CLIMATE ACTION PATHWAY

CLIMATE RESILIENCE

Action Table

2020

Global Climate Action
United Nations Climate Change

Marrakech Partnership

ACTION TABLE STRUCTURE

The Climate Resilience Pathway is structured around delivering the overall vision of the Race to Resilience campaign. This vision recognizes that building climate resilience requires mitigation and adaptation actions that must be combined to tackle the current and future impacts of climate change. The Pathway has one cross-cutting impact area and **five more thematic impact areas.** The action table is organized around these six areas. This framework is shown below.

TYPES OF INTERVENTIONS TO BUILD CLIMATE RESILIENCE

Building climate resilience involves all actors including: government central and sectoral ministries, communities, investors, businesses, academia, civil society and international organizations. These all need to have the capacity to anticipate climate risks and hazards, absorb shocks and stresses, and reshape and transform their business and development plans to achieve resilience. We propose six steps that sectors and all organizations and communities need to take in developing climate resilience. These are presented linearly below, but should be undertaken in a circular and iterative manner:

1. **Awareness-raising and advocacy** – Become aware of climate change risks. Be clear that the future will not resemble the past. Base awareness-raising and advocacy on science and examine different scenarios – ranging from an increase of 1.5 degrees to higher levels of global warming – and their impacts.
2. **Assess the climate risks** and the impacts of climate change.
3. Develop and **implement appropriate actions** and interventions, including the transformation of systems.
4. **Mobilize resources** to support resilience actions and build human and institutional capacity to scale up actions.
5. **Monitor and track progress** to ensure progress is made, and promote continuous improvement**.**
6. **Share knowledge,** experiences and solutions to strengthen and build future collaboration and investments into resilience.

We have combined 'disaster risk reduction and management, including emergency preparedness and response' with 'climate change adaptation approaches' to develop a suite of interventions and measures to address climate risks and impacts across and within sectors and guide the development actions in the Marrakech Partnership Global Climate Action (MPGCA) pathways. These include:

- Climate risk and vulnerability assessments, disclosure and monitoring actions.
- Access to early warning systems and development of early actions.
- Climate-proofing of infrastructure and services.
- Risk transfer: insurance and social protection instruments.

- Preparedness with contingency plans and emergency responses.
- Establishment of effective governance to manage climate risks accompanied by human and institutional capacity-building.
- Nature-based solutions used to reduce risks.
- Sharing of knowledge and best practices on climate risk management.
- Increase in the volume, quality and access of public and private finance to invest in resilience.

These climate risk management interventions are needed to build climate resilience across all sectors and systems. They are presented in the following Climate Resilience Action Table with resilience actions taken from the seven other MPGCA climate action pathways. These seven sectoral action tables provide more detail on mitigation and resilience actions and cover: land use (including food and agriculture); human settlements; energy; industry; transport; ocean and coastal zones; and water. They can be found here: https://unfccc.int/climate-action/marrakech-partnership/reporting-and-tracking/climate_action_pathways.

The Climate Resilience Action Table presented below has six impact areas:

1. Resilience Cross-Cutting Actions.
2. Resilient Food and Agricultural Systems.
3. Resilient Water and Natural Ecosystems.
4. Resilient Cities, Resilient Coastal Zones and Oceans.
5. Resilient Infrastructure and Services (covering transport, energy and industry).

Global Climate Action
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Impact 1

RESILIENCE – CROSS-CUTTING ACTIONS

RESILIENCE

NEXUS

	By 2021	By 2025	By 2030	By 2040
Policymakers (national, subnational and local levels)	▪ 50% of all developing countries produce NAPs and embark on implementation. ▪ Ensure updated nationally determined contributions (NDCs) and Adaptation Communications include climate resilience actions and are aligned with Sustainable Development Goal (SDG) targets. ▪ Incorporate nature-based solutions (NbS) (including ecosystem-based adaptation	▪ 100% of all developing countries will have produced a NAP and all would be implementing priority adaptation actions ▪ Ensure all countries are submitting Adaptation Communications and on their climate resilience actions and are aligned with SDG targets. ▪ Ensure NbS (including ecosystem-based adaptation and DRR) are incorporated into all updated 2025 NDCs.	▪ All countries are producing updated NAPs iteratively, and results of NAP implementation are measurable, all NDCs address climate resilience actions. ▪ All countries are submitting Adaptation Communications and on their climate resilience actions and climate risk management and help deliver SDG targets. ▪ Ensure NbS planned in 2025 NDCs are implemented.	▪

	and disaster risk reduction (DRR)) in 50 % of the updated 2021 NDCs. ▪ Integrate climate risk and resilience into COVID-19 recovery and build-back-better programmes and investments. ▪ Ensure the Group of Twenty (G20) expands the definition of climate-related financial risk to include conflict relating to water security and water risk. ▪ Promote policy coherence for climate-resilient transport, trade, tourism, fisheries and aquaculture for sustainable development in small island developing States (SIDS). ▪ Integrate climate and DRR measures in cross-sectoral plans and policies. ▪ Include arts, culture and heritage agencies and Indigenous Peoples' organizations in climate resilience planning and action. ▪ Ensure governments increase work on developing policies, rules and incentives to shift consumption patterns and the production of foods, goods	▪ Restore 175 million hectares of degraded terrestrial and aquatic ecosystems, generating about USD 4.5 trillion in ecosystem services in support of all sectors. ▪ Include a climate-informed disaster risk assessment in all national adaptation plans and related investments. ▪ Ensure all climate actions, plans and policies on resilience and adaptation are gender- and youth-inclusive and include marginalized groups. ▪ Ensure governments, as part of their SDG efforts, develop basic national, subnational and local strategies for risk, vulnerability and capacity mapping and monitoring to build climate resilience across sectors. ▪ Recognize knowledge of Indigenous Peoples, culture and heritage in national adaptation/resilience strategies, communications and NDCs. ▪ Ensure managers of monuments, heritage sites, museums, archives and sacred sites undertake vulnerability	▪ Restore 350 million hectares of degraded terrestrial and aquatic ecosystems, generating about USD 9 trillion in ecosystem services in support of all sectors.[1] ▪ Ensure all national and sectoral plans are climate-risk informed and mainstream climate risk management measures. ▪ Ensure all national and subnational governments apply policies, rules and incentives to help shift 100 % of consumption patterns and production of foods, goods, and services towards climate-friendly practices in terms of reducing GHG emissions and climate risks.	

