UN-Water input on Freshwater-Biodiversity Linkages: Response to the Zero-Draft Document from the Open-Ended Working Group on the Post-2020 Global Biodiversity Framework

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EXECUTIVE SUMMARY

Freshwater ecosystems host exceptional biodiversity: covering less than 1% of the Earth's surface, they harbour more than 10% of all species. Despite their critical importance, the biodiversity crisis impacts freshwater ecosystems most significantly out of all ecosystems. More than 50% of all wetlands globally have been lost since 1900 with inland wetlands being lost faster than coastal and marine, and freshwater vertebrate populations have fallen by 83% since 1970, which is more than twice as steeply as terrestrial or marine populations.

No global framework exists to guide policy responses commensurate with the scale and urgency of the situation, and the existing targets and indicators including current Aichi Biodiversity Targets are simply not adequate to set forth the ambitious framework needed to motivate international action. Under these circumstances, the targets and indicators need to be improved, and more actions need to be scaled up.

Emerging scientific consensus is pointing the way towards principle areas of action for recovery of freshwater biodiversity, focusing on implementing environmental flows, improving water quality, protecting and restoring critical habitats, managing over-exploitation of freshwater species and materials, preventing and controlling invasive species, and safeguarding and restoring habitat connectivity. These areas of action can form the basis of improved targets and indicators.

In 2020, governments will review the Strategic Plan under the Convention on Biological Diversity (CBD) and formulate a global biodiversity framework that will include new goals, targets and indicators for 2030 and 2050. This paper aims to provide consolidated and constructive input from the entire UN-Water membership to inform the Open-Ended Working Group on the Post-2020 Global Biodiversity Framework.

This paper proposes detailed suggestions on the new goals and targets of the CBD framework, and recommends coherent monitoring and reporting on all targets and indicators related to freshwater and biodiversity between the SDG and the new CBD frameworks. Moreover, this paper proposes that other actions should be strengthened, including: addressing the drivers of freshwater biodiversity loss, developing capacity-building activities, reforming the governments' responses to challenges, improving financial and technical resources, and enhancing public-private partnerships.

The recommendations set forth in this technical input paper have been endorsed by UN-Water and as such it represents the collective position of UN-Water's 32 Members and 41 Partners.

1. THE IMPORTANT FRESHWATER BIODIVERSITY INTER-LINKAGES

Freshwater, in sufficient quantity and quality, is essential for all aspects of life and fundamental to sustainable development. Freshwater ecosystems supply water and food to billions of people, provide unique habitats for many plants and animals and protect us from droughts and floods. While freshwater ecosystems cover less than 1% of the Earth's surface area, and only hold about 0.007% of the total planetary water supply, these habitats harbor exceptional diversity, hosting about 10% of all known species, one third of vertebrate species, and more described fish species than have been found in the World's oceans [i] [ii] [iii] [iv].

Freshwater biodiversity supports the functioning of all ecosystems, including generating 3% of the total net primary production on Earth [v]. Estimates have put the total value of freshwater ecosystem services to people globally as US$ 4 trillion per year [vi]. For example, inland fisheries are a critical source of food and nutrition security for nearly a billion people, particularly in developing parts of the world such as Asia and Africa [vii]. These inland fisheries have an estimated economic value of US$ 38-44 billion [viii], and in low income countries, inland fisheries provide livelihoods for more than 60 million people [ix]. Moreover, stable, high-yield fisheries have been shown to be strongly correlated with high fish species richness, indicating the close relationship between biodiversity and fisheries services [x].

Preserving or restoring wetlands, coastal mangrove forests, and natural floodplains is also an important nature-based climate change mitigation approach as these ecosystems act as carbon sinks, absorbing greenhouse gas emissions [xi]. Peatlands store at least twice as much carbon as all of Earth's forests, while mangrove soils hold over 6 billion tons of carbon and can sequester up to 3-4 times more carbon than their terrestrial counterparts [xii]. Halting peatlands drainage is therefore not only important for protecting their specific biodiversity but also to avoid their transformation from greenhouse gas sinks to sources. Compared to technology-based solutions to climate challenges, nature-based solutions such as wetland conservation and restoration are often lower cost and have multiple synergistic benefits for a variety of sectors and political goals [xiii] [xiv].

While the relationships between the conservation of freshwater ecosystems and the provision of ecosystem services to support Sustainable Development Goals (SDGs) are usually discussed in reference to Goal 6 Water and Sanitation, well-functioning freshwater ecosystems and the sustainable management of water resources has a role in achieving most of the SDGs [xv]. However, a significant challenge to effectively protect and restore freshwater ecosystems is that the management of these systems often is focused on water provision for human and other consumptive uses, with insufficient consideration taken to ensure the integrity of ecosystem functions which are the source of the services on which society depends and the foundation of the biodiversity of species therein. This challenge is further compounded by institutional and policy fragmentation, inefficient jurisdiction and enforcement, and poor coordination between a multitude of sectors that influence freshwater systems. A consequence has been the sacrifice of freshwater life, which can ultimately also lead to the destruction of the ecosystems required to support these same objectives[xvi] [xvii].

