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1 TITLE: **Brazil's Native Vegetation Protection Law jeopardizes wetland conservation: a**  
2 **comment on Maltchik *et al.***

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49 **Keywords:** Wetland policy, Terms, Definitions, Unsustainable legislation, Biodiversity,  
50 Ecosystem services

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52 **The future of Brazil's vast and highly biodiverse wetlands depends on interpretation of**  
53 **the country's new Native Vegetation Protection Law (NVPL). Maltchik *et al.* recently**  
54 **reviewed wetland-related terminologies and concepts in Brazilian legislation and**  
55 **concluded that all the country's wetlands are legally protected under the NVPL. Here**  
56 **we show that this is not the case. Finally, we point to a unique opportunity for scientists**  
57 **to help minimize damage to wetlands by contributing to the state-level 'regulation' of**  
58 **the NVPL, now underway, and we argue that the country needs a national policy**  
59 **focused specifically on the conservation of these ecosystems.**

60 Brazil's vast and highly biodiverse wetlands are under relentlessly increasing threat,  
61 and input from the scientific community is crucial to help minimize the impact of recent  
62 legislative setbacks. Terminologies and concepts in laws affecting wetlands is part of this, and  
63 Maltchik *et al.* (2018) have contributed a comprehensive review of such elements. However,  
64 their treatment needs reinterpretation.

65 Maltchik *et al.* (2018) evaluated wetland-related terms and definitions in Brazil's  
66 federal and state legislations to contribute to the assessment of the efficacy of wetland  
67 conservation policies. Most of terminologies they found had only regional application and  
68 poor or non-existent conceptualization. The generic term 'wetlands' ('*áreas úmidas*', in  
69 Portuguese), which is the most basic and important term in any wetland policy, was only used  
70 in one law: the Native Vegetation Protection Law (hereafter NVPL; Federal Law nº  
71 12,651/2012; Brazil 2012). Based on this term being the better defined than other  
72 designations, and given the precedence of the NVPL over state laws, Maltchik *et al.* (2018)  
73 concluded that: (1) the term 'wetlands' represents all wetland types, (2) the clear descriptors  
74 of the term's definition allow the identification of the totality of wetland ecosystems, and (3),  
75 due to (1) and (2), the NVPL ensures the protection of all wetlands.

76 Maltchik *et al.* (2018) have provided important inputs for a better understanding the  
77 adequacy of Brazil's legislation on wetlands. However, the generalizations that these authors  
78 make regarding the NVPL's protection of all wetlands is unfounded. The term 'wetlands'  
79 appears only twice in the NVPL and is not used in any conservation policy. Its first  
80 appearance is before its definition (Chapter I, Article III, Subsection XXV) and the second  
81 (Chapter II, Section I, Article VI, Subsection IX) is in a clause that specifies that wetlands  
82 (especially those of international relevance) may become protected only if declared to be of  
83 'social interest' by an act of the President of the Republic. The term 'wetlands' and its  
84 definition therefore do not guarantee the protection of any wetland in Brazil.

85 Regardless of the effective use of terminologies, the elements reviewed by Maltchik *et al.*  
86 *et al.* (2018) lead to conclusions different from the ones they drew. The term 'wetlands',  
87 although generic when considered in isolation, does not represent all wetland types in the  
88 context of the NVPL; because its definition is highly exclusionary, using this term cannot  
89 ensure the effectiveness of wetland-related conservation policies. Examples of wetlands that  
90 clearly do not fit the NVPL's definition are those subject to unpredictable (i.e., non-periodic)  
91 flood pulses (e.g., riparian wetlands adjacent to streams and low-order rivers), all areas that  
92 are permanently flooded (e.g., permanent ponds, lakes and lagoons), and all or any parts of  
93 these areas that are not subject to flooding but are temporarily or permanently saturated (Junk  
94 *et al.* 2014; Mitsch & Gosselink 2015).

95 An inclusive definition of 'wetlands' would also not guarantee the efficacy of wetland  
96 conservation strategies. As shown by Maltchik *et al.* (2018), Brazilian legislation is  
97 remarkably insufficient with regards to the representation and detection of singular wetland  
98 types (which is especially worrying in view of the extreme diversity and complexity of the  
99 country's wetlands; see Junk *et al.* 2014). These shortcomings cannot be masked or overcome  
100 only by adoption of the generic term 'wetlands' (and hence its definition), since each wetland

