Proposed global targets for wetlands

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Peatlands: The remaining undrained peatland carbon stores remain intact and 10 million hectares of drained peatland are restored, by 2030.

The goals for conservation and restoration of peatlands are usually for a mix of benefits including climate change mitigation/adaptation, water storage and regulation, biodiversity conservation, as well as securing productive use for local livelihoods. Locking up carbon in peatlands, as well as the maintenance and recovery of other values of drained and degraded peatlands, depends on keeping them wet or fully restoring them through re-wetting. The on-going high greenhouse gas emissions from drained peatlands has led to a conservation and restoration target based on what is needed for peatlands to become carbon neutral in accordance with the Paris Agreement. This means that by 2050 the remaining peatlands must be conserved and around 50 million hectares need to be rewetted to prevent carbon emissions.

The area of peatland that has been drained in the past amounts to c. 65 million ha (see Global Peatland Database, Greifswald Mire Centre). But not all of that has remained as peatland because part has already completely been oxidized. The total current area of drained peatlands is in the order of magnitude of 50 million ha (Joosten, 2021).

Compensation for the ongoing emissions from drained peatlands through other sectors seems unlikely, since there are no technological sinks operational yet, and the entire remaining land sector sink can only compensate for some 40% of the currently drained peatlands (Humpenöder *et al*, 2020). Materialising large scale conservation and restoration efforts to achieve this outcome depends on peatland assessments, technical and institutional capacities, as well as finance, policies and social acceptance. Therefore, a target of 10 million hectares is proposed as a feasible while still challenging target for 2030.

Key References:

Joosten, H. (2021). Draft report to Ramsar Convention: Ramsar Global Guidelines for Peatland Rewetting and Restoration, Greifswald University and Duene e.V., Partners in the Greifswald Mire Centre, Greifswald.

Humpenöder, F., Karstens, K., Lotze-Campen, H., Leifeld, J., Menichetti, L., Barthelmes, A. & Popp, A. (2020). Peatland protection and restoration are key for climate change mitigation. Environmental Research Letters. https://doi.org/10.1088/1748-9326/abae2a

Mangroves*:* A net gain of 20% in global mangrove cover, by 2030

Mangroves are highly valued for their rich biodiversity, the nursery role they provide in fisheries, their potential to store vast amounts of carbon (so-called blue carbon) making them critical for climate regulation and mitigation, as well as for protecting coasts from erosion and enabling communities to adapt to climate change. Of an estimated original 33 million ha of mangroves, half

was lost, with an additional 15-20% severely degraded, by 2015. At this rate of loss mangroves will disappear over the next 100 years (see references below).

The target to restore 20% by 2030, using 2015 levels as the benchmark, has been set by the Global Mangrove Alliance on the basis of the fact that we need to restore mangroves at a substantive scale in order to restore the range of biodiversity and ecosystem services that were lost. The mangrove cover target refers to existing and former mangrove areas and to restoration that brings these areas back to a state of good (ecological, biogeochemical and anthropogenic) functionality. Measures of mangrove cover therefore need to include indicators of these aspects.

The target aims to address feasibility, taking into account coastal zone management and aquaculture reform. It also recognizes that not all mangroves are restorable, as much of former mangrove land has been converted for aquaculture, farming (rice and oil palm) and urban development. Also some former mangrove lands might be unrestorable due to sea- level rise and soil subsidence; while in some places inward migration of mangroves is deemed possible, we also see a latitudinal move of mangroves, including salt marsh habitat turning into mangroves as temperatures rise.

Key References:

Global Mangrove Watch. Wetlands International. www.globalmangrovewatch.org

Spalding, M. *et al* (2010) World Atlas of Mangroves. First Edition. Routledge

Daniel A. Friess *et al,* (2019) The State of the World's Mangrove Forests: Past, Present, and Future. Annual Review of Environment and Resources. Vol. 44:89-115 (annualreviews.org)

Floodplain wetlands: Remaining, free-flowing rivers and floodplains remain intact and river connectivity is enhanced, restoring floodplain ecosystem functionality and area.

Riverine floodplains are very complex, dynamic and diverse ecosystems. As producers of food and regulators of water and carbon their health is of huge importance to global climate and development agendas. The pervasiveness of dams, levees and other factors such as rapid spreading of alien invasive species often severely disrupts flow and sediment pulses. These affect river – floodplain interactions and these can cause a cascade of effects which have real consequences for biodiversity, human livelihoods and societal resilience to water shocks. Furthermore. their high productivity makes them very suitable for agricultural conversion and their typically gentle morphology makes them highly suitable for habitation, road and rail networks and industrial installations leading to degradation and even loss.

Over the past 30 years there have been significant advances in understanding how climate, human interventions and floodplain dynamics influence the natural functions of the riparian system, biodiversity and ecosystem services. However, the extent of floodplain loss caused by various land and water management activities or infrastructure, at different spatial scales and challenges of definition have made the development of a target for conservation and restoration a challenge (e.g. Tockner *et al*, 1999). This is reflected by the lack of a clear area-based target for floodplain restoration at the time of writing.

