Water Interactions for Consideration in NDC Enhancement & Implementation

Sectoral checklists to help climate change professionals and decision-makers identify water-related issues

WATER GOVERNANCE FACILITY

AGWA SIWI UNDP

The UNDP-SIWI Water Governance Facility

A partnership between United Nations Development Programme (UNDP) and Stockholm International Water Institute (SIWI) the UNDP-SIWI Water Governance Facility (WGF) was established in 2005, with the support of the Swedish International Development Cooperation Agency (Sida), serving to strengthen UNDP's capacity to provide relevant policy support and advice to countries, and to build the knowledge and capacities for improved water governance within governments and civil society as well as among UN agencies.

How to cite: UNDP-SIWI Water Governance Facility. 2020. Water Interactions for Consideration in NDC Enhancement and Implementation. Stockholm:SIWI

Contributors: The present version [October 2020] was produced by the UNDP-SIWI Water Governance Facility, written by Ingrid Timboe (AGWA), with Marianne Kjellén (UNDP), David Hebart-Coleman (SIWI), Birgitta Liss Lymer (SIWI) and Katharina Davis (UNDP), with contributions from Håkan Tropp (SIWI) and Kanika Thakar (SIWI). Helpful comments on previous versions have been received from colleagues at UNDP, SIWI, AGWA and elsewhere.

Cover photo: iStock
Editing and design: Stockholm International Water Institute, SIWI

For latest information, please visit www.watergovernance.org

Introduction

This document comprises a series of sectoral checklists, developed to help climate change professionals and decision makers identify water-related issues to consider and address further within climate plans and policies. In particular, it aims to assist in the ongoing process of enhancing the Nationally Determined Contributions (NDCs) to the Paris Agreement.

These checklists, organized by sectors/themes, **are not** a complete list of climate-water interactions but a starting point for a conversation between climate focal points and their water colleagues. The hope is that these will spur further substantive discussion and help identify areas where improved water management and governance may be needed to make climate mitigation and adaptation efforts more successful.

Enhancing NDCs – A guide to Strengthening National Climate Plans by 2020 proposes a process for NDC Enhancement. Figure 1 (see below) from this document outlines the various dimensions for enhancing NDCs. These dimensions include: 1) mitigation ambition –where water might have an underestimated role to play; 2) adaptation – where water has been the most prioritized sector for action to date; 3) implementation – where the understanding and management of water interactions can make a significant difference; and 4) communication (Figure: Types of NDC Enhancement, p. 7).

These checklists provide a brief snapshot of important climate-water interactions and are intended primarily to spark and inform discussions. Further explanation interactions are available in many other substantive reports, including the United Nations World Water Development Report 2020: Water and Climate Change, the Alliance for Global Water Adaptation's Watering the NDCs: National Climate Planning for 2020 and Beyond, the Climate Change Adaptation and Integrated Water Resources Management manual, the Global Commission on Adaptation's background report on water, the Water Supplement to the UNFCCC NAP Technical Guidelines and GWP's further analyses of Water in NDCs, e.g. The Untold Story of Water in Climate Adaptation. Part II.

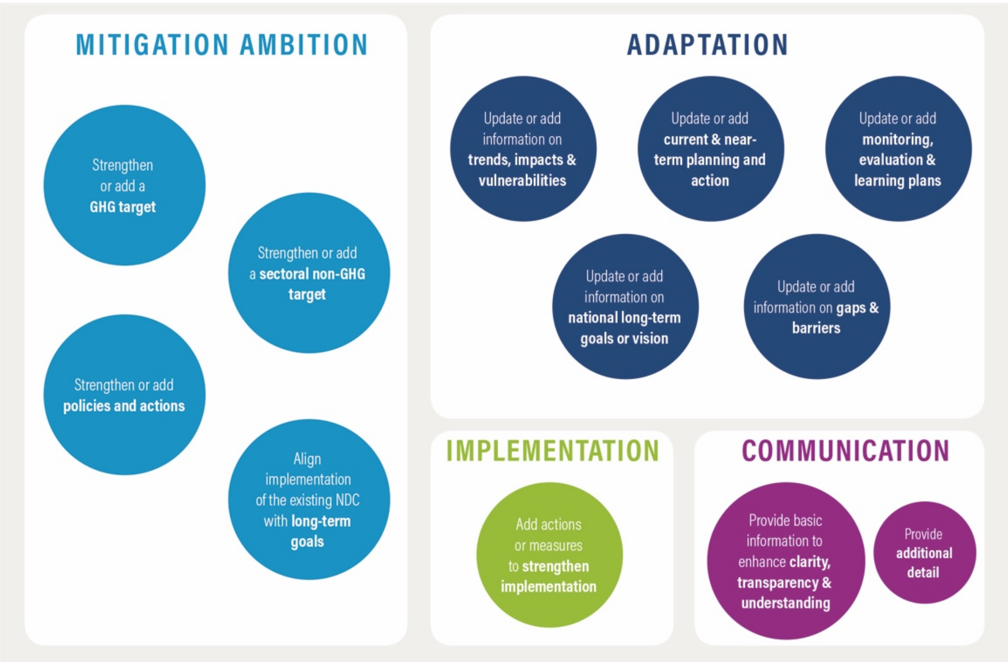

Fig 1. The various dimensions for enhancing NDCs.

Table of Contents

ENERGY & INDUSTRY

Water for energy production

Energy production is almost universally water intensive, whether it is generated from fossil fuels, nuclear or "clean" energy technologies like biofuels or hydropower. Emission reduction technologies such as carbon capture and storage also have significant water dependencies. Only solar and wind power have minimal water needs. As the global demand for energy grows, it is assumed that more water will need to be set aside for energy production. At the same time, climate-induced changes to the timing (both seasonal and inter-annual variation), frequency, distribution and duration of precipitation call into question water availability in many regions, potentially constraining energy production and undermining clean energy targets. Hydropower generation, in particular, is vulnerable to water scarcity while hydroelectric dam reservoirs themselves can produce significant methane emissions. Similarly, the production and processing of biomass for biofuel feedstock requires large amounts of water that may not be available five, ten, or thirty years from now.

Are you taking into consideration...?

- ☐ The water use of your current energy mix? How might this change when switching to renewables or adding new technology such as wastewater biomass, carbon sequestration and storage to existing facilities? Is your proposed energy mix, outlined in the first NDC, reliant on an increase in water resources?
- ☐ The long-term impact and viability of new technologies, given increasing water risks? Have you given sufficient thought to the water needs of all energy generation methods/ options **prior** to siting, planning and investing in new technologies or retrofitting existing infrastructure?
- ☐ The effects of large hydropower on upstream areas, including potential relocated communities and permanently flooded agricultural areas or natural habitats? What are the implications for land, water, and communities downstream as river flow changes over time?
- ☐ Land use changes induced by a switch to biofuels production, which, in addition to being water intensive, may have long-lasting or permanent impact on the land and associated ecosystems?
- ☐ Integrating energy and water planning in order to optimize investments and avoid inefficiencies or failure, including the joint development and management of water and energy infrastructure and technologies?

