CLIMATE BONDS STANDARD - WATER CRITERIA

Defining Expectations for Water Infrastructure-Related Certified Climate Bonds

Background Paper to Eligibility Criteria

Water Technical Working Group

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Draft Climate Bonds Standard Water Criteria – Background Paper
For Public Consultation

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We, the Consortium Partners, would like to extend our sincere gratitude to John Matthews, Coordinator for the Alliance for Global Water Adaptation (**AGWA**) and lead specialist on the Technical Working Group for the Climate Bonds Standard Water Criteria. John was instrumental in driving the development of the Water Criteria, leading the discussions with the Technical Working Group and Industry Working Group.

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1. Introduction

1.1. Funding the transition to a climate-resilient development trajectory

The current trajectory of climate change is expected to lead to a global warming of 4-6°C by the end of the century. The potential for such change poses an enormous threat to the future of the world's nations and economies, with rising sea levels, increased frequency and severity of hurricanes, droughts, wildfires, typhoons, changes in agricultural patterns and yields.

At the same time, the world is entering an age of unprecedented urbanisation and related infrastructure development. Global infrastructure investment is expected to amount to USD 90 trillion over the next 15 years, which is more than the entire current infrastructure stock.[1] To ensure sustainable development and halt climate change, this infrastructure needs to be both low-carbon and resilient to climate change, without compromising the kind of economic growth needed to improve the livelihoods and wellbeing of the world's most vulnerable citizens.

Ensuring that the infrastructure built is low-carbon raises the annual investment needs by 3–4% to USD 6.2 trillion.[2] Climate adaptation needs add another significant amount of investment, which is estimated at USD 280–500 billion per annum by 2050 for a 2-degree Celsius scenario.[3]

Traditional sources of capital for infrastructure investment (governments and commercial banks) are insufficient to meet capital requirement needs to 2030; institutional investors, particularly pension and sovereign wealth funds, are increasingly looked to as viable actors to fill these financing gaps. Bonds offer relatively stable and predictable returns, and long-term maturities. This makes them a good fit with institutional investors' investment needs.

Labelled green bonds are bonds where the proceeds are used for green projects and assets, mostly climate change mitigation and/or adaptation projects, and labelled accordingly. The rapid growth of the labelled green bond market has shown in practice that the bond markets provide a promising channel to finance climate investments.

1.2. Water infrastructure as part of that vision

Modern economies are deeply water intensive. Freshwater resources are essential for meeting water supply and sanitation needs, for most types of energy production, for agriculture, for terrestrial, aquatic, and near-shore marine ecosystems, and for industrial and manufacturing needs.

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[1] The Global Commission on the Economy and Climate (2016). *The Sustainable Infrastructure Imperative: Financing for Better Growth and Development*. Available from: http://newclimateeconomy.report/2016/wp-content/uploads/sites/4/2014/08/NCE_2016Report.pdf

[2] The Global Commission on the Economy and Climate. *Better Growth, Better Climate.* Available from: www.newclimateeconomy.report

[3] UNEP (2016). *The Adaptation Finance Gap Report.*

Water and water infrastructure will play an even more fundamental role in resilient, low carbon economies.

From a climate mitigation perspective, water and water infrastructure often have a deep connection to carbon emissions. Therefore, efforts to reduce the energy consumed and/or the amount of water treated or moved can all have very significant impacts on greenhouse gas emissions, and make a significant contribution to rapid decarbonisation of the global economy.

Climate adaptation and resilience is one of the most important new aspects of water management. Water assets that are designed and operated to ensure adaptation and resilience are the newest type of water investments. Adapting existing systems to future climate or building new systems to ensure effective adaptation are essential given the primacy of water in modern economies.

At the most basic level, climate change means that water quality, quantity, and the timing of its availability are evolving and will likely continue to do so for decades or centuries. The ability of water infrastructure to provide robust, reliable services is essential to meet and continue to meet sustainable development goals (SDGs) and NDC (UNFCCC Nationally Determined Contributions) commitments, as well as integral to meeting the commitments of the 2015 Paris Agreement. Attention needs to be paid to perhaps one of the greatest challenges around water in a changing climate: ensuring that water supplies are sufficient across a wide set of allocations (cities, ecosystems, agriculture) even as these demands, hydrological conditions and the climate evolve over time.

