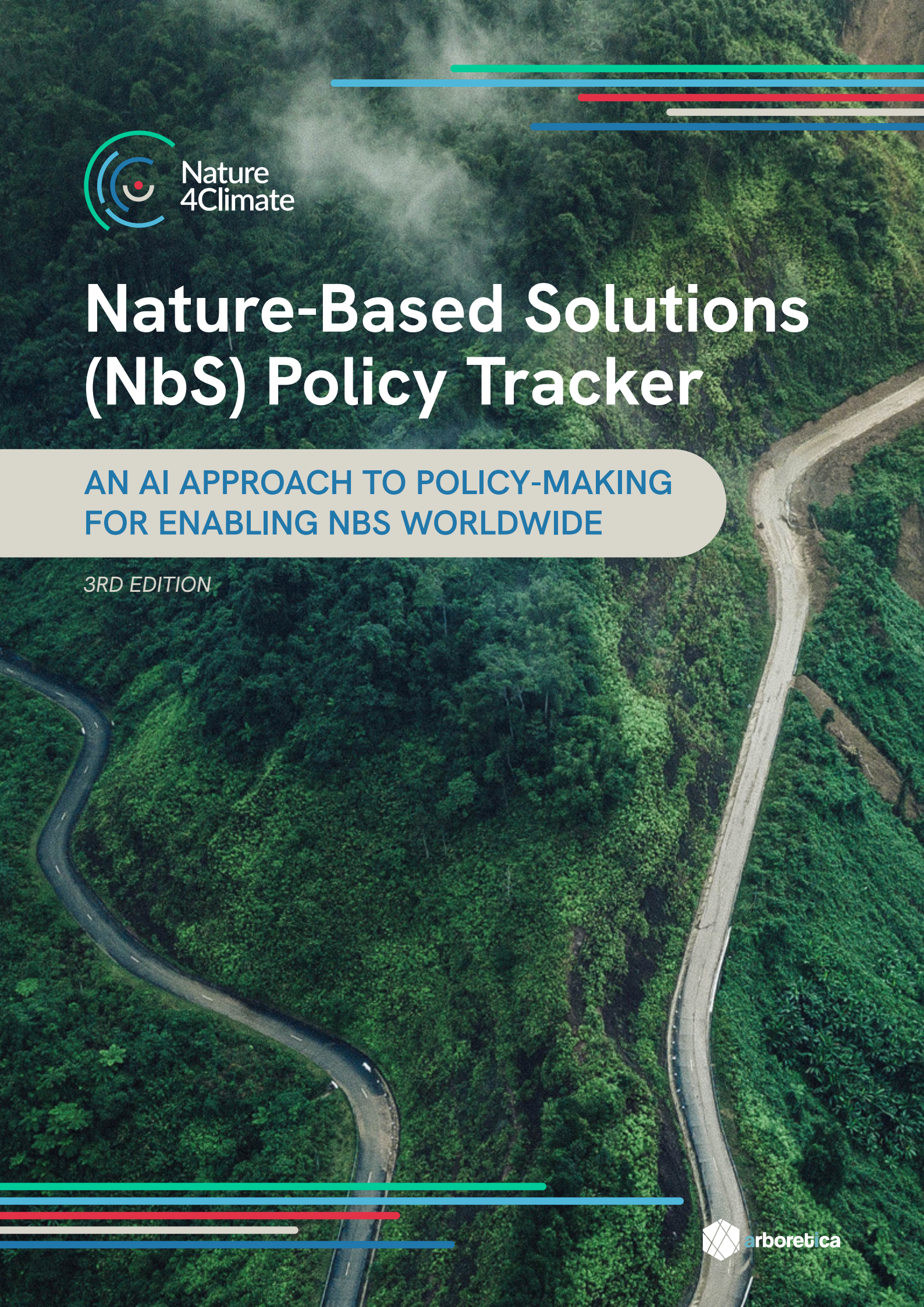

Nature-Based Solutions (NbS) Policy Tracker

AN AI APPROACH TO POLICY-MAKING FOR ENABLING NBS WORLDWIDE

3RD EDITION

arboretica

Participating Organizations

Nature4Climate

Nature4Climate (N4C) is an initiative of 22 partnering organizations: the United Nations Development Programme (UNDP), UN-REDD, United Nations Environment Programme (UNEP), the Convention on Biological Diversity (CBD), the International Union for Conservation of Nature (IUCN), Birdlife International, the Clean Cooking Alliance (CCA), Conservation International (CI), the Environmental Defense Fund (EDF), Global Mangrove Alliance (GMA), The Nature Conservancy (TNC), RE:wild, TreeAid, Wildlife Conservation Society (WCS), Woodwell Climate Research Center, World Business Council for Sustainable Development (WBCSD), World Resources Institute (WRI), WWF (World Wildlife Fund), We Mean Business, the Food and Land Use Coalition (FOLU) and Youth4Nature (Y4N), International Fund for Animal Welfare (IFAW). 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 empowers organizations to make smarter, impactful decisions by uncovering meaningful insights from the world's public data. Combining automated open-source intelligence with expert analysis, Arboretica extracts and prioritizes the information needed – and only that– to accelerate decision making and streamline work processes. Arboretica has been trusted by world-leading institutions, NGOs, and corporations in Europe, -the U.S., and China to drive impactful actions in environmental analysis, policy research, industry intelligence, and consumer analytics, using customized AI solutions.

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Executive Summary

The Paris Agreement is built upon a mechanism that ratchets up ambition. For example, the global agreement was initially built around consensus on a 2°C global goal, but the ambition has increased and we now have a global goal to limit warming to 1.5°C. 2023 is the year of the first Global Stocktake of the Paris Agreement and there is moment to stop and assess progress toward global goals.

WHAT POLICIES ARE WE TRACKING?

