

# The supply chain of violence

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**Every year, more people are killed defending the environment than are soldiers from the United Kingdom and Australia on overseas deployments in war zones combined. During the last 15 years, the number of both deaths of environmental defenders, and the countries where they occur, have increased. Recorded deaths have increased from two per week to four per week over this period. These deaths are primarily related to conflict over natural resources, across a range of sectors. Of 683 total deaths, >230 were related to mining and agribusiness between 2014 and 2017. We find that rule of law and corruption indices are closely linked to patterns of killings. Using spatial data, we investigate the drivers of these conflicts and violence and seek to identify who may be most at risk and why. We argue that businesses, investors and national governments at both ends of the chain of violence need to be more accountable.**

Between 2002 and 2017, 1,558 people in 50 countries were killed for defending their environments and lands<sup>1</sup> (Supplementary Table 1). This is more than double the number of United Kingdom and Australian armed service people killed on active duty in war zones over the same period ( $n = 697$ ; refs. <sup>2,3</sup>) and almost half as many as the number of US soldiers killed in Iraq and Afghanistan since 2001 ( $n = 4,044$ ; ref. <sup>4</sup>). ‘Environmental defenders’ here refers to people engaged in protecting land, forests, water and other natural resources. This includes community activists, members of social movements, lawyers, journalists, non-governmental organization staff, indigenous peoples, members of traditional, peasant and agrarian communities, and those who resist forced eviction or other violent interventions. These people take peaceful action, either voluntarily or professionally, to protect the environment or land rights<sup>1</sup>. They may be directly involved in working on the land, represent those who do, or be advocates for conservation of habitats or species.

The forms of violence (direct, structural and cultural), and the types of harm caused (for example, physical and psychological), are examined in detail elsewhere<sup>5–7</sup>. We distinguish between large-scale violence linked to armed conflicts (civil, guerrilla or international) rooted in struggles over natural resources, and that aimed at individuals or particular communities or groups of individuals due to their acts of resistance and/or protection of their land or environmental rights. Environmental defenders currently face a wave of violence that includes threats of physical harm, intimidation and criminalization<sup>8,9</sup> (Fig. 1). We focus on the deaths of environmental defenders, documented since 2002 by Global Witness (UK), the Comissão Pastoral da Terra (Pastoral Land Commission, Brazil), *The Guardian* (UK) and others. Deaths represent the ‘tip of the iceberg’ of the violence that environmental defenders face. For every defender murdered, thousands more face direct violence, threats and psychological intimidation, and more invisible cultural and structural violence (or ‘slow violence’)<sup>10</sup>. We examine the particular conditions, sectors and interactions leading to the deaths of defenders. Using global datasets, we analyse the drivers of violence contributing to these deaths. Other studies have looked at the links between authoritarianism and deaths of environmental defenders<sup>11</sup> and the relationship between economic growth and these deaths<sup>12</sup>. We further this analysis by evaluating the relationship between spatial factors (natural resource distribution such as hectares of

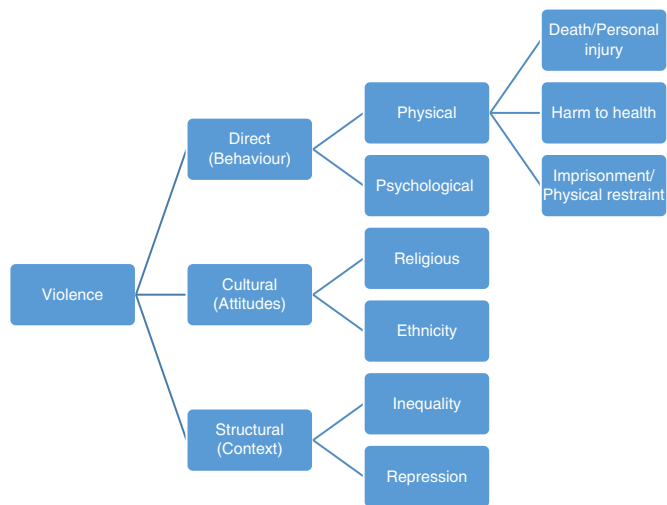
agricultural cultivation and area of mining concessions) and deaths of environmental defenders.