Nowhere is the biodiversity crisis more acute than in freshwater ecosystems [xviii]. Wetlands are disappearing three times faster than forests. An estimated 87 per cent of all wetlands were lost globally in the last 300 years, and more than 50 per cent since 1900 [xix]. Globally, freshwater vertebrate populations have fallen more than twice as steeply as terrestrial or marine populations[xx] and 1 in 3 freshwater species on the Red List are threatened with extinction [xxi].

The causes of these declines have been comprehensively synthesized [xxii] [xxiii] and include flow alteration; pollution; habitat degradation and loss; overexploitation of species and riverine substrates; invasive non-native species; and loss of connectivity. These threats are driven by a wide range of human activities including agriculture, power generation, urbanization, industry, mining, flood management and domestic water supply. In many cases, negative impacts are felt downstream from where these activities take place, adding to the need for coherent, coordinated water governance especially in transboundary basins.

Arguably the greatest stressor impacting on rivers, that aggregates many of the above sources of stress, is the alteration of quantities of water and the change in seasonality of river flow regimes. These changes impact in turn on aquatic ecosystems and ultimately on aquatic species biodiversity, and thus a major avenue for protection and restoration of aquatic biodiversity is to ensure implementation of environmental flows or e-flows [xxiv] .This has been a notable missing component of major global conservation plans and strategies, including the Aichi targets.

Too often, wetlands and other freshwater habitats have been regarded, simplistically, as a subset of forests or grasslands, thus obscuring many of the primary threats above and precluding effective action. However, in 2020 governments will review the Strategic Plan under the Convention on Biological Diversity (CBD) and formulate a global biodiversity framework that will include new goals, targets and indicators for 2030 and 2050. There is a brief window of opportunity now to provide recommendations on freshwater and biodiversity linkages that can inform this review process and guide future policy responses.

This paper aims to do exactly that - provide consolidated and constructive technical input from the entire UN-Water membership to the Open-Ended Working Group on the Post-2020 Global Biodiversity Framework. By factoring in freshwater perspectives in the development of the post-2020 global biodiversity framework we have an opportunity to begin slow and reverse the loss of global freshwater biodiversity. Not only will this help to protect and restore vital freshwater ecosystems and habitats, but it will be essential for the achievement of the post-2020 Global Biodiversity Framework at large.

2. PROPOSED STRENGTHENING OF FRESHWATER-BIODIVERSITY LINKAGES IN THE POST-2020 BIODIVERSITY FRAMEWORK

This section proposes text changes (both insertions and deletions) to the detail contained within Appendices 1 (Goals) and 2 (Targets) of the Zero-Draft Document of the post-2020 global biodiversity framework. Proposed new text is inserted in red. Proposed deletions are marked with a ~~strike through~~. Only those Goals and Targets in which changes are proposed have been included and addressed. Throughout the tables below, in column C, the new suggested indicators are to be considered the **priority indicators** for monitoring the freshwater-related aspects of the goals and targets. These indicators are the most important to operationalize, but they alone they will not be enough to cover all the elements and aspects of the goals and targets. Therefore, some expansions and modifications to the indicators initially listed have been suggested. Also, In the comments below the tables a few additional indicators that could be considered in a second step, once the priority indicators are in place, have been provided. Enhancement or development of these additional indicators should be regarded as priorities for further research to support the Global Biodiversity Framework.

If UN-Water's proposed re-formulations, deletions and additions to the goals, targets and indicators as listed in the Appendices are adopted, they will also need to be transferred as appropriate into relevant sections of the Zero-Draft Main Document for the post-2020 global biodiversity framework.

2.1 Proposed strengthening to APPENDIX 1: Goals

2.1.1 Goal 1: No net loss in area or integrity

	A	B	C
	Draft 2050 Goals	**Suggested elements of the goals for monitoring**	**Suggested priority indicators**
1	No net loss by 2030 in the ~~area~~ extent and integrity of: i) freshwater, ii) marine and iii) terrestrial ecosystems, and increases in each ecosystem type of at least [20%] by 2050, ensuring ecosystem resilience.	Change, and rate of change, in extent of natural ecosystems and biomes (overall, for each biome/ecosystem type, and for intact areas, e.g. primary forests).	i) Freshwater indicators - SDG indicator 6.6.1 "Change in extent of water-related ecosystems over time" - Wetland Extent Trends Index - Continuous Global Mangrove Forest Cover. ii) Marine: Live coral cover. iii) Terrestrial: - Forest area as a proportion of total land area. - Trends in forest extent and/or tree cover. - Trends in primary forest extent Applicable to all three ecosystems - Species Habitat Index. - Biodiversity Habitat Index. - Red List for Ecosystems
		Change in ecosystem connectivity and fragmentation.	- Connectivity Status Index for rivers[xxv]
		Change in ecosystem integrity resilience and degradation and rate of ecosystem restoration.	- Proportion of land that is degraded over total land area - Global Ecosystem Restoration Index. - Cumulative human impacts on marine ecosystems. - Ocean Health Index. - Vegetation health index - Human footprint - Implementation of environmental flows[xxvi] - Freshwater Health Index

Comment (i): Freshwater in this UN-Water input paper is defined as all surface and ground water resources found within freshwater ecosystems for example lakes, reservoirs, rivers, groundwater and inland wetlands. Inland wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.[xxvii]

Comment (ii): The recommended and existing SDG 6.6.1 indicator, which is based on high resolution Earth Observation data, may be sufficient as it covers most of the aspects of UNEP-WCMS's Wetland Extent Trends Index (which is applied at a relatively coarse scale) and the Continuous Global Mangrove Forest Cover. However, should the Wetlands Extent Trends Index be included as an additional indicator it would be necessary to modify it to distinguish between natural and artificial wetlands.