We have put together the third edition of this NbS Policy Tracker to uncover and amplify actions–specifically national budgets and policies–that enable NbS. We track actions that enable nature-based solutions including the underlying budgets, subsidies, and legislations that enable the creation of NbS throughout the global policy landscape. We used a set of 22 categories to determine whether an action is indeed related to enabling NbS. These categories can be found in Appendix 1 of the report. We also index the policies for key considerations using nine keyword based criteria.

WHY ARE WE TRACKING NBS POLICIES?

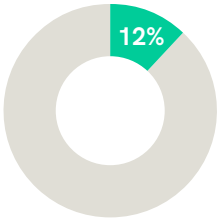
Data from Nature4Climate's nature-based solution commitment tracker shows that whilst the ambition gap is slowly closing, the implementation gap still remains widely ignored. By following the 80 commitments that include NbS in NDCs N4C found that 45% of commitments show only small signs of progress or no progress at all. Improving ambition is not necessarily leading to increasing action. We have put together the third edition of this NbS Policy Tracker to uncover and amplify actions–specifically national budgets and policies–that enable NbS.

WHAT HAVE WE LEARNED?

Key Statistics: There are 1180 policies and budgets from 188 countries in the database we have been developing over the past three years. This year, we added 628 new policies and budgets coming from 147 countries. The EU had the most with 83 new policies added this year. By adding additional languages to the algorithmic policy tracking process, we can ensure a holistic approach. In the latest iteration of the policy tracker we added 543 English policies and budgets, 70 in Spanish, and 15 in French. We had a wide range of categories covered in this year's additional policies and we searched for the first time NbS policies and budgets related to climate adaptation. This led to the highest percentage of the newly included entries – 58.8% – being categorized as climate adaptation policies.

We index the policies using keyword criteria (see Appendix 2 and 3) and a third (66.72%) of the newly added policies and budgets have keywords related to adaptation and just under a third (29.78%) of the policies mention science-based approaches.What is missing from the policies are equity-based approaches i.e. gender equity, IPLC equity and free and informed prior consent. Only 23 policies or 3.66% mention gender equity and only 4 or less than 1% mention IPLC equity. However, we see that 73 or 11.62% of the policies mention IPLC generally without mentioning equity and/or rights.

Just under 12% of the policies have clearly allocated budgets, emphasizing the gap in funding for NbS.



KEY CONSIDERATIONS FOR POLICY MAKERS

There are several keys to advance nature-based solutions (NbS) action. These include publicly announcing and publishing implementation plans for NbS, along with policy, regulatory, and budget commitments for the next five years to scale up these solutions effectively. Additionally, it is crucial to collaborate with other parties to provide finance and technical support to protect, manage, and restore nature while benefiting communities. Furthermore, ambitious regulatory safeguards that prioritize Indigenous Peoples and local communities, adhering to the UN Declaration of the Rights of Indigenous Peoples, are essential. This involves ensuring equitable investment delivery through rights-based governance approaches, such as rights of nature and Free, Prior, and Informed Consent (FPIC). Finally, both mandatory and voluntary measures should be established to incentivize businesses and financial institutions to invest in a nature-positive, net-zero economy, promoting sustainability.

ACCESSING DATA

Data can be accessed through the Nature4Climate website: https://airtable.com/appbS2M6tSPVl8rAr/tblvGiyOaf3tzCfw2/viwnWnjxmlaODUyBd

Introduction

As we continue through the final decade in which we can enact transformative change to combat the intertwined crises of nature and climate, the imperative to act has never been more apparent. It is a critical juncture, nature-based solutions (NbS) emerge as potent tools capable of addressing the dual challenges of climate change and biodiversity loss, all while fostering the socio-economic prosperity essential for transitioning towards a net-zero, nature-positive economy.

The UN defines nature-based solutions as "actions to protect, conserve, restore, sustainably use, and manage natural or modified terrestrial, freshwater, coastal, and marine ecosystems, addressing social, economic, and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience, and biodiversity benefits" (2022). This holistic perspective underscores the centrality of NbS in engaging Indigenous peoples and local communities (IPCL) and aligning with the 2030 agenda for Sustainable Development (SDGs).

The efficacy of 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). NbS are promising for climate adaptation—a vital aspect as more and more communities grapple with the mounting challenges of surging temperatures and the escalating frequency and severity of climate-related disasters. The benefits of NbS include but are not limited to improvements in air quality, the enhancement of biodiversity, the conservation of water resources, and the restoration of soil health, improvement of livelihoods all of which contribute to a holistic vision of ecological restoration.

In the year of the first UNFCCC Global Stocktake (GST) of the Paris Agreement, accountability and recognition take center stage. Regulation can serve as an opportunity or formidable barrier in climate action. (see figure 1). Our evolving understanding acknowledges the intrinsic link between climate and nature, recognizing them as inseparable forces that bolster each other's success (Pörtner et al., 2021).

In this report, Nature4Climate partners with Arboretica to update for the third consecutive year, the world's largest Nature-based Solution Policy Tracker. Leveraging artificial intelligence, the tracker analyzed over 385,000 online sources across English, French and Spanish, and identified over 600 new nature-enabling policies from 147 countries, including 29 french-speaking and 20 spanish-speaking nations that are signatories to the Paris Agreement. In the report, we delve deeper into the methodologies, categories, and highlight case studies of budgets and policies in the latest update of the policy tracker. This third edition of the NbS Policy Tracker uses a taxonomy of twenty-two different nature-based solution topics, and evaluates the policies for nine relevant criteria including equity consideration, adaptation measures and IPLC rights etc.

By highlighting and compiling solutions, we aim to provide a searchable database of replicable examples of policies and budgets to further enable action. We expect policy advocates to be able to use this database to advance national policy to further enable NbS. We expect researchers, and civil society can use this data to make informed analysis and pull case studies for relevant solutions. Business and financial institutions can use this information to scope where there is fertile ground for private finance and corporate action on NbS.