## Natural resource conflicts

Conflicts over natural resources are linked to different resources and/or sectors (for example, fossil fuels, minerals, timber, agriculture, aquaculture and water), as well as access to land and/or bodies of water from which natural resources can be extracted<sup>13</sup>. These conflicts can be seen as a continuation of colonial land and resource appropriation that established systems of dispossession and control. Such appropriation includes: displacement, forced labour and denial of native and Indigenous rights; private control and exploitation of land and natural resources with state backing (for example, the Congo Free State under King Leopold II of Belgium); benefits of natural resource exploitation in one nation accruing to another nation; a global shift from communal to private land rights<sup>14</sup>. Developed countries’ resource consumption is outsourced to less wealthy nations and regions<sup>15</sup>.

Conflicts often arise around the extraction of resources by companies or others without legitimate user-rights to the resource (for example, illegal logging in community forests); or when user-rights are granted by corrupt governments (for example, access to water already used by communities); or through political processes that fail to respect free prior informed consent (for example, oil drilling in concessions in indigenous territories in Peru<sup>16,17</sup>). In other cases of conflict, traditional natural resource users are excluded from the land, often in the name of conservation in national parks or marine protected areas that restrict fishing activities (for example, evictions of indigenous Sengwer from their traditional forest lands in Kenya<sup>18,19</sup>). Some conflicts surround benefit-sharing from extractive industries (for example, the Panguna mine owned by Rio Tinto subsidiary BCL in Papua New Guinea<sup>20</sup>); in others, it is the indirect effects of the extraction that lead to conflicts (for example, water pollution caused by mining or oil drilling and air pollution from factories). In some more extreme cases, extractive industries can lead to displacement of communities: either through contamination of rivers and lands that makes an area uninhabitable (for example, Chevron and Texaco in Ecuador and Peru<sup>21,22</sup>); or by flooding of entire communities for the creation of hydroelectric dams (for example, the Belo Monte dam, Pará, Brazil, and the Lower Sesan 2 dam, Strung Treng, Cambodia<sup>23,24</sup>). In addition to local or national

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**Fig. 1 | Typology of violence.** Violence can be manifest in different forms, as shown. All of them can be linked to violence against environmental defenders, often including Indigenous peoples/ethnic minorities (cultural violence) and economically marginalized groups (structural violence). We focus on direct physical violence leading to death, which is the ‘tip of the iceberg’ of the violence experienced by environmental defenders.

industrial drivers based on these natural resources, multinational corporations that directly outsource their resource exploitation can be involved in violence against environmental defenders<sup>21</sup>.

In many cases, environmental conflicts do not lead to physical violence. However, in cases with intractable conflict, which cannot be solved through various social, administrative or legal processes<sup>25</sup>, violence can emerge. Three conditions increase the chances of violence against defenders: (1) strong incentives (financial, political and other) by government and private actors to exploit natural resources; (2) marginalization (economically, culturally and politically) of those who depend most on natural resources; and (3) weak rule of law (corruption, lack of enforcement and impunity)<sup>1,8,9</sup>. Using global datasets on variables related to deforestation rate, corruption indices, allocation of land concessions, agribusiness commodity prices and other potential drivers, we explored spatial relationships between governance, natural resource sectors and deaths, to identify key interactions.

### Drivers of environmental defenders' deaths

In 2017, at least 185 environmental and land defenders were killed<sup>1</sup>. Of these, Indigenous peoples died in higher numbers than any other group (approximately 40% of such deaths in 2015 and 2016 and 30% of deaths in 2017). Regionally, most of these deaths were in Central America (36%), followed by South America (32%) and Asia (31%); the Philippines and Colombia had the greatest number of deaths of Indigenous peoples overall (36 and 22 people, respectively) during 2015–2017.

The availability of data on murders of environmental defenders is limited by research effort (contacts and languages spoken), the extent of free media and the presence of human rights monitors in some countries. Countries with the lowest protection for press and non-governmental organizations have the highest corruption scores<sup>26</sup>. The data are likely to be underestimates since countries that appear to have the highest number of such deaths may in fact be those with a free press, and apparent increases in numbers of murders may be due to improvements in reporting.

