

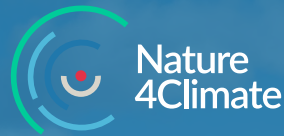


Nature-Based Solutions (NbS) Policy Tracker

AN AI APPROACH TO POLICY-MAKING
FOR ENABLING NBS WORLDWIDE

4TH EDITION

Participating Organizations



Nature4Climate

Nature4Climate (N4C) is a multi-stakeholder coalition of 28 international members and a strategic platform for unbranded communications and advocacy campaigns. Our members are the United Nations Environment Programme (UNEP), the Convention on Biological Diversity (CBD), the International Union for Conservation of Nature (IUCN), United Nations Development Programme (UNDP), UN-REDD, Birdlife International, Clean Cooking Alliance (CCA), Conservation International (CI), Environmental Defense Fund (EDF), Global Mangrove Alliance, The Nature Conservancy (TNC), RE:wild, Wildlife Conservation Society (WCS), Woodwell Research Center, World Business Council for Sustainable Development (WBCSD), World Resources Institute (WRI), World Wide Fund for Nature (WWF), We Mean Business, the Food and Land Use Coalition (FOLU), Tree Aid, Youth4Nature, International Fund for Animal Welfare (IFAW), Fauna & Flora, National Audubon Society, The Biodiversity Consortium (Restor, CrowtherLab, SEED), Live and Learn Environmental Education, Forest Stewardship Council (FSC) and Wetlands International (WI). The secretariat is housed in TNC.

Nature4Climate brings together networks around the world in a joint effort to drive investment in and action on nature-based solutions (NbS). It does this by catalyzing partnerships between governments, civil society, businesses, and investors. Its work includes advocating for and demonstrating the breadth and untapped potential of better management of land activities; highlighting success stories of meaningful nature and climate action around the world; facilitating dialogue around nature-based solutions; sharing scientific knowledge; and providing unbranded communications resources and creative treatments of the subject.



Arboretica

Arboretica, headquartered in Rotterdam (Netherlands), is a pioneer in using machine learning and natural language processing to automate the work of environmentalists and policymakers. They constantly innovate cutting-edge, peer-reviewed data-driven technologies to make sustainability analyses more streamlined and scalable.

Arboretica has helped global policymakers, universities, NGOs, and corporations to automate manual working processes, discover hidden insights, and create tangible impact on climate change, nature, and biodiversity. The team has led the creation of many AI-driven environmental solutions, including ChatNetZero and GreenSearch.AI.

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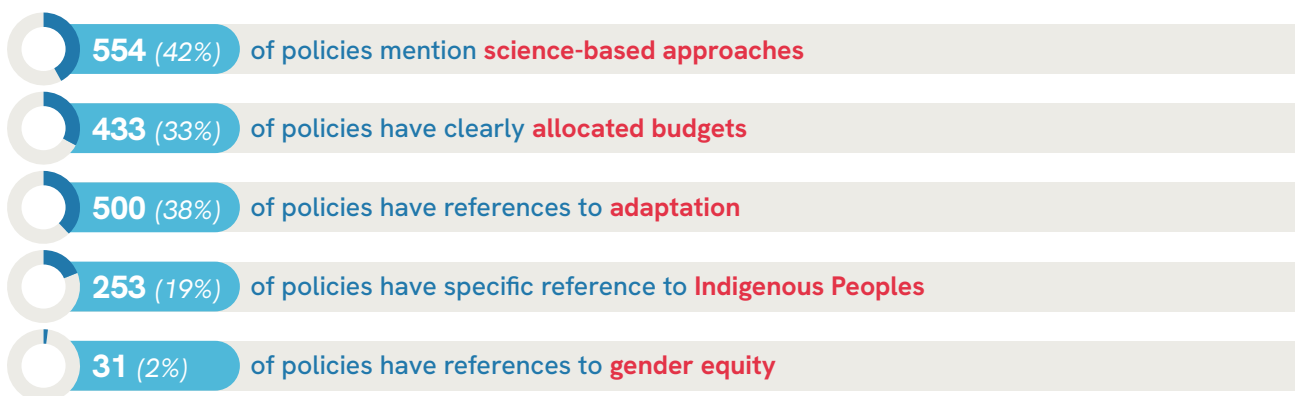
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Executive Summary



1,306 Nature-based Solutions (NbS) policies from **190** countries are collated in the N4C Global NbS database. [See interactive NbS policy database here.](#)



WHAT IS BEING TRACKED

In this fourth edition of the Nature-based Solutions (NbS) Policy Tracker, we focus on identifying and analyzing policies that integrate NbS as a key mechanism for addressing climate and biodiversity challenges. The tracker monitors national legislation and budget allocations across 191 countries, highlighting policies that emphasize whole-of-society approaches, rights-based frameworks, and whether there is financing for NbS. Our analysis captures over 1,300 policies, including new entries from 2024. They reflect the growing recognition of NbS in both climate mitigation and adaptation strategies.

