

Intergenerational equity can help to prevent climate change and extinction

Intergenerational rights to a healthy environment are protected by the constitutions of 74% of the world's nations. These explicit commitments and similar, ancient principles of sovereign public trust are often overlooked but, if enforced, they offer sustainable protection for the biosphere.

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The global crises of climate change and extinction imperil all life on Earth, including present and future human generations. Yet protections against climate change and extinction exist in the supreme, fundamental laws of 74% of the world's nations — 144 countries have such protections written into their constitution^{1,2} (Fig. 1). These 144 nations emit the majority of atmospheric CO₂ and host most of the world's biodiversity by several measures.

Several other countries whose constitutions do not express protections for the biosphere, such as the USA and Canada, nonetheless respect ancient sovereign public trust principles that protect nature³. We argue that application and enforcement of these protective constitutional and public trust frameworks by decision-makers and courts, combined with an enhanced application of the principles of intergenerational equity, would better secure climatic and ecological

conditions that can support the survival and well-being of our planet.

The 144 nations we identify can be classified as having recognized procedural or substantive rights to an unimpaired environment, governmental obligations to protect a healthy environment, or personal obligations to do so. Together, these countries emitted 74.4% of global atmospheric CO₂ in 2015⁴. This percentage is proportional to the number of nations represented but