There are signs this might be changing. Global data on the status of different aspects of river connectivity (e.g. Grill *et al*, 2019); can be used as a surrogate indicator of river and floodplain health insofar as this indicates changes affecting floodplain hydrological regimes, itself a determinant of functioning and services delivery. Using a variety of models and data sources, Grill *et al* assessed the connectivity status of 12 million kilometres of rivers globally and identified those that remain free-flowing in their entire length. From that they deduced that only 37 per cent of rivers longer than 1,000 kilometres remained free-flowing over their entire length and 23 per cent flowed uninterrupted to the ocean.Furthermore, recent advances in satellite mapping (e.g. Nardi *et al*, 2019) open up opportunities for estimating the extent and rates of floodplain loss at different scales.

Given the challenges outlined above we do not feel ready to post a quantified global target. Instead we are proposing a directional statement that we believe can be quickly improved upon, building on the knowledge and data acknowledged above. In the coming years we will convene international expertise to agree upon such a target and a system to track and monitor progress towards its realization.

Key References:

Grill, G., Lehner, B., Thieme, M. *et al.* (2019)Mapping the world's free-flowing rivers. *Nature* 569, 215–221. https://doi.org/10.1038/s41586-019-1111-9

Tockner, K. & Standford, J.A. (2002) Riverine flood plains: present state and future trends. Environmental Conservation, 29, 308–330

Nardi, F., Annis, A., Di Baldassarre, G. *et al.* GFPLAIN250m, a global high-resolution dataset of Earth's floodplains. *Sci Data* **6,** 180309 (2019). https://doi.org/10.1038/sdata.2018.309

Tidal Flats: A net gain of 10% in area of tidal flats, by 2030

Protection and restoration of tidal mudflats is vital to conserve globally threatened biodiversity and is urgent in light of sea level rise associated with current and future climate scenarios, as well as coastal and inland human development linked land use changes, river discharges and sediment flows. It is estimated that 16% of tidal flats have been lost over the last 3 decades (Murray *et al*, 2019). The target to restore 50% of the recent loss over the past three decades (1990 benchmark), means approximately a net gain of 10%. This modest target recognises the low feasibility of mudflat restoration, given the increasing human development demands in coastal zones. The target is meant to imply not only an area gain but also return to a state of good ecological functionality, to support the full range of ecosystem services. Within this, priority for conserving and restoring tidal flats for nature conservation benefits should be given to critical sites for migratory shorebirds.

Key References:

Murray, N.J., Phinn, S.R., DeWitt, M. et al. (2019) The global distribution and trajectory of tidal flats. Nature 565, 222–225. https://doi.org/10.1038/s41586-018-0805-8

Wetlands for migratory waterbirds: 50% of the estimated 7000 critically important sites identified along flyways come under favourable management, by 2030.

The conservation and recovery of the world's 2,500 migratory and resident waterbird populations along all major flyways requires favourable management and restoration of a connected network of an estimated 7,000 critically important wetland sites worldwide. This depends on no net loss of already identified critical sites and net gain through identification and improved management of other critical sites. The proposed target uses numbers of critical sites as a proxy for the adequacy of site networks needed by waterbirds at the population level. For connectivity within the network, a high percentage of wetland sites need to be in good ecological condition. Identification of these critical sites is the first step, which already leads to progress in flyway agreements and by conventions towards designation and improved management. "Favourable management" is the terminology adopted by the East Asian and Australasian Flyway Partnership and while further work is needed to agree how to measure this, it seems to be a concept and approach to targets that could be adopted globally. Information on the management status of sites is just starting to be gathered. For example, AEWA parties are now asked to report against their national critical sites including about management. The proposed 50% level of 'favourable management' is a balance between ambition and reality. The ambition is to achieve site management that addresses specific objectives for the conservation of migratory waterbirds and their habitats, amongst other management goals.

The target takes into account current and future climate scenarios that are expected to affect spatial distribution and availability of suitable habitats, with losses in many regions (ref Breiner *et al* (in prep, Nagy *et al,* in prep). The intention is to improve the target and monitoring by introducing measures of network functionality and connectivity in future. Wetlands International estimates, through gathering expert knowledge, that an estimated 2000 critical sites remain to be identified in the Americas Flyways, 400 sites in the Central Asian Flyway, 150 sites in the Central Pacific Flyway and Jaensch (2013) estimates a further 1,060 sites in the East Asian - Australasian Flyway. In the best researched African-Eurasian flyway for which information needs updating, around 3,050 critical sites are recognised, of which 35% have some protection (http://critical-sites.wetlands.org/en).

Key References:

Breiner et al. (in prep). Managing Critical Sites of the Africa-Eurasian waterbird flyway to adapt to climate change. Submitted to Nature Climate Change

Nagy et al. (in prep). Climate change exposure of waterbird species in the African-Eurasian flyway. Submitted to Bird Conservation International