Comment (iii): The Connectivity Status Index and the Freshwater Health Index could be developed into globally operational indices. The index measure changes to freshwater ecosystem integrity, connectivity and fragmentation.[xxviii]

Comment (iv): The implementation of environmental flows could be taken as the proportion of river basins in a country where environmental flows are provided in accordance with the e-flow methodology of SDG indicator 6.4.2. An improved global dataset for river flows and associated e-flows should be a priority for research.

2.1.2 Goal 2: Species decline

	A	B	C
	Draft 2050 Goals	**Suggested elements of the goals for monitoring**	**Suggested priority indicators**
2	Net species extinction risk stabilized by 2030, extinctions halted from 2020, and average population abundance of native species increased by 20% by 2030 and 60% by 2050 ~~The percentage of species threatened with extinction is reduced by [X%] and the abundance of species has increased on average by [X%] by 2030 and by [X%] by 2050.~~	~~Number of extinctions.~~ Extinction risk per species	- Number of species extinctions and species threatened ~~birds and mammals~~ per taxonomy group and ecosystem type: freshwater/terrestrial/marine). - ~~Number of extinctions prevented.~~ - Red List Index - The Living Planet Index
		Change in species abundance per ecosystem type (freshwater, terrestrial, marine).	- Living Planet Index. - Biodiversity Intactness Index.

Comment (v) According to the originally suggested text it is unclear how to measure that a percentage of threatened species is reduced, as the baselines for assessing this percentage are not clear. There is also no mention of halting extinctions in the original text; hence the overall percentage of species threatened could be reduced simply by letting species go extinct. Net species extinction risk stabilized could be measured with the Red List Index. Population abundance is measured using the Living Planet Index, which, has noted in the Living Planet report, has declined by 60%; therefore, the goal should be to increase species abundance back up by 60% again.

Comment (vi): Taxonomy could be grouped by mammals, birds, amphibians, and crustaceans (currently global data exists for these groups); and in addition, for reptiles, fishes, dragonflies/damselflies, mollusks, freshwater plants (currently regional data exists with global completion expected soon).

Comment (vii): The IUCN's Red List Index for species and the Wild Bird Index [xxix] are the main sources of information for monitoring changes to species. In the future these indices could be complemented by the recently launched IUCN Green List of Protected and Conserved Areas. [xxx]

Comment (viii): A future additional indicator to be considered to monitor trends in species diversity is "Trends in number of species that have been reassessed and moved to the 'Critically Endangered' category from a lower threat category."

2.1.3 Goal 4: Nature provides benefits to people

	A	B	C
	Draft 2050 Goals	**Suggested elements of the goals for monitoring**	**Suggested priority indicators**
4	Nature is protected, restored and managed to provide benefits to people including ~~contributing to~~: (ii) ~~Improvements in sustainable access to safe and drinkable water for at least~~ Freshwater in sufficient quantity and quality for direct human use and other consumptive and non-consumptive uses ~~[X million] people, by 2030 and [Y million] by 2050~~;	Change in ~~access to~~ availability of freshwater of adequate quantity and quality.	- SDG indicator 6.6.1: Change in the extent of water-related ecosystems over time.[1] - SDG indicator 6.3.2.: Proportion of bodies of water with good ambient water quality. - ~~SDG indicator 6.1.1.: Percentage of population using safely managed drinking water services~~ - SDG Indicator 6.4.2.: Level of water stress: freshwater withdrawal as a proportion of available freshwater resources - ~~Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe WASH services).~~ - ~~Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type.~~ - Implementation of environmental flows[2]

Comment (ix) The suggested change in the goal formulation is to enable monitoring of the goal and to ensure that focus is on the functional capacity of ecosystems to provide services for human and other consumptive and non-consumptive uses. As such a CBD goal should not predetermine a certain global number of people benefitting from ecosystem goods and services as this is related to many other factors, including infrastructure, economic and other capacities.

Comment (x): Goals and indicators related to safely managed drinking water and WASH services are not directly related to the health of ecosystems, which form the ambient water source. Provision of drinking water and sanitation are services which relate investments in infrastructure for treatment, collection and distribution systems to etc. thus not relevant here.