Water for thermoelectric cooling

Most electricity is currently produced using thermal power generation. This process requires large quantities of water, primarily for cooling purposes. However, water consumption rates vary substantially within and across technology categories, as well as by geography and type of cooling system in use. As temperatures rise due to climate change, more water will be needed for cooling while, in many regions, less water will be available. Thermoelectric power generation also impacts recipient water bodies by increasing temperatures, suspended solids and other pollutants while decreasing oxygen supply, which can degrade freshwater and marine ecosystems and compromise fisheries downstream.

Are you taking into consideration…?

- ☐ The water requirements of thermoelectric cooling methods currently in use?
- ☐ How to increase both the energy and water efficiency of thermoelectric production?
- ☐ Decreasing waste heat by reusing it in a combined heat and power plant? Or considered the possibility of using alternative sources of water for cooling such as treated wastewater or seawater?
- ☐ The need for integrated planning between energy and water departments, producers, resource managers, regulators, and decision makers at all governance levels?

Energy needs of water production, treatment and transfer

Another side of the energy-water nexus is the energy required to pump, treat and transport water to the end user. The energy used to power the systems of water supply, distribution, water and wastewater treatment, and, increasingly, for desalination, accounts for some 3-7% of global greenhouse gas (GHG) emissions, but does not include the non-carbon dioxide GHGs (e.g. methane and nitrous oxide) generated from decomposing waste and organic material. According to the World Energy Outlook 2018, electricity use by the water sector is mainly for the abstraction (40%), conveyance (25%) and treatment (20%) of water and wastewater, amounting to some 4% of global electricity production. As it becomes increasingly scarce or polluted due to climate change and other factors, water will need to be transported longer distances or receive more intensive treatment. Increased reliance on pumping groundwater for agriculture, industrial use and human consumption may also require larger amounts of energy. Finally, as the use of desalination technologies increases, energy demand may rise as both membrane-based (e.g. reverse osmosis) and thermal evaporation-based technologies are very energy intensive.

Are you taking into consideration...?

- ☐ Managing demand and reducing energy requirements for water through adequate metering and pricing or upgrading old networks? Are you taking careful consideration of impacts on vulnerable groups?
- ☐ How the pumping and distribution technologies of water impacts national climate change mitigation efforts?
- ☐ Co-production of clean water and energy generation such as using anaerobic digestion of sewage sludge in wastewater treatment plants?
- ☐ The scale of energy needs of desalination facilities and the potential deployment of solar power to power the plant? Do you have an efficient water distribution system and end-user access system in place?
- ☐ How more frequent storms, as a result of climate change, will lead to higher volumes of stormwater, requiring an expansion of treatment options?
- ☐ Assigning value to wastewater by-products (e.g. fertilizer production, biogas production) to reduce direct and indirect greenhouse gas emissions related to wastewater treatment and discharge?
- ☐ Implementing greywater reuse and recycling to supplement existing water services to alleviate water stress? If water reuse replaces drinking water for non-potable purposes, such as irrigation, then the emissions related to drinking water abstraction, treatment, distribution and discharge can be avoided.

Industrial Processes

Water is an essential raw material for many industrial production processes including fabricating, processing, washing, diluting, cooling, or transporting products, generating steam, or for sanitation needs within the manufacturing facility. Globally, industries abstract roughly a fifth of available freshwater. Most of this water is either directly or indirectly discharged back into the environment as wastewater, which increases the generation of GHGs such as methane and nitrous oxide. Increased competition with other water users such as energy, agriculture, and human supply means there may be less water available for industrial purposes in the future. Furthermore, as climate change leads to drought, more serious storms and sea-level rise, companies are being forced to alter major decisions about plant location, capacity and the likely lifespan of their facilities.

Are you taking into consideration…?

- ☐ Treating industrial wastewater to reduce GHG emissions, improving water quality and potentially providing clean energy to your industrial facilities?
- ☐ Opportunities to improve the efficiency of water use or otherwise reduce the demand for water in industrial processes, thereby improving the resilience of operations in the face of increasing water variability?
- ☐ Retrofitting existing industrial facilities or planning and siting new facilities that are designed to be both climate- and water-smart?

AGRICULTURE & LIVESTOCK

Land use, cropping and soil health

Rising temperatures may alter crop water requirements and compromise soil health. Greater rainfall variability or changes to seasonal precipitation patterns may also mean that planting seasons shift or become more or less productive, necessitating crop rotation and/or intensifying production during altered growing seasons. These climate impacts and resulting adaptation actions can affect the amount and timing of water needed. Moreover, as existing farmlands become unsuitable for agricultural purposes while global food demand continues to increase, new lands are being converted to agriculture and grazing. Such land use change has important consequences for the water cycle and may reduce or destroy important carbon sinks such as forests and peatlands. In areas facing water scarcity, land use change can further intensify drought or aridification, leading to additionally increased crop and soil water needs over time. A full vulnerability and needs assessment for the country's agriculture and food sector should be considered.

Are you taking into consideration...?

- ☐ The water requirements of the major crops, including biofuels, produced in your region?
- ☐ The benefits, trade-offs and water needs of agroforestry practices?
- ☐ Improving agricultural soil health to retain soil moisture? (E.g. by increasing the amount of organic matter content in the soils or adopting alternative tilling practices such as cover crops and conservation or low/no tillage?)
- ☐ Increasing capacity for surface water storage to increase resilience of rainfed agriculture by way of supplementary irrigation?
- ☐ The short, medium, and long-term trade-offs between opening new lands to agricultural production and maintaining current ecosystems and the services they provide?
- ☐ Sustainable water management i.e. efficient irrigation and drainage systems, wastewater recycling and reuse, basin management, rainwater harvesting, and integrated water resource management?
- ☐ What types of crops might be able to better tolerate changes to water availability or extreme events and provide the same or increased level of nutrition or economic benefit?

Irrigated agriculture

Prolonged drought, intense storms as well shifts in seasonal rainfall patterns in regions such as South Asia and East Africa mean an increased uncertainty about water availability for agriculture and livestock. Higher temperatures typically also induce greater crop water needs. In many areas, this leads to increased demand and reliance on supplemental irrigation. Even where water is available to support expanded irrigation, it may be energy-intensive to extract as well as having a negative impact on ground and surface water reserves. In other areas, climate-induced precipitation impacts may be managed by switching to less water-intensive crops and by managing existing irrigation systems more efficiently.

Are you taking into consideration...?