KEY RESULTS

The tracker combines automated policy indexing with curated case studies. This year's tracker identified over 300 policies from 50 countries. 40% of the new entries mention budgets/financing for NbS, highlighting a shift towards aligning financial resources with climate goals. We also see an increased emphasis on NbS in climate adaptation, showcasing its role in building resilient strategies.

Featured examples include Brazil's integration of NbS into tourism and spatial planning, Canada's Environmental

Protection Act incorporating Indigenous rights, and Colombia's rights-based agrarian frameworks. Other cases include NbS education programs in the DRC, the EU's continent-wide restoration plan, sustainable fishery management in Mauritius, and water resource management in Vietnam.

HOW TO USE THIS DATA

The NbS Policy Tracker offers valuable insights for various sectors. Academics can leverage the data for research on the integration of NbS into national and regional policies, while NGOs can use it to identify effective policy models for advocacy and program development. Businesses can explore innovative NbS approaches that align with sustainability goals and investment opportunities. Data can be accessed through the Nature4Climate website for further analysis and application.

KEY TAKEAWAYS FOR POLICY MAKERS

The interconnected crises of biodiversity loss, climate change, and desertification demand interconnected solutions. For local communities on the ground, there is no distinction between climate and nature targets, making it essential to have a unified approach. Helping deliver sustainable livelihoods while transitioning to a nature positive and net zero economy.

For Policy Makers, nature-based solutions provide a strategic and cost-effective avenue to address the interconnected challenges of the Rio Conventions: climate change, biodiversity loss, and land degradation, while at the same time making tangible headway towards the sustainable development goals.

Finding funding for nature still remains challenging. This research shows that only 33% of policies have budgets allocated, however, this is increasing from previous years with 55% of new policies added this year having allocated budgets. NbS remains dramatically underfunded by governments at US\$200 billion per year globally (finance flows to activities directly harming nature were more than 30 times larger¹). We need this to almost triple to US\$542 billion per year by 2030 to meet the Rio Convention targets on limiting climate change and the Biodiversity Plan targets.

The World Economic Forum estimates that nature-positive policies could attract more than [US\\$10 trillion](#) in new annual business value and create 395 million jobs by 2030. However, if we want to create jobs and support livelihoods we need to support the Indigenous Peoples (IP) and local communities both the rights and territorial claims and provide access to direct funding. Indigenous Peoples manage 50% of the world's land, but they currently receive less than [1%](#) of climate funding.

Only 17% of climate conservation and funding intended for IPs and Local Communities (LCs) actually reaches them.

Carbon markets could deliver up to [32% of the global cumulative potential](#) of NbS by 2030. However, in the last three years, only 1.2% of the annual cost effective potential of NbS has been unlocked by the voluntary carbon markets. Policy makers have a critical in creating the guardrails that will ensure the right safeguards are in place to implement high integrity Nature-based Solutions on the ground.

Our research shows only 23% of policies including Multi Stakeholder approaches and with only 19% of policies having direct reference to IPLCs. We would raise concerns that there is a danger that regulations will fail to direct project design to meet the internationally recognised IUCN standard for Nature-based Solutions. Further to this our research shows that only 2% of policies reference gender equity and IPLC equity which is a missed opportunity as there is strong evidence that secure IPLC rights to land and resources contribute to conservation as noted in the IPBES Global Assessment of 2019. In addition, social safeguards can address access to information and justice, accountability, and law enforcement. While the primary objective of safeguards is avoiding negative impacts, they can also be used to enhance human wellbeing, improve quality of life, and improve governance. All adding to the successful implementation of wider policies objectives.

WE WOULD LIKE TO SEE POLICY MAKERS:

- 1. Create investable NDCs to mobilize the private sector capital to close the climate finance gap:** Currently for every US\$3 of public funding for climate change, we only see US\$1 of private finance. The private sector must mobilize its resources to align the economy with our climate and nature goals.
- 2. Responsibly develop carbon markets:** To boost the Paris Agreement's climate goals, countries need to finalize Article 6 with high integrity rules and strong safeguards for people and nature. There is an opportunity to cooperate with other countries to harmonize rules to ensure both high integrity of carbon markets but also make them easier for foreign investors to navigate.
- 3. Increase direct, fit-for-purpose funding mechanisms for Indigenous Peoples, local communities and sub-national governments:** making sure finance actually reaches communities on the ground. At least 20% of all public climate finance for nature-based projects and investments should be directed towards IPs and LCs. Recognising their role in the protection and restoration of nature and helping accelerate the transition to local nature positive economies.

¹ In 2022, [US\\$7 trillion](#) is going to activities that have a direct negative impact on nature (the private sector is responsible for US\$5 trillion). This is 140x larger than private finance flows to NbS (US\$35bn of private investments in NbS).