[1] https://www.decadeonrestoration.org/what-ecosystem-restoration.

	and services towards climate-friendly practices in terms of reducing greenhouse gas (GHG) emissions and climate risks.	and risk assessments and implement and monitor climate-resilience measures. ▪ Ensure more than 71 regions have adopted adaptation plans and actions..		
Financial institutions	▪ Ensure investments are starting to be aligned and tracked to deliver the adaptation/ resilience plans and actions in the NDCs and NAPs. ▪ Increase the number of climate resilience bonds issued, including by cities, regions and states. ▪ Ensure banks, insurance companies, asset owners and asset managers disclose targets to manage climate-related risks.	▪ Establish a global public finance goal for adaptation and ensure finance flows to developing countries to build resilience. ▪ Ensure investments are over 50% aligned with NDC adaptation/ resilience plans and actions. ▪ Provide risk finance and insurance mechanisms to 500 million poor and vulnerable people against disaster and climate shocks. ▪ Ensure insurance industry provides USD 5 billion to support risk finance and insurance mechanisms.[2] ▪ Ensure the public and private sectors make USD 6 trillion/year available for climate-smart infrastructure.[3] ▪ Make climate risks explicit in financial and infrastructure	▪ Ensure climate investments are all aligned to NDC adaptation/ resilience plans and actions. ▪ In line with NDCs, ensure 50 % of national and international funds are allocated for green infrastructure, energy and water efficiency projects, and innovative environmental projects are established. ▪ Issue USD 1 trillion in labelled green bond standards in low- to middle-income countries.	▪

[2] https://www.artemis.bm/news/idf-members-commit-5bn-of-capacity-to-support-insuresilience-goals/.
[3] https://www.un.org/pga/71/wp-content/uploads/sites/40/2017/02/New-Climate-Economy-Report-2016-Executive-Summary.pdf.

		investment decisions, including agreement on resilience metrics and standards across sectors, regions and investment types.[4] ▪ Support the continued expansion of labelled sovereign green bond issuance. ▪ Shift investment (capital steerage) to channel greater private capital towards, for example, climate water bonds.		
Technology providers and innovators	▪ Extend climate risk and early warning systems support to more than 44 countries that are least developed countries (LDCs) and/or SIDS.[5] ▪ Ensure building codes integrate main climate risks.[6] ▪ Ensure research institutions dedicate more of their portfolio to climate resilience technology and innovations.	▪ Ensure early warning systems are in place and achieve Sendai Framework for Disaster Risk Reduction 2015–2030 targets reducing disaster impacts and mortality, benefitting 1 billion people. ▪ Ensure building codes for all infrastructure fully integrates main climate risks.[7]	▪ Ensure climate-related early warning systems and actions reach more than 8.5 billion people and help to reduce damage and loss. ▪ Ensure climate-resilience measures are fully integrated in all infrastructure assets and sectors/systems.	▪

[4] https://gca.org/reports/

[5] Climate Risk and Early Warning Systems (CREWS).

[6] Sendai Framework for Disaster Risk Reduction 2015–2030 target D.

[7] Sendai Framework target D.

Business and service providers	▪ Ensure post-COVID-19 green recovery triggers shift in production of foods, goods and services to be more climate-friendly in terms of GHG emission reductions and risks.[8]	▪ Ensure 50 % of businesses mainstream climate risk considerations in planning, investment, operations and management decisions. ▪ Facilitate major shift in production of foods, goods and services (50 %) to climate-friendly practices reducing GHG emission and risks.	▪ Ensure all (100 %) of businesses mainstream climate risk considerations into planning, investment, operations and management decisions. ▪ Facilitate a full shift in the production of foods, goods and services towards climate-friendly practices reducing GHG emission and risks..	▪ Ensure businesses and products/services are climate-resilient, low-carbon or carbon-neutral, and sustainable. ▪ Ensure climate risk considerations are an integral part of business planning, investment, operations and management decisions.
Civil society	▪ Advocate for a post-COVID-19, gradual shift of individual consumption of food, goods and services towards climate-friendly practices in terms of GHG emission reductions and risks (e.g. Good Life Goals). ▪ Mobilize the culture, art, music, heritage and design sectors to address the cultural dimensions of resilience.	▪ Ensure major shift (50 % of population) of individual consumption of food, goods and services to climate-friendly practices in terms of GHG emission reductions and risks.	▪ Ensure full shift (90 % of population) of individual consumption of food, goods and services to climate-friendly practices in terms of GHG emission reductions and risks in line with SDG 12.1.	▪

[8] https://www.unenvironment.org/explore-topics/sustainable-development-goals/why-do-sustainable-development-goals-matter/goal-12.

EXISTING INITIATIVES (WORKING ACROSS SECTORS)

Adrienne Arsht-Rockefeller Foundation Resilience Center	Aims to reach one billion people with resilience solutions to climate change, migration and human security challenges by 2030 using a range of evidence-based and innovative approaches.
African Adaptation Initiative	Focuses on adaptation action in Africa on: (1) climate information services; (2) strengthening of policies and institutions; (3) enhancement of on-the-ground action; and (4) access to and mobilization of finance and investment.
AGIR (the Global Alliance for Resilience Initiative)	Helps build resilience to the recurrent food and nutrition crises that affect the countries of the Sahel and West Africa.
Africa Risk Capacity	Aims to use finance mechanisms such as risk pooling and risk transfer to create pan-African climate response systems that enable African countries to meet the needs of people harmed by natural disasters.
ASEAN Climate Resilience Network	Supports regional exchange, particularly for sharing information, experiences and expertise on climate-smart agriculture.
Asia Pacific Adaptation Network (APAN)	Supports Asia and the Pacific stakeholders with knowledge for designing and implementing adaptation measures and building capacity to access technologies and finance in support of climate change adaptation.
Caribbean Catastrophe Risk Insurance Facility (CCRIF)	Regional catastrophe fund for Caribbean governments that limits the financial impact of devastating hurricanes and earthquakes by quickly providing financial liquidity when a policy is triggered.
Climate Adaptation Management and Innovation Initiative (C-ADAPT)	Develops innovative climate-induced food insecurity analyses and practices to inform programming and decision-making.
Climate Bonds Initiative	International initiative that promotes investment in projects and assets necessary for a rapid transition to a low carbon and climate resilient economy.
Climate Heritage Network	Network of organizations, businesses, universities and government agencies committed to using arts, culture and heritage to help communities realize the ambitions of the Paris Agreement.
Climate Investment Platform	Aims to declutter the climate finance landscape and provide streamlined support to developing countries, emerging economies and the private sector.
Climate Resilience Network (CRN)	An informal group of organizations working on building resilience to climate risks. It acts as a platform for information exchange and collaboration on climate resilience, including those under MPGCA.