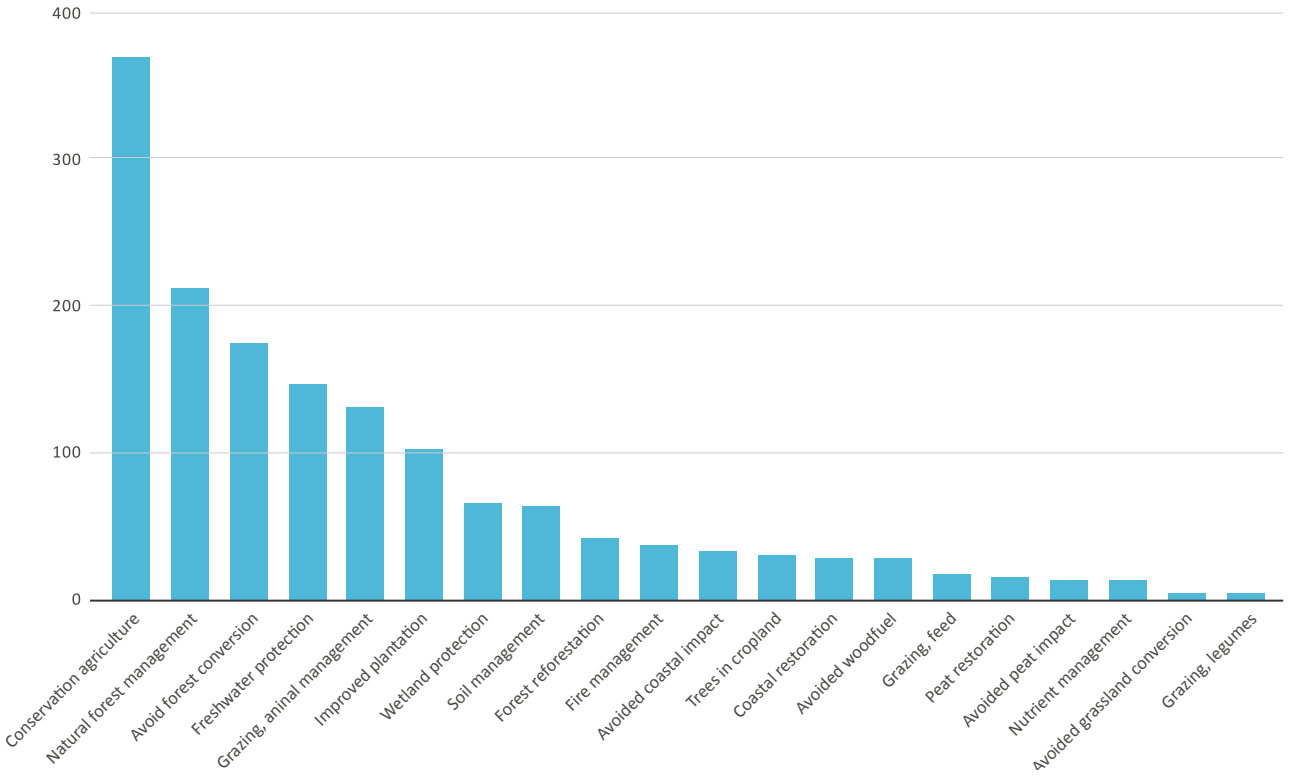
Key Words

CATEGORIES:

In order to identify national policies and budgets that enable NbS, twenty-three keywords were selected. These keywords provide a wide range of relevant policies and budgets. *See full ontology in Appendix 1.*

Forest Reforestation | Fire Management | Conservation Agriculture | Avoided Grassland Conversion
Wetland Protection | Avoid Forest Conversion | Soil Management | Improved Rice | Adaptation
Coastal Restoration | Natural Forest Management | Trees in Cropland | Grazing, Animal Management
Peat Restoration | Freshwater Protection | Improved Plantation | Grazing, Optimum Intensity
Nutrient Management | Avoided Peat Impact | Avoided Woodfuel | Grazing, Feed
Grazing, Legumes | Avoided Coastal Impact

Over half the policies added to the database this year (58.8%) are related to conservation agriculture. Based on the ontology of keywords searched for this category, these include policies related to actions such as preventing the need for pesticides, fertilizers, and other inputs. One of the least covered action areas in this iteration of the database is avoided grassland and avoided peatland conversion. These actions, crucial to successful landscape-level NbS, seem to be overlooked in global action as they only account for 0.8% and 2.2% of the policies discovered. Forest-related policies continue to be popular with 33.8% of policies covering natural forest management, 27.9% relating to avoided forest conversion and 6.5% related to reforestation.



INDEXING CRITERIA:

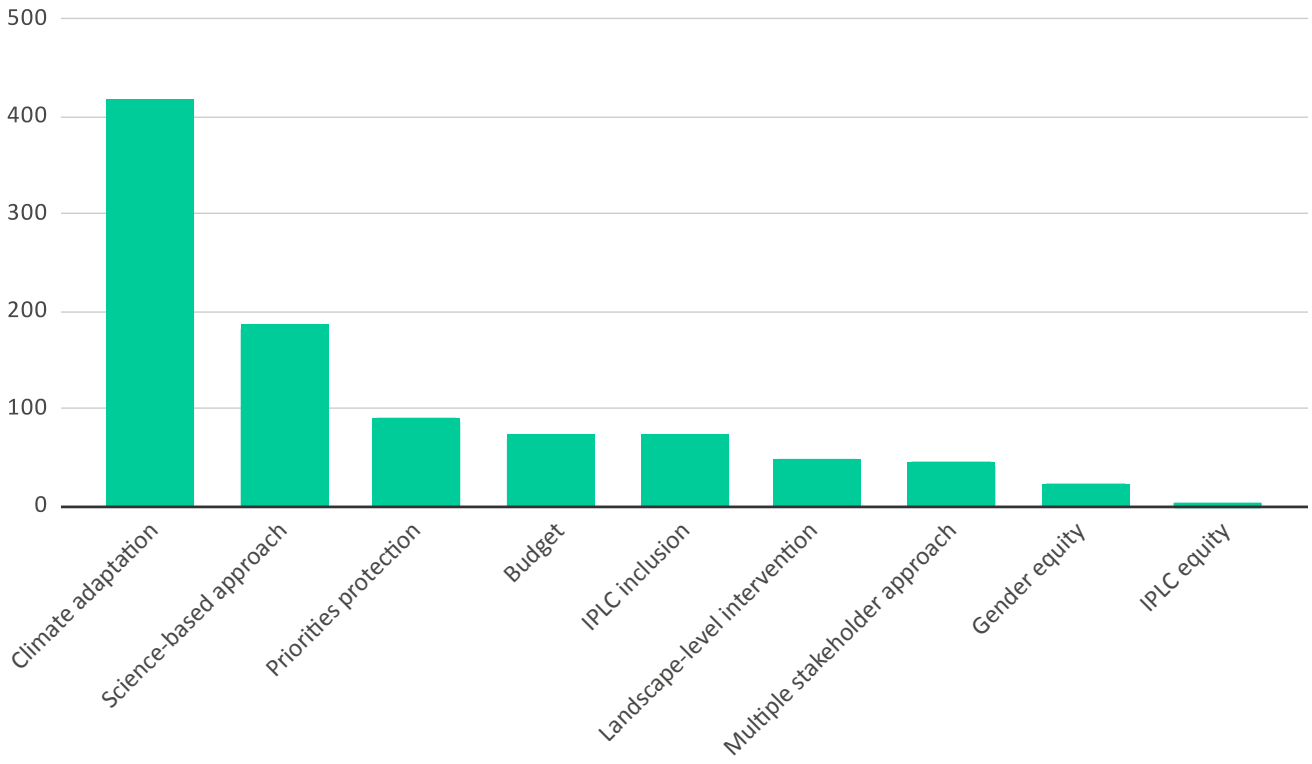
The policies highlighted in the NbS Policy Tracker indexed based on inclusion of keyword criteria. This year, we have added three additional criteria to index policies against: Indigenous People and Local Communities Equity, Gender Equity, and Climate Adaptation.

Multi-Stakeholder Approach | Climate Adaptation | Science-based Approach | Prioritizes Protection | IPLC Equity | IPLC Inclusion | Gender Equity | Landscape-Level Intervention | Budget

Our criteria assessment system is by no means a foolproof effort to index policies but gauge if keywords are being mentioned in policies (see full ontology in Appendix 2 and description in Appendix 3). With this in mind, climate adaptation-related policies featured prominently in this database update. Two thirds of the policies are oriented towards climate adaptation, indicating a strong emphasis on addressing the impacts of climate change through Nature-based Solutions (NbS). Also well represented are policies and budgets with strong scientific foundations, nearly a third of the policies and budgets prioritize a science-based approach.

We are seeing fewer policies with clearly indicated budgets as just under 12% of the policies have clearly allocated budgets. This highlights a potential gap in funding for NbS, especially considering the estimated funding gap of up to 4.1 trillion USD by 2050 (UNEP, 2021).

Few policies are including Indigenous People and Local Communities (IPLC) into policy text (11.62%) and even fewer are including any indication of IPLC equity, like free and informed prior consent. IPLC equity keywords were only identified in four policies or less than 1% of all the new policies added to the database this year. Gender equity and IPLC equity require more attention and are currently very under represented in the policy database. Only 23 policies mentioned on gender equity therefore there is potential for greater emphasis on these important dimensions in NbS policy development.



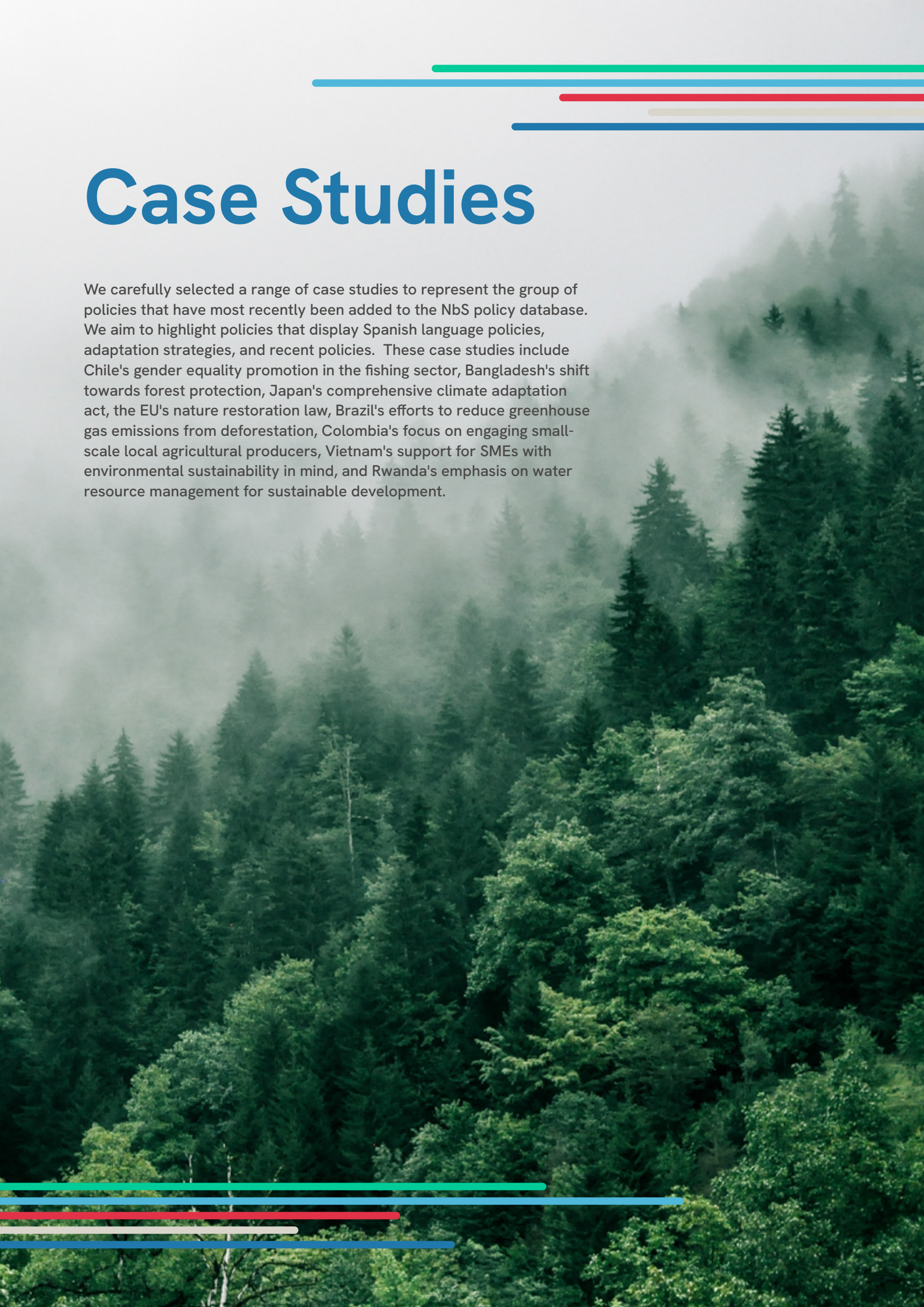
See full ontology for keywords in Appendix 2. See criteria methodology in Appendix 3

