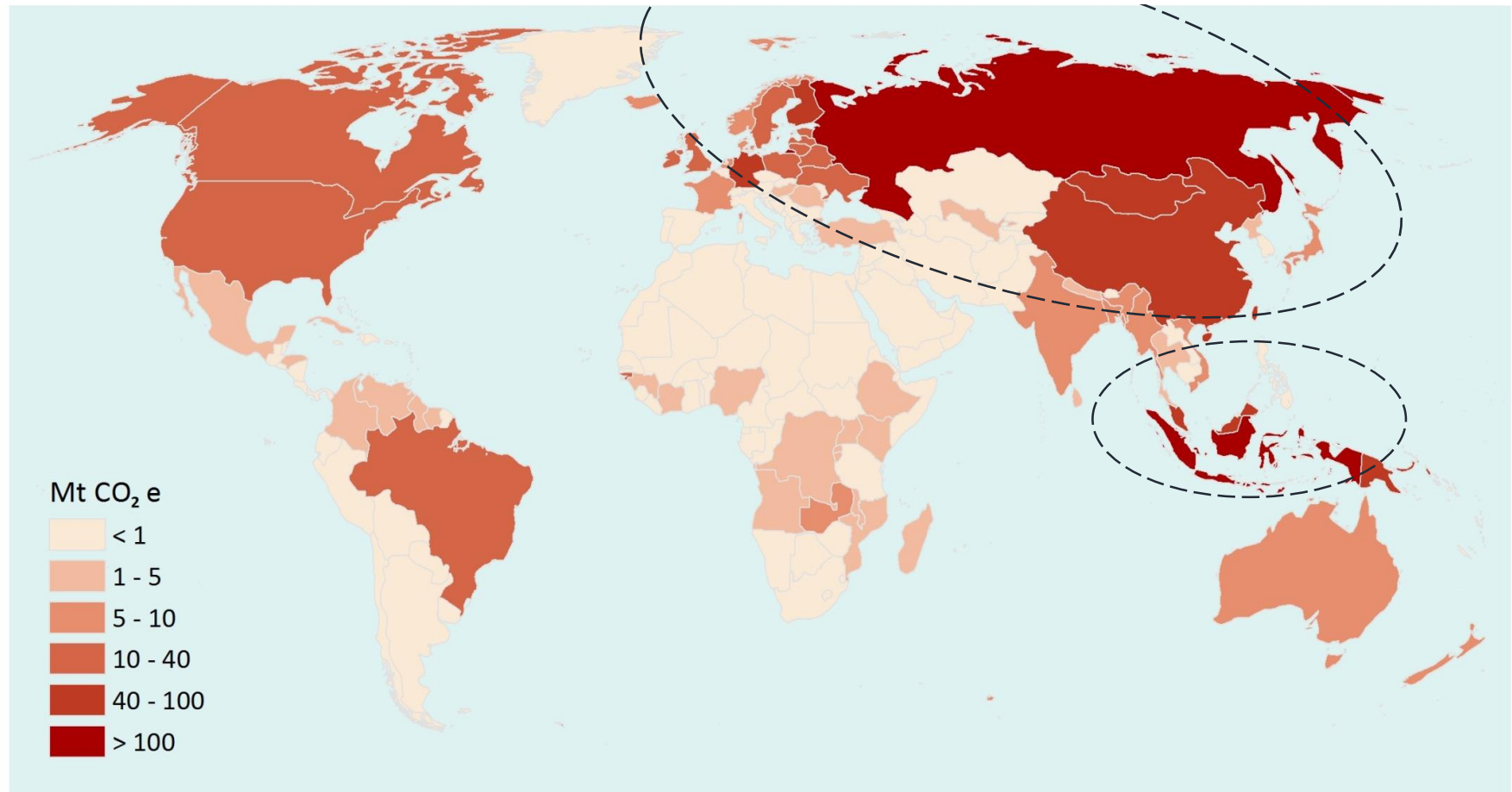
Assessment of global emissions from organic soils