2.2 Proposed strengthening to APPENDIX 2: Targets

2.2.1 Target 1: Retain and restore ecosystems

	A	B	C
	Draft 2030 targets	**Suggested elements of the targets for monitoring**	**Suggested priority indicators**
1	Retain and restore freshwater, marine and terrestrial ecosystems, increasing by at least [50%]	Change in extent and rate of change of natural ecosystems and biomes.	- SDG indicators 6.6.1 and 6.3.2 - SDG indicator 6.5.1 Degree of integrated water resources management implementation

1 The SDG indicator 6.6.1. includes a sub-indicator on lake water quality - turbidity and eutrophication
2 See Comment (iv)

	the land, freshwater, and sea area under ~~comprehensive spatial planning~~ effective management addressing inland water/land/sea use change and source-to-sea linkages, achieving by 2030 a net increase in area, connectivity and integrity and retaining existing intact areas and wilderness.	Area under effective management Land-use change for agriculture Forest area as a proportion of total land area. Trends in forest extent (tree cover). Spatial planning. Changes in wetland extent Changes in freshwater use as a proportion of river flows	- SDG indicator 6.5.2: Proportion of the transboundary basin area within a country with an operational arrangement for water cooperation in place - Continuous Global Mangrove Forest Cover. - Live coral cover. - Species Habitat Index. - Wetland Extent Trends Index[3] - Freshwater Health Index
			- Proportion of inland water, land and sea area under spatial planning regimes that adequately integrate freshwater biodiversity.
		Change in ecosystem connectivity.	- Connectivity Status Index
		Change in ecosystem integrity resilience and degradation and rate of ecosystem restoration	- Implementation of environmental flows[4] - SDG indicators 6.3.2 and 6.6.1

Comment (xi): The first 2030 action target is to "retain and restore freshwater, marine and terrestrial ecosystems". This provides a promising start, but the connection between these systems could be further emphasized, and elements of ambition for dealing with those connections could be added to the framework.

Comment (xii): There will need to be some definition of **effective management** linked to Goal 1 on measurement of loss of extent and integrity.

Comment (xiii): The SDG 6.5.1 indicator includes an assessment of how water-related ecosystems are managed. It includes a 5-step scale from "No management instrument being applied" to a level where "Management instruments are implemented on a long-term basis, with excellent coverage across different ecosystem types and the country and are highly effective. Environmental water requirements are analyzed for whole country." In the future this could be expanded upon to more specifically include aspects of freshwater biodiversity.

2.2.2 Target 2: Protected areas

	A	**B**	**C**
	Draft 2030 targets	**Suggested elements of the targets for monitoring**	**Suggested priority indicators**
2	~~Protect~~ Safeguard all sites of particular importance for biodiversity through protected areas and other effective area-based conservation measures, by 2030 ~~covering at least [60%] of such sites and at least [30%] of inland water, land and sea areas with at least [10%] under strict protection.~~	Change in extent of protected areas and other area-based conservation measures for inland waters, land and sea areas.	- Protected area coverage for inland waters, land and sea areas. - OECM coverage.
		Coverage and representativity of protected areas and other area-based conservation measures (per ecosystem type, and key areas).	- Protected Area Coverage of Key Biodiversity Areas and free-flowing rivers (to include length of riverine and floodplain habitat protected) - Protected area coverage of ecoregions.

3 See Comment (ii)

4 See Comment (iv)

			- Protected Area Representativeness Index. - Species Protection Index.
		Connectivity of protected areas	- Protected Area Connectedness Index (PARC-Connectedness). - Connectivity Status Index for protected freshwater areas
		Protected area management	- ~~Protected Areas Management Effectiveness~~ - Management Effectiveness Tracking Tool - IUCN Green List of Protected and Conserved Areas - Governance of protected areas and OECMs (public, private, community, IPLC)

Comment (xiv) The Management Effectiveness Tracking Tool has been applied to terrestrial protected areas and could be adapted to include freshwater protected ecosystems.[xxxi]

2.2.3 Target 3: Invasive alien species

	A	**B**	**C**
	Draft 2030 targets	**Suggested elements of the targets for monitoring**	**Suggested priority indicators**
3	Control all pathways for the introduction of invasive alien species achieving by 2030 a [50%] reduction in the rate of new introductions and eradicate or control priority invasive alien species to ~~eliminate or~~ reduce their harmful impacts by 2030, including in at least [50%] of priority sites.	Change in the number of countries. ~~Measures put in place to control introduction pathways, by pathway, distinguishing intentional (release) and unintentional (escape, stowaway, contaminants and corridors)~~ Measures put in place to control introduction pathways, by pathway, distinguishing intentional (release) and unintentional (escape, stowaway, contaminants and corridors); also developing sub-indicators for islands and freshwater ecosystems, for the particular vulnerability and sensitivity of these ecosystems to invasions	- Legislation for prevention and control of invasive alien species (IAS), encompassing "Trends in policy responses, legislation and management plans to control and prevent spread of invasive alien species" and "Proportion of countries adopting relevant national legislation and adequately resourcing the prevention or control of invasive alien species (also, SDG indicator 15.8.1). - Number of species assessed for risk. - Number of Parties to, and counties applying, relevant international legal instruments that for controlling pathways (BWM Convention; IPPC, OIE, Biofouling guidelines; World Customs Organization Safe Framework of Standards) - Number of countries monitoring priority invasive alien species

2.2.4 Target 4: Pollution

	A	B	C
	Draft 2030 targets	**Suggested elements of the targets for monitoring**	**Suggested priority indicators**
4	Reduce by 2030, pollution from excess nutrients, biocides, plastic waste and other sources by at least [50%].	Change in the trends in nitrogen waste and phosphorus	~~- Nitrogen Use Efficiency.~~ ~~- Nitrogen + Phosphate Fertilizers (N+P205 total nutrients).~~ ~~- Trends in Loss of Reactive Nitrogen to the Environment.~~ ~~- Trends in Nitrogen Deposition.~~ - SDG indicators 6.6.1 and 14.1.1 [5]
		Change in amount of other pollutants (including light and noise, and emerging pollutants).	- *To be identified* - Trends in pharmaceuticals and plastics pollution of freshwater bodies - SDG indicator 6.3.2