Key Statistics

1180	total policies in the compiled NbS Policy Tracker
188	countries are represented in the full NbS Policy Tracker database
628	new policies and budgets added this year
147	countries represented in this year's additional policies and budgets
83	new policies and budgets added from the EU this year, more than any other country/region
543	English policies and budgets were added
70	in Spanish policies and budgets were added
15	in French policies and budgets were added
59%	of the newly included entries are related to climate adaptation
30%	of the policies mention science-based approaches
23	or 3.7% of the newly added policies and budgets mention gender equity
<1%	of the newly added policies and budgets mention IPLC equity.
73	or 11.6% of the newly added policies and budgets mention IPLC generally without mentioning equity and/or rights.
<12%	of the policies have clearly allocated budgets, emphasizing the gap in funding for NbS.

Case Studies

We carefully selected a range of case studies to represent the group of policies that have most recently been added to the NbS policy database. We aim to highlight policies that display Spanish language policies, adaptation strategies, and recent policies. These case studies include Chile's gender equality promotion in the fishing sector, Bangladesh's shift towards forest protection, Japan's comprehensive climate adaptation act, the EU's nature restoration law, Brazil's efforts to reduce greenhouse gas emissions from deforestation, Colombia's focus on engaging small-scale local agricultural producers, Vietnam's support for SMEs with environmental sustainability in mind, and Rwanda's emphasis on water resource management for sustainable development.



CASE STUDY 1

Chile

Policy Year: 2021

Policy/Budget: Modifica diversos cuerpos legales con el fin de promover la equidad de género en el sector pesquero y acuícola. *English Translation: It modifies various legal bodies in order to promote gender equality in the fishing and aquaculture sector.*

Description: The purpose of this law is to promote gender equality in the fishing and aquaculture field. For these purposes, it introduces modifications to the General Law of Fisheries and Aquaculture and to the law that Creates the National Institute for Sustainable Development of Artisanal Fisheries and Small-Scale Aquaculture (INDESPA). The modifications aim to incorporate the gender perspective in conservation and administration measures, as well as in the interpretation and application of the general law on fishing and aquaculture. Likewise, mechanisms to reduce gender gaps are introduced within the functions and attributions of INDESPA.

Relevant Categories: Conservation Agriculture

Criteria Fultilled: IPLC Inclusion | Science-based Approach | Climate Adaptation | Gender Equity

CASE STUDY 2

Bangladesh

Policy Year: 2023

Policy/Budget: Forest Bill 2023 and Forest Conservation Bill 2023

Description: Bangladesh is set to introduce new laws aiming to transform forest management and conservation practices, replacing colonial-era legislation that treated forests as revenue sources. The Forest Bill, 2023, and the Forest Conservation Bill, 2023, mark a paradigm shift by focusing on protection and preservation rather than exploitation of forest resources. These laws emphasize safeguarding rapidly depleting green cover, including critical mangrove ecosystems, with the goal of addressing deforestation and promoting sustainable practices for forest health and biodiversity.

Relevant Categories: Forest Reforestation | Avoid Forest Conversion | Natural Forest Management | Conservation Agriculture | Grazing, Animal Management | Avoided Woodfuel

Criteria Fultilled: Gender Equity | Climate Adaptation | Prioritizes Protection

CASE STUDY 3

Japan

Policy Year: 2018

Policy/Budget: Climate Change Adaptation Act (No. 50)

Description: Japan has instituted a comprehensive act that established many different means for which the government can incorporate climate adaptation more deeply into its frameworks. The Act outlines the responsibilities of the national government, local governments, businesses, and the general public in promoting climate change adaptation. It establishes a Climate Change Adaptation Plan, encourages scientific knowledge enhancement, and highlights the significance of local climate change adaptation plans. The Act also emphasizes international cooperation and the importance of coordination with related policies and measures, providing a structured approach to address climate change impacts and promote resilience in Japan.