101 type has unique characteristics and therefore specific conservation needs (e.g., buffer zone  
 102 width) that can only be met through their being recognized as particular landscape features. A  
 103 single conservation measure cannot serve for ecosystems ranging from the vast Amazonian  
 104 floodplains to small temporary ponds in the semi-arid zone. One of the main functions of the  
 105 term ‘wetlands’ (if not the main one) is not to replace terms for specific wetland types, but  
 106 constitute elements representing and/or describing them (e.g., ‘upland-embedded wetlands’ as  
 107 a description of ponds and lakes; Calhoun *et al.* 2017a) to ensure that they cover the full range  
 108 of wetland subtypes (e.g., from temporarily saturated to permanently flooded areas).  
 109 However, this crucial auxiliary function is not fulfilled in any Brazilian law (Maltchik *et al.*  
 110 2018). Potentially negative consequences of the lack of this kind of application of the term  
 111 ‘wetlands’ is exemplified by NVPL’s term ‘ponds’ (*‘lagoas’*, in Portuguese), which lacks  
 112 conceptualization. As comprehensively defined, ponds are upland-embedded wetlands with  
 113  $\leq 2$  ha (Hamerlík *et al.* 2014). However, some researchers alternatively use the term ‘pools’  
 114 (*‘poças’*, in Portuguese) in place of ‘temporary ponds’ (e.g., De Meester *et al.* 2005). It is  
 115 therefore unclear if temporary ponds are protected by the NVPL, which may lead to  
 116 exclusionary conservation policies and, consequently, to the collapse of unique ecosystem  
 117 services (Calhoun *et al.* 2017b) and communities (Hill *et al.* 2017; Volcan & Lanés 2018) (in  
 118 fact, the NVPL does not ensure the protection of any pond; Grasel *et al.* 2018). Given the  
 119 paramount importance of appropriate terms and definitions of wetland types in environmental  
 120 policies, it should be recognized that Brazil’s legislation seriously jeopardizes wetland  
 121 conservation.

122 Deficiencies related to the elements used to represent and identify wetland systems,  
 123 however, are not the only problems that compromise the conservation of these ecosystems in  
 124 Brazil. While a detailed analysis of the country’s wetland-related policies is beyond the scope  
 125 of this comment, it is also important to highlight that the NVPL’s enactment in 2012 (when it  
 126 replaced the old 1965 ‘Forest Code’) imposed catastrophic risks to Brazil’s wetland heritage.  
 127 Setbacks or inadequacies in the NVPL that diverge from Maltchik *et al.*’s conclusions  
 128 include:

- 129● Removal of the protection conferred to ponds with <1 ha and wetlands associated with  
 130 intermittent springs and ephemeral streams;
- 131● Dramatic reduction in the requirements for restoration of ‘buffer zones’ (legally considered  
 132 ‘Permanent Preservation Areas’; hereafter PPAs) cleared before 22 July 2008, especially for  
 133 those around ponds and lakes (for which protection with PPAs is now only 5-30 m) and  
 134 adjacent to streams and rivers (where protection is only 5-100 m). This protected vegetation is  
 135 now delimited according to the size of the property, regardless of the size or width of the  
 136 wetlands or waterbodies;
- 137● Alteration of the basis for delimiting PPAs adjacent to streams and rivers from the maximum  
 138 water level to the ‘regular bed’ of watercourses, thus reducing or removing protection from  
 139 many riparian areas, especially from the vast Amazonian floodplains, which can reach widths  
 140 of tens of kilometers and be ‘protected’ by PPAs as narrow as 5 m (Souza Jr *et al.* 2011;  
 141 Brancalion *et al.* 2016);
- 142● Authorization of aquaculture (including raising alien species) in converted PPAs around  
 143 ponds and lakes and adjacent to either intermittent and permanent watercourses on rural  
 144 properties with  $\leq 15$  fiscal modules (for details about fiscal modules, see Brancalion *et al.*  
 145 2016);
- 146● Non-protection of mangroves, salt marshes and hypersaline areas (*sensu* Junk *et al.* 2014)  
 147 though upland PPAs (mangroves are themselves considered PPAs, but salt marshes and  
 148 hypersaline areas are not);
- 149● Permission to use salt marshes and hypersaline areas for shrimp farming (including exotic  
 150 species) and salt production (10% of the area of these ecosystems can be used in the Amazon

- 151 biome and 35% in other Brazilian biomes) (see also Rovai *et al.* 2012; Oliveira-Filho *et al.*  
 152 2016);
- 153● Allowing 50% of any required restoration of PPAs around ponds, lakes and perennial springs  
 154 and adjacent to intermittent/permanent watercourses and *veredas* (wetlands in the *Cerrado*  
 155 biome) to be done using exotic woody species (even in grassy biomes);
  - 156● Establishment of the Rural Environmental Registry (known as the ‘CAR’) with poor  
 157 provisions for monitoring compliance with the rules for protection of waterbodies and  
 158 wetlands, especially in the case of narrow or small aquatic ecosystems (e.g., Taniwaki *et al.*  
 159 2018).

160 Recognizing the limitations and problems of the NVPL is a pressing need in the  
 161 current Brazilian political scenario. Although in force since 2012, the NVPL’s ‘regulation’  
 162 (setting of rules to implement a law) at the state level is still underway, offering a unique  
 163 opportunity to supplant its inadequacies. Therefore, scientists and policymakers must engage  
 164 in dialogue to regulate environmental legislation with evidence-based criteria (Azevedo-  
 165 Santos *et al.* 2017).

166 However, the legal mechanisms provided by the NVPL, even if improved at the state  
 167 level, are clearly insufficient to promote wetland conservation in Brazil. Overcoming  
 168 environmental challenges imposed, for example, by climate change (Junk *et al.* 2013), high  
 169 rates of wetland loss (Creed *et al.* 2017), and spread of exotic species (e.g., Stenert *et al.*  
 170 2016) will require adoption of effective integrated strategies for the protection, restoration,  
 171 management, creation, mapping, and monitoring of wetlands (e.g., Grasel *et al.* 2018). We  
 172 emphatically recommend the creation of a national policy specifically focusing on wetland  
 173 conservation.

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#### 182 **CONFLICT OF INTEREST**

183 None.

#### 184 **ETHICAL STANDARDS**

185 None.

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