Introduction

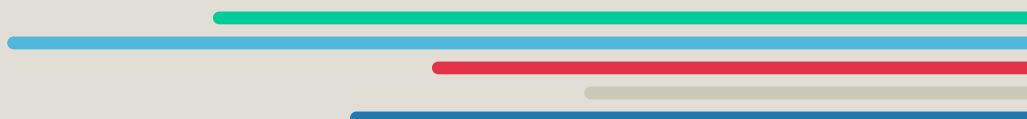
The role of Nature-based Solutions (NbS) in mitigating and adapting to climate change is well-documented, contributing up to one-third of the global mitigation required by 2030 (Griscom et al., 2017).

Nature-based solutions offer significant environmental and socio-economic benefits, crucial for steering us towards a net-zero, nature-positive future. Nature-based solutions encompass a diverse array of approaches with varying potentials for climate mitigation, biodiversity protection, and socio-economic benefits. While the review by Buma et al. (2024) highlights the solid scientific foundation and significant mitigation potential of pathways like tropical forest conservation and reforestation, it also reveals that some popular NbS pathways lack sufficient scientific certainty, particularly concerning greenhouse gas (GHG) measurement and accounting. However, as highlighted by Dunlop et al. (2024), the value of NbS extends beyond climate mitigation alone. Their research underscores that NbS are also crucial in addressing a range of societal challenges that have been underrepresented in the current research landscape, such as economic and social development, human health, food security, and water security. For instance, while significant research

has focused on climate change impacts and biodiversity loss, the societal benefits of NbS, such as their role in disaster risk reduction and their potential to enhance human health and food security, have been less studied. This highlights a critical gap in understanding the full range of benefits that NbS can provide.

This year, Parties to the UNFCCC submit their updated Nationally Determined Contributions and the ambition loop takes center stage. The ratcheting mechanism of the Paris Agreement assumes the continued increase of ambition through commitments, policy, and actions. This whole-of-society approach in turn further motivates governments to strengthen their policies, leading to a continuous cycle of increased climate/nature ambition from both public and private sectors, accelerating climate action.

In this report, Nature4Climate partners with Arboretica for the fourth consecutive year to present the latest update of the world's largest Nature-based Solution (NbS) Policy Tracker. Utilizing artificial intelligence, the tracker has examined over two million pages since 2021 in English, French, Spanish, and this year, Russian.



Updates to the Tracker

The NbS Policy Tracker has expanded significantly over the past four years, now encompassing 1,300 policies identified through a web scraping algorithm. This algorithm searches for policies that enable NbS using a set of keywords derived from an extended ontology, which is detailed in the appendix. Although the policies are human-validated before being included in the database, the process is not foolproof. Once policies are identified as

NbS-enabling, they are further tagged based on indexing keywords. This tagging process helps determine specific attributes of the policies, such as whether they include Indigenous Peoples and Local Communities, consider their rights, allocate a budget, adopt a landscape-level approach, adhere to the mitigation hierarchy, or prioritize preventing nature loss.

Methodology

The NbS Policy Tracker has expanded significantly over the past four years, now encompassing 1,300 policies identified through a web scraping algorithm. This algorithm searches for policies that enable NbS using a set of keywords derived from an extended ontology, which is detailed in the appendix. Although the policies are human-validated before being included in the database, the process is not foolproof. Once policies are identified as NbS-enabling, they are further tagged based on indexing keywords. This tagging process helps determine specific attributes of the policies, such as whether they include Indigenous Peoples and Local Communities, consider their rights, allocate a budget, adopt a landscape-level approach, adhere to the mitigation hierarchy, or prioritize preventing nature loss.

The NbS policy database was established using a combination of automated policy collection, qualification approaches, and manual validation. Policy collection is conducted through automated web scraping, using natural language processing algorithms to identify NbS-enabling policies from different countries, published online in English, French, Russian, and Spanish, from official legislation websites, research databases, and other public sources. The policies included in the database consist of legislation, subsidies, and policy documents with allocated budgets, all enacted since the Paris Agreement. The web scraping algorithm utilizes semantic search terms in these languages. All collected policies were assessed based on topics of interest, publication date, and criteria for policy qualification. The policies were then manually validated to ensure relevance and gather insights on improving the search algorithm.

WHAT'S A POLICY?

For the purposes of this tracker, we limit the policies collected to national legislation and national budgets. We track policies that have been passed since 2015, when the Paris Agreement was signed.

HOW ARE POLICIES SELECTED FOR INCLUSION?

This tracker utilizes a comprehensive keyword ontology that has been developed and expanded over the past four years to encompass a wide range of policies that support nature-based solutions.

Artificial Intelligence (AI) techniques were used to gather public policies from countries across the globe. During this period, the keyword search has evolved to integrate terms related to the initial twenty natural pathways identified by Griscom et al. (2017). See *Appendix for keywords used to identify NbS-enabling policies*.