1.3. The goal of the Climate Bonds Standard and the associated Water Criteria

The global green bond market reached over US$80bn in annual issuances in 2016, up from US$ 11.5 billion in 2013, and could be valued at US$1tn by 2020[4]. Water infrastructure-related bonds represent a growing subset of the this market. Green bonds invested in water assets/projects reached USD7.4bn outstanding in 2016, 14% of the green bond market, up from 9% in 2015.

In the absence of clear and widely accepted definitions around what is green, this rapid growth has raised questions around the environmental claims of these bonds and the potential for ‘greenwashing’, where bond proceeds are allocated to assets that have little or uncertain environmental value. This can both shake confidence in the market and hamper efforts to finance a transition to a low carbon, climate resilient economy.

The Climate Bonds Standard and Certification Scheme is a tool to address greenwashing. It allows investors and intermediaries to easily assess the climate integrity of bonds, and to identify and invest in climate compatible assets/projects.

The Climate Bonds Initiative convenes scientists, engineers, investors and other specialists in expert committees to develop clear, evidence- and research-based scientific criteria on what is 'climate-compatible'. Only bonds which meet these Criteria can be certified. The associated Certification scheme provides assurance on the climate credentials of Certified Climate Bonds by offering certification only where independent verifiers determine that the bond is aligned with requirements of the Climate Bonds Standard.[5]

In this context, the **Water Criteria under the Climate Bonds Standard** are intended to communicate to investors what water-related investments are resilient, effective, and sustainable over their operational lifetime, and provide complying issuers in the global corporate, municipal, sovereign and supra-sovereign markets with a means to clearly differentiate their green bond offerings. By establishing this screening tool, the intention is to maintain transparency and credibility with respect to water-related bonds in the green bonds market.

A key objective has been to close the significant gap between the credibility of labelling green and climate bonds in the finance market and the broader water management and science community. Significant shifts are occurring in how water-related projects are developed, incubated, and designed, particularly with reference to climate change. It is essential that these shifts are fully reflected in investment decisions.

Box 1 outlines what mitigation and adaptation might mean in the context of water infrastructure investments, highlighting the potential for confusion between policy, investor and water managers due to different understanding of key terms.

[5] The Climate Bonds Standard has requirements on use of proceeds (alignment with green definitions based on sector criteria under the Standard), management of proceeds, reporting and disclosure, and external review. The Standard is aligned with the requirements of the Green Bond Principles (GBP). https://www.climatebonds.net/standards/standard_download

Box 1: Climate mitigation, climate adaptation, and mitigating impacts

Terminology differences between the policy, investor, and water management worlds can be enormous in the context of climate change, especially around the terms “adaptation” and “mitigation.”

In a climate policy context, **climate mitigation** refers to efforts to reduce rates of greenhouse gas emissions (or to lower the concentration of greenhouse gases in the atmosphere). Climate mitigation projects include shifts to low-carbon energy generation sources, such as solar power and wind, or avoiding carbon-emitting activities such as deforestation. Climate mitigation has occupied the overwhelming amount of policy efforts within global climate governance, and has also been the primary focus of national level climate policy in most developed and urban middle-income countries.

For many in the water world, however, the term mitigation refers to reducing or offsetting a negative impact, such as creating a new wetland following the destruction of a marsh in the course of implementing an infrastructure project.

The water definition of mitigation is actually closer to the policy meaning of **climate adaptation,** a term that refers to efforts to limit or avoid negative climate impacts like increased drought frequency, sea level rise or earlier snowpack melt. Unfortunately, some climate adaptation literature also refers to “mitigating climate impacts” (i.e., reducing negative impacts), but without any intended allusion to greenhouse gases (climate mitigation). Such usage is confusing. Worse, the term “adaptation” is also widely used in biology and natural resource management to refer to concepts that have little relevance to “climate adaptation,” though both definitions can sometimes be found in single documents that reference climate change and ecosystems.