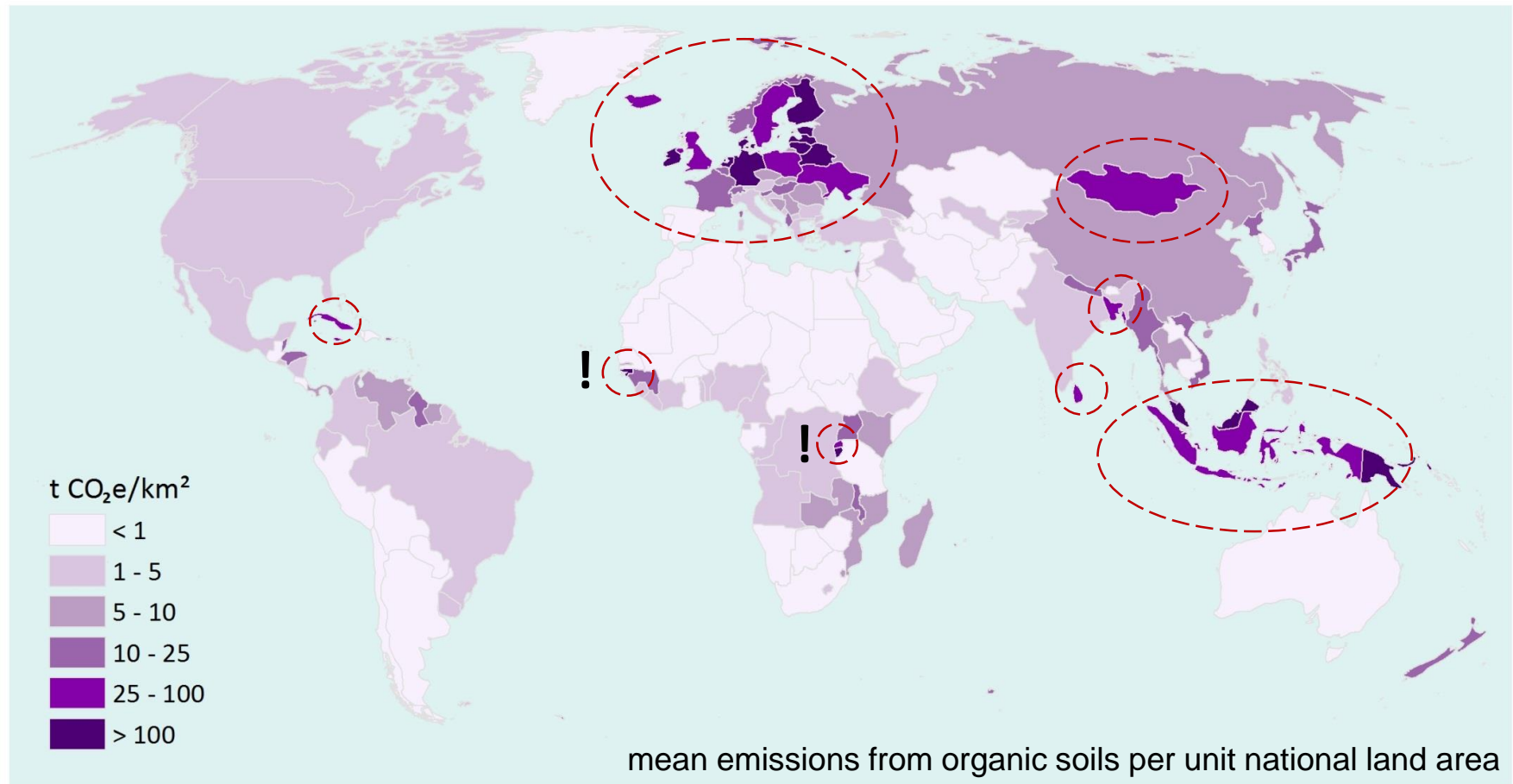
25 countries are together responsible for 95% of global emissions from drainage or organic soils (excluding fires).