WHAT LANGUAGES ARE USED FOR SEARCH?

The keywords have been translated into Spanish, French, and Russian to enhance accessibility and relevance across different languages.

HOW ARE CASE STUDIES CHOSEN?

Case studies are selected for inclusion qualitatively. They are used to demonstrate different dimensions of what is tracked within the NbS Policy Tracker and to highlight the potential for further research and exemplary action.

Language Insights

The tables show a summary of the policies within the overall data set (collected over the past four years) and the policies that have been added this year. This year, we added a dedicated search in Russian to identify policies that might not be found translated into English. Added in years past, this year we also did a dedicated search in Spanish and French.

POLICY LANGUAGE SPREAD

Full Policy Database	
Language	Number of Policies
English	1110
Spanish	96
French	86
Russian	14

New Policies Introduced in this Update	
Language	Number of Policies
English	123
Spanish	26
French	16
Russian	14

Qualitative Policy Insights

QUALITATIVE POLICY INDEX

Full Policy Database		
Index	# of Policies	% of Policy
Science-based Approaches	554	42.42%
Adaptation	500	38.28%
Budget	433	33.15%
Prioritizes Protection	363	27.79%
Multiple Stakeholder	294	22.51%
IPLC	253	19.37%
Landscape	194	14.85%
Gender Equity	31	2.37%
IPLC Equity	6	0.46%

New Policies Introduced in this Update		
Index	# of Policies	% of Policy
Adaptation	83	46.37%
Prioritizes Protection	71	39.66%
Budget	55	30.73%
Science-based Approaches	37	20.67%
Multiple Stakeholder	22	12.29%
IPLC	14	7.82%
Landscape	8	4.47%
Gender Equity	7	3.91%
IPLC Equity	2	1.12%

The policies are indexed based on whether they include keywords (see appendix) highly associated with certain policy characteristics. We looked at the full database (including this year's update) and isolated the policies newly added to this year's database.

Recent updates to the Nature-based Solutions (NbS) Policy Tracker show a promising shift towards prioritizing nature protection. On average, policies added in 2024 score higher for prioritizing the protection of nature, with 363 policies (28%) containing keywords related to landscape and nature preservation, 71 of which were added in the latest update. Notably, 40% of the policies introduced this year focus on avoiding the destruction of natural resources. Given that land-use change is the leading driver of biodiversity loss, as highlighted by IPBES in 2019, this trend signals positive progress towards aligning global policies with the urgent need for conservation and sustainable land management.

Country Coverage

In this year's NbS Policy Tracker update, there were 179 policies added from 71 countries. Given the dedicated policy search this year in Russian, 19 policies were flagged from the Russian Federation that appear to be enabling NbS.

In the full NbS Policy Tracker database, there are 1306 policies from 191 countries. That leaves all but three countries (Democratic People's Republic of Korea, South Sudan, and Holy See (Vatican City)) as the only ratified Paris Agreement signatories to not have policies included within the database.

Countries with New Policies Introduced in this Update



Countries Included within the Full NbS Policy Database





Case Studies

We have selected nine policies from this year's update to the NbS policy database to showcase as case studies. These policies emphasize whole-of-society approaches to enabling NbS. Some of the highlighted policies were uncovered through the expansion of our search mechanism to include additional languages—such as the included peat protection policy in Russia. Additionally, we have included policies that, while not newly introduced, have been amended to better integrate NbS-enabling elements—such as the rights-based approaches seen in Canada.

Below is a list of the nine case studies:

01 European Union

06 Mauritius

02 Russia

07 Vietnam

03 Canada

08 Brazil

04 Timor Leste

09 DR Congo

05 Colombia



CASE STUDY 1

European Union



Policy Year:

2023

Policy/Budget:

[EU Restoration Law](#)

Description:

This legislation establishes a comprehensive plan for restoring nature across the EU. It regulates electronic data alignment for monitoring, reporting, and enforcement of nature restoration activities. The law includes specific data sources and indicators, such as monitoring "urban green space" using Tree Cover Data from the Copernicus Land Monitoring Service. Member states are required to publicly disclose the data generated from these monitoring activities, which include indicators like pollinator abundance. The policy also allocates funding to develop necessary monitoring approaches through the Joint Research Council (JRC).

Relevant Categories:

Reforestation

Conservation agriculture

Wetland protection

Freshwater conservation

Criteria Fulfilled:

Budget

Science-based Approaches

Landscape

CASE STUDY 2

Russia



Policy Year:

2020

Policy/Budget:

Federal Law No. 534-FZ, "[Федеральный закон от 30.12.2020 № 534-ФЗ](#)"

Description:

This amendment to the electric power industry law bans the use of peat as a fuel source, thereby enhancing peatland protection by prohibiting its use in energy generation.