For clarity and consistency, this document will exclusively employ the climate change policy frame of reference for “mitigation” and “adaptation.”

1.4. The development process and this document

The Water Criteria were developed and rolled out in two phases.

Phase I developed eligibility Criteria for **engineered** or **built** water infrastructure for the purposes of water collection, storage, treatment, distribution, or flood and drought defences. These Criteria were released in October 2016. To date, three bonds have been certified by demonstrating compliance with these Criteria, two from the San Francisco Public Utilities Commission, and a third from the City of Cape Town.[6]

Phase 2 began in April 2016 with the objective to develop complementary Criteria for **nature-based solutions**, which includes green and hybrid water infrastructure for such purposes as

[6] For more information on these bonds, see https://www.climatebonds.net/standards/certification

water collection, storage, treatment or distribution, flood protection, and drought resilience. These Phase 2 Criteria are now being shared for public consultation.

The Climate Bonds Initiative convened two groups to develop these Criteria. A Technical Working Group (TWG) and an Industry Working Group (IWG). Annex 1 lists the more than 100 members of these groups.

The TWG is a group of key experts from academia, international agencies, industry and NGOs in water sector, selected for their expertise and insight into sustainable water management, often (but not always) with additional experience or knowledge around climate resilience and impact, climate adaptation, and/or climate mitigation with relevance to water resources management. The TWG drafted the proposed Water Criteria, which detailed technical criteria for the eligibility of water assets and projects as well as guidance on the tracking of eligibility status during the term of the bond.

These draft Criteria have refined through engagement with finance and industry experts who are or who might be involved in the process of issuing, assessing or investing in a water-related green or climate bond. As such, the IWG provides an industry voice about practicality and relevance from both global and regional perspectives. Special climate knowledge was not assumed with the IWG members, whose role is to review the Criteria and provide feedback based on the utility of the Criteria, refine its scope, as well as gauge potential demand and industry interest.

A consensus based approach has been followed to reflect the issues, demands, and insights of both the IWG and TWG.

The Criteria are also released for wider public consultation. Final approval of Criteria is given by the Climate Bond Standards Board.

The purpose of this Background Document is to give an overview of the water sector and highlights opportunities for mitigation and adaptation, providing context to the work of the Water TWG under the Climate Bond Standard and Certification Scheme. It summarises the issues considered by the TWG in developing the Water Criteria, explaining how these issues have shaped the development of the proposed Criteria.

Those involved in the development of both phase 1 and phase 2 of these Criteria have undertaken to present a comprehensive first version of the Criteria. It is, however, acknowledged that revisions will be needed over time. We emphasise that the Criteria may be amended either due to public feedback or future developments in the water sector. However, amendments to the Criteria will not be applied retrospectively to already bond already certified under prior versions of the Criteria.

As regards the phase 2 Criteria relating to nature-based-solutions and green or hybrid water infrastructure, these are currently open for public consultation. Feedback is welcomed in order to ensure the Climate Bonds Standard Water Criteria are as robust, credible and practical as possible.

2. Water infrastructure in the context of climate change

2.1. What do we mean by water infrastructure

Modern and developing economies "float" on water resources and the infrastructure necessary for energy production, the supply and storage of water resources, irrigation and aquaculture, disaster management and avoidance, and industrial and management applications.

In this context, water infrastructure functions and associated assets addressed by the Water Criteria include:

- **Water capture:** assets that retain water moving across the landscape;
- **Water storage:** assets that keep water for transfer, allocation, and delayed use;
- **Water treatment**: assets that alter water to meet specific standards, stakeholders, consumers, or environmental applications;
- **Flood defence**: assets that provide protection against rising waters;
- **Drought defence:** assets that address water scarcity;
- **Stormwater management:** distinct from flood-related assets, assets that cope with intense precipitation events?