- ☐ How resilience of rain-fed agriculture may be enhanced by supplementary irrigation? And how rainfall variability might impact the ability to irrigate crops, particularly in rain-fed areas?
- ☐ 'Conjunctive water management' that involves the combined use of ground and surface waters, or using a mix of local and more distant sources?
- ☐ The need for more flexible irrigation mechanisms (i.e. smaller scale systems, solar pumps, or alternative water storage systems) and how to ensure that water for agriculture is used efficiently and effectively during times of scarcity or flooding?
- ☐ How the selection of crops, farming practices and technologies may impact the need for groundwater pumping as well as renewable energy options such as solar water pumps to support irrigation?
- ☐ The impact of irrigation on the source water bodies upstream (lakes etc.), and water bodies downstream (oceans and fisheries etc.)?
- ☐ How climate change and water infrastructure such as hydropower plants, storage dams and water sharing agreements affect irrigation opportunities and drinking water supply down-stream?
- ☐ How cultivation of biofuels affects water demand, land use and deforestation?

Grazing and livestock

Lands used for grazing can quickly become degraded by livestock if not carefully managed. This is critical when grazing takes place in sensitive areas along stream corridors and other water bodies, which can become loaded with pollutants such as sediment and animal waste. Increasingly variable rainfall or prolonged drought may cause forage shortages that impact livestock as well as the pastoralists whose livelihoods depend on them. As global demand for animal protein continues to rise, there is pressure to expand rangeland into forests and wetlands. The conversion of these lands may reduce their carbon storage potential while contributing to increased GHG emissions from livestock and degraded land.

Are you taking into consideration...?

- ☐ The trade-offs between opening new lands to grazing and maintaining current ecosystems and the benefits they provide, including mitigation opportunities? How do these land uses impact water and carbon budgets?
- ☐ How rotational grazing, shrub control, or stream buffers and/or livestock barriers in rangeland may protect fragile habitat necessary to maintain vegetation, moisture and healthy pastures?
- ☐ Fodder production for stall-fed livestock production, including the potential for controlled reuse of water and nutrients by linking to smart sanitation systems?
- ☐ Extension services for pastoralists to improve rangeland management as well as insurance schemes such as index-based insurance to help mitigate climate risk?

FORESTRY & LAND USE

Forest management, land rehabilitation, and soil conservation

Forests hold substantial potential for both climate change mitigation and adaptation. Forests and water are inseparably linked through multiple interrelated functions, including the regulation of ground and surface water flows, maintenance of soil and water yield and quality, reduction of water-related risks such as floods, drought and landslides as well as climate regulation through carbon sequestration and storage. Forests also influence downwind precipitation patterns. However, the relationship between forests and water is highly contextual and complex, requiring management decisions based on both science and ancestral knowledge as well as an understanding of how these relationships operate at different temporal and spatial scales in a changing climate. For example, forest conservation measures (a popular type of nature-based solution [NbS]) in tropical forests will likely not be suitable for use in temperate settings. There are knowledge gaps regarding the factors that regulate the multiple functions of the forest-water nexus, their interactions, and ultimately their effects on those that rely on them for water. This makes monitoring and continued research critical to climate planning so that forest-based climate projects are well adapted to local contexts and can adjust as knowledge advances or conditions change.

Are you taking into consideration...?

- ☐ The role of forests not only for sequestering carbon, but also for maintaining soil health, water regulation, retention and filtration?
- ☐ The water needs of large reforestation projects that may initially require large amounts of water or are based on species that require large amounts of water?
- ☐ What tree species and tree densities to use in reforestation, and adapt these to the local hydrological and climatological context?
- ☐ How increased temperatures due to climate change may affect your forests? For example, which types of trees are able to survive, their water requirements and infiltration potential?
- ☐ The role of local communities in managing, conserving and restoring forest habitat?
- ☐ The role of agroforestry in supporting local livelihoods and enhancing water efficiency?
- ☐ How to measure, monitor and adjust forest management over time related to impacts on water flows and quality as the climate changes?

Wildfire management

Wildfire is a natural phenomenon throughout most vegetated terrestrial ecosystems, necessary for regulating forest and grassland health. With climate change, however, fires are becoming hotter, more frequent, burning longer and covering larger territories, making it harder for ecosystems to recover sufficiently. Wildfires can also have significant impact on freshwater ecosystems, degrading water quality and increasing stream temperatures by removing streamside vegetation that would otherwise shade river channels. Charring and the loss of vegetation mean that when precipitation does arrive following a fire, the bare soil has less stability and water retention capacity, leading to mudslides and erosion, which can release pollutants into waters. Sedimentation in streams, floods and lakes is also likely to increase. These impacts can last decades or longer and permanently alter regional water cycles and landscapes.

Are you taking into consideration…?

- ☐ How climate change is altering the timing and severity of wildfire and how that might impact the carbon storage potential of your forests?
- ☐ How wildfire is affecting the quantity and quality of local water resources in the short, medium, and long term?
- ☐ How vegetation can be managed or restored to reduce the risk of wildfires as well as the associated water requirements for these interventions?
- ☐ Where and how you are sourcing water to fight fires? Are these sources at risk from changes to seasonal water patterns?

Coastal management

Coastal zones are uniquely vulnerable to multiple climate change impacts including sea level rise, land subsidence, beach erosion, saltwater intrusion, and extreme weather events such as floods and tropical storms. Estuaries, where inland water bodies meet the sea, are important habitats and nurseries for marine and freshwater species while providing livelihoods and storm buffers for coastal communities. These ecosystems rely on clean freshwater inputs from rivers and groundwater aquifers in order to maintain their proper chemistry and ecological functions. Coasts are also home to many human settlements, including several of the world's largest megacities, which require water for drinking and sanitation. Urban water infrastructure such as wastewater treatment plants are often located in low-lying areas, which are particularly vulnerable to flooding and consequent pollution of the environment.

Are you taking into consideration…?

- ☐ How changing river flows impact coastal ecosystems and estuaries? (E.g. how reduced river flows may facilitate saltwater intrusion into coastal aquifers?)
- ☐ How soil erosion, saltwater intrusion, or storm surges may affect terrestrial and freshwater ecosystems and the water supply of coastal communities?
- ☐ How sea level rise and coastal erosion are threatening marine and coastal ecosystems?
- ☐ Reinforcement – or retreat – of built infrastructure, such as levees and seawalls? Or the strengthening of natural buffers, such as oyster beds (NbS)?
- ☐ Upstream-downstream flows of materials into coastal environments both positive (sediment, freshwater) and negative (pollutants)?
- ☐ How blue carbon ecosystems such as mangrove forests, tidal salt marshes, and seagrass meadows, along with freshwater wetlands and peatlands contribute to both adaptation and mitigation? These can help give protection from storm surges, purify water and sequester carbon.