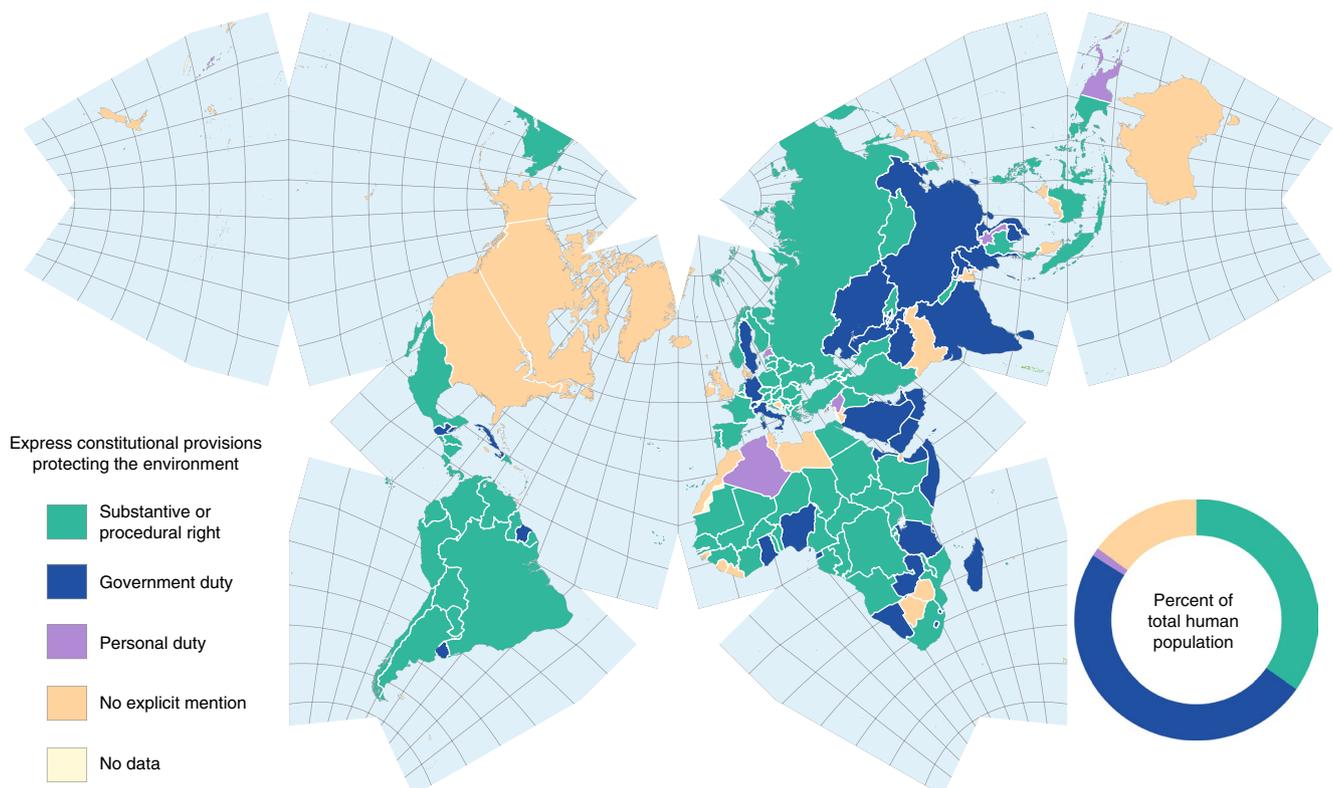


Fig. 1 | Categories of constitutional provisions for environmental protection². Countries in green (46.9%) codify the strongest constitutional rights of current and future generations to an unimpaired environment; blue countries (24.2%) codify no environmental rights but place a duty on governments to protect the environment; purple countries (3.1%) codify only a personal duty to protect the environment; the constitutions of orange countries (25.8%) contain no explicit mention of environmental protection. Several of the last category recognize ancient, sovereign public trust principles protecting the biosphere. The ring (bottom right) depicts the percentage of total human population in each category¹⁹ (data are in the Supplementary Information). Credit: Jen Burgess.

Percentage of global atmospheric CO₂ emissions

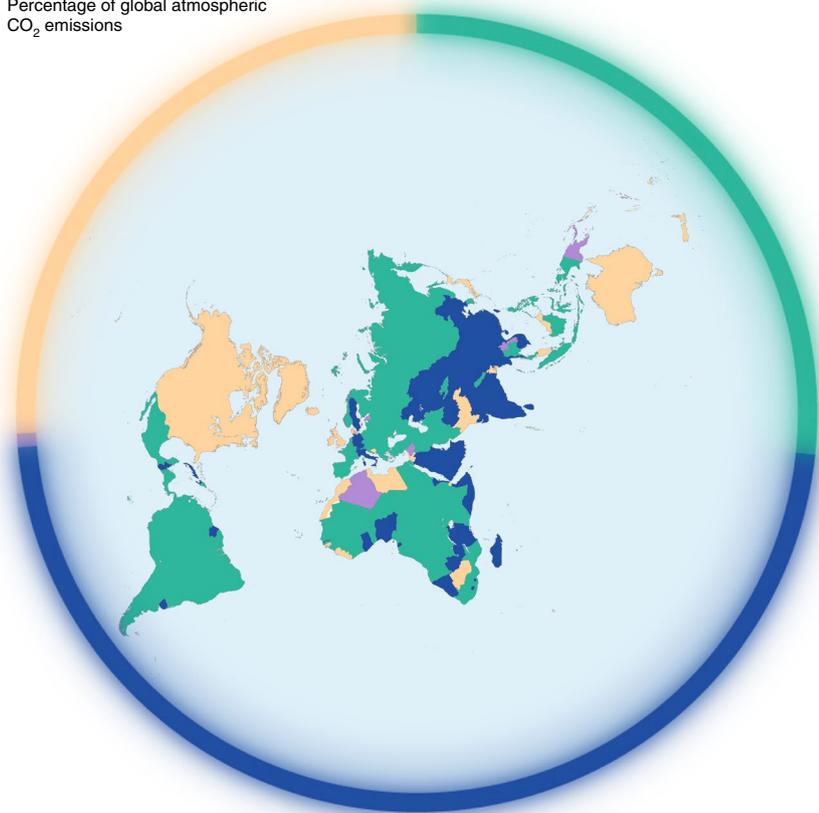


Fig. 2 | Global atmospheric CO₂ emissions by category of constitutional provisions for environmental protection. See Fig. 1 for categories. Emissions data from ref. ⁴. Credit: Jen Burgess.