This infrastructure does not always refer to concrete, stone, and steel. Ecosystems and the underlying geology they interact with through the water cycle are the original "water infrastructure" — rivers and lakes, as well as aquifers, groundwater, and the living and non-living systems that compose ecosystems. This 'nature-based' water infrastructure are essential to provisioning a wide range of water services, and increasingly they are being integrated within formal water management systems as green and hybrid infrastructure.

For this reason, while Phase 1 of the Criteria (already released) focused on **built or engineered water infrastructure**, Phase 2 of the Criteria (now out for public consultation) focuses on **green, nature-based, or natural infrastructure.** This includes the use of ecosystems and ecological processes in order to deliver water services, (such as the use of wetlands for water treatment and the use of biophysical structures for water storage, such as aquifers), as well as hybrid infrastructure (which blends built and green solutions, such as "room for the river" flood control solutions that mix ecosystems with built levies).

Additional detail is available below on the potential range of investments relevant within each function and sector.

2.5. Water infrastructure and climate change

Developed economies are deeply water intensive. Freshwater resources are essential for meeting water supply and sanitation needs, for most types of energy production (hydropower

and thermal energy systems, as well as most solar, geothermal), for agriculture (especially irrigated farming and aquaculture), for terrestrial, aquatic, and near-shore marine ecosystems, and for industrial and manufacturing needs. Water is essential too for health and sanitation needs.

For example, in most developing economies, agriculture consumes 70 to 80% of national-level water resources, while the energy sector often uses more than 50% of resources in countries such as the United States, France, and Japan.[7]

Water is also viewed as a resource essential to meeting the 2030 Agenda for Sustainable Development and the SDGs (Sustainable Development Goals). Water is most prominently named in SDG 6, but many others such as SDGs 2 (hunger) and 11 (urban resilience) fundamentally require long-term sustainable resource management.

The connections between water resources and economic development and sustainability are relatively clear, but the relationship between water and climate change may be less obvious.

The earth is already facing to many decades and centuries of ongoing climate change impacts. Moreover, the water cycle — the process through which water moves between the oceans, atmosphere, and the terrestrial surfaces (and sub-surfaces) of the planet — has proven to be extremely sensitive to climate. Indeed, water is so important to human activities and economies that it has been called the "medium through humans will experience most of the negative impacts of climate change".[8] The World Economic Forum has called out water and the failure to adapt to climate change as two of the most dangerous threats facing economies today.[9]

Water infrastructure and ecosystems represent special challenges under these conditions, primarily because (a) both tend to remain on the landscape for a scale extending from decades to centuries (and even millennia in some cases), and (b) our management processes tend to be based on an analysis of past rather than of future conditions.[10] The latter, an assumption referred to as "stationarity," represents a deep crisis in how we articulate our economy and define ecological sustainability that has proven challenging to reorient.[11]

In effect, climate change is redefining our definition of sustainability through the lens of water, a process that is being expressed through our economic dependence on long-lived water infrastructure for cities, energy, health and sanitation, ecological management, agriculture, and

[7] International Energy Agency. 2016. Water Energy Nexus. Paris: OECD/IEA. https://www.iea.org/publications/freepublications/publication/WorldEnergyOutlook2016ExcerptWaterEnergyNexus.pdf
[8] Grey D, Sadoff C. W (2007) Sink or swim? Water security for growth and development. Water Policy 9: 545–571.D. GreyC. W. Sadoff2007Sink or swim? Water security for growth and development.Water Policy
[9] World Economic Forum. 2017. Global Risks Report 2017, 12th edition. Geneva: World Economic Forum. http://www3.weforum.org/docs/GRR17_Report_web.pdf
[10] Matthews JH, Wickel BA, Freeman S (2011) Converging Currents in Climate-Relevant Conservation: Water, Infrastructure, and Institutions. PLoS Biol 9(9): e1001159. https://doi.org/10.1371/journal.pbio.1001159
[11] Matthews JH, Wickel BA, Freeman S (2011) Converging Currents in Climate-Relevant Conservation: Water, Infrastructure, and Institutions. PLoS Biol 9(9): e1001159. https://doi.org/10.1371/journal.pbio.1001159

other sectors. While growing gaps between the "fit" between our ambient climate and existing water infrastructure is a serious cause for concern, the rise of new approaches to resilient water management represents a new vision for sustainable economies that can both adjust and adapt to emerging climate conditions and continue to slow the rate of climate change through lower greenhouse gas emissions. Water is both a symptom of a deep problem and the primary instrument for new solutions.