Relevant Categories: Natural Forest Management | Conservation Agriculture

Criteria Fultilled: Climate Adaptation

CASE STUDY 4

Brazil

Policy Year: 2023

Policy/Budget: Decree No. 11,548/2023

Description: Brazilian Decree No. 11,548, issued on June 5, 2023, establishes the National Commission for Reducing Greenhouse Gas Emissions from Deforestation and Forest Degradation, Conservation of Forest Carbon Stocks, Sustainable Management of Forests, and Increase of Forest Carbon Stocks, using the REDD+ framework. The commission's primary purpose is to coordinate and monitor the National Strategy for REDD+ (ENREDD+), with the goal of reducing emissions from deforestation and forest degradation. It also oversees the development of requirements for accessing payments for REDD+ results recognized by the United Nations Framework Convention on Climate Change. The commission comprises representatives from various government ministries, indigenous peoples, and environmental entities dedicated to controlling emissions from deforestation and forest degradation. Additionally, it addresses issues related to REDD+ safeguards, payments for emissions reduction, and eligibility criteria for accessing these payments.

Relevant Categories: Avoid Forest Conversion | Natural Forest Management | Conservation Agriculture | Improved Plantation | Freshwater Protection

Criteria Fultilled: IPLC Inclusion | Science-based Approach | Climate Adaptation | Prioritizes Protection

CASE STUDY 5

Colombia

Policy Year: 2020

Policy/Budget: Ley N° 2046 - Ley por la cual se establecen mecanismos para promover la participación de pequeños productores locales agropecuarios y de la agricultura campesina, familiar y comunitaria en los mercados de compras públicas de alimentos. *Law No. 2046 - Law by which mechanisms are established to promote the participation of small local agricultural producers and peasant, family and community agriculture in public food purchasing markets.*

Description: This Colombian law sets forth provisions and tools for food supply programs within the public sector. Its primary objective is to encourage the engagement of small-scale local and agricultural producers, particularly those aligned with Peasant, Family, and Community Agriculture (ACFC) systems or their duly established associations. The strategies, criteria, and tools facilitating the involvement of small agricultural producers affiliated with ethnic communities, or those whose agricultural practices align with Peasant, Family, or Community Agriculture, in the local public food procurement market, will be outlined in specific regulations for each community. These regulations will be developed in consultation with these communities to honor their customs, traditions, and collective rights, as stipulated by this Law.

Relevant Categories: Conservation Agriculture

Criteria Fultilled: IPLC Inclusion

CASE STUDY 6

European Union

Policy Year: 2023

Policy/Budget: EU Restoration Law

Description: The EU Restoration Law, recently passed July 2023 in the European Parliament, and is a specific action toward implementation of the 2030 EU Biodiversity Strategy. It outlines economic opportunities and return on investment for significant nature restoration projects. This law builds upon the EU LIFE program, emphasizing the need to restore Europe's declining natural habitats and ecosystems. Successful projects, like the restoration of the Făgăraș Mountains in Romania, and the preservation of Cyprus cedar trees, are highlighted as examples. Additional funding of EUR 611 million is allocated to support nature conservation, environmental protection, climate action, and clean energy transition projects in 2023.

Relevant Categories: Natural Forest Management, Avoided Woodfuel, Trees in Cropland, Coastal Restoration, Conservation Agriculture, Peat Restoration, Freshwater Protection

Criteria Fultilled: Science-based Approach, Landscape-Level Intervention, Climate Adaptation, Budget, Prioritizes Protection

CASE STUDY 7

Viet Nam

Policy Year:	2017
Policy/Budget:	Law No. 04/2017/QH14 on Support for Small- and Medium-sized Enterprises
Description:	This law establishes principles and resources for assisting small and medium-sized enterprises (SMEs) in Vietnam. It outlines various funding sources for SME support, including state-backed loans, state budget allocations, tax exemptions, and contributions from domestic and foreign organizations and individuals. The law emphasizes several principles, such. It also prioritizes women-owned SMEs and those with a higher number of female employees when multiple SMEs qualify for assistance. This legal framework aims to enable Nature-based solutions by potentially directing resources and support to environmentally sustainable SMEs such as forestry and agriculture in compliance with market rules and international treaties, transparency in assistance programs, and focused support aligned with specific objectives and available resources.
Relevant Categories:	Natural Forest Management; Conservation Agriculture
Criteria Fultilled:	Gender Equity; Budget

CASE STUDY 8

Rwanda

Policy Year:	2020
Policy/Budget:	Law #71/2019 OF 29/01/2020 Establishing Rwanda Water Resources Board
Description:	The Law N° 71/2019 establishes the Rwanda Water Resources Board (RWB) as a non-commercial public institution with a mission to ensure the availability of sufficient and well-managed water resources for sustainable development in Rwanda. The RWB has several responsibilities, including advising the government on water resource matters, implementing national policies and laws related to water resources, developing strategies for flood management, water resource data and research, and managing the quality and quantity of water resources. Importantly, the law enables nature-based solutions by emphasizing the protection of catchment areas and coordinating erosion control plans, which are essential for preserving natural ecosystems and maintaining water quality. The RWB is also tasked with establishing water storage infrastructure and allocation plans while enforcing water resource use efficiency. This legal framework supports the sustainable management and conservation of water resources, which is crucial for nature-based solutions and overall environmental sustainability in Rwanda.
Relevant Categories:	Wetland Protection; Freshwater Protection
Criteria Fultilled:	Science-based Approach; Climate Adaptation

Recommendations for Policy Makers

Nature-based solutions (NbS) are critical tools to accelerate the transition to a nature-positive, net-zero future, while providing climate adaptation benefits and driving positive impact at scale to conserve biodiversity and improve livelihoods.We will not reach our global climate and biodiversity goals without halting and reversing nature loss by 2030, while rapidly phasing out the use of fossil fuels.

Emissions from the Land Use, Land Use Change and Forestry sector must reach net zero *more quickly than any other sector* – by or shortly after 2030 (CI, 2022). Moreover, delayed action will reduce the capacity of NbS to enhance the resilience of ecosystems and communities and to avert and minimize loss and damage, with some ecosystems already reaching their hard and soft limits for adaptation (IPCCC, AR6 2023).