Coalition for Climate Resilient Investment (CCRI)	Works to transform infrastructure investment by integrating climate risks into decision-making, driving a shift toward a more climate-resilient economy for all countries, including the most vulnerable.
Convergence	Global network for blended finance that generates finance data, intelligence and deal flow to increase private sector investment in developing countries.
Climate Resilience and Adaptation Finance and Technology-transfer Facility (CRAFT)	Blended finance structure that includes public, private and philanthropic investors that will invest in companies that have technologies and solutions that support climate resilience.
Climate Risk and Early Warning Systems (CREW) Initiative	Supports LDCs and SIDS to significantly increase the capacity to generate and communicate effective, impact-based, multi-hazard, gender-informed early warnings to protect lives, livelihoods and assets.
EcoShape - Building with Nature platform	Foundation that carries out the public-private Building with Nature innovation programme through its network and partners.
Friends of Ecosystem Based Adaptation (FEBA)	Network of organizations promoting collaboration and knowledge-sharing on ecosystem-based adaptation through joint events and initiatives and position papers and technical documents.
Global Adaptation and Resilience Investment Working Group (GARI)	Convenes private investors and other stakeholders to focus on practical approaches to adaptation and resilience investment.
Global Commission on Adaptation (GCA)	Aims to inspire heads of state, government officials, community leaders, business executives, investors and other international actors to prepare for and respond to impacts of climate change with urgency.
Global Facility for Disaster Reduction and Recovery (GFDRR)	Supports developing countries to mainstream disaster risk management and climate change adaptation, and improve the quality and timeliness of resilient recovery and reconstruction following a disaster.
Global Innovation Lab for Climate Finance	Accelerates financial instruments that can unlock billions for energy efficiency, renewable energy, sustainable transport, climate smart agriculture and curbing deforestation.
Global Island Partnership	Led by the Presidents of the Marshall Islands, Palau and Seychelles, the Prime Minister of Grenada and the Premier of British Virgin Islands, it aims to promote action to build resilient and sustainable island communities.
Global Resilience Partnership (GRP)	Partnership of more than 60 public, private, academic and civil society organizations working towards a world where vulnerable people and places are able to thrive in the face of shocks, uncertainty and change.

Insurance Development Forum (IDF)	Public/private partnership led by the insurance industry that aims to extend insurance use and its related risk management capabilities to build greater resilience of people, communities and businesses.
InsuResilience Global Partnership	Public-private partnership working towards strengthening the resilience of the poor and vulnerable by scaling up disaster risk financing and risk transfer solutions.
Least Developed Countries Universities Consortium on Climate Change (LUCCC)	Aims to support all 48 LDCs to become able to adapt effectively to the adverse impacts of climate change.
LDC Initiative for Effective Adaptation and Resilience	Led by least developed countries, it aims to ensure support reaches vulnerable communities and countries, with no one left behind.
National Adaptation Plan (NAP) Global Network	Aims to enhance national adaptation planning and action in developing countries. The Network also facilitates international peer learning and exchange.
Nature for Climate	Aims to increase investment and action on natural climate solutions in support of the 2015 Paris Agreement.
One Billion Coalition for Resilience (1BC)	Provides an opportunity for individuals, households, communities and organizations to work together to increase collective impact in resilience-building in communities worldwide.
Pacific Resilience Partnership (PRP)	Created by Pacific leaders to implement the Framework for Resilient Development in the Pacific.
Partnership for Environment and Disaster Risk Reduction (PEDRR)	Alliance of United Nations agencies, non-governmental organizations and specialist institutes it aims to promote the implementation of ecosystem-based disaster risk reduction and in development planning.
Regions4 (RegionsAdapt initiative)	Network of regional governments (states, regions and provinces) aiming to inspire them to adopt adaptation strategies, take concrete actions, collaborate, and report on their progress on an annual basis.
Resilience Africa Network (RAN)	Partnership of 20 African universities that strengthen the resilience of communities by nurturing and scaling up innovations from the different universities.
Resilience Alliance	An international, multidisciplinary research alliance that explores the dynamics of social-ecological systems.
Resilient coasts' initiative (Mangroves for the Future)	Works to promote investment in coastal ecosystem conservation for sustainable development.
Resilience Evaluation, Analysis and Learning (REAL) consortium	Building the knowledge base on resilience programme design and the implementation of United States Agency for International Development programmes.

Resilience Evidence for Decisions in Development Initiative (REDDI)	Building better connections between the evidence-related needs of decision-makers and the products of resilience measurement.	
Resilience Frontiers	UNFCCC Nairobi work programme action to maximize climate resilience beyond 2030 by harnessing the potential of disruptive frontier technologies and emerging social trends towards sustainability.	
Risk-informed Early Action Partnership (REAP)	Working to make one billion people safer from disasters by creating a new partnership to greatly expand early action financing and improve early warning systems and the capacity to act on the risks they face.	
Resilience Measurement, Evidence and Learning Community of Practice (RMEL CoP)	A network of experts who are collaborating to improve resilience measurement concepts, approaches and methods, and their application.	
Sustainable Insurance Facility (SIF)	A platform for insurance regulators and supervisors addressing sustainability and wanting to share best practices.	
Task Force on Climate-related Financial Disclosures	Develops voluntary, consistent climate-related financial risk disclosures for use by companies in providing information to investors, lenders, insurers and other stakeholders.	
Value Chain Risk to Resilience (R2R)	Aims to see more companies carrying out climate risk assessments across their value chains using a science-based approach.	
UN Climate Resilience Initiative (A2R)	Promotes climate resilience in the United Nations system and for its partners to understand and manage climate risks and hazards at scale across and within sectors and related SDGs.	