2.5.1. Water and Greenhouse Gas Emissions

From a climate mitigation perspective, water and water infrastructure often has a deep connection to carbon emissions.[12]

For instance, water pumping from groundwater or from storage sites to consumption points (cities, irrigation, energy) can be very energy intensive given the volume and density of water resources and the distance covered. Distances of dozens to hundreds of kilometers are common for water transfers.

As another example, water treatment facilities and processes can be especially "thirsty" for energy.[13] This can include urban wastewater, agricultural and industrial effluent treatment, desalinization of sea water and some types of groundwater, where water quality is altered to meet some targets for acceptable use or for re-entering the environment.

Therefore, efforts to reduce the energy consumed and/or the amount of water treated or moved can all have very significant impacts on greenhouse gas emissions, and make a significant contribution to rapid decarbonisation of the global economy.

2.5.2. Adapting Water Management to Climate Impacts

Attention has recently focussed on ensuring that water-using facilities are robust to future climate change, including changing hydrological conditions. For example, in the energy sector specifically, many large water-intensive energy production facilities more than 30 or 40 years old have begun to experience very significant impacts from climate change as water conditions have diverged from their initial operating parameters. In effect, these facilities have seen significant, sometimes enormous, drops in efficiency and capacity, requiring large reinvestments to ensure that green energy targets can continue to be met.[14] New facilities face the same

[12] World Bank Group. 2016. *High and Dry: Climate Change, Water, and the Economy*. World Bank, Washington, DC. https://openknowledge.worldbank.org/handle/10986/23665

[13] Rodriguez, Diego J.; Delgado, Anna; DeLaquil, Pat; Sohns, Antonia. 2013. *Thirsty Energy. Water Papers*. World Bank, Washington, DC. https://openknowledge.worldbank.org/handle/10986/16536

[14] These stories are becoming quite common. Two well-documented stories come from Africa (https://www.nytimes.com/2016/04/13/world/africa/zambia-drought-climate-change-economy.html?_r=0) and California in the USA (https://www.nytimes.com/2017/02/14/us/oroville-dam-climate-change-california.html).

challenge if they have not been designed to be resilient across a range of potential future climate conditions.

However, attention also needs to be paid to perhaps one of the greatest challenges around water in a changing climate, namely ensuring that water demands are sufficient vis a vis other types of allocations (cities, agriculture) even as these demands evolve over time. Gaps between available and needed water resources have led to widespread conflicts, including some on a catastrophic scale.[15]

The impacts of climate change on the water cycle are often complex. Shifts in the frequency and severity of droughts, flooding, and tropical cyclones are obvious trends that have been widely identified, but even these can be unpredictable. In 2015 the U.S. state of California declared a severe drought in terms of an absolute decrease in the amount of precipitation it has received (a drought that has been linked to climate change in the scientific literature[16]). Both Oregon and Washington, states to the north of California, received relatively normal amounts of annual precipitation, but they declared drought emergencies in 2015 as well. Their winter precipitation fell much more than usual in the form of rain instead of a mix of both rain and snow in 2014–2015.

Instead of facing a long dry season for 2015 with ample groundwater recharge and extensive snowpack “stored” in their mountains, these US states experienced severe shortages because of shifts in the *types* of precipitation, not its quantity. By the winter of 2016, record-setting rains occurred in the region, abruptly ending the drought and transiting to severe flood conditions that in a few cases surpassed the design conditions of major assets. The partial failure of the Oroville Dam in northern California, forcing the evacuation of several hundred thousand nearby residents, was a sign of the emerging stressors that climate change adding to our water management systems.[17]

Such impacts are completely novel in the experience of local decision makers. These impacts have been affecting urban infrastructure, energy generation, agriculture, the forest fire regime, and environmental management tradeoffs.