The key natural resource sector drivers of violence and deaths of environmental defenders vary by country or region (Fig. 2). For the

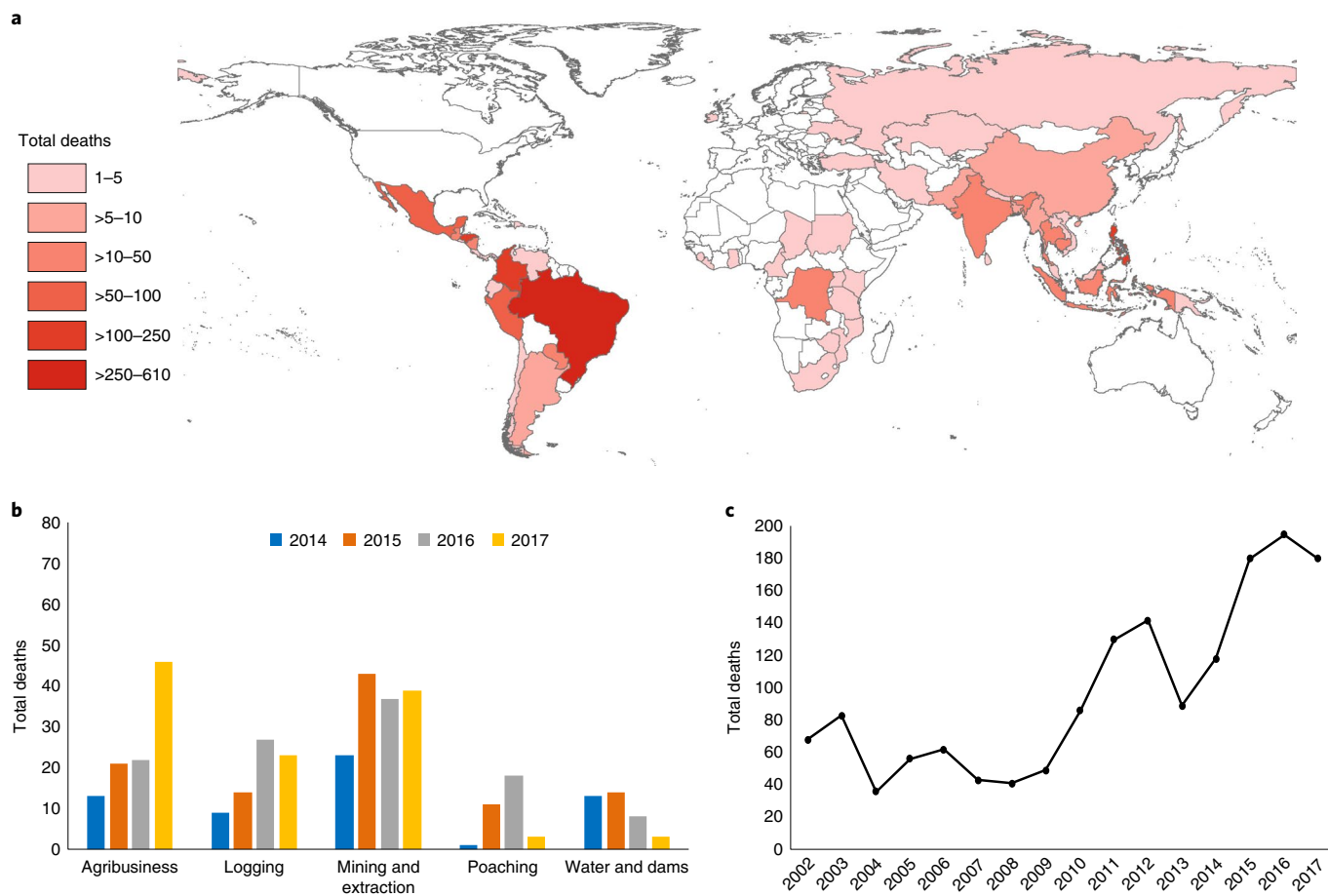
period 2014–2017, the most deaths linked to the agriculture sector were in the Philippines and Brazil (Fig. 3a). Brazil is also the country with the most deaths in the logging sector (Fig. 3b). For mining and extraction, the most deaths were in the Philippines, Colombia and India (Fig. 3c), while Guatemala and Honduras had the most deaths related to water and dams (Fig. 3d). Poaching-related deaths were most frequent in Vietnam and the Democratic Republic of the Congo. Although there is some correlation between the spatial distribution of natural resource extent and exploitation, and number of deaths of environmental defenders locally, there is no global universal pattern between spatial extents of resource sectors.