Relevant Categories:

Avoided peat impact

Criteria Fulfilled:

Prioritizes protection

CASE STUDY 3

Canada



Policy Year:

2023

Policy/Budget:

[Amendment to the Environmental Protection Act](#)

Description:

The 1999 Canadian Environmental Protection Act was amended to include the implementation of the UN Declaration of Rights of Indigenous Peoples including free, prior, and informed consent. The amendment also includes recognition of the role of science and Indigenous Knowledge in the process of making decisions related to the protection of the environment and human health.

Relevant Categories:

Nature Protection

Freshwater conservation

Avoid forest conversion

Criteria Fulfilled:

IPLC Equity

CASE STUDY 4

Timor Leste



Policy Year:

2023

Policy/Budget:

[Decree-Law No. 78/2023 establishing the structure of the Ministry of Tourism and Environment \(MTA\)](#)

Description:

This policy establishes a comprehensive framework for managing and preserving environmental and cultural biodiversity. It creates multiple roles including an ecological tourism position, a national climate change directorate, and an environmental education center as well as relevant information centers. The policy focuses on improving international coordination, enhancing internal capacity, and maintaining biodiversity data while ensuring better public awareness and education. The policy also includes a budget for personnel as well as financing the implementation of projects.

Relevant Categories:

Avoid forest conversion

Criteria Fulfilled:

Multistakeholder

Prioritizes Protection

Budget

Science-based Approaches

CASE STUDY 5

Colombia



Policy Year:

2023

Policy/Budget:

Decree 151 ordering the publication of Legislative Act Project number 035 of 2022 Senate, 173 of 2022 Chamber by which the Political Constitution of Colombia is reformed and the Agrarian and Rural Jurisdiction is established. "[Decreto 151 de 2023 por el cual se ordena la publicación del Proyecto de Acto Legislativo número 035 de 2022 Senado, 173 de 2022 Cámara por el cual se reforma la Constitución Política de Colombia y se establece la Jurisdicción Agraria y Rural.](#)"

Description:

This decree reformulates the agrarian and rural jurisdiction, providing particular protection to ethnic groups, including Indigenous Peoples. It establishes a framework for agrarian courts to better address the needs and rights of these communities.

Relevant Categories:

Conservation Agriculture

Criteria Fulfilled:

IPLC Equity

Multiple stakeholder

Prioritizes protection

CASE STUDY 6

Mauritius



Policy Year:

2023

Policy/Budget:

[The Fisheries Act](#)

Description:

This Act regulates Mauritius' fisheries and aquaculture, emphasizing sustainable management and conservation. It includes provisions for governance, conservation measures, fishing practices, licensing, and trade rules. The Act also addresses data management, enforcement, and handling of seized items, aiming to ensure effective resource management and compliance with international standards.

Relevant Categories:

Coastal restoration

Avoided coastal impact

Criteria Fulfilled:

Science-based approaches

CASE STUDY 7

Vietnam



Policy Year:

2023

Policy/Budget:

Law No.28/2023/QH15 on Water Resources

Description:

This policy includes comprehensive management of water resources, holistically addressing the water quality, the amount of water across surface and groundwater, both upstream and downstream. It outlines the State's role in overseeing water supply and infrastructure, including irrigation, hydropower, and both urban and rural water systems. The law allocates funding for baseline water resource surveys and the restoration of degraded waterways.

Relevant Categories:

Conservation Agriculture

Freshwater conservation

Criteria Fulfilled:

Budget

Prioritizes Protection

Adaptation

Science-based Approaches

CASE STUDY 8

Brazil



Policy Year:

2023

Policy/Budget:

Law No. 11.612 amending Law No. 9.931 on the Rio Grande do Norte Tourism Policy to define guidelines for planning, development, and stimulation of the tourism sector. "[LEI Nº 11.612, DE 1º DE DEZEMBRO DE 2023](#)"

Description:

This law promotes the development of transportation and infrastructure to systematically connect ecotourism destinations and enhance tourism hubs. It incorporates landscape and spatial planning elements and advocates for a whole-of-society approach to tourism with a strong environmental focus.

Relevant Categories:

Ecotourism

Nature Protection

Criteria Fulfilled:

Prioritizes Protection

Landscape Approach

CASE STUDY 9

DR Congo



Policy Year:

2023

Policy/Budget:

Ordinance-Law No. 23-007 of March 3, 2023 amending and supplementing Law No. 11/009 of July 9, 2011 containing fundamental principles relating to environmental protection "[Ordonnance-loi n° 23-007 du 03 mars 2023 modifiant et complétant la loi n° 11/009 du 9 juillet 2011 portant principes fondamentaux relatifs à la protection de l'environnement](#)"

Description:

This legislation establishes the National Council for Environment and Sustainable Development. It promotes environmental education to raise national awareness about climate change and the implementation of Nationally Determined Contributions (NDCs). The policy outlines key nature-climate terms, defines the state's role in maintaining quality of life, and ensures people's right to environmental education. It also creates a fund for environmental interventions to finance research, education, and climate innovation.