Other common impacts from climate change on the water cycle derive from shifts in the timing and seasonality of precipitation, a pattern already seen in areas such as South Asia with increasing variability in the Indian monsoon; shifts in the qualities of so-called climate engines such as El Niño–La Niña cycling

The El Niño Southern Oscillation (ENSO) and the Pacific Decadal Oscillation (PDO), which influence precipitation over large regions; and water quality impacts, those seen in China's Yangtze basin indicate more frequent and intense eutrophic conditions (which support algal blooms) observed even in southern China’s winter.

[15] https://www.theguardian.com/world/2012/jul/31/india-blackout-electricity-power-cuts

[16] Source: http://www.ldeo.columbia.edu/news-events/warming-climate-deepening-california-drought

[17] Source: https://www.nytimes.com/2017/02/14/us/oroville-dam-climate-change-california.html

In this context, climate adaptation and resilience is one of the most important new aspects of water management and how we cope with climate impacts. At the most basic level, climate change means that water quality, quantity, and the timing of its availability are evolving will likely continue to do so for decades or centuries. The ability of water infrastructure to provide robust, reliable services is essential to meet and continue to meet development goals (SDGs) and NDC (UNFCCC Nationally Determined Contributions) commitments, as well as integral to meeting the commitments of the Paris Agreement.

For financial analysts, assessing water-related investments' exposure to climate risks has been largely opaque and ill defined. Awareness of the need to consider climate risks related to water are growing rapidly and are now consistently are identified as one of the most important threats to growth and profitability by groups such as the World Economic Forum (WEF 2017), but progress has been slow.

Investors are increasingly aware of these special risks and seek assurance that "climate-compatible" investments are reliable, robust to diverse futures, and flexible in the face of uncertainty. The Water Criteria are designed to communicate how these issues have been addressed by the issuer, and to do so in a simple, clear format.

3. Green bonds for Water Infrastructure

3.1. Funding needs in this sector

Water investments have been highlighted globally through the 2030 Agenda connected to the Sustainable Development Goals, which depend heavily on water resources to meet targets for access to clean water, effective healthcare, energy and food security in particular.

In 2015, the international community, under the auspices of the UN Framework Convention on Climate Change (UNFCCC) set out targets in the Paris Agreement to slow the rate of climate change. National goals under the Paris Agreement are defined through a new instrument call National Determined Contributions (NDCs). More than 80% of the NDCs to date explicitly mention water as necessary to meeting climate mitigation and adaption goals, and new and updated water infrastructure will be critical to meeting both NDC and global climate targets.

Estimates for annual global investments in water range between 1 and 2 trillion USD, including both new construction, operations, maintenance, and upgrades to existing assets, all of which span many sectors: energy, agriculture, cities, disaster prevention, sanitation and health, and ecosystems.

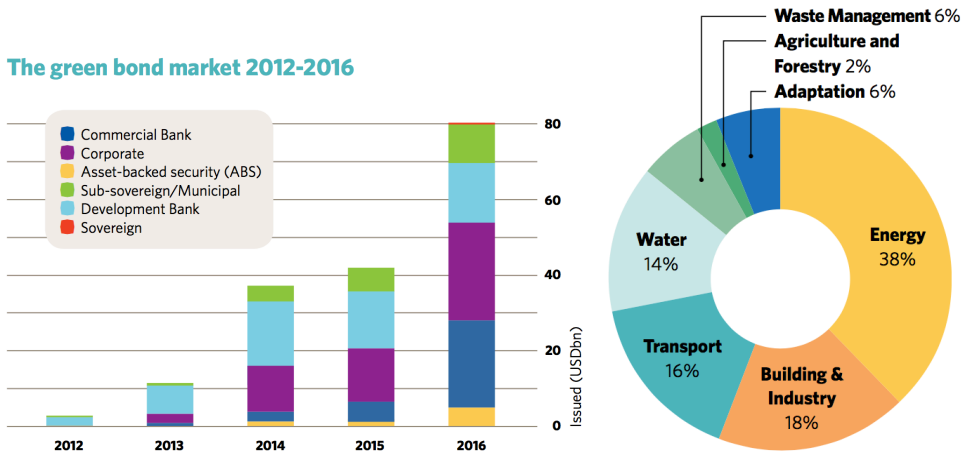
3.2. Bond issuances to date

The green bond market emerged in 2007- 2008 with bonds issued by the World Bank and European Investment Bank (EIB). From 2007-2012, the market mainly featured development