FISHERIES & AQUACULTURE

Inland and marine fisheries

Freshwater ecosystems are among the natural systems most threatened by climate change, and freshwater fish populations, already in rapid decline in most areas around the world, are extremely vulnerable to rising water temperatures. Upstream pollution impacts aquatic environments and fish habitats downstream. In addition, freshwater habitats such as lakes and streams are often naturally isolated and fragmented, meaning that fish cannot adapt by dispersing to more suitable areas. For marine fish, there may be more room to roam as ocean temperatures rise but changing migratory patterns, for example, can have cascading impacts on marine ecology and fish abundance and composition with significant impacts for the global fishing industry.

Are you taking into consideration...?

- ☐ How climate change and water infrastructure such as hydropower plants, storage dams and water sharing agreements affect downstream marine fisheries?
- ☐ Ways to improve freshwater health, such as limiting nutrient pollution into freshwater bodies and investing in vegetation buffers along waterways in order to maintain sustainable fisheries in your region?
- ☐ How sustainable management and protection of coastal and freshwater ecosystems such as mangroves, salt marshes, wetlands, and seagrass beds can help save fish stocks, filter pollutants, provide coastal protection from storms, and store excess carbon?
- ☐ Working with (often vulnerable) fisheries communities to ensure socially and scientifically sound adaptation measures to safeguard fisheries livelihoods and the production of fish protein for food?

Aquaculture

Aquaculture is an increasingly important source of animal protein worldwide, estimated by the FAO to now account for almost half of the fish humans eat. Aquaculture facilities are primarily located in coastal marine areas such as protected bays and estuaries but can also be found in freshwater bodies. Given their locations, they are highly vulnerable to the impacts of sea level rise, ocean acidification, storms, tsunamis, and rising air and water temperatures as well as increased flooding and sediment in deltas and freshwater bodies. Extensive removal of native coastal ecosystems such as mangroves for aquaculture fisheries is compromising benefits, making already vulnerable coastal communities more exposed to climate impacts. Poorly regulated aquaculture facilities can be a major source of pollution to surrounding waterbodies (e.g. excessive nutrient loading stemming from concentrated amounts of fecal waste, fish food and antibiotics) and threaten wild species.

Are you taking into consideration...?

- ☐ The interactions between your aquaculture facilities and the surrounding ecosystems in the context of climate change? What are the effects on potential pollution or biodiversity loss?
- ☐ How climate impacts such as sea level rise may affect these facilities' ability to operate?
- ☐ What are the effects of changing salinity levels? And how is this affected by activities upstream?
- ☐ The energy needs for cooling, transport and fish processing?

ECOSYSTEMS & BIODIVERSITY

Ecological processes and biodiversity

Ecosystems, ecological processes, most species, and all ecological communities are extremely responsive to climate shifts, but most responses are difficult to predict and using the past as a guide for future action may have limited effectiveness. Ecosystems are influenced heavily by the water cycle and water is a crucial component in most ecosystem services. Given the inherent uncertainties surrounding climate change as well as the complex, interlinked nature of terrestrial, marine, and freshwater ecosystems, management approaches should focus on interventions that allow these systems to persist, adapt, or transform in the face of uncertain climatic shocks and stressors. Freshwater ecosystems, including lakes, rivers and wetlands, provide a variety of life-supporting ecosystem services (e.g. water security, food supply, flood and drought mitigation), and are incredibly diverse and particularly sensitive to climatic shifts. Freshwater biodiversity is a major asset to climate change mitigation and adaptation efforts and should be considered as a potential NbS.

Freshwater ecosystems cannot be managed in isolation. Upstream/downstream material flows as well as upwind/downwind processes both impact and are impacted by adjacent terrestrial and marine ecosystems. For example, runoff from forested mountain and upland watersheds constitute most of the world's accessible freshwater for domestic, agricultural, industrial and ecological needs while freshwater plays a regulatory role in landcover extent and composition, landscape productivity (e.g. agriculture and forestry) as well as nearshore marine habitat. In managing ecosystems for climate resilience, serious consideration of these context-based interlinkages is warranted.

Are you taking into consideration...?

- ☐ Climate-influenced shifts in key variables – such as timing and amount of freshwater flows – and how these affect the abundance and distribution of species, the composition of ecological communities, and the makeup and qualities of ecosystem services?
- ☐ Collecting data regarding freshwater biodiversity and monitoring rivers and aquifers to aid in freshwater protection measures?
- ☐ Ways to combine scientific data and management with ancestral knowledge and community-based ecosystem management?
- ☐ How aquaculture, untreated wastewater, livestock production, and agricultural run-off impact water quality?
- ☐ Managing water at the basin scale? River and groundwater basins often cross political boundaries: are there existing laws, agreements or regulations to manage these waters in an integrated and systematic way?
- ☐ Transparent, inclusive, multi-stakeholder processes when developing strategies and guidelines for managing ecosystems and biodiversity in the landscape/water basin?
- ☐ Implementing climate adaptation measures related to sustainable ecosystem management in order to help communities and ecosystems adapt by improving water security?
- ☐ Managing forest cover for soil and water protection?

Wetlands, peatlands and mangroves

The role of wetlands and peatlands as important NbS helping communities and ecosystems adapt to climate change are well documented, supporting livelihoods, biodiversity and human wellbeing. For countries with coastal wetlands such as mangroves, these ecosystems constitute an important defense against storms and sea level rise. In addition to their adaptation services, wetlands – and in particular peatlands – are significant carbon sinks. A UNEP Rapid Response Assessment suggests that peatlands cover less than three percent of the Earth's surface but are the largest terrestrial organic carbon stock, and that the emissions from drained or burned peatlands account for five percent of the global carbon budget, producing carbon dioxide and nitrous oxide. Hence, for both climate change mitigation and adaptation, it is important to protect and even expand these ecosystems.

Are you taking into consideration...?

- ☐ How wetlands and peatlands in your country can contribute to your mitigation commitments and can be used for integrated and restorative urban water services?
- ☐ The water requirements of wetlands and peatlands to avoid carbon emissions?
- ☐ Identifying wetland or peatland areas that are most vulnerable due to land use change, degradation, and climate change and targeting them for conservation?
- ☐ Improving coastal defenses by protecting or restoring coastal wetlands such as tidal marshes and mangrove forests?

WATER, SANITATION & HEALTH

Resilient water and sanitation services

In 2017, 71 percent of the global population (5.3 billion people) used a safely managed drinking water service – that is, one located on premises, available when needed, and free from contamination. However, at least 2 billion people use a drinking water source contaminated with faeces. Seven hundred and eighty-five million people lack even a basic drinking water service, including 144 million people who are dependent on surface water. For sanitation, some 5.6 billion people used safely managed or at least basic sanitation services in 2017, but 2.0 billion people still do not have basic sanitation facilities such as toilets or latrines. Of these, 673 million defecate in the open, for example in street gutters, behind bushes or into open bodies of water. The collection, treatment, reuse and recovery of wastewater is, in many areas, a growing source of GHG emissions worldwide as demand for treatment grows, more communities are being connected to wastewater systems, and standards for treated water increase. And in areas not served by centralized or distributed wastewater treatment facilities, untreated latrines release methane and contribute to surface and groundwater pollution. An increasingly variable water supply due to climate change is already impacting the poorest and most vulnerable among us.