GENERAL REFERENCES & GUIDANCE ON RESILIENCE

Analysis of Resilience Measurement Frameworks	IPCC Report: Global Warming of 1.5ºC
Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED) Resilience Exchange	IPCC Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation.
Call for Action: Raising Ambition for Climate Adaptation and Resilience	ISO Adaptation to climate change - Principles, requirements and guidelines
Cost of doing nothing	Lessons from the Pilot Program for Climate Resilience
EC: A Strategic Approach to Resilience	Measuring Resilience
Global Commission on Adaptation (GCA) – Adapt Now	Oxfam Framework and Guidance for Resilient Development
GRP Resilience Insights	Sendai Framework for DRR
How to analyse risk and build a roadmap to resilience	UN Common Guidance on Resilience
Integrated Conflict Prevention and Resilience Handbook	UNDRR Global Assessment Report on Disaster Risk Reduction
Future of our Pasts: Engaging Cultural Heritage in Climate Action	United in Science

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Impact 2

RESILIENT FOOD AND AGRICULTURE SYSTEMS

RESILIENCE

NEXUS

	By 2021	By 2025	By 2030	By 2040
Policymakers (national, subnational, local levels)	▪ Align national and regional agriculture policies to ensure that small-scale agriculture and food production moves towards resilient, regenerative and climate-smart practices. ▪ Develop a demand-led research and development agenda to support the climate resilience of smallholder farmers. ▪ Incentivize diversification in cropping patterns and an	▪ Formalize and enforce indigenous and local community forest tenure and rights, recognizing their role in protecting forests and terrestrial ecosystems. ▪ Increase the quantity, quality and resilience of forests and other natural terrestrial ecosystems against climate change threats with positive impacts on biodiversity.	▪ Ensure there is minimal waste (less than 5 %) of food and agriculture products in all food and agriculture value chains. ▪ Build resilience of 300 million smallholder agricultural producers.[10] ▪ Enable markets and public sector actions to incentivize climate-resilient and low-emission practices; bring 200 million farmers into	▪ Ensure all policies, regulation and public support provides incentives for inclusive, sustainable and resilient food and agriculture systems.

[10] https://gca.org/reports/

	efficient use of water to produce "more nutrition per drop and encourage farmers to stop growing water intensive crops in water stressed areas. ▪ Adopt NbS to drive policies and regulations for the food system at all levels. ▪ Develop regulations that support deforestation-free food value chains in forest rich countries. ▪ Support and scale up climate risk-informed and shock-responsive social protection schemes for the most vulnerable people with agriculture-based livelihoods.	▪ Ensure at least 25 countries have developed policy frameworks for transformative climate outcomes in agriculture. ▪ Realign USD 300 billion of agricultural subsidies to help build climate resilience and regenerative agriculture in 16 countries. ▪ Improve "ease of doing business" in 24 sub-Saharan African countries. ▪ Significantly improve the readiness score in 49 countries in the Notre Dame Global Adaptation Initiative Country Index.[9] ▪ Ensure governments support regenerative agriculture policies and practices, and protect soil health, including soil erosion control and water use efficiency.	appropriate markets through increased profitability and market development.[11]	
Financial institutions	▪ Ensure investments take into account the specific range of prevailing climate risks. ▪ Ensure increased uptake of agricultural risk insurance.	▪	▪ Scale up access for over 100 million small-scale producers to insurance, markets, finance and productive safety nets.[12]	▪ Ensure all investments are allocated to inclusive, low-carbon, climate-resilient and sustainable food and agriculture systems.

[9] https://cgspace.cgiar.org/bitstream/handle/10568/108489/Actions%20to%20Transform%20Food%20Systems%20Under%20Climate%20Change.pdf.

[11] https://cgspace.cgiar.org/bitstream/handle/10568/108489/Actions%20to%20Transform%20Food%20Systems%20Under%20Climate%20Change.pdf.

[12] https://sdg.iisd.org/news/un-climate-summit-sees-usd-790-million-in-pledges-for-small-farmers/.

	▪ Scale up public-private partnerships and investment to increase productivity, resilience and sustainability aligned with forest protection and restoration. ▪ Improve access to financial services for small and medium-sized agriculture enterprises so that they can adopt resilient, regenerative, climate-smart and agro-ecological practices. ▪ Shift to investments in deforestation-free food value chains. ▪ Shift to investments that conserve and maintain soil health and diversity.		▪ Ensure donors double agricultural research spending through the CGIAR system to help 200 million small-scale producers adapt to become more climate-resilient.[13] ▪ Put compliance mechanisms in place to ensure that investors and lenders do not support unsustainable forest and land-use practices and loss of biodiversity. ▪ Ensure natural capital is quantified and considered as part of national budgets for policy implementation.	
Technology providers and innovators	▪ Improve the quality of and access to agro-meteorological information and early warning systems at farm, national, regional and global levels. ▪ Promote use of indigenous and traditional agricultural knowledge, such as heritage seeds and breeds, as contemporary resilient food systems technology.	▪ Provide access to tools for land-use monitoring systems and mobile technologies for smallholder farmers to carry out assessments of the climate change risks, variability and impacts. ▪ Operationalize risk-informed systems to strengthen resilience for large scale commodity production.	▪ Improve access to and use of adaptation technologies and agro-ecological practices for 100 million small-scale producers. ▪ Expand access to climate-informed digital agricultural advisory services for at least 100 million small-scale producers. [14] ▪ Public and private organizations provide 100 million smallholder farmers with access to climate-informed advisory services.	▪ Ensure monitoring tools and new technologies are used by policy makers and investors to inform sustainable forest and land-use decisions.

[13] https://gca.org/reports/

[14] https://gca.org/reports/

		▪ Make advances in near-term climate prediction to ensure water and agriculture managers respond to sub-seasonal variabilities more effectively.	▪ Secure resilient livelihoods and value chains through early warning systems and adaptive safety nets; realign USD 5 billion per year in humanitarian assistance for 40 million rural dwellers. [15]	
Business and service providers	▪ Develop blueprint to scale up investment in climate-informed farmer advisory services and information and communication technology (ICT) platforms. ▪ Ensure largest corporate consumers of agricultural commodities commit to regenerative agricultural practices across supply chains. ▪ Shift to deforestation-free food value chains in forest areas.	▪ Ensure agricultural commodity supply chains worth USD 50 billion annually have enhanced sustainability through climate-resilient approaches to investment.	▪ Halve per capita global food waste at the retail and consumer levels and reduce food losses in production, post-harvest and supply chains, including post-harvest losses (SDG 12.3). ▪ Climate services accessed by 200 million farmers and agribusinesses through ICT-advisory services.[16] ▪ Ensure 50 % reductions in food loss and waste in five major supply chains where loss or waste are high.	▪ Reduce food losses in upper- and middle-income countries by over 50 %. ▪ Ensure largest corporate consumers source 100 % of agricultural commodities from suppliers implementing regenerative agricultural practices.
Civil society	▪ Promote climate-friendly and plant-based diets and the reduction of food waste.	▪ Reduce food and waste loss by 20 per cent.	▪ Reduce food losses in upper- and middle-income countries by 30 per cent.	▪ Minimize consumer food waste.