Relevant Categories:

Avoid forest conversion

Avoided woodfuel

Criteria Fulfilled:

IPLC

Adaptation

Multiple stakeholder

Key Takeaways for Policy Makers

Policymakers should focus on creating **investable Nationally Determined Contributions (NDCs)** to mobilize private sector capital and help close the climate finance gap. Currently, for every US\$3 of public funding, only US\$1 comes from private finance. The private sector must step up to align economic activities with climate and nature goals.

Additionally, **responsible development of carbon markets** is crucial for achieving the Paris Agreement's objectives. Countries should finalize Article 6 with robust, high-integrity rules and safeguards for people and nature.

Cooperation between nations can harmonize these rules, making carbon markets more accessible for foreign investors while maintaining integrity.

Finally, **increasing direct funding for Indigenous Peoples, local communities, and sub-national governments** is vital. At least 20% of public climate finance for nature-based projects should reach these groups, recognizing their critical role in nature protection and restoration, and supporting the transition to local nature-positive economies



Conclusion

In conclusion, the 2024 edition of the Nature-based Solutions (NbS) Policy Tracker illustrates significant progress in collation of and overall understanding of the global landscape of the integration of NbS into global policies. With over 1,300 policies from 191 countries analyzed over the past four editions, the data highlights key shifts toward financing, whole-of-society approaches, and the inclusion of Indigenous Peoples and Local Communities (IPLC). While the increase in budget allocations and references to NbS in climate adaptation is encouraging, critical gaps remain, particularly in IPLC and gender equity considerations. The underfunding of NbS, despite its proven benefits, continues to be a challenge. This is echoed by a [WWF analysis](#) that finds 92% of Nationally Determined Contributions (NDCs) include nature as of 2021 and as of 2022 according to an [analysis by the Nature-based Solutions Initiative](#) 41% of the new NDCs included the term Nature-based Solutions.

To maximize the effectiveness of Nature-based Solutions (NbS), policymakers should prioritize several key actions. First, they must create more investable Nationally Determined Contributions (NDCs) to attract private sector capital, which is critical to closing the global climate finance gap. Second, there is a need to responsibly develop carbon markets by finalizing Article 6 of the Paris Agreement with high-integrity rules and safeguards for both people and nature. Aligning carbon market regulations across countries can ensure ease of access for foreign investors while maintaining environmental standards. Finally, direct, fit-for-purpose funding mechanisms should be established for Indigenous Peoples and Local Communities (IPLC), ensuring that at least 20%

of public climate finance reaches the communities that play a crucial role in NbS implementation.

These recommendations will help accelerate the deployment of NbS, addressing not only climate goals but also promoting biodiversity conservation, social equity, and sustainable economic growth. By prioritizing these actions, governments can create more resilient ecosystems, bolster livelihoods, and unlock new opportunities for sustainable development globally.

To fully harness the potential of NbS, it is essential that policymakers focus on mobilizing private sector capital, responsibly developing carbon markets, and increasing direct funding for IPLC and local communities. This report reinforces the urgency for holistic, well-funded approaches to NbS, emphasizing the need for robust safeguards and inclusive policies that address both climate and biodiversity crises.

[See interactive NbS policy database here](#)

LINK TO N4C ASSETS:

- [Interactive Policy Database](#)
- [Naturebase](#)
- [Commitment Tracker](#) for Nature-based Solutions
- [Global Stocktake Information Portal](#)
- 2023 NbS Policy Tracker [Report](#)
- 2022 NbS Policy Tracker [Report](#)
- 2021 NbS Policy Tracker [Report](#)



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Appendix



APPENDIX 1:

Category Keyword Ontology

Forest Reforestation		
reforest	fragmen.{0,10}forest	forest.{0,15} restor
natural pathway	afforest	restor.{0,15} forest
forest.{0,10} regenera	tree.{0,10}plant	forested land
commercial.{0,10} planatation	plant.{0,10}tree	Biological Carbon dioxide removal (CDR)
regenera.{0,15} forest	tree.{0,10}cover	Biological Carbon dioxide sequestration
commercial.{0,10} plant	plant.{0,10}cover	forest code
native cover	forest.{0,10} cover	

Avoid forest conversion		
forest.{0,15} conserv	chang.{0,10} land use	forest.{0,30} degrad.{0,30} prevent
conserv.{0,15} forest	land use.{0,10} chang	LULUCF
forest.{0,15} conver	forest.{0,15} restor	mitigat.{0,30} forest.{0,30} degrad
conver.{0,15} forest	restor.{0,15} forest	mitigat.{0,30} degrad.{0,30} forest
reduce impact logging	prevent.{0,25}deforest	forest.{0,30} degrad.{0,30} mitigat
RIL	deforest.{0,25} prevent	reduce-impact logging
harvest cycle	AFOLU	protected area
subsis.{0,20} agricult	mitigat.{0,25}deforest	conservation area
subsis.{0,20} farm	deforest.{0,25} mitigat	protected Landscape
deforest.{0,30} emission	reduc.{0,25}deforest	national park
emission.{0,25} deforest	deforest.{0,25} reduc	illegal log
forest.{0,10} protect	prevent.{0,30} forest.{0,30} degrad	
protect.{0,10} forest	prevent.{0,30} degrad.{0,30} forest	