Using all deaths data for environmental defenders, for 2002–2017, Kendall's  $\tau$  analyses revealed significant correlations between deaths per million and rule of law ( $P=6.396 \times 10^{-7}$ ,  $\tau=0.34$ ) and between deaths per million and area harvested ( $P=0.00163$ ,  $\tau=0.22$ ). These two drivers are themselves closely correlated ( $P=0.00062$ ,  $\tau=0.21$ ), although we note that correlation does not equate to causation. There was some correlation between deaths per capita and dams ( $P=0.04223$ ,  $\tau=0.20$ ) but none between deaths per million and mining or intact forest ( $P=0.2197$ ,  $\tau=0.17$  and  $P=0.4014$ ,  $\tau=0.01$ , respectively). Welch  $t$ -test analysis showed significant differences between binary deaths (countries with deaths/countries with no deaths) and rule of law ( $P=2.057 \times 10^{-9}$ ,  $t=6.47$ ) and between binary deaths and area harvested ( $P=0.0297$ ,  $t=-2.24$ ).

A country's rule of law was the key variable associated with environmental deaths (Fig. 4a,b). While there was a strong correlation ( $P<0.0001$ ;  $\tau=0.34$ ) between the countries with the most such deaths and their rule of law score<sup>27</sup>, it may be that the most corrupt countries are so dangerous and have such weak rule of law that there is less environmental activism (for example, Somalia, North Korea and Afghanistan). There was a positive correlation between economic development and safety<sup>28</sup> but even countries that are not deemed very corrupt can see brutal crimes against environmental defenders (for example, Ireland). All except three ( $n=47$ ) of the countries where such deaths have been recorded are classed as highly corrupt, in that their corruption perceptions index score fell below 50 on a 0–100 scale<sup>26</sup>.

### Discussion

Weak rule of law is identified as an important condition leading to violence against defenders. The level of impunity in the deaths of environmental defenders is high: globally on average it is estimated that just over 10% of these murders result in a conviction<sup>29</sup>, which is low compared to global homicide convictions (43% on average in 2012)<sup>30</sup>. Impunity in these cases of violence against environmental defenders is linked to two main factors. First, corruption within police and judiciary branches in many countries means that cases are not properly investigated or tried; sometimes it is the police and/or government authorities who are directly responsible for the violence, or have financial and/or familial ties to those responsible. The massacre of ten land activists at Pau D'Arco (Pará, Brazil on 24 May 2017) is one instance where civil police are the main suspects<sup>31</sup>. Second, because they are linked to natural resources, many murders occur in remote areas with weak government and police presence, which adds to the difficulty of gathering evidence. In Brazil (consistently the country with the highest number of deaths of environmental defenders, especially of Indigenous peoples), the election of Jair Bolsonaro raises new concerns. He plans to relax gun laws and environmental protections, labelling non-governmental organizations and activists as terrorists<sup>32</sup>, to undermine and repress those in disagreement with the political regime<sup>11</sup>. In the Philippines, there was a 71% increase in the murders of environmental defenders from 2016 to 2017 under Rodrigo Duterte, who has taken a violent stance toward human rights defenders, Indigenous peoples, environmentalists, women, drug users and others.



**Fig. 2 | Key natural resource sectors driving violence and deaths. a**, Spatial distribution of deaths of environmental defenders by prominent key natural resource sectors: agribusiness, logging, mining and extractive industries, water and dams, and poaching (2014–2017). **b**, Global total number of deaths by key natural resource sector (2014–2017). **c**, Total number of deaths between 2002 and 2017. Credit: world map baseline from the Database of Global Administrative Areas (GADM)

Indigenous peoples manage or have tenure rights over at least 38 million km<sup>2</sup> globally—about a quarter of the world’s land surface, which overlaps with about 40% of all terrestrial protected areas and ecologically intact landscapes<sup>33</sup>. Conflict over natural resources and land often arises due to failure to recognize Indigenous land rights or poor law enforcement to protect those rights. Although evidence is increasing that Indigenous territories are equally, or more, effective at conserving forests than are state-managed protected areas<sup>34</sup>, continuing lack of rights, repression and marginalization, and liberalization of external investment in land-based sectors means that these groups are more subject to violence with impunity<sup>11</sup>. Indigenous rights infringements and resulting violent conflict is also apparent in the global North. In the United States, the Standing Rock resistance to the North Dakota access pipe line was forcefully repressed with use of water cannon in sub-zero temperatures; many demonstrators were hospitalized.