[15] https://cgspace.cgiar.org/bitstream/handle/10568/108489/Actions%20to%20Transform%20Food%20Systems%20Under%20Climate%20Change.pdf, page 7.
[16] https://cgspace.cgiar.org/bitstream/handle/10568/108489/Actions%20to%20Transform%20Food%20Systems%20Under%20Climate%20Change.pdf, page 7.

EXISTING INITIATIVES

Adaptation of African Agriculture Initiative (AAAI)	Aims to reduce the vulnerability of Africa and its agriculture to climate change. It promotes and fosters the implementation of specific projects.
Global Alliance for Climate Smart Agriculture (GACSA)	Forum for those who work on climate-smart agriculture to share and exchange experiences, information and views on issues when adapting to climate change and mitigating greenhouse gases.
Global Landscape Forum	Platform on sustainable land use dedicated to achieving the Sustainable Development Goals and Paris Climate Agreement.
Global Peatland Initiative	Supports countries in the conservation, better management and restoration of peatlands, and in facilitating South–South cooperation.
Food and Land Use Coalition (FOLU)	A community of organizations and individuals committed to the urgent need to transform the way we produce food and use our land for people, nature and the climate.
Just Rural Transition	Transform climate-resilient, sustainable food production, land use and eco-systems, which is urgently needed to feed a growing population without collapse of the natural systems that sustain life.
One Planet Business for Biodiversity	Action-oriented business coalition on biodiversity with a specific focus on agriculture.
Scaling Up Nutrition (SUN)	Collaboration with governments to improve nutrition and household and community resilience in 16 developing countries.

FURTHER REFERENCES

EAT-Lancet Report on Healthy Diets From Sustainable Food Systems	**Nature-Based Solutions for Climate Manifesto**
Global report from the Food and Land Use Coalition (FOLU)	**Voluntary guidelines for ecosystem based approaches to climate change adaptation and DRR**
IPBES Land Degradation and Restoration Assessment	**IPCC Report: Climate Change and Land**
IPBES Global Assessment on Biodiversity and Ecosystem Services	

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Impact 3

RESILIENT WATER AND NATURAL ECOSYSTEMS

RESILIENCE

NEXUS

	By 2021	By 2025	By 2030	By 2040
Policymakers (national, subnational, local levels)	▪ Commit to resilient water management through integrated water resources management and source-to-sea concepts in NDCs, national adaptation plans and other national planning documents. ▪ At least 100 river basins and groundwater aquifers, and SIDS have plans to finance climate adaptation and resilience measures.	▪ Build climate change resilience in 10 transboundary basins, e.g. by supporting and helping implement transboundary vulnerability and water-food-energy-ecosystem nexus assessments and adaptation and DRR strategies and plans (for the Danube, Dniester, Drin, Drina, Neman, Bug, Chu-Talas, Congo, Sava, North-Western Sahara Aquifer System and Niger basins) and increase the capacity of at least 10 basins administrations to	▪ Ensure governments support the development of regional resilient water management training centers.	▪

	▪ Help governments ensure the Aichi Targets[17], including 11 (Conservation of protected Areas including water) and 14 (Safeguarding of ecosystem services including water related ecosystem services), are successfully met.	prepare bankable projects on adaptation to climate change.[18] ▪ Ensure 50 countries address climate change risks in their water systems to prioritize integrated planning and execution of comprehensive flood and drought management to advance preparedness and mitigate water extremes.[19] ▪ Ensure 100 river and groundwater basins have action plans that incorporate trade-offs across the forest-water nexus. ▪ Ensure governments create supportive institutional, legal and regulatory frameworks to promote resilient water management at all levels (local to transboundary).		
Financial Institutions	▪ Raise an additional billion for climate-smart, risk-informed development, including building flood resilience by 2022. ▪ Include climate-based water resilience criteria in green bonds and blue bonds.	▪ Ensure investments in ecosystem protection and restoration have doubled since 2021. ▪ Prioritize support and investment in basin resilience, including support for strengthening institutions, information and governance systems and	▪ Increase capital investments three-fold from 2020 needed to meet SDG targets 6.1 and 6.2 for safe water and sanitation; facilitate more climate financing directed to climate-resilient water and sanitation from the	▪

[17] Strategic Plan for Biodiversity 2011-2020.

[18] https://gca.org/reports/

[19] https://gca.org/reports/

	▪ Scale up payment for ecosystem services schemes to help communities manage water and upstream habitat protection and land management.	financing infrastructure and NbS in at least 20 basins.[20] ▪ Incentivize the use of NbS, such as green infrastructure, to address flood and drought risk.	Green Climate Fund, among other sources.	
Technology Providers and innovators	▪ Build and update a database of resilient water management case studies. ▪ Improve hydrological predictions, forecasting and early warning capacities, particularly in support of more proactive flood and drought risk management.	▪	▪	▪
Business and service providers	▪	▪	▪ Establish flood defenses that use both 'hard' infrastructure and NbS in 10 critical river basins.	▪
Civil society	▪ Set up regional adaptation training programmes at the Asian Institute of Technology (Asia-Pacific), IHE-Delft Institute for Water Education (Europe-Africa) and Oregon State University (Americas-Caribbean); 50 focal points to attend the first year.	▪ Ensure 200 individuals have completed the 30-day course worldwide. ▪ Support 30+ countries in accessing climate finance for water-informed national adaptation plans and integrated flood and drought management policies and measures.[21]	▪ Boost the resilience of ~30 million people in 15 landscapes in 5 countries by 2030 by promoting the integration of ecosystem-based approaches in infrastructure development.	▪

[20] https://gca.org/reports/
[21] Global Water Partnership's GCA Water Action Track commitment.