* countries of the European Union are aggregated

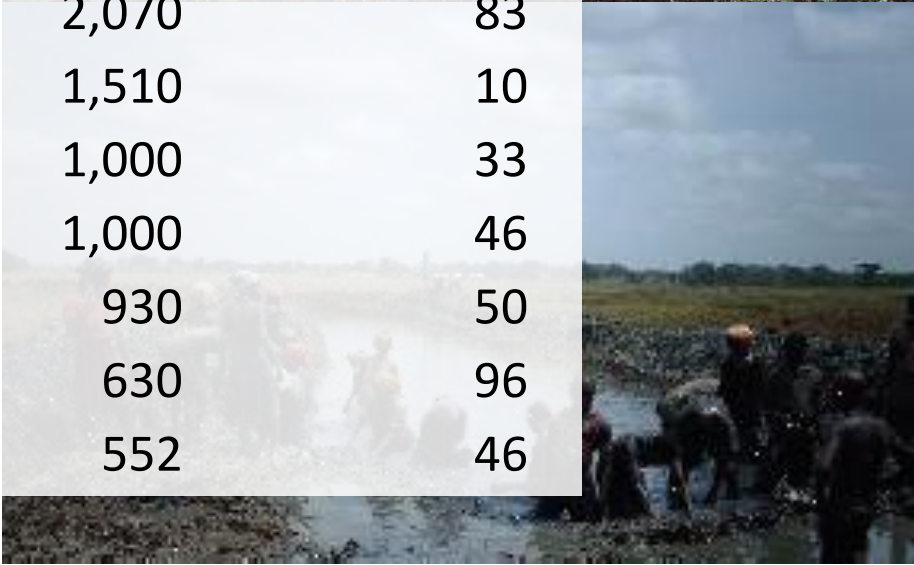
Organic soil emission hotspots: Europe and Asia



Countries with high emissions related to their size.

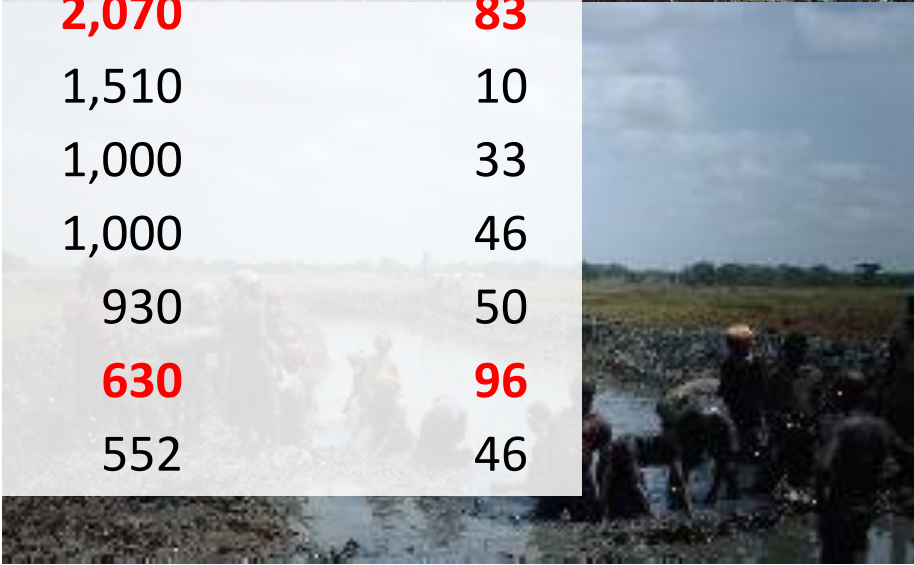


Assessment of global emissions from organic soils



AFRICA	
country	
Guinea-Bissau	2,070 83
Zambia	1,510 10
Mozambique	1,000 33
Ethiopia	1,000 46
Madagascar	930 50
Burundi	630 96
Rwanda	552 46