Given the urgent need for basic hygiene (i.e. hand washing) to combat communicable diseases, such as COVID-19, it is essential that such services be made universally available and resilient to climate-related risks. Ensuring that investments in resilient WASH systems prioritize the poorest populations in areas identified as being at the highest risk is also a primary concern.

Are you taking into consideration...?

- ☐ Monitoring and testing water quality over time to ensure safe, reliable water services for poverty alleviation and building community resilience?
- ☐ The use of WASH planning and implementation to adapt and adjust to changing conditions, and ensuring priority to human needs also in times of water stress?
- ☐ How to ensure that water services remain affordable and accessible if water prices rise so that those most in need do not compromise personal and environmental hygiene?
- ☐ How safe sanitation is critical for poverty alleviation; and how poverty alleviation may be the most effective climate change adaptation measure of all?
- ☐ Ways to reduce the energy use of wastewater systems through gravity-based systems and increased use of distributed or decentralized systems?
- ☐ How sensitive household toilets are to potential flooding and release of contaminated waste?

Water-related disease

Climate change has the potential to enhance the spread of water-related diseases, including diarrhea and cholera. Vulnerability to diarrheal disease is mostly mediated by poverty, including its multiple dimensions, and affects those already weakened by malnutrition or other ills. Environmental factors that contribute to the spread of infectious disease are flooding and runoff contaminated by sewage and disease agents from other sources. Water-borne diseases such as cholera are also highly sensitive to changes in temperature, precipitation and humidity.

Vector-borne diseases like malaria or bilharzia are also sensitive to changes in temperature, precipitation and humidity that impact the prevalence of vectors. Again, vulnerability is mediated through the multiple dimensions of poverty like the quality of housing and neighborhood environments. Where poor people's livelihoods are negatively affected, this may hamper nutrition and thus increase the susceptibility to disease. Access to stable livelihoods and nutrition, proper hygiene facilities and equipment, decent housing and safe water and sanitation can greatly mitigate against adverse health effects.

Are you taking into consideration...?

- ☐ How lack of water or hygiene facilities and equipment in households, schools, markets or workplaces may compromise cleanliness and contribute to food- and or water-borne illnesses, including cholera?
- ☐ How to specifically protect vulnerable populations including children, the elderly and immunocompromised individuals?
- ☐ How to protect vulnerable populations in general through pro-poor/poverty alleviation measures?
- ☐ Investing in capacity development, planning and preparedness for shocks such as floods/droughts to improve the quality of emergency responses?
- ☐ Monitoring and the timely sharing of information to understand disease prevalence and the potential for outbreaks and spreading of infectious or vector-borne disease?

URBAN & REGIONAL PLANNING

Water supply and wastewater infrastructure systems

It is estimated that abstracting, treating and distributing water for urban populations currently contributes some 5 percent of global GHG emissions. This does not include emissions associated with discharging untreated sewage in rivers. In many countries, water utility servicing and wastewater treatment is expanding. In addition, water demand and the use of energy intense desalination processes will most likely increase.

Many urban water and wastewater infrastructure systems rely on a mix of conveyance methods, including transport of water or wastewater by way of pipes, pumps, wells, canals, trucks, carts and hand carrying. The use of vehicles, and groundwater or booster pumping (from public networks) have an important aggregate impact on water system energy requirements. Water and wastewater companies may contribute to decarbonization efforts by enhancing the efficiency of their operations as well as by recovering energy, nutrients and other materials from wastewater (i.e. biogas). In recent years, utilities from around the world have gathered experience in optimizing management approaches as well as installing and upgrading technologies for cost and emission reduction.

It is also important to note that water infrastructure such as intake dams and pipes are typically built to last 40-100 years or more, and much of the world's existing infrastructure needs replacement or repair, meaning that investments today will remain in place for decades. Serious consideration of functionality over the entire operational lifetime of these systems is warranted to ensure financially sound investment in systems that are both robust and adaptable to changing conditions.

Are you taking into consideration…?

- ☐ How increased demand for water in urban areas may affect service delivery, particularly with simultaneously increasing competition for water resources from energy or agriculture?
- ☐ How to improve and incentivize the efficiency of water and wastewater utilities to reduce losses and costs, and generate savings to reinvest in infrastructure and improved service delivery?
- ☐ The potential mitigation and adaptation (and disaster risk reduction) benefits of hybrid green-grey water treatment systems such as wetland filtration alongside secondary treatment facilities?
- ☐ The siting of wastewater and sanitation infrastructure with regard to flood-prone locations?
- ☐ How untreated wastewater affects both greenhouse gas emissions as well as freshwater contamination in your region?
- ☐ The use of energy by water and wastewater systems, including pumping and treatment, the respective costs and carbon emissions depending on the energy source?
- ☐ The energy and rehabilitation needs of water/wastewater facilities over the next 10, 20 or 50 years as well as the planned expansion of coverage over the next 10, 20 or 50 years?
- ☐ Integrating stormwater management into urban land use planning? For example, using more permeable surfaces to absorb stormwater, reduce sewage overflows, moderate urban heat islands and facilitate groundwater recharge?
- ☐ Managing wastewater as a resource? Once treated, it can be used for irrigation, industrial processes, or recreational purposes, or be returned to rivers or aquifers to support the environment. It can also be used as an opportunity for biogas production and nutrient recovery, which can offset GHG emissions and provide a new source of nutrients for fertilizers.

Rural water services

Despite the global trend of urbanization, rural communities still comprise approximately 45 percent of the global population. Rural communities more commonly resort to 'self-supply' and are often reliant on a number of different sources of water to address their needs – including both domestic and economic needs. Rural water sources can be vulnerable to the impact of climate change, land use change or an increase in the number of users accessing the same surface water resource or aquifer. For example, local springs and wells may be impacted by changes in vegetation causing reduced water infiltration (and consequent reduction of groundwater recharge). Increased pollution from agricultural activities may impact the usability of surface waters and other sources. Many rural areas have limited resources for investment, and the impact of a loss of a key source of water – whether through reductions in quantity or quality – can be dramatic.

Are you taking into consideration…?