EXISTING INITIATIVES

Alliance for Water Stewardship	Collaboration of businesses, non-governmental organizations and public sector actors working on the sustainability of local water resources through the adoption and promotion of a universal framework for the sustainable use of water.
Business Alliance for Water and Climate	Alliance of companies committed to analyzing and sharing water-related risks; measuring and reporting water use data; and reducing impacts on water in operations and throughout the value chain.
Zurich Flood Resilience	Multi-sector partnership focusing on finding practical ways to help communities strengthen their resilience to floods globally.

FURTHER REFERENCES

Landscape approach for disaster risk reduction in 7 steps	**Nature-based flood protection: Principles and implementation guidance.**
Water Shocks: Wetlands and Human Migration in the Sahel	**Water Resilience and Climate Adaptation**

Global Climate Action
United Nations Climate Change

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Impact 4

RESILIENT CITIES

RESILIENCE

NEXUS

	By 2021	By 2025	By 2030	By 2040
Policymakers (national, subnational, local levels)	▪ Improve access to water and sanitation for vulnerable communities living in slums and informal settlements. ▪ Establish and improve policies, plans and ordinances to expand urban tree canopies and green spaces and increase the use of green infrastructure. ▪ Boost government budgets for water usage data collection and analysis for buildings. ▪ Ensure cities put in place resilience policies to use when undertaking	▪ Ensure cities draft water resilience action plans. ▪ Ensure cities in the most stressed river basins have established source water protection plans. ▪ Ensure cities consider grey, green and blue infrastructure when undertaking renewal/upgrade/new developments in city infrastructure. ▪ Ensure 200 cities have plans that address the role of the arts, culture, heritage and creativity in local adaptation and resilience.	▪ Ensure water and wastewater utilities have reached complete decarbonization and improved climate resilience through climate risk management. ▪ Ensure 100 water-insecure cities around the world achieve net-zero emissions and are no longer water-stressed. ▪ Ensure universal and equitable access to safe, affordable and climate-resilient drinking water and sanitation services (SDG 6), especially servicing the most vulnerable populations.	▪

	renewal/upgrade/new developments in city infrastructure. ▪ Ensure local governments undertake city-wide climate hazard and vulnerability assessments. ▪ Ensure arts, culture and heritage agencies are engaged in climate-resilience planning and action, building on SDG 11.4 and the New Urban Agenda.		▪ Make 600 million urban slum dwellers more resilient. ▪ Implement new or improved heatwave action plans and early warning systems for 1 billion people.	
Financial Institutions	▪ Increase public and private sector investments in green spaces, urban canopy, green infrastructure and other NbS. ▪ Ensure bilateral/multilateral development country assistance strategies include a resilience component. ▪ Ensure finance institutions make available capitalization and access to funding sources for resilience and adaptation in human settlements. ▪ Ensure finance institutions allow for funding water usage data collection and analysis for buildings. ▪ Ensure investors embed TCFD recommendations and publicly disclose their climate-related risks and opportunities.	▪ Ensure cities in high-risk locations have resilience standards embedded into their building codes. ▪ Facilitate financing for resilient cities through green bonds.	▪ Increase capital investments three-fold from 2020 levels needed to meet SDG targets 6.1 and 6.2 for safe water and sanitation. ▪ Ensure more climate financing is directed to climate-resilient WASH from the Green Climate Fund, among other sources.	▪ Ensure public and private financial investments in city planning, infrastructure and operations incorporate green spaces, green infrastructure and other NbS.

Technology providers and innovators	▪ Increase the use of satellite imagery to support cities in creating land-use inventories, managing urban green spaces and measuring progress on green infrastructure goals.	▪ Ensure technology providers engage in research and development on climate-proof infrastructure above and below ground.	▪ Ensure city planning officials, policymakers and investors use monitoring tools and new technologies to inform urban land-use decisions.	▪
Business and service providers	▪ Scale up the city water resilience approach in eight cities (Amman, Cape Town, Hull, Manchester, Mexico City, Miami, Rotterdam, Thessaloniki) to develop a training program based on the Arup University – Massachusetts Institute of Technology Sloan School of Management Executive Masters on Resilience of Urban Systems. ▪ Ensure businesses work with governments in adopting holistic, resilient urban planning business models that take into account green, blue and grey infrastructure. ▪ Ensure businesses embed TCFD recommendations and publicly disclose their climate-related risks and opportunities.	▪ Ensure the private sector includes resilience considerations when developing neighborhoods.	▪	▪
Civil society	▪ Ensure that previous pledges, commitments and policy-decisions made by governments, companies and other actors are followed and, when not, actors are held accountable.	▪	▪	▪

EXISTING INITIATIVES

C40	C40 cities are taking bold climate action, leading the way towards a healthier and more sustainable future.
Coalition on Urban Transitions	Coalition members collaborate to fill key knowledge gaps facing national governments looking to help drive progress towards sustainable cities.
Covenant of Mayors	Signatory cities pledge action to support the implementation of the European Union's 40 per cent greenhouse gas reduction target by 2030 and the adoption of a joint approach to tackling mitigation and adaptation to climate change.
Global Alliance for Buildings and Construction	Platform for governments, the private sector, civil society, and intergovernmental and international organizations to increase action towards a zero-emission, efficient and resilient buildings and construction sector.
ICLEI – Local Governments for Sustainability	Global network of more than 1,750 local and regional governments committed to sustainable urban development.
Leadership of Urban Climate Investments (LUCI)	Aims to accelerate the scale-up and leveraging of climate finance for climate-friendly urban infrastructure.
Urban Poor Fund International	Community-driven fund led by Slum/Shack Dwellers International and working to provide control over development and climate funding to the urban poor.