less than expected given that 85% of the world's population resides in those nations (Figs. 1 and 2; Supplementary Information). Those nations having constitutional rights to a healthy environment (green in the figures) emitted an annual average of 104,000 gigagrams (Gg) CO₂ per nation, which was less than the average 353,000 Gg emitted by the one-third of the nations with a governmental duty to protect a healthy environment (blue in the figures), and also less than the average of 201,000 Gg emitted by nations without explicit mention of the environment (orange in the figures). We also find that the 144 nations host disproportionately more biodiversity than their numerical or demographic representation would predict; for example, 84% of threatened mammals that are endemic to a single country⁵ and 83% of all bird species are found in these 144 countries (Fig. 3; Supplementary Information).

The potential protective influence of national constitutions is clear. Such protection might be realized if citizens claim these rights or compel their governments to uphold those duties and act swiftly. Similar protections for nature bequeathed

on current and future generations exist in subnational jurisdictions⁶ and in indigenous legal systems, such as those undergoing resurgence in North America⁷.

Intergenerational equity Constitutions command

Intergenerational equity. Indeed, constitutions have the potential to protect future citizens better than other legal frameworks⁸. Constitutions supersede other laws in a jurisdiction because they establish sovereignty (“the mode in which a state is constituted or organized; especially, as to the location of the sovereign power⁹”) and last longer than the ephemeral laws or regulations set by the branches of governments elected and appointed by current adults. For democratic governments, current and future generations of citizens enjoy equal sovereign power. Several nations respect sovereign public trust principles, despite the lack of express constitutional commands about the biosphere. For example, the US Supreme Court's landmark case of *Illinois Central Railroad* in 1892¹⁰ upheld the perfect equality of current and

future legislatures: no legislature could deprive a future one of its power to protect nature as a public trust. That case declared that the US public trust was permanent, and the trustee governments could never abdicate their duties to preserve the trust unimpaired, whether by grant, sale or contract. This ruling has not been modified or overruled by subsequent decisions^{3,11,12}, and the decision has been cited in an ongoing case in which young people have made constitutional claims against the US federal government over its climate policies and regulations (Box 1).

These plaintiffs have argued, successfully thus far, that constitutions command intergenerational equity¹³ — the ethical and legal principle that current and future generations have equal rights. As the US Constitution does not mention the environment, the plaintiffs have also argued that the ancient sovereign public trust doctrine applies to the atmosphere¹³. The public trust doctrine in the USA obligates the government to act as trustee for nature and other public resources, including wild organisms^{3,6,11,14}. Indeed, the crux of many such atmospheric trust cases in the USA and other countries with public trust doctrines is whether intergenerational equity and public trust principles are judicially enforceable fiduciary duties, or merely aspirational goals for government trustees.

Intergenerational equity might counter situations in which the rights of future generations are overlooked in the current adult-dominated political process. In general, current marketplaces recognize the costs associated with resource exploitation and present consumption, but discount uncertain future consumption, and the benefits and costs of preservation and restoration for future citizens and the biosphere¹². Across multiple environmental sectors and levels of governments, decision-makers characteristically prohibit or permit use of the environment by following narrow statutory commands, which often fail to achieve broad, lasting protection for air, water, soil and species^{6,12,15}. Youth and the unborn are typically voiceless in current legislatures and executive branches, so they are powerless to preserve the future legacy from current impairment. But if the needs of non-voting youth, current adults and future generations were contemplated as co-equal when the fiduciary trustee is making decisions on environmental use, then preservation would be treated equitably alongside short-term exploitations. We predict the outcome would be slowed or reversed species endangerment and CO₂ emissions.