- ☐ The extent to which rural communities rely on shared surface waters or aquifers that are projected to be affected by climate change? Are there alternative sources should those become limited?
- ☐ What the local capacities for resilient management of water systems are? And what means of support, including technical, are there from central authorities?
- ☐ How shortages in domestic water supply in rural areas could impact local agricultural production (and vice versa)?
- ☐ What measures there are to support rural populations in case of natural hazard events such as prolonged drought or regular flooding?
- ☐ Social support mechanisms or direct transfers that can reduce the vulnerability of rural communities in the face of prolonged droughts or increasingly intense flash floods?
- ☐ Managing water demand and efficiency (especially water loss from irrigation)?
- ☐ The potential for rainwater harvesting and treatment to supplement water supply?

Transportation systems

Rivers, lakes and the ocean make up important networks for water transport, facilitating the movement of goods and people around the world. Climate change is already affecting navigable waterways; dangerously low or high flows render rivers non-navigable for long periods, halting commerce and human mobility. Extreme weather events such as floods, landslides and storm surge further impact the broader transportation systems, including roads and railway lines.

Are you taking into consideration…?

- ☐ The impact of variable rainfall and extreme weather events on transportation infrastructure in your region? Which systems may be more or less able to adapt to these changes?
- ☐ How vulnerable your transport system is to extreme weather events? Are there particularly critical routes that need to be taken into account?
- ☐ Alternative methods of transporting goods and people and the cost as well as the projected emissions of those alternatives?
- ☐ The long-term role of water-based transport in your strategies? How does it gauge against different climate and water-level scenarios?

Green Infrastructure and Nature-based Solutions (NbS)

There is a growing recognition of the benefits of green infrastructure and a larger suite of so-called nature-based solutions (NbS)[1] for both climate change mitigation and adaptation. While types of NbS differ greatly, all NbS seek to manage or deliberately use nature to address particular human socio-environmental challenges. Water itself can be categorized as a type of NbS, and other types of green infrastructure such as coastal forests can offer multiple water-related benefits and help address water quantity, quality and risks while simultaneously building community resilience. It is important to note that nearly every type of NbS is water-dependent, meaning that without water in the needed quantity, quality and at the right time, these solutions may not be possible to implement, or may have reduced benefit over time. When considering NbS for national climate plans, it is essential to consider the role of water resources when implementing these schemes.

[1] Nature-based solutions for water use or mimic natural processes to enhance water availability (like soil moisture retention or groundwater recharge) improve water quality (through natural or constructed wetlands) or reduce risks of water-related disaster.

In general, NbS should be considered as part of larger mitigation or adaptation programmes as they have the ability to improve the function of traditional management approaches. For example, river floodplain reconstruction on its own may not be sufficient to fully curb residential flood risk but can be considered in conjunction with other complementary adaptation strategies such as levees and property setbacks.

Are you taking into consideration…?

- ☐ How green infrastructure/NbS, such as wetlands for flood absorption and filtration, can improve the climate resilience and reduce the GHG emissions of traditional grey infrastructure such as levees or water treatment facilities?
- ☐ The water needs of the NbS proposed in your national climate plans? How water-dependent are these actions?
- ☐ What activities are required to support the introduction and long-term viability of NbS, including regulation changes, new policy instruments or investment?
- ☐ The use of hybrid NbS approaches such as constructed wetlands to process wastewater for industrial, ecological or agricultural needs?
- ☐ Implementing water-sensitive design for urban development to create an integrative and regenerative infrastructure for the city, providing services such as water purification, wastewater purification, and flood water reduction?
- ☐ How source water treatment and protection can reduce water treatment costs and related GHG emissions?

CROSS-CUTTING CONCERNS

Achieving climate adaptation and mitigation goals requires new forms of cooperation and management working across all levels of government and parts of society. The considerations listed below are essential to creating a resilient, just future and should be embedded into all of the sectoral considerations listed above. While no means exhaustive, below are some elements to consider when revising and implementing your climate plans.

Human rights

Universal access to water and sanitation have been explicitly recognized as a fundamental human right. The lack of access to safe, sufficient and affordable water, sanitation and hygiene facilities compromises the health, dignity and prosperity of billions of people, and has significant consequences for the realization of other human rights. Climate change threatens the enjoyment of all human rights, including the rights to health, water, food, housing, self-determination, and life itself. As stated by the United Nations, climate change is a result of policy choices that breach the affirmative obligations of States to respect, protect and fulfil human rights.

The Human Rights-Based Approach to development suggests increasing the capacities of rights-holders (citizens) and governments (duty-bearers) in the realization of human rights and the operationalization of development goals. The human rights-based approach to IWRM can be used to ensure that respect for human rights be integrated into water policies and plans, including plans for climate change adaptation and mitigation.

Are you taking into consideration…?

- ☐ Integrating human rights considerations into multi-stakeholder dialogues as part of the NDC revision? Did the stakeholder process ensure participation by vulnerable and marginalized groups?
- ☐ Including transparency and accountability as governance pathways on how to enhance NDCs and implement climate/water plans.
- ☐ How climate change impacts as well as mitigation and adaptation plans can affect different groups in society?
- ☐ Informing citizens about their human rights to water and sanitation, and the environment, and how this relates to possible impacts of climate change and mitigation and adaptation measures?

Gender equality

Changes affect women and men differently. Across the world, women and men access, manage, use and benefit from water and other resources differently. In many households, women are the primary users and managers of water for reproductive activities including cooking, cleaning, subsistence agriculture, health and sanitation. As primary managers of household water resources, women and girls are particularly susceptible to changes in water availability. Variability in water quality and quantity can mean women and girls will have even less time to dedicate to education and productive uses of time outside the home. Women are also responsible for more than half of the world's food production, but due to limitations on their ability to own land and water rights, they must rely heavily on rainfed agricultural practices, making them more vulnerable to changes in weather patterns. While women are relatively unlikely to own land, the benefits of female land ownership range from improved nutrition and reduced domestic violence to greater income and savings.

When it comes to the disastrous effects of climate change in the form of floods and storm surge, women are at a disadvantage due to social norms. Women are less likely to be aware of the warning signs of a disaster, less likely to be trained in swimming or tree climbing or may be left in the path of harm because they are responsible for caring for infirm relatives and children. In some places, women may also need permission from their husbands to leave the home or use a vehicle. Such discrimination renders women more vulnerable to the effects of disasters.

Are you taking into consideration...?

- ☐ Whether women and men have been appropriately consulted regarding climate change mitigation and adaptation measures? Are women well represented in decision making forums? Do they have equal ability to influence decisions?
- ☐ The ways in which policy and practice changes may impact women differently than men? Will changes to water management result in women and girls needing more time to collect water?
- ☐ Ensuring that women are well informed about and equipped to deal with potential disasters like flooding? Have specific efforts been made to ensure information is shared in a way that is sure to reach women and girls equally?
- ☐ Increasing women's influence and control over land and water resources as a concrete mitigation or adaptation measure?