banks such as the EIB, IFC and World Bank. As the market grew, there has been increasing diversification of both issuers and investors. In 2016, the labelled green bond market amounted to over USD118bn outstanding, with an issuance of USD81bn in 2016 – a record high.[18]

Looking at water related bonds in particular, green bonds invested in water assets/projects reached USD7.4bn outstanding in 2016. Overall, this sector has increased from 9% of green bond issuance in 2015 to 14% in 2016. See Figure 1.

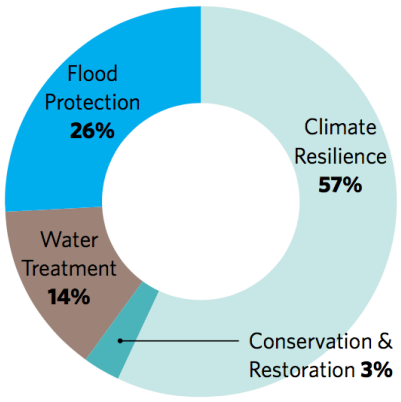
Figure 1: Growth in the green bond market since 2012, and use of proceeds of bonds issued in 2016



As illustrated in Figure 2 below, the proceeds of these water related bonds have been allocated to various water assets/projects including water treatment with a focus on waste and drinking water upgrades; flood protection which involves investment in levees, storm sewers, sea walls and other food defences; restoration of natural water and the conservation of water supply, and other general water authority adaptation upgrades.

Figure 2: Use of proceeds for water related green bonds issued in 2016

[18] Climate Bonds Initiative (2017). https://www.climatebonds.net/2017/01/climate-bonds-2016-highlights-big-issuers-big-numbers-trends-count-and-2017-forecast



In the US, several labelled green bonds related to water assets have been issued. An early issuer was DC Water who came to market in 2014, and have subsequently returned to the market in 2015 with a $100m issuance. Authorities with green bonds include Massachusetts Clean Water, Indiana, New York, St Pauls, Connecticut and New Jersey. Two bonds totalling over USD1bn have been issued by San Francisco Public Utilities Commission, both of which were certified under the Climate Bonds Standard under the provisions of Phase 1 of the development of these Water Criteria.

Box 2 below provides further clarification on the nature of green and climate bonds, vis-à-vis regular or vanilla bonds.

Box 2: Climate Bonds, Green Bonds and Blue Bonds

Green bonds are just like regular bonds in that they are issued by a public of private entity, who guarantees to repay the bond over a certain period of time, plus either a fixed or variable rate of return. They have however one distinguishing feature over regular bonds: proceeds are earmarked for projects or assets with environmental benefits.

The idea of a climate bond is an extension of the green bond concept. The use of proceeds in a climate bond are earmarked for assets and projects with climate change benefits, either mitigation, adaptation and/ or climate resilience.

Blue bonds is a label sometimes used to refer to bond offerings that drive capital toward water-related projects and assets.

In reality, there is much overlap between green, blue and climate labelled bonds. Many green bonds are used specifically to fund specifically climate mitigation and adaptation assets and projects. Further, as climate bonds move into climate resilience considerations they are increasingly incorporating a range of traditional sustainability impacts. And blue bonds are themselves green or climate bonds, but focussed on a 'blue sector'.

3.3. Growing green finance for water

The rapid growth in the green bond market over the past 3 years has been met with questions around the environmental claims of these bonds. In the absence of clear and widely accepted definitions around what is green, many investors have raised concerns about 'greenwashing', where bond proceeds are allocated to assets that have little or uncertain environmental value. This can both shake confidence in the market and hamper efforts to finance a transition to a low carbon economy.