Comment (xv): Indicators of pollution should, as far as possible, measure impact on biodiversity rather than quantity of pollution. Hence, it is suggested to replace proxy indicators such the proposed indicators: Nitrogen Use Efficiency, Nitrogen + Phosphate Fertilizers (N+P205 total nutrients), Trends in Loss of Reactive Nitrogen to the Environment and Trends in Nitrogen Deposition with" Trends in freshwater and coastal eutrophication" which are measured by SDG indicators 6.6.1 and 14.1.1 (coastal eutrophication and floating plastic debris density) respectively.

Comment (xvi): Trends in water pollution could build on SDG indicator 6.3.2 (ambient water quality) and where data is available also include: Soil Salinization, Nitrogen Loading, Pathogen loading, Phosphorus Loading, Mercury Deposition, Pesticide Loading, Sediment Loading, Organic Loading, Potential Acidification, Thermal Alteration - as used by Vörösmarty et al (2010)[xxxii] and http://www.riverthreat.net

2.2.5 Target 5: Wild species

	A	B	C
	Draft 2030 targets	**Suggested elements of the targets for monitoring**	**Suggested indicators**
5	Ensure by 2030 that the harvesting, trade and use of wild species, is legal and at sustainable levels.	Change in the health of fisheries. Wild species being sustainably used	- Proportion of sustainable, threatened and highly threatened inland fisheries - Proportion of fish stocks within biologically sustainable levels ~~- Inland fishery production.~~ - Marine Trophic Index.
		Change in percentage of fisheries under sustainable management certification.	- MSC Certified Catch; with equivalent sustainability certification scheme applied to inland fisheries.

Comment (xvii): Best available global data on freshwater fisheries is from FAO (2018) Review of the state of the world's fisheries: Inland Fisheries http://www.fao.org/inland-fisheries/resources/detail/en/c/1145511/. USGS and FAO are currently conducting a threat assessment on inland fisheries with the initial iteration to be publicly available in 2020 with the aim to reassess on regular intervals.

Comment (xviii): The national status of inland fisheries should not decline from their current state or should be improved where the existing state is degraded. Inland fisheries should align with SDG targets 14.4, and 14.6 (regulate harvesting and prohibit subsidies contributing to overfishing), and 15.1 (sustainable use of freshwater ecosystems).

5 These indicators cover trends in freshwater and coastal eutrophication respectively

2.2.6 Target 6: Climate change

	A	B	C
	Draft 2030 targets	**Suggested elements of the targets for monitoring**	**Suggested priority indicators**
6	Contribute to climate change mitigation and adaptation and disaster risk reduction through nature-based solutions providing by 2030 [about 30%] [at least XXX MT CO2=] of the mitigation effort needed to achieve the goals of the Paris Agreement, complementing stringent emission reductions, and avoiding negative impacts on biodiversity and food security.	Trends in the amount of carbon stored in ecosystems and emissions avoided while maintaining biodiversity.	- Indicators related to REDD+ - SDG indicator 6.6.1[6]
		Trends in the restoration of degraded ecosystems acting as carbon sinks, such as forests and wetlands	- Soil Carbon
		Trends in disaster risk reduction.	- Number of people with reduced vulnerability due to NBS (e.g. coastal protection from mangroves, coral reefs; flood and drought risk reduction from functioning flood plains).

2.2.7 Target 8: Sustainable use of biodiversity in agricultural and other managed ecosystems

	A	B	C
	Draft 2030 targets	**Suggested elements of the targets for monitoring**	**Suggested priority indicators**
8	Conserve and enhance the sustainable use of biodiversity in agricultural and other managed ecosystems including aquaculture, to support the productivity, sustainability and resilience of such systems, particularly by promoting agroecology to ensure the health of the broader agricultural system, and sustainable aquaculture that promotes the conservation of wild species and their environments. ~~reducing by 2030 related productivity gaps by at least [50%].~~	Change in the health of aquaculture fisheries	- Proportion of cultured species within biologically sustainable levels

Comment (xix): Baseline data should come from FAO as for Target 5.

Comments (xx): Currently wild inland fisheries are treated under Target 5 (harvesting of wild species), whereas aquacultured species are treated as a managed ecosystem and thus included within Target 8.

