

Conservation of Latin America freshwater biodiversity: beyond political borders

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34 suggestions put forward cross-border perspectives, urging governments to engage in
35 actions, objectives, monitoring elements and post-2020 indicators that consider the
36 reality of and threats to transnational ecosystems such as many river basins of Latin
37 America.

38 **Keywords**

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40 monitoring, ecological connectivity

41 **Introduction**

42 The rich freshwater biodiversity of Brazil is addressed by Azevedo-Santos et al.
43 (2021), along with examples of needed actions to conserve it. The authors describe
44 five concrete and necessary actions: 1) a national plan to reduce threats, 2) restoration
45 of freshwater ecosystems, 3) implementing protected areas efficient in protecting
46 freshwater environments, 4) more investment in research and 5) promoting science
47 communication and outreach. They argue that these actions should guide the parties
48 of the Convention on Biological Diversity (CBD) when engaging in discussions with
49 Brazil on developing an improved agenda to conserve biodiversity for the post-2020
50 Global Biodiversity Framework (post-2020 GBF).

51 The actions raised by Azevedo-Santos et al. (2021) are highly relevant, but not unique
52 to Brazil as they apply to most other countries in Latin America. We acknowledge that
53 national circumstances relative to political cycles and specific national legislations
54 differing in regulations and compliance rigor, may constrain particular challenges to
55 national territories (Torremorell et al, 2021). However, attempts to successfully
56 counteract threats to freshwater biodiversity, intensify their research and promote their
57 restoration, must move beyond national boundaries. A regional roadmap guiding such
58 attempts should: a) seek inspiration from success stories in Latin America and
59 elsewhere, b) exploit synergies with existing instances and organizations, c) be
60 scalable across regions and d) be widely communicated.

61 We propose and illustrate four perspectives that complement the actions suggested
62 by Azevedo-Santos et al. (2021) aimed at effectively protecting freshwater biodiversity
63 in Latin America. Our contributions represent a *global south* perspective echoing
64 recent pledges to better inform and further enhance the ability of global (post-2020
65 GBF) and continental (e.g. Biodiversity Strategy of the European Union [EU])
66 initiatives to halt and reverse the rapid global decline of freshwater biodiversity (e.g.
67 van Rees et al., 2021). We share insights based on numerous discussions led while
68 establishing the Freshwater Biodiversity Observation Network in Latin America
69 (FWBON, <https://geobon.org/bons/thematic-bon/freshwater-bon/>) to support the
70 definition of the long-term goals in the 2050 Vision for Biodiversity of the CBD,
71 currently under discussion in the context of the post-2020 GBF.

72

73 **Develop and support transnational initiatives.** National, regional or global
74 freshwater biodiversity conservation goals cannot be achieved without coordinating
75 actions across large river basins. Many river basins in Latin America, including some
76 of the largest worldwide, cross national borders (e.g. Amazonas, Orinoco, La Plata,
77 Bravo del Norte, Lempa) making up more 37% of Central America and almost 60% of
78 South America (UNEP 2008; GWP 2011). Nations thus need to establish actions and
79 policies for transnational basin management and it is essential for post-2020 GBF to
80 include management elements and indicators that are effective at this scale. As a
81 simple example, the citizen science project Ictio (www.ictio.org), collects observations
82 on fish across the Amazon to understand their migration behaviour (Johnson et al.,
83 2021). The associated smart-phone application is accessible to many relevant
84 stakeholders as it was launched in two languages (Portuguese and Spanish). Also,
85 transnational research networks can streamline collaboration and initiatives, provided
86 they have financial support. For instance, the ZICOSUR Programme “Conservation,
87 sustainable use and good governance of biodiversity in four vulnerable biomes in the
88 center of South America” launched within the EU framework “Biodiversity for life”
89 strategy (B4Life), promotes the conservation of the Rio Paraguay catchment and four
90 crucial ecosystems therein: Pantanal, Bosque Chiquitano, Cerrado and Gran Chaco
91 (United Nations Convention to Combat Desertification, 2019).