Improved plantation		
improve.{0,100} plant	map.{0,20} crop	plant.{0,50}conserv
plant.{0,100} improve	crop.{0,40} map	conserv.{0,50}plant
rotat.{0,50} length	agricultur.{0,30} intens	plant
length.{0,50} rotat	intens.{0,30} agricultur	

Natural forest management

natural.{0,15} forest.{0,25} manag	FBA	maxim.{0,10} mitigat
manag.{0,25} natural.{0,15} forest	SFM	biophy.{0,20} warm
forest	biodiversity.{0,10} conserv	co2 fertili
Forest based adaptation	conserv.{0,10} biodiversity	corbon.{0,20} fertili
Forest-based adaptation	forest.{0,30} degrad	fertili.{0,30} carbon
Sustainable forest management	degrad.{0,30} forest	fertili.{0,30} co2
sustain.{0,25} forest.{0,15} manag	reduce impact logging	natural forest
manag.{0,25} sustain.{0,15} forest	RIL	enhanced forest carbon stocks
manag.{0,25} forest.{0,25} sustain	reduce-impact logging	reduc.{0,10}biophy.{0,20} effect

Avoided woodfuel

woodfuel	charcoal	sawdust
firewood	pellet fuel	wood

Fire management

peat.{0,50} fire	savana.{0,50} fire	prescrib.{0,50} fire	fire
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Soil Management

biochar	carb.{0,10} soil	BECCS
natural carbon stor	soil.{0,10} carbon sequestration	bioenergy
soil manage	carbon sequestration.{0,50} soil	bio energy
manag.{0,20} soil	no till	bio-energy
climate-smart agriculture	no-till	biogas
climate smart agriculture	terrest.{0,20} carbon loss	bio gas
agricult.{0,20} climate smart	groud.{0,20} carbon loss	agriculture-based bio
prevent.{0,20} desert	carbon loss.{0,20} terrest	CSA
desert.{0,20} prevent	carbon loss.{0,30} groud	soil additives
stor.{0,10} natural carbon	Anthropo.{0,20} greenhouse gas	fertili
stor.{0,10} carbon.{0,30} natur	Anthropo.{0,20} ghg	subsoil
soil carb	carbon captur	

Trees in cropland

tree.{0,100}crop	subsis.{0,20} farm	forest.{0,100} agricultural land
forest.{0,100}crop	agroforest	agricultural land.{0,100} tree
crop.{0,100}tree	habitat.{0,40}biodivers	agricultural land.{0,100} forest
crop.{0,100}forest	biodivers.{0,40} habitat	
subsis.{0,20} agricult	tree.{0,100}agricultural land	

Grazing, feed

reduc.{0,50} methane	mathane.{0,50} reduc	grazing
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Conservation agriculture

agricult.{0,50} conserv	prevent.{0,120} veterinar	avoid.{0,20} damage
conserv.{0,50} agricult	reduc.{0,120} pesticide	prevent soil damage
farm.{0,50} conserv	reduc.{0,120} herbicide	prevent.{0,20} damage
conserv.{0,50} farm	reduc.{0,120} veterinar	prevent.{0,20} veterinar.{0,20} medicine
fish.{0,50} conserv	soil cover	prevent.{0,20} medicine.{0,20} veterinar
conserv.{0,50} fish	minimal soil disturbance	prevent.{0,20} veterinar.{0,20} practic
prohibit.{0,120} pesticide	crop diversification	prent.{0,20} animal.{0,20} disease
prohibit.{0,120} herbicide	reduce erosion	prevent.{0,20} animal.{0,20} care
prohibit.{0,120} veterinar	soil protection	fish
prevent.{0,120} pesticide	crop rotation	veget
prevent.{0,120} herbicide	avoid soil damage	agricult

Improved rice

improv.{0,20} rice	rice.{0,20} improv	diet.{0,20} shift	shift.{0,20} diet
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Wetland protection

wetland.{0,20} protect	water.{0,30} protect	estuar.{0,20} protect
protect.{0,20} wetland	protect.{0,20} water	protect.{0,20} estuar
wetland.{0,20} cover	marsh.{0,20} protect	
cover.{0,20} wetland	protect.{0,20} marsh	