6 Sub-indicator on spatial extent changes to wetland carbon sinks (incl. peatlands, marshes, bogs and fens)

2.2.8 Target 9: Nature-based solutions for clean water

	A	B	C
	Draft 2030 targets	**Suggested elements of the targets for monitoring**	**Suggested priority indicators**
9	Enhance nature-based solutions contributing, by 2030, to sustainable use of freshwater ecosystem resources, including water and riverine aggregates (e.g. sand), for direct human use and other consumptive and non-consumptive uses ~~clean water provision for at least [XXX million] people.~~	Change in the number of ~~people with access to sufficient amounts or quality freshwater.~~ freshwater-related nature-based solutions implemented	~~- Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe WASH services).~~ ~~- Percentage of population using safely managed drinking water services.~~ - Number of new freshwater sources and flood/drought mitigation initiatives derived from implementing nature-based solutions. - SDG indictor 6.4.2 on water stress and total renewable water resources - SDG indicator 6.3.2.: Proportion of bodies of water with good ambient water quality.
		Change in the number and condition of protected forested watersheds and inland water ecosystems essential for the provision of water.	- SDG indicator 6.6.1[7] - Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type. - Connectivity Status Index for rivers (as a proxy for sediment flows to vulnerable cities and communities in low-lying river deltas)
		Change in water use intensity.	- Human appropriation of fresh water (water footprint). ~~- Change in water use efficiency over time.~~ ~~- Change in water use efficiency over time (SDG Indicator 6.4.1).~~ - Level of water stress: freshwater withdrawal as a proportion of available freshwater resources (SDG Indicator 6.4.2). - Implementation of environmental flows[8]

Comment (xxi) As for Goal 4, comment (ix), the suggested change in the target formulation is to enable monitoring of the target and to ensure focus on implementation of nature-based solutions.

7 Sub-indicators on extent of inland wetlands and mangroves, lake water quality and extent of lakes

8 See Comment (iv)

Comment (xxii): Protected forested watersheds and inland water ecosystems may include artificial systems as long as these are not disproportionately detrimental to natural systems and/or where there is the opportunity to return semi-natural systems to their original condition to the overall benefit of biodiversity.

2.2.9 Target 12: Incentives

	A	B	C
	Draft 2030 targets	**Suggested elements of the targets for monitoring**	**Suggested priority indicators**
12	Reform incentives, eliminating the subsidies that are most harmful for biodiversity, ensuring by 2030, that incentives, including public and private economic and regulatory incentives are either positive or neutral for biodiversity.	Change in the value of subsidies harmful to biodiversity	- Trends in potentially environmentally harmful elements of government support to agriculture (producer support estimate). - Fuel subsidies for fisheries and pumping for irrigation. - Subsidies for pesticide use and fertilizer use in agriculture and aquaculture.
		Change in the value of positive incentives for biodiversity.	- Number of countries with biodiversity-relevant charges and fees. - Number of countries with biodiversity-relevant taxes. - Number of countries with biodiversity-relevant tradable permit schemes.

Comment (xxiii): The target should reference the perverse impact of aid and subsidies to freshwater systems. For example, subsidies to poorly planned and ecologically harmful, water-related infrastructure projects; subsidized fuel leading to over pumping of aquifers for irrigation; subsidies to intensive farming or other polluting industries. The targets should also include gaps in water pricing and supply that encourages inefficient use. The target should be linked with SDGs 2, 7, 9 and 13 to ensure that subsidies that would help achieve those SDG Goals/Targets will not have negative effects on this CBD Target. It should also link to SDG 14.6 which addresses the need to prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing.

3. MONITORING AND REPORTING

Data gathering, analysis and sharing between water-related sectors within and across countries is crucial for conserving freshwater biodiversity under different human-driven threats. Such activities will become critical to the success in achieving the new goals, and in reporting against the indicators, with closer alignment of water service orientated data, conservation data, and data on water quantity & quality and invasive species to help guide actions and regulatory and policy reform.

Monitoring, based on data and using agreed global indicators, can fulfil two purposes: assessing the extent to which the world is on track to meet the stated goals of the post-2020 CBD framework; and stimulating action at local scales to address key biodiversity challenges. For the first of these purposes, global scale data analysis will be the priority. It is often possible for such analysis to be undertaken centrally by selected institutions who have suitable capacity and skills. As presented and commented upon in Section 2 of this paper, UN-Water has suggested a total of 16 priority indicators on freshwater biodiversity, some of which were already mentioned in the

Zero-Draft Document. Most of the suggested indicators have well defined and statistically robust methodologies, long-term host organizations and global data coverage. Some of the existing indicators will need further refinement and an increased scope to meet the needs of the post-2020 CBD framework but with a solid foundation to build from. Only four entirely new indicators have been suggested. An overview of the suggested priority indicators for monitoring and reporting freshwater-related biodiversity in the post-2020 CDB framework is provided in the Annex.

The advantage of the suggested approach is that it enables efficient production of global scale monitoring using a standardized scientific method. On the other hand, the global datasets that underpin such analyses might in some cases be less accurate than national or local datasets (where these exist). Moreover, devolving monitoring to national or sub-national governments can be more effective in bringing about local understanding and ownership of monitoring results and can therefore be effective in achieving the second purpose of monitoring. In practice, some combination of centralized global efforts and devolved national or sub-national monitoring will be needed.

Harmonization of monitoring and reporting on all targets and indicators related to freshwater and biodiversity between the SDG and the new CBD frameworks is very important. The suggested new freshwater-related indicators together with the existing SDG indicators need to form the basis for country reporting on freshwater ecosystems and biodiversity. It is advised that other frameworks and monitoring and reporting mechanisms also should build on these to avoid duplication of effort, lessen the monitoring burden on UN Member States and to ensure coherent and comparable data across countries and regions. UN-Water has a dedicated site for monitoring SDG indicators: www.sdg6data.org, harvesting data from custodian agencies, including dedicated indicator websites in some cases. Any new centralized reporting portal should harvest existing indicator data from the relevant sources as appropriate.

