



# Environmental liability: A missing use for ecosystem services valuation

The PNAS 100th Anniversary Special Feature on natural capital and ecosystem services highlights a range of opportunities and challenges to operationalize these concepts to strengthen environmental governance (1). However, the issue's focus is largely on the role these concepts play in ex ante decision-making, and overlooks their role in informing courtroom liability suits for ex post environmental damages.

Liability provisions are based on the “polluter pays” principle, and hold responsible parties financially liable for environmental damages. This enables recoveries to restore or replace injured ecosystem services and to compensate for environmental harms. These costs rarely appear in company balance sheets (hence, neither in macroeconomic accounts), unless they are claimed through court cases or unless state regulations mandate the internalization of environmental damages. We believe this omission reflects an important gap in mainstream thinking about ecosystem services and natural capital accounting.

As highlighted in the Special Feature (1), service quantification and valuation are increasingly associated with efforts to implement payments for ecosystem services schemes, raise awareness about environmental benefits, and enable trade-off analysis and priority-setting for improved decision-making. The importance of service quantification and valuation to measuring damages for legal liability suits is much less frequently discussed. It remains largely absent from leading ecosystem service initiatives, such as the Millennium Ecosystem Assessment, World Bank's Wealth Accounting and the Valuation of Ecosystem Services Program (WAVES),

and The Economics of Ecosystems and Biodiversity (TEEB).

Liability for environmental harm serves both important deterrence and corrective justice roles: it increases the financial and nonfinancial burdens of rule-breaking in ways that can disincentivize future environmental harm, while also compensating victims and securing resources for environmental restoration (2, 3). Such liability cases exemplify how natural capital concepts can be leveraged to both improve the environment and address environmental justice concerns (4, 5).

In addition to the many topics featured in the PNAS Special Feature, the increased, thoughtful use of ecosystem service valuation to inform environmental suits should also be highlighted as a promising, underused opportunity to effect “large-scale transformative change” (table 1 in ref. 1) by holding responsible parties more accountable for their actions and by placing environmental justice at the center of decision-making.

The ecosystem services research community has an important role to play, serving as experts on individual damage assessments for large cases, and also integrating and disseminating more accessible valuation data to create simplified, lower-cost approaches to valuing damage claims for smaller cases (e.g., benefits transfer to enable data on damages from one case to be considered in other similar cases, the Indonesia default dollar value per hectare to measure biodiversity loss). Moreover, the research and development communities are central to highlighting the relevance of ecosystem services concepts to legal suits; if the content experts largely overlook these links, then we

have little reason to expect others to take them up.

**ACKNOWLEDGMENTS.** This Letter is based on research supported by the Development for International Finance (DFID) KnowFor Grant to the Center for International Forestry Research (CIFOR).

**Jacob Phelps<sup>a,b,1</sup>, Carol Adaire Jones<sup>c</sup>, John A. Pendergrass<sup>c</sup>, and Erik Gómez-Baggethun<sup>d,e</sup>**

<sup>a</sup>Lancaster Environment Center, Lancaster University, Lancaster, Lancashire LA1 4YQ, United Kingdom; <sup>b</sup>Center for International Forestry Research (CIFOR), Jalan CIFOR, Situ Gede, Bogor Barat 16110, Indonesia; <sup>c</sup>Environmental Law Institute, Washington, DC 20036; <sup>d</sup>Norwegian Institute for Nature Research, 0349 Oslo, Norway; and <sup>e</sup>Environmental Change Institute, University of Oxford, Oxford OX1 3QY, United Kingdom

- 1 Guerry AD, et al. (2015) Natural capital and ecosystem services informing decisions: From promise to practice. *Proc Natl Acad Sci USA* 112(24):7348–7355.
- 2 Cohen MA (1992) Environmental crime and punishment: Legal/economic theory and empirical evidence on enforcement of federal environmental statutes. *J Crim L & Crim* 82(4):1058–1060.
- 3 Abelkop ADK (2013) Tort law as an environmental policy instrument. *Or L Rev* 92(2):391–427.
- 4 Jones CA (2000) Economic valuation of resource injuries in natural resource liability suits. *J Water Resour Plan Manage* 126(6):358–365.
- 5 Greyl L, Ojo GU, eds (2013) Digging deep corporate liability: Environmental justice strategies in the world of oil. *EJOLT Report 9* [Environmental Justice Organisations, Liabilities and Trade (EJOLT)], 73 pp.

Author contributions: J.P., C.A.J., J.A.P., and E.G.-B. wrote the paper.

The authors declare no conflict of interest.

<sup>1</sup>To whom correspondence should be addressed. Email: jacob.phelps@gmail.com.