FURTHER REFERENCES

Global Climate Action
United Nations Climate Change

Marrakech Partnership

Impact 5

RESILIENT COASTAL ZONES AND OCEANS

RESILIENCE

NEXUS

	By 2021	By 2025	By 2030	By 2040
Policymakers (national, subnational, local levels)	▪ Provide support to developing countries to identify and quantify climate-related risks and impacts in the fisheries and aquaculture sector and identify adaptation and mitigation measures (including NbS). ▪ Plan for coordinated source-to-sea actions to build system resilience. ▪ Accelerate capacity-building (technology, finance, policy and regulation, human resources) and risk-assessment for climate-	▪ Ensure continued support to strengthen NDCs so they include coastal and marine NbS to climate change adaptation and mitigation. ▪ Ensure coastal planning tools, such as Integrated Coastal Zone Management and incorporate climate change adaptation indicators, including those relating to cultural heritage and traditional/indigenous knowledge. ▪ Designate 25% of oceans as marine protected areas (MPAs).	▪ Designate 30 % of MPAs are designated and implemented. ▪ Undertake institutional capacity development for the management of actions, projects and programmes for ecosystem-based adaptation to and mitigation of ocean and coastal climate change. ▪ Increase resilience and adaptive capacity of ocean-dependent coastal	▪ Designate 40 % of oceans as MPAs, many of which are climate-smart (site selection to enable them to withstand some climate change). ▪ Ensure a thorough understanding of the human history of coastal areas actively drives adaptation and resilience policies for coastal communities affected by rapid shoreline change and extreme weather events.

	resilient coastal transport infrastructure, in particular in vulnerable ocean economies, including SIDS. ▪ Ensure cities and regions develop ocean acidification action plans, including actions to build adaptation and resiliency (International Alliance to Combat Ocean Acidification).	▪ Incorporate indicators and thresholds for adaptive management of species and places. ▪ Conduct vulnerability assessments to identify risks that changing climate and ocean conditions pose to marine resources and coastal economies. ▪ Establish pH monitoring sensors to measure trends in ocean and coastal chemistry.	communities, fisheries and aquaculture. ▪	
Financial institutions	▪	▪ Increase access to blue bonds or debt for adaptation/nature swaps. ▪ Leverage greater private investments and create insurance products that address coastal risk and resilience. ▪ Increase investment in programmes to empower small-scale fishers to protect and conserve their coastal ecosystems.	▪ Ensure 500 million coastal people are supported by financial and insurance products to build resilience. ▪ Prohibit fishery subsidies that contribute to overcapacity and overfishing. ▪ Subsidies that contribute to illegal, unregulated and uncontrolled fishing are eliminated, (SDG target 14.6).	▪
Technology providers and innovators	▪ Accelerate technology development to support the climate resilience of critical coastal transport infrastructure, in particular in vulnerable ocean economies, including SIDS.	▪ Increase scientific research and data on the mitigation and adaptation value of coastal conservation efforts. ▪ Extend technological capabilities and capacity to coastal communities in developing countries – including large ocean states – to enable them to record their local heritage.	▪ Routinely use NbS solutions to provide protection against sea level rise, saltwater intrusion and storms.	▪

Business and service providers	▪ Mainstream climate resilience in critical coastal transport infrastructure planning and operations, in particular in SIDS.	▪	▪	▪
Civil society	▪ Strengthen the use of cultural heritage to raise awareness of society's continuing dependence on the changing ocean.	▪ Ensure ocean literacy programmes in schools and communities mobilize traditional knowledge and achieve sustainable behaviours.	▪	▪

EXISTING INITIATIVES

Future Oceans Alliance	Global alliance of organizations and individuals working to enhance the sustainable development of the ocean from the local to the global levels, inclusive of local communities.	▶
Global Ocean Forum	International and independent non-profit forum whose mission is to promote good governance of the ocean, healthy marine ecosystems and sustainable development.	▶
Ocean Risk and Resilience Action Alliance (ORRAA)	Multi-sector collaboration between governments, financial institutions, the insurance industry, environmental organizations and stakeholders from the Global South.	▶

FURTHER REFERENCES

IPCC Report on the Ocean and Cryosphere in a Changing Climate

Global Climate Action
United Nations Climate Change

Marrakech Partnership

Impact 6

RESILIENT INFRASTRUCTURE AND SERVICES

COVERING TRANSPORT, ENERGY AND INDUSTRY

RESILIENCE

NEXUS

	By 2021	By 2025	By 2030	By 2040
Policymakers (national, subnational, local levels)	▪ Ensure integration of climate impact assessments and resilience-building for critical transport, energy and other infrastructure into land and marine spatial planning, national adaptation plans, and other plans and processes (including the 2030 Agenda for Sustainable Development, the Paris Agreement and Sendai Framework) ▪ Review legal, policy and institutional frameworks for	▪ Put in place policies, governance, legal and institutional frameworks to effectively support climate-resilience of all new transport, energy and other infrastructure to at least 2050. ▪ Implement policies to optimize energy efficiency and demand response in appliances, transport and buildings. ▪ Ensure cities have water management plans in place that incorporate wastewater reuse.	▪ Ensure policies, governance, legal and institutional frameworks are in place to support the climate-resilience of all critical (transport, energy and other) infrastructure to (at least) 2050. ▪ Ensure human capacity is in place to maintain and operate critical transport, energy and other infrastructure. ▪ Ensure that renewable energy solutions contribute to adaptation strategies for land use, transport, energy and	▪ Ensure the climate-resilience of all critical transport, energy and other infrastructure to at least 2100. ▪ Ensure innovation for efficient and resilient electricity systems and other critical infrastructure is a continuing priority. ▪ Ensure decarbonized power systems (electricity installations) are resilient to ever-increasing climate impacts. ▪ Ensure integrated planning policies (e.g. energy-water-land-

	effective climate risk assessment and adaptation planning for transport, industry and energy infrastructure. ▪ Accelerate institutional and human capacity-building to manage climate risks to transport, energy and other critical infrastructure. ▪ Recommend that multi-hazard climate risk assessments, adaptation strategies and contingency/disaster response plans are prepared and implemented by responsible entities for all critical transport, industry and energy infrastructure and services. ▪ Ensure policies promote climate-resilient transport modes for safe and efficient transportation of goods and people. ▪ Develop model language for regulatory development to promote energy sector resilience.	▪ Develop and introduce public procurement policies that prioritize climate-resilient vehicles. ▪ Ensure NbS are mainstreamed into transport, energy and other infrastructure. ▪ Ensure the relocation of critical transport and energy infrastructure out of high-risk areas through the use of land-use planning and other tools where feasible.	other infrastructure (including water/sanitation and communication infrastructure).	use nexus) are in place to reduce climate-risks for infrastructure and operations.
Financial institutions	▪ Accelerate access to finance for transport and other systems and infrastructure resilience-building, in particular for most vulnerable countries and regions (e.g. SIDS, LDCs).	▪ Make finance for investment in transport, energy generation and other infrastructure systems and vehicles contingent on identifying and appropriately accommodating climate risks. ▪ Link sectoral insurance premiums to investment in resilient	▪ Ensure risk finance and insurance for resilient infrastructure is available in all developing countries ▪ Ensure finance is in place to support the climate-resilience (to at least 2050) of all critical transport and other infrastructure	▪ Put financial and investment provisions in place to support the climate-resilience (to at least 2100) of all critical transport infrastructure and systems.