Assessment of global emissions from organic soils

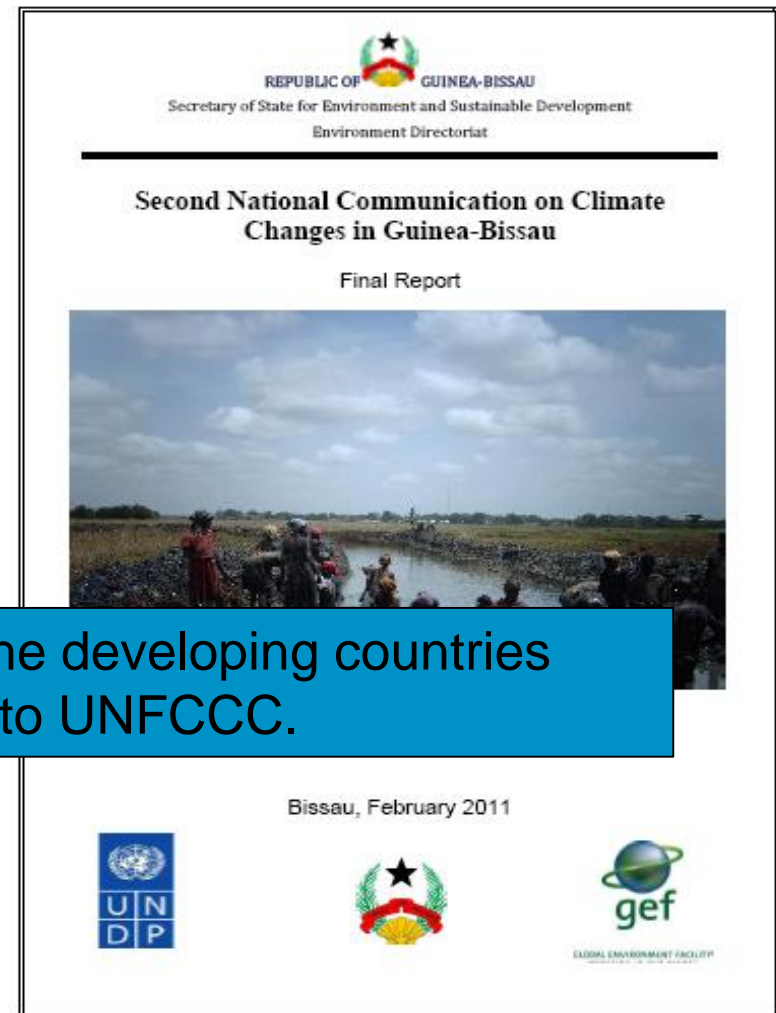


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Zambia	1,510	10
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Madagascar	930	50
Burundi	630	96
Rwanda	552	46

“... In this study was found that all agriculture practiced in **Guinea-Bissau** is in organic soils.