92

93 Further, freshwater biodiversity could benefit from existing structures regulating
94 interactions between countries when managing water in transnational basins.
95 International River Basin Organizations (IRBOs; Milman and Gerlak 2020) for
96 example, engage in hydro-diplomacy and foster scientific collaboration across borders
97 to support decision-making processes. Latin American countries have experience
98 managing catchments based on scientific evidence and citizen participation, usually
99 coordinated by regional or local management committees. However, programme
100 implementation and continuity differ, partially because of the existence of a vast
101 informal sector which neither complies with legal norms, nor responds to economic
102 and monitoring instruments (Dourojeanni, 2001). Although structures in Latin America
103 lack the reach and the commitment of those in the EU (e.g. Water Framework
104 Directive; European Union, 2000), we envision organizations similar to IRBOs
105 engaging in freshwater-biodiversity-diplomacy next to the necessary hydro-diplomacy.
106 These would build upon existing international alliances such as the Amazon

107 Cooperation Treaty Organization (ACTO), which promotes the sustainable
108 development of the Amazon Basin or the Central American Integration System (SICA)
109 which pursues regional integration, including nature conservation. Failure to manage
110 transboundary basins and their ecosystems collectively, can result in conflicts among
111 nations (e.g. Rios-Touma et al., 2020).

112

113 **Develop and harmonize transnational data collection and monitoring.**

114 Freshwater biodiversity monitoring in Latin America is infrequently grounded in laws
115 or formal regulations, often leading to spatially isolated and non-standardized data
116 collection (Feio et al. 2021). Thus, there is a need for regionally harmonized freshwater
117 monitoring and bioindicators that provide critical information on the status and trends
118 of biodiversity, which are universally interpretable by different stakeholders. This
119 entails data acquisition and handling using compatible methods at multiple scales to
120 enable a comprehensive evaluation of the impacts and take appropriate actions
121 against anthropogenic impairments and climate change (Barthem et al. 2004; Heino
122 et al. 2020).

123

124 Building on harmonized data, key variables and indices can be computed at the
125 required scale (e.g. cross-border catchment), yielding information for environmental
126 management, conservation and policy-making. Essential biodiversity variables (EBVs;
127 Pereira et al. 2013) are successful examples of variables which have been directly
128 linked to meaningful conservation indicators (e.g. Living Planet Index) and to the Aichi
129 Biodiversity Targets (Proença et al. 2017), including the strategic goals B and C
130 (Targets 5-13; Schmeller et al., 2018). BON in Box (<https://boninabox.geobon.org>)
131 assembles suitable tools for standardized collection and management of data,
132 assessing measure effectiveness and monitoring biodiversity trends based on EBVs.
133 A global approach for applying EBVs to freshwater biodiversity was advanced by
134 GEOBON's Freshwater Working Group including specific priorities for the 2020 Aichi
135 targets and the 2030 SDG Goals (Turak et al 2017), of which globally harmonized
136 freshwater macroinvertebrate sampling protocols are being progressed
137 (<https://geobon.org/bons/thematic-bon/freshwater-bon/>).

138

139 **Increase engagement in a pluricultural region and enable participatory**
140 **monitoring.** Analogous to its biodiversity, Latin America has a tremendous socio-

141 cultural diversity, with the Amazon basin alone being home to more than 300
142 indigenous groups (Hoorn, et al. 2010). Embracing this diversity by participating
143 different indigenous and traditional cultures, and their perspectives in biodiversity
144 conservation is essential (Frainer et al. 2020). For example, having lived in the
145 Amazon rainforest for millennia, indigenous peoples (Barlow, et al. 2012) monitor key
146 food resources, including turtles and fish, using self-developed systems that are
147 formally incorporated into national biodiversity monitoring in Brazil (Roque, et al.,
148 2018). In the department of Amazonas in Colombia, indigenous communities have an
149 impact on decision-making of territorial planning schemes and regulations of the
150 Ministry of the Environment through their involvement in monitoring schemes of fishery
151 resources, riparian vegetation and river dolphins (Trujillo & Duque, 2014). A
152 widespread integration of local indigenous and traditional ecological knowledge into
153 freshwater biodiversity monitoring should promote inclusive decision-making
154 processes in catchment-wide management (Heino et al., 2020; Thompson et al.,
155 2020).