This year is the first Global Stocktake (GST) and provides a vital course correcting moment. It is anticipated that it will demonstrate a significant shortfall in terms of reaching the Ambitions of the Paris Agreement by 2030. It therefore provides a unique opportunity to embed nature as a key solution to correct the course. It will call on parties to show political leadership and recognizes the significant gaps in capacity, policy, and institutional frameworks that must be addressed to enable and accelerate national and collective action to implement NbS (UNFCCC, 2023).

That is why we are calling on parties to

- Publicly announce and publish plans for implementation of NbS, including policy, regulatory and budget commitments for the next five years to deliver these solutions at scale.
- Commit to collaborate with other Parties to deliver finance and share technical support targeted to deliver the greatest impact to protect, manage and restore nature whilst simultaneously empowering and benefiting communities.
- Implement ambitious regulatory safeguards which center Indigenous Peoples and local communities and are legally bound by the UN Declaration of the Rights of Indigenous Peoples. This includes ensuring the equitable delivery of any investment, including high integrity NbS, through rights-based approaches including Free, Prior and Informed Consent (FPIC).
- Establish mandatory and voluntary measures to create a level playing field and incentives for businesses and financial institutions to scale their investments towards a nature-positive, net-zero economy.

Conclusion

In the year of the Global Stocktake we added 628 new additions this year to our NbS Policy Tracker. The NbS Policy Tracker has overall uncovered and analyzed 1,180 policies and budgets from 188 countries. Taking stock of nature within the context of climate mitigation, adaptation, and loss and damage is key as we approach the first ever attempt to take stock of climate actions. With recent evidence showing that while the ambition gap may be improving, there is a deep need to improve the acceleration of action in line with this relatively strong ambition.

Within the newly added policies there is a strong emphasis on climate adaptation, agriculture, and forests. However, we have yet to see much action in line with gender and Indigenous Peoples' equity considerations. To advance NbS action, policy makers must commit to implementation plans, collaborative financing, and safeguards that prioritize Indigenous Peoples and local communities.

Additionally, measures to incentivize private sector investment in a nature-positive, net-zero economy are crucial. Missing from these actions are budgets and policies with clearly defined budgets which are not promising for closing the financing gap on nature-based solutions for climate action.

These policies and budgets are essential steps in achieving the global goal of limiting warming to 1.5°C and must be continually monitored and improved to ensure their effectiveness in addressing the challenges ahead.

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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	
native cover	forest.{0,10} cover	

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

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

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

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

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

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

Improved rice		
improv.{0,20} rice	diet.{0,20} shift	shift.{0,20} diet
rice.{0,20} improv		

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

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

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	

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	

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	vlue carbon.{0,40} protect	nutrient pollution
carbon dens	water manag	avoid coastal erosion

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	

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

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	

Science-based Approaches		
monitor	indicator	framework
reporting	kpi	best available
verification	measurement	
mrv	oversee	

Landscape	
landscape	spatial

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	

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

Adaptation		
resilience	restor	risk mitigation
ecosystem-based adaptation	conserv	risk adaptation
mitigation	protect	mitigat.{0,20} risk
early action	community-based adaptation	adaptation
co-benefits	prevention	\bEBA\b
vulnerability reduction	capacity-building	
adjust	sustainable management	

APPENDIX 3:

Index Criteria Descriptions

BUDGET

Policies with an allocated budget.

Current NbS funding is insufficient and estimates show that there will be a funding gap for NbS of up to 4.1 trillion USD by 2050 (Dasgupta, 2021). Reallocating finances and subsidies toward NbS is essential to fill this gap (Cornelius & Pérez-Cirera., 2021). According to the European Commission, funding pathways for NbS are complicated due to their cross-cutting political nature (European Commission, 2020). Examples of where NbS funding can be designated are: data collection, restoration, and monitoring (i.e. weather stations). When reliable, long term NbS funding is achieved, it is easier to leverage other financing opportunities (Cornelius & Pérez-Cirera., 2021). Therefore, legislation that provides funding for protecting natural capital and ecosystem services are essential.

IPLC KNOWLEDGE/ INCLUSION

Policies that include Indigenous Peoples and Local Communities (IPLC) in establishment, maintenance, monitoring, and budget.

Climate science should be inclusive of various science systems. Indigenous Peoples have been stewards of nature for millenia. IPLCs, making up less than 5% of the world population, protect 80% of biodiversity across forests, deserts, grasslands, and marine environments around the globe (World Wildlife Fund [WWF], 2020). NbS that have a proper structure and are based on science and/or traditional knowledge safeguard the survival of existing ecosystems and livelihoods, being key to preserving these environments. Ensuring that policies are appropriate to local context, considerate towards traditional knowledge and co-designed alongside knowledge holders improve the success of NbS (Cohen-Shacham et al., 2019). Inclusive governance has proven to be an indicator of success for NbS, especially in climate-vulnerable areas (Cornelius & Pérez-Cirera, 2021; Seddon et al., 2021; Townsend et al., 2020).

LANDSCAPE LEVEL INTERVENTION

Policies that emphasize landscape level interventions considering different spatial scales.

NbS can range greatly in scale (Dumitru & Wendling, 2021). The IUCN (2020) reports that current NbS projects are not large enough in scale. This affects the ability of the project to mediate upstream and downstream relationships, dependencies, and benefits (Cohen-Shacham et al., 2016). Considering a landscape (the landforms and the people who inhabit it) and building NbS with this scale in mind allows for consideration of larger ecological processes and interactions (Selman, 2006), and provides spatial information for effective NbS design (Albert et al., 2020). NbS projects should therefore be upscaled (to the level of a landscape) whenever possible (Cohen-Shacham et al., 2019). Scaling up NbS to the landscape scale also increases the potential to enhance climate mitigation, resilience, and adaptation as well as improve the lives of local residents and address biodiversity loss (Cornelius, & Pérez-Cirera, 2021). Lastly, NbS design is informed by the landscape's features, scale, and community members finding synergies between the economy, society, and ecosystem (IUCN, 2020a).