Efforts to enhance national capacities and utilize new technologies need to be upscaled to improve reporting. This includes, among others, the mobilization of human capacity (e.g. citizen science) for in situ monitoring of ecosystem condition, and optimal use of the best available Earth Observation data, global models, machine learning/artificial intelligence, as promoted through the Group on Earth Observations (GEO) mission to improve the availability, access and use of Earth observations for a sustainable planet.

It is also recommended that the role and interaction with the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) should be strengthened, including to address use of inland waters, as distinct from land and sea use, as a driver of biodiversity loss.

4. PRINCIPAL AREAS OF ACTION

To slow and reverse the loss of global freshwater biodiversity, the suggested goals, targets and indicators need to be coupled with concrete action. As described by Tickner et al [xxxiii], bolder action is required primarily in the following areas:

- Protecting and restoring critical habitats
- Safeguarding and restoring connectivity of water-related and coastal ecosystems
- Improving water quality and reducing pollution at source rather than through end-of-pipe fixes

- Accelerating implementation of environmental flows
- Managing exploitation of freshwater species and riverine aggregates (such as sand mining)
- Controlling non-native species invasions.

As underscored in the Zero-Draft Main Document for the post-2020 global biodiversity framework there is a need for increased efforts to address the drivers of biodiversity loss. There is a significant and increasing need for transformative solutions to address the underlying socio-economic drivers of freshwater biodiversity declines, stemming from food, energy, industrial and infrastructure sectors, and economic planning paradigms. Priority should also be given to developing methodology for tracking and reporting the impact of addressing these drivers of freshwater biodiversity loss.

One challenge is to transition from ad hoc freshwater conservation successes to a strategic approach to recovery that achieves results at far larger scales. Measures will only be effective if they are based on an understanding of the processes that underpin freshwater ecosystems and the distinct threats to them, such as riparian landcover change, flow modification and connectivity loss. Simply regarding freshwater habitats as a subset of terrestrial ecosystems obscures those distinct threats and precludes effective and collaborative action with sectors such as agriculture and forestry. Conversely, carefully designed portfolios of conservation and restoration actions, that address the most critical direct and indirect threats, can stimulate rapid improvements in the condition of freshwater ecosystems.

New approaches and broader and diverse partnerships matched with increased investment will be necessary to tackle the freshwater biodiversity crisis. Investment into ecosystems and habitats is needed not only to protect and restore their biodiversity but also to secure the services they provide for humans, water security and economic productivity.

Rapid change is necessary to create the reforms needed for how governments, national stakeholders and organizations respond to the challenge of protecting freshwater ecosystems and maintaining water security, and the opportunities that these actions present. To achieve no net loss in the area and integrity of freshwater ecosystems, improvement in coordination and collaboration between sectors, organizations and stakeholders at all levels will be required. Large gaps remain for example in governance linkages between line ministries and policies across these ecosystems, and the sectors that work within and across them.

Financial and technical resources must be made available at regional, national and sub-national levels to address freshwater-biodiversity challenges in order to reverse negative trends and achieve the new targets. Additional financial resources will also be required to set up the monitoring and reporting, bioinformatics, capacity development, database sharing and archiving of information required for effective reporting and follow-up. It is important that Parties commit sufficient resources to ensure that the agreed actions are implemented, by the proposed deadlines.

As noted in the two most recent reviews of the state of freshwater biodiversity [xxxiv] [xxxv], significant capacity development activities will be needed over the next ten years to help countries prepare for this challenge, given the increasing recognition of water's critical role in providing human security, ecosystem integrity, climate regulation, and our economic development. Changes in the water cycle, hence also the availability of water at any given place and time, will be the primary

component of how our climate shifts over the coming years; hence, improving climate change understanding and adaptability in our management responses will be critical.

Responding to the post-2020 CBD goals and targets will require new relationships with the private sector, from small scale agriculture to SME's, multinational corporations and financial institutions operating, bankrolling and influencing regional and global supply chains. The impact of infrastructure and urban development brings both challenges and opportunities for investment in nature-based solutions and subsidy reform, bringing new and more diverse stakeholders into the response on freshwater and biodiversity linkages. As pointed out in the Zero-Draft Main Document the participation of all relevant stakeholders, including indigenous peoples and local communities', women, youth, civil society, local and subnational authorities, the private sector, academia and scientific institutions will be required to protect and restore freshwater biodiversity.