Box 1 | Examples of atmospheric trust litigation

Uganda. The Ugandan Constitution imposes a public trust duty, including intergenerational equity obligations, on the government:

“(i) The State shall promote sustainable development and public awareness of the need to manage land, air and water resources in a balanced and sustainable manner for the present and future generations. (ii) The utilisation of the natural resources of Uganda shall be managed in such a way as to meet the development and environmental needs of present and future generations of Ugandans; and, in particular, the State shall take all possible measures to prevent or minimise damage and destruction to land, air and water resources resulting from pollution or other causes. (iii) The State shall promote and implement energy policies that will ensure that people’s basic needs and those of environmental preservation are met. (iv) The State, including local governments, shall—... promote the rational use of natural resources so as to safeguard and protect the

biodiversity of Uganda.” (Article 27, Ugandan Constitution of 1995.)

In 2012, petitioners filed an atmospheric trust lawsuit against the Ugandan government²⁰, to compel Ugandan agencies to enforce terms of international climate treaties, conduct carbon accounting, develop a climate change mitigation plan in accordance with the best science and protect Ugandan children from the adverse impacts of climate change. Petitioners invoked the Ugandan Constitution of 1995 and specifically Article 39, stating “Every Ugandan has a right to a clean and healthy environment”, and Article 237, stating “the government or a local government as determined by Parliament by law shall hold in trust for the people and protect natural lakes, rivers, wetlands, forest reserves, game reserves, national parks and any land to be reserved for ecological and touristic purposes for the common good of all citizens.” Parties are still engaged in settlement talks.

USA. Several state and federal lawsuits have been filed since 2010³. Cases have

invoked constitutional provisions²¹ or asserted the public trust along with statutory or regulatory challenges²². In federal court, youth plaintiffs have invoked the federal public trust and express constitutional guarantees based on the due process clause, the equal protection clause and unenumerated rights preserved by the ninth amendment³.

The youth plaintiffs gained a sweeping victory when, in 2016, the federal district court denied defendants’ motions to dismiss and found that all claims could proceed to trial. The court found that the constitutional public trust obligation and the due process and other clauses of the US Constitution provide the basis for rights asserted by youth demanding governmental action to protect against climate change^{3,13}. The court stated, “I have no doubt that the right to a climate system capable of sustaining human life is fundamental to a free and ordered society”¹³.

A motion made by the Trump administration challenging the Juliana decision is pending before the Ninth Circuit Court of Appeals. These cases and several others are reviewed in refs^{3,23}.

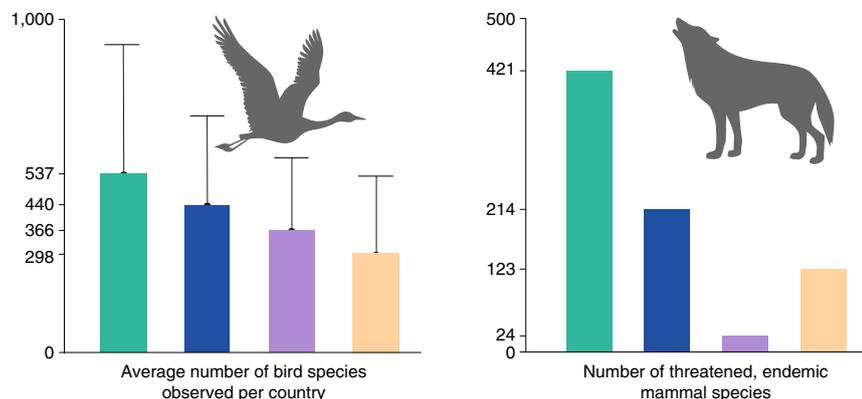


Fig. 3 | Bird and mammal diversity by category of constitutional provisions for environmental protection. See Fig. 1 for categories. Three categories (green, blue and purple) together host more than 84% of mammals that are endemic to a single country and deemed threatened⁵. Average (+1 s.d.) nationwide numbers of bird species are more evenly distributed but most occur in countries with the strongest constitutional protections (green). Data are from eBird (<http://ebird.org/content/ebird/>, accessed 30 August 2017) and presented in the Supplementary Information. Credit: Jen Burgess.