	▪ Accelerate availability of finance for targeted impact and risk-assessment at facility level. ▪ Launch sector criteria for resilient water-related investments including hydropower. ▪ Climate disclosure (eg TCFD) is started to be mainstreamed as standard financial disclosure for major companies.	infrastructure, including: transport infrastructure assets, systems and vehicles; and energy generation, transmission and distribution assets and systems. ▪ Use low or zero discount rates to promote climate-resilient infrastructure. ▪ Accelerate availability of innovative finance mechanisms for resilience building and adaptation, e.g. climate bonds/blue bonds and parametric insurance (in particular for the most vulnerable groups of countries). ▪ Ensure sector criteria for climate-resilient hydropower investments are used to invest in 100 projects worldwide. ▪ Incentivize the use of NbS, such as green infrastructure for addressing flood and drought risk.	and systems (as well as vehicles, where necessary). ▪ Ensure insurance underwriters accurately integrate climate risks in their assessments and ensure affordable coverage without market distortion. ▪ Establish more green funds for infrastructure, energy efficiency and/or water efficiency projects. ▪ Issue USD 1 trillion in labelled green bond standards in low- to middle-income countries.	
Technology providers and innovators	▪ Accelerate institutional and human capacity and technology development to identify and manage climate risks to transport, energy and other critical infrastructure. ▪ Develop guidance and training for energy and transport infrastructure risk reduction (e.g.	▪ Develop multi-hazard monitoring and early warning systems that provide integrated information and decision-making support. ▪ Refine real-time hydro-meteorological monitoring and early warning systems. ▪ Develop new flexible/adaptive designs and associated	▪ Develop new technologies that enable the integration of high-share renewable technologies to increase infrastructure and system resilience. ▪ Ensure new vehicles (buses, trucks, trains, vessels, etc.) incorporate modifications	▪ Provide technology and related capacity-building to support the climate-resilience of all critical transport, energy and other infrastructure and systems to (at least) 2100. ▪ Ensure electricity installations are resilient to ever-increasing climate impacts.

	hardening solar and wind resources in areas that have high solar/wind potential but experience hurricanes/cyclones). ▪ Accelerate development of resilient renewable energy supply and systems for infrastructure. ▪ Address redundancy and mapping of interdependencies and critical services to reduce cascading failures.	industry standards where relevant to accommodate climate related risks. ▪ Develop training and capacity building for transportation/energy/infrastructure professionals to integrate climate risks and promote resilience. ▪ Re-design energy infrastructure and markets to incentivize grid flexibility for the integration of high-share renewable technologies that increase system resilience.	needed to strengthen resilience to extreme weather.	
Business and service providers	▪ Ensure business capacities are in place to manage climate risks to existing assets and operations. ▪ Promote accurate integration of climate risks by insurance underwriters in their assessments. ▪ Continue to develop cement standards to incorporate new cements, recognizing the criticality of safety and resilience. ▪ Ensure utility planning incorporates climate resilience, resilient benefit-cost analysis and flexible adaptation pathways. ▪ Mainstream climate change considerations into planning, management, maintenance and operational decision-making for	▪ Develop resilience-focused distributed energy resource pilots. ▪ Ensure the climate resilience of all new energy and transport infrastructure and systems (as well as vehicles, where necessary) to at least 2050. ▪ Ensure companies of all sizes commit to 1.5^0 net zero targets.	▪ Ensure the climate resilience of all new energy and transport infrastructure and systems (as well as vehicles, where necessary) to at least 2050. ▪ Ensure insurance underwriters accurately integrate climate risks in their assessments and ensure affordable coverage. ▪ Implement concrete standards that address the criticality of safety and resilience.	▪ Ensure all critical transport and energy infrastructure and systems are climate resilient to at least 2100. ▪ Ensure climate change considerations are fully integrated into planning, management, maintenance and operational decision-making for critical transport and energy infrastructure and systems. ▪ Consolidate organizational capacity to manage climate risks affecting the full lifecycle of critical infrastructure services, including transport infrastructure, systems and operations, and the development and operation of

	critical transport and energy infrastructure and systems.			energy generation, distribution and transmission.
Civil society	▪ Implement multi-stakeholder public awareness campaigns to increase transparency and track decisions on resilient transport, energy, water and other infrastructure and commitments. ▪ Support an engaged and proactive public in decisions concerning resilient electricity infrastructure. ▪ Raise awareness of health, safety and (socio)economic issues if vehicles, transport and energy infrastructure and systems are not climate-resilient.	▪ Promote civil society and stakeholder engagement to support the climate resilience of all new transport and energy infrastructure and systems (as well as vehicles, where necessary) to at least 2050. ▪ Incorporate water issues into the green building movement and the funding of community demonstration projects.	▪	▪

EXISTING INITIATIVES

Coalition for Disaster Resilient Infrastructure (CDRI)	Provides knowledge products, standards, case studies and best practices on disaster and climate infrastructure risk and resilience.
LDC Renewable Energy and Energy Efficiency Initiative (LDC REEEI)	LDC-driven overarching framework to accelerate the harnessing of renewable energy potential across LDCs and to promote energy efficiency.
Navigating a Changing Climate	Partnership committed to work together to support the inland and maritime navigation infrastructure sector as they respond to climate change.
Pathways to Low-Carbon & Resilient Development	Platform for companies and key stakeholders to share, learn and identify effective ways to contribute to NDC and SDG implementation in the private sector.
Resilience Shift	Exists to empower the global community to make the world safer through resilient infrastructure.

SE4ALL Sustainable Energy for All	Works with leaders in government, the private sector and civil society to drive further, faster action toward the achievement of Sustainable Development Goal 7.
The Cool Coalition	Aims to accelerate the shift to sustainable energy sources for cooling, improve the efficiency of conventional cooling and protect vulnerable populations.

FURTHER REFERENCES

Building with Nature: Thinking, acting and interacting differently	**Climate Risk and Vulnerability Assessment Framework for Caribbean Coastal Transport Infrastructure**
Climate Change Adaptation Guidelines for Ports	**Engineering With Nature: an atlas.**
Climate Change Impacts and Adaptation for International Transport Networks	**RailAdapt. Adapting the railway for the future**