Grazing, animal management

reduc.{0,50} methane	manur.{0,20} manag	feed.{0,40} concentrat
mathane.{0,50} reduc	concentrat.{0,40} feed	livestock
animal.{0,20} manag	manag.{0,30}animal	animal
livestock.{0,20} manag	manag.{0,30}livestock	wildlife
paddock.{0,20} grazing	manag.{0,30}manur	

Grazing, optimum intensity

optim.{0,10} intensity	carbon.{0,30} soil{0,30} increas	concentrat.{0,40} feed
intens.{0,10} optim	soil.{0,30} carbon.{0,30} increas	feed.{0,40} concentrat
increas.{0,30} soil.{0,30} carbon	paddock.{0,20} grazing	

Grazing, legumes

legume	carbon.{0,30} soil{0,30} increas	pest.{0,10} outbreak
increas.{0,30} soil.{0,30} carbon	soil.{0,30} carbon.{0,30} increas	outbreak.{0,10} pest

Avoided grassland conversion

grass.{0,20} convers	shift.{0,20} diet	grass.{0,40} protect
convers.{0,20} grass	paddock.{0,20} grazing	rotational grazing
diet.{0,20} shift	protect.{0,40} grass	

Coastal restoration

coast.{0,50} restor	veget.{0,30}coast	reverse eutrophication
restor.{0,50} coast	coast{0,30}veget	seagrass
coast.{0,50} protect	rewet.{0,10}wetland	mangrove.{0,20} protect
protect.{0,50} coast	wetland.{0,10}rewet	protect.{0,20} mangrove
carbon density	coastal blue carbon management	

Nutrient management

manag.{0,20} nutri	water filt	soil fertil
nutri.{0,20} manag	filt.{0,20} water	

Avoided peat impact

peat.{0,50} impact	carbon dens	peat.{0,20}rewet
impact.{0,50} peat	rewet.{0,10}wetland	avoid carbon loss
soil fertil	wetland.{0,10}rewet	avoid nitrogen loss
no till	avoid methane emission	
no-till	rewet.{0,10}peat	

Avoided coastal impact

rewet.{0,10}wetland	nature.{0,30} costal resilien	avoid eutrophication
wetland.{0,10}rewet	costal resilien.{0,40} nature	avoid nutrient input
coast.{0,50} impact	protect.{0,40} blue carbon	nutrient run-off
impact.{0,50} coast	blue carbon.{0,40} protect	nutrient pollution
carbon dens	water manag	avoid coastal erosion

Freshwater conservation

freshwater	lake	water.{0,30} quality
river	watershed	quality.{0,30} water
basin	surface water	aquatic ecosystem
wetland	reservoir	water pollution
water.{0,20}manage	creek	lagoon

Peat restoration

peat.{0,50} restor	soil fertil	wetland.{0,10}rewet
restor.{0,50} peat	reduc.{0,35}peat fire	rewet.{0,10}peat
bog.{0,50} restor	carbon dens	peat.{0,20}rewet
restor.{0,50} bog	rewet.{0,10}wetland	

APPENDIX 2:

Index Criteria Keyword Ontology

Budget

budget	\€	financ	secure
funding	USD(?![a-zA-Z0-9])	support	fund
dollar.{0,1}	EUR(?![a-zA-Z0-9])	RMB(?![a-zA-Z0-9])	results-based budget
\\$	grant	Yuan(?![a-zA-Z0-9])	
euro.{0,1}	invest	Yen(?![a-zA-Z0-9])	
subsid	Franc(?![a-zA-Z0-9])	allocat	

IPLC

indigenous	tribe	local knowledge
local communit	iplc	
traditional.{0,25}knowled	traditional.{0,15}land	

Prioritizes Protection

avoid	destruct	adaptation
protect	reduc	mitigation
remain	prohibit	
prevent	ban	

Multiple Stakeholder

soci.{0,15}challenge	communit	partner
stakeholder	cooperat.{0,15}	collaboration
compan.{0,2}	agenc.{0,2}	
business.{0,2}	together	

Gender Equity

Gender.{0,20}development	human rights-based approach	HRBA
women	representation	\bGAD\b
woman	equal opportunity	

Science-based Approaches

monitor	indicator	framework
reporting	kpi	best available
verification	measurement	
mrsv	oversee	

Landscape

landscape	spatial
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IPLC Equity

Free and Informed Prior Consent	human rights-based approach	Equitable sharing of benefits
FPIC	Cooperation	indigenous.{0,50}rights
Land right	Inherent right	HRBA
Land tenure	rights.{0,50}indigenous	

Adaptation

resilience	conserv	mitigat.{0,20} risk
ecosystem-based adaptation	protect	adaptation
mitigation	community-based adaptation	\bEBA\b
early action	prevention	(transform absorpt).{0,50} (capacity strateg)
co-benefits	capacity-building	sensitivity reduct
vulnerability reduction	sustainable management	(proact plan).{0.100}(action response)
adjust	risk mitigation	
restor	risk adaptation	