The cause of these deaths is primarily conflict over resources, as local communities and defenders are not consulted but instead are often violently silenced. Although no such deaths have yet been recorded in the United States or the United Kingdom, environmental rights are being eroded and environmental defenders are increasingly deemed criminals. For instance, in September 2018 in the United Kingdom, three protestors were convicted of causing a public nuisance following their non-violent direct action to prevent hydraulic fracking at Preston New Road, Lancashire. They are the first environmental activists to receive jail sentences for a protest in

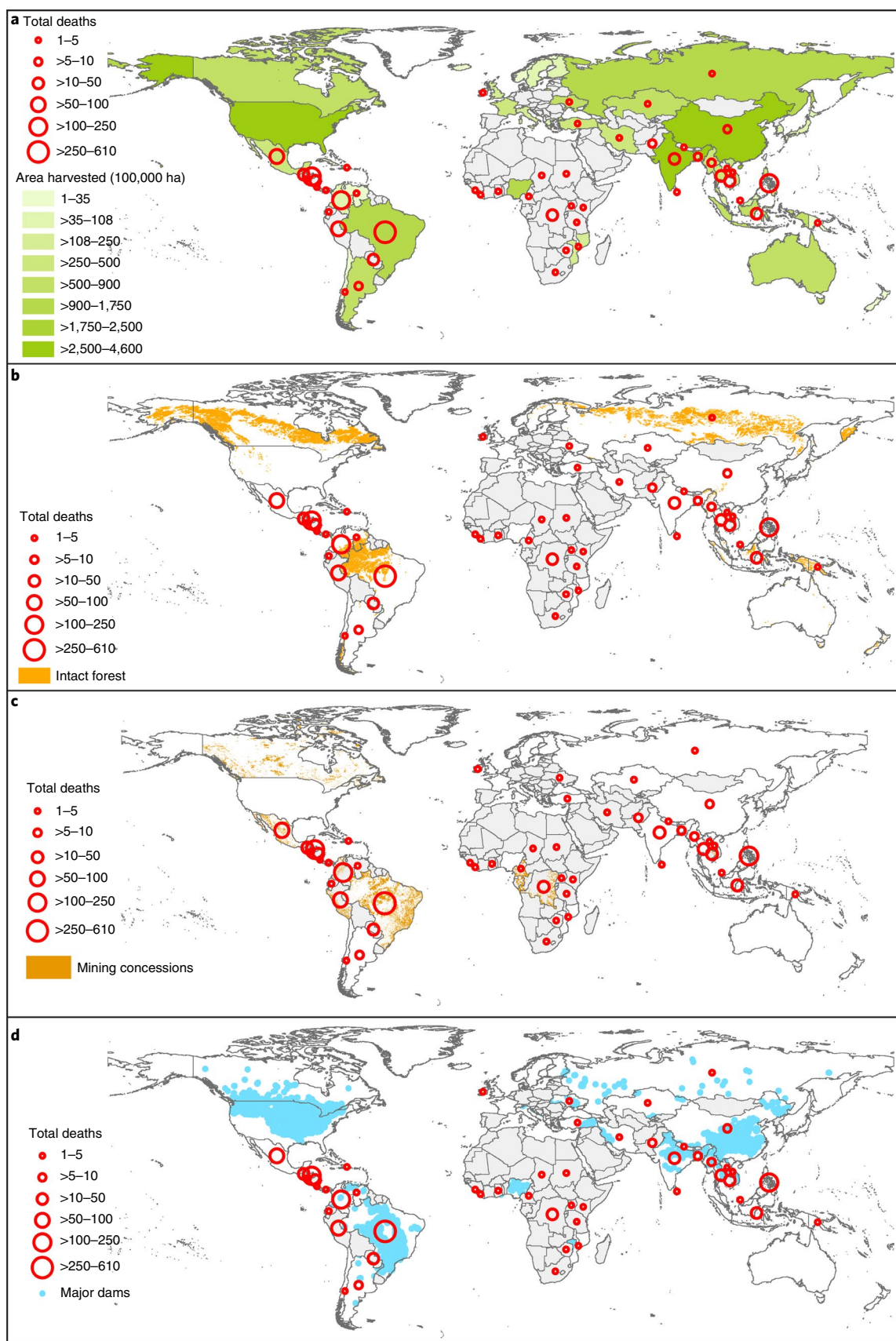
the United Kingdom since 1932 (in that case, for land trespass)<sup>35</sup>. This gives rise to grave concerns about sustainable development and climate change commitments in the United Kingdom.