Future generations have equal rights

It is not just decision-makers who often overlook the rights of future generations and governmental duties to preserve environments for the future — scholars and conservation practitioners do too. Participatory decision

processes have become a common source of inequity because they favour current users over future generations, and also provide a forum for powerful or influential ‘constituents’ to manipulate environmental decisions to their advantage^{6,12,16}.

This overlooking of the rights of future generations seems particularly acute among biodiversity conservationists advocating for local control or stakeholder decision-making. For example, the *Open Standards for the Practice of Conservation*, now in its third edition since 1998, has been the leading guide for practitioners worldwide, yet it does not mention future generations, equity, public trust or constitutions¹⁷. Indeed, its sole mention of laws is cursory, involving one step in designing interventions (conservation strategies), without considering if a given conservation vision or project goal should address constitutional or ethical obligations to preserve for the future. Notably, the guide seems to ignore the potentially unethical and illegitimate decisions that arise when one preferentially involves current users (typically a few adults)^{6,16}, but not representatives of future generations. Moreover, inequities multiply when advocates for preservation are misidentified as a special or minority interest, which we view as a gross disenfranchisement of youth and the unborn. Calls have been made for reform of the ethics and methods of water sciences in the USA¹⁵ and of wildlife management in North America and the

European Union^{6,11,16} — such reforms should be extended across conservation sciences.

A constitutional and public trust framework for environmental protection scales from single to global jurisdictions, and hinges on rebalancing the interests of future generations, today's youth and current adults. Ethics, law and environmental scholarship converge to make this feasible and coherent. Enforcing constitutional and public trust frameworks for intergenerational equity will be more feasible in jurisdictions that grant legal standing to youths and the legitimate representatives of future generations. As environmental lawyer Joseph Sax pointed out almost half a century ago, enforcement will also be more feasible in jurisdictions that grant courts the authority to review legislative and executive allocations of natural resources against a legal standard of prudence¹⁸. Although overcoming existing political practices will not be easy, our future and that of much of life on Earth demand it. □

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Published online: 18 January 2018
<https://doi.org/10.1038/s41559-018-0465-y>

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Acknowledgements

D. Bantlin, M. Rabenhorst and R. Treves helped with data and illustrations.

Competing interests

The authors declare no competing financial interests.

Additional information

Supplementary information accompanies this paper at <https://doi.org/10.1038/s41559-018-0465-y>.

Author Correction | Published: 28 March 2018

Author Correction: Intergenerational equity can help to prevent climate change and extinction

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Nature Ecology & Evolution **2**, 910 (2018) | Download Citation

The original article was published on 18 January 2018

Correction to: *Nature Ecology & Evolution*

<https://doi.org/10.1038/s41559-018-0465-y>, published
online 18 January 2018.

The original Article mistakenly coded the constitutional rights of Australia as containing a governmental duty to protect the environment (blue in the figures); this has been corrected to containing no explicit mention of

environmental protection (orange in the figures). The original Article also neglected to code the constitutional rights of the Cayman Islands (no data; yellow in the figures); this has been corrected to containing a governmental duty to protect the environment (blue in the figures).

Although no inferences changed as a result of these errors, many values changed slightly and have been corrected. The proportion of the world's nations having constitutional rights to a healthy environment changed from 75% to 74%. The proportions of nations in different categories given in the Fig. 1 caption all changed except purple countries (3.1%): green countries changed from 47.2% to 46.9%; blue countries changed from 24.4% to 24.2%; and orange countries changed from 25.3% to 25.8%. The proportion of the global atmospheric CO₂ emitted by the 144 nations changed from 72.6% to 74.4%; the proportion of the world's population represented by the 144 nations changed from 84.9% to 85%. The values of annual average CO₂ emissions for blue countries changed from 363,000 Gg to 353,000 Gg and for orange countries from 195,000 Gg to 201,000 Gg. The proportion of threatened mammals endemic to a single

country represented by the 144 countries changed from 91% to 84%. Figures 1–3 have been updated to show the correct values and map colours and the Supplementary Information has been updated to give the correct country codes.

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About this article

SPRINGER NATURE

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