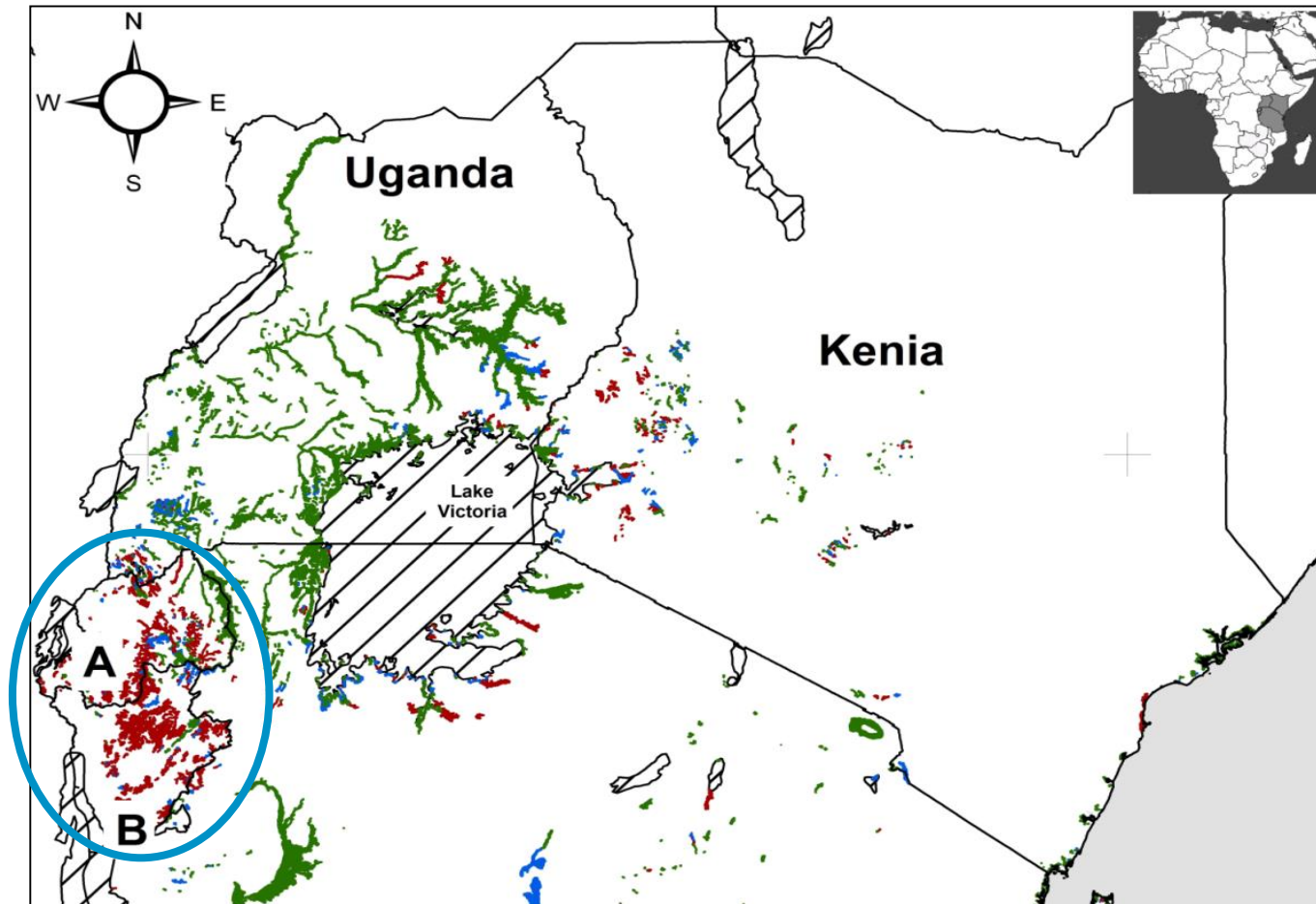
There are totally 206,737 ha that is used for agriculture...”

Guinea-Bissau is an exception among the developing countries while reporting on drained organic soils to UNFCCC.