Local or national variables contributing to environmental conflict include corruption and land tenure allocations. International and multinational companies that profit from natural resources—sourced under conditions that infringe defenders’ rights in a particular country but sold elsewhere—are complicit in driving violence through their supply chains. They have a responsibility to act transparently and ethically. There is a need for a global perspective on natural resource conflicts, recognizing transboundary effects and teleconnections. The current displacement of environmental and social damage, from the global North to the global South, is a result of globalization and historical colonialism. This problem is increasing as trade and consumption grow<sup>36</sup>. The correlation between rule of law and area found in our analysis reflects this relationship. This global perspective needs to be further explored. Transparency across all aspects of environmental conflict is necessary<sup>37</sup>.

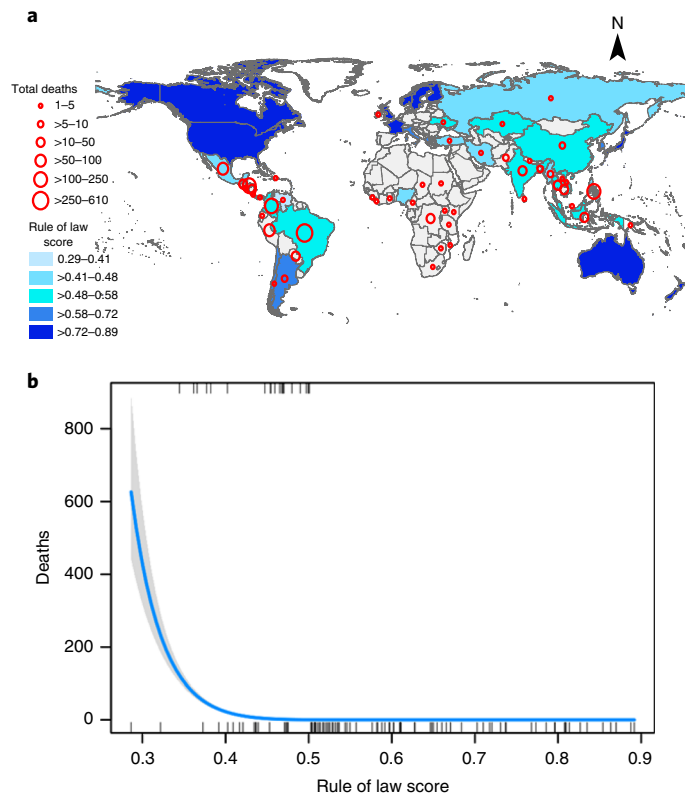
## Conclusions

People are dying to protect their livelihoods, along with the forests, lands and ecosystems that are essential for all our futures. These murders are on the scale of armed conflict—defined as 25 deaths per year<sup>38</sup>: 56 environmental defenders were killed in Brazil and 47 people in the Philippines in 2017. This study offers a global analysis of the drivers of violence, showing that corruption and rule





**Fig. 3 | Global overlay of environmental defenders' deaths (2014–2017) and natural resource drivers. a**, Agriculture (as area harvested). The most deaths in this sector were in the Philippines ( $n=39$ ). **b**, Logging/land clearance (as intact forest). The most deaths in this sector were in Brazil ( $n=41$ ). **c**, Mining and extractive industries. The most deaths in this sector were in Colombia ( $n=25$ ) (as reserves/concessions). **d**, Water and dams (major dams shown). The most deaths in this sector were in Guatemala ( $n=12$ ) and Honduras ( $n=12$ ). See Methods for data sources. Credit: world map baseline from GADM