MULTI-STAKEHOLDER APPROACH

Policies that include wide areas of involvement: businesses, local communities, NGOs, governments, etc. to address societal challenges.

Promoting multi-stakeholder involvement and engagement enables meaningful partnerships between public and private stakeholders within a landscape. Together, these partnerships contribute to the implementation of NbS with a joint, long term vision. Multi-stakeholder involvement can also enhance connectivity, biodiversity and carbon sequestration, whilst also addressing societal challenges (such as equal benefit distribution among relevant actors) (Cornelius & Pérez- Cirera, 2021). Including stakeholders in NbS policy design and implementation also ensures inclusion of those living near the affected area, and helps NbS practitioners enable context-appropriate solutions and objectives, as well as mobilize diversified funding. NbS policies have frequently provided services for governments and communities distant from the implementation site, but including many local stakeholders leads to effective NbS outcomes (Cohen- Shacham et al., 2019). Additionally, as NbS can benefit a wide range of sectors, policies that include local stakeholders can help secure different types of funding for joint initiatives (Cornelius, & Pérez-Cirera, 2021). Furthermore, stakeholders can provide additional input on potential outcomes of NbS (e.g., between ecosystem services and society). This input from stakeholders can support practitioners in determining NbS which are context appropriate and can help establish impact assessment objectives (Dumitru & Wendling, 2021).

SCIENCE-BASED APPROACH

Policies that include a monitoring plan and Key Performance Indicators (KPIs) based on best available science for the NbS.

Within NbS policy design and implementation, scientific evidence is used for setting targets, planning, governance, and coherence across policy goals (Chausson et al., 2020). A lack of clear definitions, guidelines, metrics, and methodologies to track, quantify, and value NbS can substantially restrict the development and financing of NbS (Swann et al., 2021). For NbS to be sustainable long-term, policy should include assessment criteria addressing the efficacy and effects of intervention (McShane & Wells, 2004). Successful monitoring and assessing can be achieved by creating a monitoring and evaluation plan for the entire duration of the project,which allows for iterative learning and enables adaptive management (International Union for Conservation of Nature [IUCN], 2020). Using appropriate performance indicators provide credible evidence on achievements and outcomes (Dumitru, & Wendling, 2021), since identified, benchmarked, and periodically assessed KPIs (IUCN, 2020) help to measure impacts and track the progress of a certain NbS against national and international commitments(Cornelius & Pérez-Cirera, 2021; IUCN, 2020). Plans for NbS data collection encourage time series comparison for effective and impactful measurement of KPIs (Dumitru & Wendling, 2021, Calliari et al. 2019).

GENDER EQUITY

Policies that enable equity for women in the context of NbS.

The criteria for identifying policies that include gender equity policies are based on principles outlined in SDG 5, which emphasize empowerment, equal representation, equal opportunity, and equal rights for women and girls. Additionally, Article 7.5 of the Paris Agreement underscores the importance of gender-responsive adaptation actions, emphasizing a country-driven, participatory, and transparent approach that takes into consideration vulnerable groups, communities, and ecosystems, guided by the best available science, and incorporating traditional knowledge, knowledge of indigenous peoples, and local knowledge systems.

PRIORITIZATION OF PROTECTION

Policy interventions that prioritize avoidance of the destruction of intact ecosystems.

The most effective NbS for climate are specifically designed to enhance and/or protect biodiversity and support healthy and resilient ecosystems (Seddon et al., 2021). The mitigation hierarchy for nature conservation, which prioritizes environmental intervention on preference for the environment includes 1) avoid, 2) minimize, 3) remediate, and 4) offset (Arlidge, 2018). NbS that avoid impact have proven to be more reliable, more effective ecologically, and more likely to result in a no-net-loss outcome than restoring damaged territories (Chausson et al., 2020; Lindenmayer et al., 2017; Watson & Ventor, 2017). Such NbS are at times also the most cost effective (Cross Sector Biodiversity Initiative, 2015). When it comes to drafting policies, prioritizing avoidance might mean protecting existing biodiversity, clear guidance on critical biodiversity areas, and setting aside areas of high societal value (Arlidge, 2018).

IPLC EQUITY

Policies that enable increased equity including free and informed prior consent for IPLC.

The criteria for identifying policies that include Indigenous People and Local Communities (IPLC) policies involve principles outlined in the SDG 10 of the 2030 Agenda, focusing on reducing inequality among countries. The Paris Agreement emphasizes the promotion of cooperation to mobilize climate action involving local communities and indigenous peoples and recognizes the need to strengthen their knowledge, technologies, and efforts in addressing climate change. Furthermore, Article 7.5 of the Paris Agreement highlights the importance of country-driven, gender-responsive, participatory, and transparent adaptation actions, taking into consideration vulnerable groups, communities, ecosystems, and incorporating traditional knowledge, indigenous peoples' knowledge, and local knowledge systems, guided by the best available science.

CLIMATE ADAPTATION

Policies that enable adaptation and resilience to climate change through NbS.

The criteria used to identify climate adaptation policies include considerations outlined in the Paris Agreement's Article 7, emphasizing the interconnection between mitigation and adaptation, the importance of early action, and the development of adaptation plans. These criteria also involve assessing the presence of mitigation co-benefits, the evaluation of adaptive capacity, and the reduction of vulnerability and climate-related risks. The Cancun Adaptation Framework further emphasizes the need for effective adaptation efforts and communication. The IPCC AR6 reports highlight additional factors, such as reducing exposure, minimizing risks, and ensuring the effectiveness of actions in terms of reducing vulnerability, enhancing resilience, and avoiding maladaptation. Effective adaptation options encompass various measures like cultivar improvements, water management, agroforestry, community-based adaptation, sustainable land management, and agroecological practices that collaborate with natural processes to address climate impacts.


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