Indigenous peoples

Over 475 million people globally define themselves as indigenous, asserting descent from inhabitants predating conquest or colonization, and whose social, cultural and economic institutions and conditions distinguish them from other sections of the national community. While overrepresented among the world's poorest, indigenous peoples manage or have tenure rights over approximately 38 million square kilometers of land, or 40% of the terrestrial land area. Indigenous peoples have often been marginalized within their respective economic systems or live in more marginal or isolated land locations, and as a result may be quite susceptible to the impacts of climate change. Many indigenous peoples have very strong connections with water, both culturally and spiritually, and increased hydrological variability can potentially impact cultural and traditional approaches to land and water management. However, indigenous peoples may be able to use traditional approaches and knowledge to build local resilience and reduce the vulnerability of local ecosystems through alternative land management.

Are you taking into consideration…?

- ☐ Appropriate platforms for dialogue and discussion between national and sub-national governmental entities and indigenous communities?
- ☐ The role that indigenous peoples play in many basins, including source protection management in headwaters and upper catchments?
- ☐ Strengthening the role of indigenous peoples in land and water conservation?
- ☐ The role of 'Traditional Ecological Knowledge' to understand and manage society-nature interrelations?
- ☐ The potential impact that water variability will have on important water bodies such as rivers or lakes and how this will affect indigenous cultural practices and traditions?

Disaster management and risk reduction

Nearly all climate models predict a global increase in the frequency and severity of storms, floods and droughts. While changes will not be uniform, many of the most important agricultural centers around the globe are particularly vulnerable to these extreme events. The World Bank report 'Uncharted Waters' shows how increasingly erratic rainfall impacts society. Droughts are 'misery in slow motion' with impacts deeper and longer lasting than previously believed – sometimes spanning generations.

Energy, agriculture, water, and sanitation infrastructure are the critical systems most at risk from rising seas, storms and drought. For example, prolonged electricity outages can impact drinking water supplies while reduced river flows during periods of drought can disrupt hydropower operations and halt the production of biofuel feed stocks. Increased flooding can cause overflows and damage local wastewater and sanitation systems, leading to increased GHG emissions from polluted standing water or reduced blue carbon stocks.

Are you taking into consideration…?

- ☐ Integrated disaster risk reduction (DRR) with risk reduction strategies, including e.g. suitable types and locations for energy, water, and sanitation infrastructure?
- ☐ Investing in locally managed early warning systems in hazard-prone communities to help reduce the risks associated with drought, floods and other natural hazards?
- ☐ Redundant or complementary supply systems to ensure stable production during and after extreme events? A strategy for managing overflows or potential damage to infrastructure?
- ☐ Improving coastal defenses by protecting or restoring coastal wetlands such as tidal marshes and mangrove forests?
- ☐ How susceptible your crops are to extreme weather events? How resistant to drought? How marketable or locally useful potential alternative crops are?
- ☐ Social security measures with targeted measures for vulnerable groups, genders and ages?

Socio-cultural values of ecosystems and relation to equality

Freshwater ecosystems provide essential services not only in terms of physical human health, livelihoods and sustenance, but they also contribute to mental health, human wellbeing and serve spiritual and cultural functions. Although water manifests uniquely in different cultural contexts, rites, rituals, and specific knowledge relating to water are present in every major religious tradition and water is sacred to cultures around the world. Rivers and many specific waterbodies hold significant spiritual value in many societies. As climate change threatens these freshwater ecosystems, traditional culture is also threatened.

Ensuring that these cultural and spiritual functions are preserved is key to climate change adaptation and can also help frame mitigation and adaptation actions for local communities. The way that people and ecosystems are governed or not – questioning what is to be 'governed' – links, at a deeper level, to how resources are respectfully used by different parts of society and equitably shared among species of different generations.

Are you taking into consideration…?

- ☐ How local communities rely on water to meet their daily needs, including their spiritual and emotional wellbeing? How they are affected by increasing variability in water availability? Or impaired water quality?
- ☐ What religious and spiritual traditions can tell us about the importance of protecting water and water-dependent ecosystems? How can we frame climate plans in ways that acknowledge these traditions and ensure their survival?
- ☐ How climate mitigation and adaptation efforts may be conditioned by the interests of specific groups in society? How these same efforts might affect water resources, ecosystems and people differently?

CLIMATE-RESILIENT WATER GOVERNANCE

Integrated Water Resources Management (IWRM)

In many regions, the impacts of climate change add to the existing water resources challenges related to population and economic growth. Increasing demands on water sharpen tradeoffs around local and regional water resources necessitating coordinated approaches to water management. Integrated Water Resources Management (IWRM) is a management optimization process recognizing that all water uses – and all water users – are interdependent. IWRM proposes a stakeholder process to ensure the coordinated development and management of water, land and related resources, and efficient water allocation between all parts of society, with a view to achieving economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems and the environment.

Are you taking into consideration...?

- ☐ Governance mechanisms, such as IWRM, that explicitly help to coordinate water management across all parts of society?
- ☐ Including civil society and local water groups in participatory and long-term water decision making?
- ☐ How to ensure that water in all sectors is used efficiently and effectively, especially during times of scarcity and difficult tradeoffs between different users?
- ☐ Future water constraints and processes for consultation and discussion regarding re-allocation among water users, resulting from new and increasing demands, or from reduced water quality and availability or increased unpredictability?
- ☐ Measuring and monitoring water use across sectors?

Sustainable groundwater management

A majority of the Earth's available freshwater is found underground and roughly one-third of humanity relies upon groundwater as their primary source of water. In addition, groundwater provides an important buffer against floods and drought. As rainfall becomes more variable or seasonal weather patterns shift, aquifers are becoming an increasingly critical source of water for agriculture, energy and human use. Worldwide, groundwater is often unregulated and is commonly referred to as an 'invisible' resource because we cannot see it. For this reason, groundwater is prone to pollution and over-extraction, meaning more water is taken out than returned to the system. The rate at which aquifers replenish varies widely depending on the underlying geology, soils, land use, topography and regional climate. Depleting aquifers faster than the recharge rate can lead to sinking land (called subsidence) and saltwater intrusion – especially in coastal aquifers – as well as reduced soil health and surface water availability. Protecting these valuable water storage and filtration systems can provide important climate solutions, such as retaining water during floods to be used later during dry periods when surface waters may run low.

Are you taking into consideration...?

- ☐ Identifying, mapping, measuring, and monitoring local groundwater supplies including upstream-downstream and surface-groundwater interactions (so-called conjunctive management)?
- ☐ Management approaches such as Managed Aquifer Recharge (MAR) where appropriate and necessary to maintain aquifer functioning and improve water availability?
- ☐ Proper management of pesticides and fertilizers as well as stormwater treatment to reduce groundwater contamination? Reporting and enforcement of contamination reduction measures?
- ☐ Management of sanitation systems to avoid contamination from latrines or leaking sewers?
- ☐ Regulating and controlling the abstraction of groundwater by private users?
- ☐ Exploring the potential of unconventional groundwater resources like brackish groundwater for domestic consumption?

