

1 LETTER

2 ***Proposed planetary boundary for freshwater sends a***
3 ***dangerous message***

4 By Stephan Pfister[†], Bradley Ridoutt[‡]

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6 [†]ETH Zurich, IfU, 8093 Zurich, Switzerland, [‡]CSIRO, Clayton, Victoria 3169, Australia

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8 The planetary boundary framework has been highly influential in shaping scientific and
9 policy discussions about the extent of human perturbation of the earth system. However,
10 the freshwater use boundary set by Steffen *et al.* in “Planetary boundaries: Guiding human
11 development on a changing planet” (13 Feb, p. 736) is troublesome. Contrary to
12 overwhelming evidence, documented by organizations such as UN Water and the
13 UNESCO World Water Assessment Programme, that excessive human water use is
14 leading to a global crisis in water stress, biodiversity loss, ecosystem damage, resource
15 depletion and human health impacts, their planetary boundaries suggest that human water
16 consumption is well within the safe operating limit. This is a dangerous signal to send, in
17 light of the plethora of water scarcity related problems, which numerous local, national and
18 international organizations are striving to tackle.

19 The planetary boundary concept is best suited for global environmental challenges, such
20 as global warming, whereby local emissions aggregate at the global level and physical
21 measurements are used to gauge the extent of the impact. Water use-related impacts,
22 conversely, are predominantly local, highly complex and not as easy to gauge. There may
23 be no absolute shortage of freshwater in the world, but the current patterns of freshwater
24 use are greatly skewed towards highly stressed watersheds where local environmental
25 and social consequences can be devastating. Part of the problem with the proposed
26 planetary boundary for water use is the coarse scale of its calculation (i.e. major river
27 basins). Another problem is the way environmental water flow requirements are defined,
28 with estimates roughly half those reported from a more conservative perspective by
29 Richter *et al.* (1). Our global assessment, based on over 11,000 watersheds and a similar
30 approach, suggests that humanity’s water footprint already exceeds safe operation by
31 almost 50% and requires immediate reduction (2).

32 **REF**

- 33 1. B. D. Richter, M. M. Davis, C. Apse, C. Konrad, A presumptive standard for
34 environmental flow protection. *River Res. Applic.* **28**, 1312-1321 (2012).
- 35 2. B. G. Ridoutt, S. Pfister, Reducing humanity’s water footprint. *Environ. Sci.*
36 *Technol.* **44**, 6019-6021 (2010).

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