**Fig. 4 | Rule of law overall score.** This score incorporates data from eight categories: absences of corruption, civil justice, criminal justice, fundamental rights, government powers, open government, order and security, regulatory enforcement. **a**, Countries in the darker colours have a higher score and are more likely to be peaceful, safe and equitable, whereas countries in the lighter colours have a lower score and are less likely to be peaceful, safe and equitable. The map shows that there are more deaths in lighter-coloured countries, particularly in tropical and subtropical regions. **b**, A fitted generalized linear model clearly indicates the correlation between numbers of deaths and rule of law. Data taken from World Justice Project, ref. <sup>27</sup>. Credit: world map baseline from GADM

of law are predictors of environmental defender deaths. To address this situation, governments, businesses and investors should be held accountable for their role in supply chains that drive violence.

The voices and actions of those at the frontline of environmental protection are violently suppressed at the hard end of a continuum of inequality<sup>11</sup>. If people are afraid to speak up or campaign, this could lead to the silencing of important environmental issues even in theoretically safe countries. This undermines international conventions, such as the Convention on Biological Diversity, and limits efforts to meet the United Nations Sustainable Development Goals.

The natural resource sectors shown to be underlying drivers are implicated in these murders. All companies should be accountable for the impact their business practices have. One way of addressing the issue could be through international schemes and legislation for environmental protection, to which all companies would be required to be signatories. In addition to threats against people, global trade puts biodiversity at risk<sup>39</sup>. New laws, such as the Global Magnitsky Human Rights Accountability Act<sup>40</sup>—set up as an anti-money laundering mechanism and as a way of penalizing perpetrators of human rights abuses—offer routes to accountability and to protecting environmental defenders. International legislation on environmental harm is needed to create accountability for industries targeting natural resources in conditions of weak local rule of law—conditions that result in deaths of defenders. Companies and

consumers must investigate the sources of products, publish the results and commit to eliminating violence from supply chains.

## Methods

The natural resource sector drivers of conflict are categorized by Global Witness as: agribusiness, logging, mining and extraction, poaching (often combined with fishing), water and dams and other<sup>1</sup>. We extracted spatial data on each of the following four natural resource sectors from freely available online resources, using relevant indicators: area harvested, intact forest, mining concessions and major dams. Data on environmental defender deaths were provided by Global Witness. We calculated rates of death per million population for each of the 50 countries where deaths of environmental defenders had taken place. For Indigenous groups, we extracted death data for available years, 2015–2017, then calculated proportions of total deaths, by country and by region (Supplementary Table 2).

We investigated the link between environmental defenders' deaths and corruption using rule of law, based on eight factors: constraints on government powers, absence of corruption, open government, fundamental rights, order and security, regulatory enforcement, civil justice and criminal justice<sup>27</sup>. The data were partial in some cases. For example, rule of law indices and all-sized dam numbers were not available for all countries, including Honduras and Guatemala, even though that sector was recorded as the key driver of environmental defenders' deaths in those countries. We included in our analyses all countries with data available for two or more of the five potential drivers. We used Kendall's  $\tau$  analysis to identify significant correlations and Welch's  $t$ -test to identify significant differences between grouped data. For absolute deaths and rule of law (that is, using only data from the 50 countries where these deaths had occurred), we used a generalized linear model.

## Data availability

The data that support the findings of this study are available from the corresponding author upon request, and were sourced from the following organizations. For environmental defender deaths, see <https://www.globalwitness.org>. For area harvested, see <http://www.fao.org/faostat/en/#data/QC>. For intact forest, see <http://www.intactforests.org/data.ifl.html>. For mining concessions, see [https://data.globalforestwatch.org/datasets/26a457ee3b584824bb930f2ec791b60d\\_0](https://data.globalforestwatch.org/datasets/26a457ee3b584824bb930f2ec791b60d_0). For major dams, see [http://data.globalforestwatch.org/datasets/537361e2df59486e898cd4e024af57ea\\_0](http://data.globalforestwatch.org/datasets/537361e2df59486e898cd4e024af57ea_0). For rule of law index, see <https://worldjusticeproject.org/our-work/wjp-rule-law-index>.

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### Author contributions

N.B., F.L. and M.M. planned the work. A.R. and N.B. analysed the data. All authors contributed to the writing.

### Competing interests

The authors declare no competing interests.

### Additional information

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