156

157 A fair representation of all stakeholders in freshwater biodiversity conservation is both
158 an opportunity and a great challenge in Latin America. Governments comprise a
159 multitude of institutions with different priorities and modes of operation across the
160 region and even within national borders (e.g. federal states in Brazil and México; Feio
161 et al. 2021). Effective conservation strategies are, therefore, challenging, regardless
162 of its spatial scale. Furthermore, widespread social inequalities are considered as
163 implementation barriers of large-scale conservation initiatives. Despite these
164 challenges, traditional and indigenous groups from different countries have created
165 collaboration spaces opening novel avenues for transnational participatory initiatives.
166 The programs “Territories and areas conserved by indigenous peoples and local
167 communities” (ICCA Consortium; [https://www.iccaconsortium.org/index.php/es/latin-](https://www.iccaconsortium.org/index.php/es/latin-america-es)
168 [america-es](https://www.iccaconsortium.org/index.php/es/latin-america-es)) and the Red Latinoamericana por la Defensa del Patrimonio Biocultural
169 (<https://www.redlatambiocultural.org>) being just two examples.

170

171 Scalable biodiversity monitoring initiatives led and managed by local stakeholders (i.e.
172 indigenous and traditional cultures; farmers cooperatives) at diverse levels of
173 organization, can be aggregated to match the spatial scale of specific conservation
174 objectives (Roque et al. 2018). Here, the potential of participatory programs promoting

175 sustainable practices at the community level, such as the *Programa Bandera Azul*
176 *Ecológica* of Costa Rica (Mora-Alvarado and Chávez-Aguilar, 2009) could be
177 harnessed. Such an approach enables sufficient monitoring capacities, effectively
178 implements conservation strategies and increases the acceptance of environmental
179 management measures. Moreover, conservation and restoration initiatives involving
180 freshwater biodiversity could promote economic opportunities for local people, such
181 as successful market initiatives in Latin America on carbon and catchment protection
182 (Grieg-Gran et al., 2005). Finally, transdisciplinary research on the relationship
183 between freshwater biodiversity and human well-being can trigger much needed
184 dialogues within society. The recently published report "Water: biodiversity, ecosystem
185 services and human well-being in Brazil" by the Brazilian Platform on Biodiversity and
186 Ecosystem Services (<https://www.bpb.es.net.br/produto/agua/>) is a valuable
187 illustration.

188

189 **Link freshwater conservation in Latin America with global economies.** The links
190 between local economies and global trade are a critical aspect of freshwater
191 biodiversity conservation in Latin America. Most economies rely heavily on agricultural
192 commodities (e.g. beef, soy, maize, sugarcane, coffee) and raw materials (e.g.
193 copper, lithium, oil) which severely impact the environment and freshwater
194 ecosystems in particular. To reduce this threat, it is fundamental to empower
195 governmental environmental protection agencies (Torremorel et al, 2021) to enforce
196 traceability and transparency in the supply chain through the declaration of
197 environmental impact in product information, including condition of freshwater
198 biodiversity. This would allow informed choices for consumers and force producers to
199 align with climatic, biodiversity and social justice. Fairly traded and organically
200 produced commodities are positive first steps, but full traceability and transparency
201 will fundamentally change international trade, reducing pressure on freshwater
202 ecosystems biodiversity.

203

204 The Transparency for Sustainable Economies (www.trase.earth) initiative, for
205 instance, monitoring deforestation caused by soy and cattle production in Latin
206 America (e.g. zu Ermgassen et al., 2019), has opened new perspectives to commodity
207 chains and may represent a new opportunity to link the status of freshwater
208 biodiversity to economic development (i.e. Mercosur-EU trade agreement).

209 **Conclusions**

210 The post-2020 GBF development by the CBD builds on a theory of change that
211 recognizes that urgent policy action is required at all scales to allow the recovery of
212 ecosystems and biodiversity. As the parties prepare to define their national biodiversity
213 goals, there is no acknowledgement of the transnational nature of freshwater
214 biodiversity. This is worrying because its conservation cannot be addressed in the
215 same way as that of terrestrial or marine biodiversity. It is thus essential that
216 negotiations consider actions beyond national goals, urging governments to engage
217 in actions, objectives, monitoring elements and post-2020 indicators that consider the
218 reality of and threats to transnational ecosystems such as the large river basins of
219 Latin America (CBD-WG2020, 2020).

220

221 Latin America is not historically marked by profound conflicts related to hydrological
222 issues. Moreover, the nations and peoples in the region share a deep admiration for
223 the natural capital that has been bestowed upon them, which provides a robust
224 foundation for mutual confidence and political trust to advance international
225 transdisciplinary cooperation (Biswas, 2011). We perceive this as a strong indication
226 of the high potential for creating exemplary agreements in the region to halt and
227 reverse the decline of freshwater biodiversity in these exceptional river systems, home
228 to remarkable diversity and richness.

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