5. CONCLUDING REMARKS

This paper provides technical input from a freshwater perspective on new goals and targets for the CBD framework. These goals and targets represent an improvement over the existing Aichi Biodiversity Targets, and better reflect the ambitious framework needed to address the scale and urgency of the biodiversity crisis in freshwater ecosystems. The Zero-Draft Main Document states that a purpose of the Post 2020 Global Biodiversity Framework is to "contribute to the implementation of the 2030 Agenda for Sustainable Development," and that "the Sustainable Development Goals will help to provide the conditions necessary to implement the framework." Hence, linkages between the two are critically important; the CBD targets can inform the SDG targets and vice versa. Accordingly, many of the suggestions and recommendations to the CBD framework presented in this paper build and expand upon the existing methodologies for the SDG indicators, highlighting the importance of using SDG indicators and methodologies to form recommendations for the CBD framework. For example, the somewhat unrecognized yet important indicator within the SDGs that serves as a major input to protection and restoration of aquatic ecosystems and biodiversity is the environmental flow component of SDG 6.4.2 on water stress. Environmental flows are surprisingly not mentioned in the Zero-Draft Main Document and should receive a much stronger attention in the CBD framework, as this is the key mechanism by which the health of freshwater ecosystems may be ensured, and their degradation arrested. Additional indicators on policy implementation within the CBD framework will enhance the data already existing from the SDGs that provide a first-estimate of the necessary environmental flows (volume and percentage flow).

Factoring in these recommendations on freshwater ecosystems in the development of a post-2020 Global Biodiversity Framework should guide urgent and concerted global action for tackling the freshwater biodiversity crisis while also supporting the ambition of the post-2020 Global Biodiversity Framework at large. Moreover, the implications of the suggestions and recommendations to the CBD framework can also guide and provide perspectives for other global frameworks, such as the United Nations Framework Convention on Climate Change (UNFCCC).

UN-Water avails itself to continue to contribute throughout the entire post-2020 CBD process. In doing so UN-Water will coordinate and consult with its membership in order to provide joint, consolidated freshwater input and recommendations.

ANNEX: Overview of suggested priority indicators for freshwater-biodiversity

Suggested indicators	Custodian agency	Current data coverage	Comments
Red List Index	IUCN	Global for some groups; with objective of more complete global coverage soon	Red List Index is a part of the larger IUCN information platform Red List of Threatened Species.
Living Planet Index	ZSL and WWF	Global – although there are data gaps for certain taxa (e.g. amphibians) and regions (e.g. Africa, parts of Asia)	The global scale Living Planet Index, including disaggregated indices for freshwater, terrestrial and marine habitats, is currently re-calculated very two years. The next version is due to be published in 2020.
Freshwater Health Index	A consortium of partners, led by Conservation International	Three basins in South America; two in Asia	A detailed tool that measures overall health and condition of freshwater ecosystems at the basin scale. Currently applied to a small set of basins.
Connectivity Status Index	McGill University and WWF	Global - The methodology is down-scalable and can be applied at river basin and other levels.	A baseline Connectivity Status Index was published in 2019. Plans are being considered for periodic updates, subject to availability of resources.
IUCN Green List of Protected and Conserved Areas	IUCN	46 areas in 14 countries	The IUCN Green List of Protected and Conserved Areas is the first global standard of best practice for area-based conservation.
Management Effectiveness Tracking Tool	World Bank/WWF Alliance for Forest Conservation and Sustainable Use	First published in 2002, by 2016 it had been applied in over a fifth of the world's terrestrial protected areas.	The Management Effectiveness Tracking Tool was developed for protected areas but could potentially be adapted for use on other regions.
Trends in pharmaceuticals and plastics pollution of freshwater bodies	-	-	A new indicator that could build on the large volume of on-going research in this field.
Proportion of sustainable, threatened and highly threatened inland fisheries	USGS and FAO	Global – 2008 Report from FAO Relatively coarse scale	USGS and FAO are currently conducting a threat assessment on inland fisheries with the initial iteration to be publicly available in 2020 with the aim to reassess on regular intervals.
Proportion of cultured species within biologically sustainable levels	USGS and FAO	-	New indicator, baseline data can come from FAO.
Number of new freshwater sources and flood/drought mitigation initiatives derived from implementing nature-based solutions.	-	-	A new indicator that could build on national, municipal and other statistics on investments related to implementing water-related nature-based solutions.
Implementation of environmental flows	-	Global data is available for the e-flow component of 6.4.2.	A new indicator that builds on SDG indicator 6.4.2. An IAEG-SDGs Tier I indicator. The e-flow component of 6.4.2 is undertaken by FAO as part of the UN-Water integrated SDG6 monitoring Initiative with support from IWMI and UNU-INWEH

SDG indicator 6.3.2 Proportion of bodies of water with good ambient water quality	UNEP, part of the UN-Water integrated SDG6 monitoring Initiative	Global data drive underway in 2020	IAEG-SDGs Tier II indicator
SDG indicator 6.6.1 Change in the extent of water-related ecosystems over time	UNEP, part of the UN-Water integrated SDG6 monitoring Initiative	Global data drive underway in 2020	IAEG-SDGs Tier I indicator
SDG indicator 6.5.1 Degree of integrated water resources management implementation	UNEP, part of the UN-Water integrated SDG6 monitoring Initiative	Global data drive underway in 2020	IAEG-SDGs Tier I indicator
SDG indicator 6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation	UNECE and UNESCO, part of the UN-Water integrated SDG6 monitoring Initiative	Global data drive underway in 2020	IAEG-SDGs Tier I indicator. The indicator covers transboundary rivers, lakes and aquifers.
SDG indicator 14.1.1 Index of coastal eutrophication and floating plastic debris density	UNEP	Global data drive underway in 2020	IAEG-SDGs Tier II indicator

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