Transboundary water management

Many of the global agreements and process around climate change are directed towards supporting national and sub-national efforts. However, many countries share important water bodies such as transboundary river basins, transboundary lakes and transboundary aquifers. National efforts to address climate change, whether mitigation, adaptation or both, will have an overall impact on transboundary water resources and, potentially, the ability of each to meet their own NDCs, both positively and negatively. For example, if one country expands its irrigated land, downstream countries may have reduced access to water. Similarly, if a downstream country expands its energy network, excess supply may be transmitted upstream and help to secure energy resources for development. On the other hand, joint or coordinated efforts can improve national outcomes. For example: co-selecting key priority areas for wetland restoration in the shared river basins can facilitate the provision of better ecosystem services while helping communities on all sides adapt to climate change. Transboundary can also refer to subnational water bodies that may transcend municipal or provincial boundaries.

Are you taking into consideration…?

- ☐ The potential water demands and available supply of both upstream and downstream countries (states, municipalities) where you are all reliant on a shared water body?
- ☐ The potential for joint projects that can address development needs of several different countries or provinces?
- ☐ The enhanced NDCs of neighboring countries and how their climate change mitigation and adaptation plans might affect, positively or negatively, the management of shared waterbodies?
- ☐ Consulting and coordinating with neighboring countries on water-related measures in shared basins included in your NDC?

Further Reading

These checklists are intended only as an introduction to key water and climate interactions, organized by sector. For a more comprehensive look at the topics covered in the checklists, we've provided a short list of additional resources that go into greater depth.

Water and Climate Policy

- UN-Water. 2019. Policy Brief: Climate and Water: https://www.unwater.org/publications/un-water-policy-brief-on-climate-change-and-water/
- UN-Water. 2020. World Water Development Report: Water and Climate Change. https://www.unwater.org/publications/world-water-development-report-2020/
- Alliance for Global Water Adaptation (AGWA). 2019. Watering the NDCs: National Climate Planning for 2020 and Beyond: www.wateringthendcs.org
- Global Water Partnership (GWP). 2019. Preparing to Adapt: The Untold Story of Water and Climate Change Adaptation Processes: https://www.gwp.org/globalassets/global/events/cop24/gwp-ndc-report.pdf
- International Water Management Institute (IWMI) and the Alliance for Global Water Adaptation (AGWA). 2019. Adaptation's Thirst: Accelerating the Convergence of Water and Climate Action: http://www.iwmi.cgiar.org/Publications/Other/PDF/adaptations-thirst-gca-background-paper.pdf
- Wetlands International. 2020. Locking Carbon in Wetlands: Enhancing Climate Action by Including Wetlands in NDCs: https://www.wetlands.org/publications/locking-carbon-in-wetlands/
- GIZ and Adelphi. 2020. Stop Floating, Start Swimming: Water & Climate Change – Interlinkages and Prospects for Future Action: https://www.everydrop-counts.org/water-climate-report

Technical Resources

- Cap-Net Water and Climate Webinars and additional resources: https://cap-net.org/webinars-water-in-ndc-enhancement/
- The World Bank. 2013. Working Paper: Thirsty Energy: https://openknowledge.worldbank.org/handle/10986/16536
- The World Bank. 2020. From Waste to Resource: Shifting Paradigms for Smarter Wastewater Interventions in Latin America and the Caribbean: https://openknowledge.worldbank.org/handle/10986/33436
- UNESCO and the International Center for Integrated Water Resources Management. 2018. Climate Risk Informed Decision Analysis (CRIDA): Collaborative water resources planning for an uncertain future: https://unesdoc.unesco.org/ark:/48223/pf0000265895
- Global Water Partnership. 2019. Addressing Water in National Adaptation Plans: Water Supplement to the UNFCCC NAP Technical Guidelines. 2nd Edition: https://www.gwp.org/globalassets/global/gwp_nap_water_supplement.pdf

- FAO. 2018. Nature-Based Solutions for agricultural water management and food security: http://www.fao.org/3/CA2525EN/ca2525en.pdf
- Global Resilience Partnership (GRP), The Nature Conservancy (TNC), and the Alliance for Global Water Adaptation (AGWA). 2019. Wellspring: Source Water Resilience and Climate Adaptation: https://www.nature.org/content/dam/tnc/nature/en/documents/Wellspring_FULL_Report_2019.pdf
- Cremades et al. 2019. Ten principles to integrate the water-energy-land nexus with climate services for co-producing local and regional integrated assessments: https://www.sciencedirect.com/science/article/pii/S0048969719335880#!
- Green Climate Fund. 2020. Readiness and Preparatory Support Programme Guidebook: https://www.greenclimate.fund/sites/default/files/document/readiness-guidebook.pdf
- The World Bank. 2019. Financing Climate Change Adaptation in Transboundary Basins: Preparing Bankable Projects: https://www.unece.org/environmental-policy/conventions/water/envwaterpublicationspub/water/envwaterpublicationspub74/2019/financing-climate-change-adaptation-in-transboundary-basins/doc.html
- The Initiative for Global Environmental Leadership (IGEL) and Suez Environment. 2016. Managing Industrial Water in the Age of Climate Change: http://d1c25a6gwz7q5e.cloudfront.net/reports/2016-09-01-IGEL-suez-report.pdf

Note on Contributions

The present set of checklists were initiated as the UNDP-SIWI WGF's contribution to the implementation of the UNDP's Climate Promise, assisting at least 100 countries to enhance their NDCs.

(A snapshot of this checklist will be appended to the water module being developed by WRI, UNDP and partners to accompany Enhancing NDCs – A guide to Strengthening National Climate Plans by 2020).

The present version [end of October 2020] has been written by Ingrid Timboe (AGWA) with Marianne Kjellén (UNDP), David Hebart-Coleman (SIWI), Birgitta Liss Lymer (SIWI) and Katharina Davis (UNDP), with contributions from Håkan Tropp (SIWI) and Kanika Thakar (SIWI). Helpful comments on previous versions have been received from colleagues at UNDP, SIWI, AGWA, and elsewhere.

A previous version of this document, used for the first round of webinars, is available at https://www.ndcs.undp.org/content/ndc-support-programme/en/home/impact-and-learning/library/water-interactions-to-consider-for-ndc-enhancement.html. This remains a living document, and other contributions are expected to be added to this list, not least after discussions on implementation of the enhanced NDC's.

Suggestions for edits and improvements are welcome, including feedback on how this set of questions may have stimulated or informed discussions between climate and water professionals. Ideas and recommendations for improvements are appreciated. Please let your workshop facilitator or contact point know, or write to the UNDP Policy Advisor - Water Governance: marianne.kjellen@undp.org.

WATER GOVERNANCE FACILITY

AGWA

SIWI

UN DP