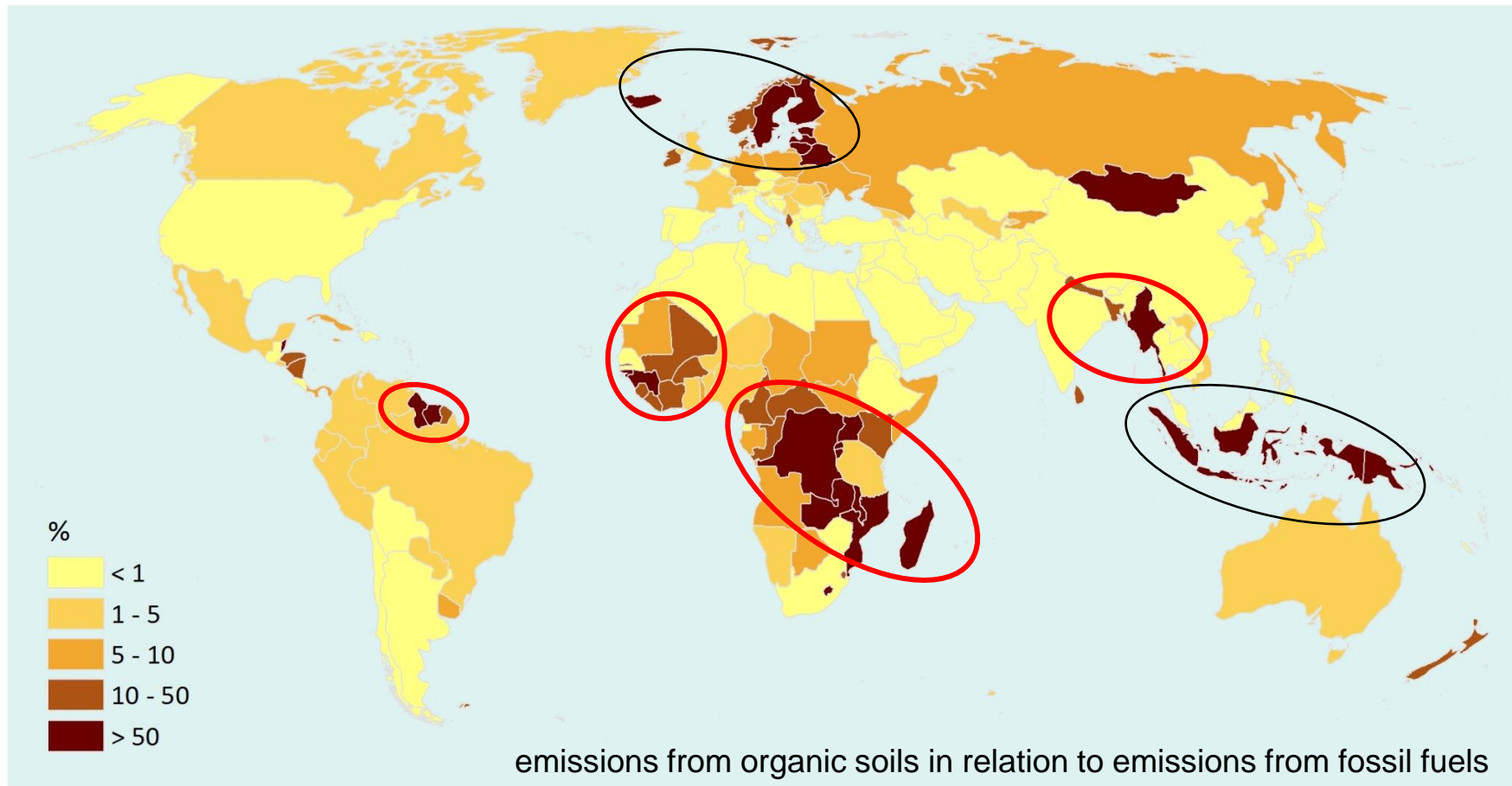


Coastal lowlands as in Guinea-Bissau occur extensively along the coasts of Tropical Africa - and are hardly covered by GHG research and UNFCCC reporting.



Data from own organic soil mapping of East Africa (A=Rwanda; B=Burundi); red: drained and degrading organic soils

Countries where organic soil emissions are important for national climate policies.



Summary

- Although very probably underestimating the real extent of globally drained organic soils, their global emissions almost double CO₂ emissions from aviation (~1,600 Mt CO_{2e}).
- 25 countries are together responsible for 95% of global emissions from drained organic soils (11 industrial and 14 developing countries).
- Europe is the second largest emitter after Indonesia and might consider comparable actions for organic soil rewetting (maybe Germany first?).

ACKNOWLEDGEMENTS

Collaboration



To ~ 130 European peatland researchers that have contributed to the *European Mires Book*, and many national authorities that provided data

Funding





Next update of the Global Peatland Database: *End of 2017*



Thank you!