The Climate Bonds Standard Water Criteria aims to define what is low carbon and climate resilient water infrastructure. It focuses on both mitigation and adaptation & resilience of water infrastructure assets, and their impact on the resilience of the system in which they are part.

Certifying a water-related green bond under the Climate Bonds Standard Water Criteria provides assurance on the climate credentials of those bonds. It allows issuers to demonstrate to the market that their water bond meets best practice for climate integrity, management of proceeds and transparency, making it easier for investors and intermediaries to identify and invest in low carbon and climate resilient water assets/projects with genuine climate benefits.

4. Key issues in developing Water Criteria for the Climate Bond Standard

4.3. What assets and activities should be covered by these Criteria?

The Climate Bond Standard Water Criteria apply to a wide range of water investments and projects, spanning industrial water efficiency, water treatment and reuse including water utility functions, aquatic ecosystem restoration and management, and water supply systems. In addition, assets and activities designed to ensure adaptation and resilience are the newest type of water investments, and as such, were deemed to be a major target for the Water Criteria.

That is, the Water Criteria cover assets and activities relating to:

- Water capture and/or transfer: retaining water moving across the landscape or facilitating the bulk transfer of water resources;
- Water storage: keeping water for later allocation and delayed use;
- Water treatment; altering water to meet specific standards or the needs of stakeholders, consumers, or environmental applications;
- Flood defence: protecting against rising waters;
- Drought defence: addressing water scarcity;
- Storm-water management; coping with intense precipitation events, especially in urban settings;
- Ecological restoration / management; supporting intact or recovering damaged ecosystems in a shifting climate.

The Criteria can apply to both new assets and those undergoing modification or repair.

They are are also appropriate for a variety of construction types, including:

- Built or engineered infrastructure, which refers to traditional water infrastructure investments. Examples include wastewater treatment plants, the use of concrete storm-water systems, and drip irrigation.
- Green, nature-based, or natural infrastructure, which includes the use of ecosystems and ecological processes in order to deliver water services, such as the use of wetlands for water treatment and the application of biophysical structures for water storage, such as aquifers.
- Hybrid infrastructure, which blends built and green solutions, such as “room for the river” flood control solutions that mix ecosystems with built structures such as levees.

Therefore, it is expected that many bond issuers will include in their portfolios assets and activities that span more than one sector, function and/ or construction type. The Water Criteria have been developed to be flexible to all these circumstances.

Where necessary, guidance is given regarding the appropriate sections of the Criteria relevant for specific components in a bond issuance.

4.3. What assets and activities are not covered by these Criteria?

Early in the development of the Criteria, hydropower represented a distinct cluster of issues relating to both climate mitigation and climate adaptation.

For instance, while hydropower is a renewable source of energy, the scientific and engineering literature illustrates a complex picture in terms of the greenhouse gas impacts associated with water storage reservoirs associated with hydropower. As a result, the recognition of hydropower as a low-carbon energy source requires detailed examination.

Moreover, the application of climate adaptation approaches to hydropower has been quite recent, with a growing but still small number of cases available and some controversy over the sensitivity, exposure, and need to address climate impacts for existing and new assets. The path for future hydropower development is an important but sometimes controversial issue, and some projects have been associated with quite negative environmental and social impacts.

For the TWG, it was unclear if these complexities around hydropower represented a significantly distinct break from other types of water assets since the group did not contain a large proportion of hydropower specialists and experts.

As a result, hydropower was withheld from this set of Criteria to be addressed by a more focused Technical Working Group. Therefore, hydropower related assets and activities are not covered by these Criteria. Readers are directed to the forthcoming Hydropower Criteria.

4.4. How does this scope fit with other sector Criteria under the Climate ?

The Water Criteria are intended to apply to a broad array of water investments and asset classes, but there are some cases where other criteria such as Land Use or Transport may be a more effective fit even when water resources are a fundamental aspect of the investment.

For clarity, the Water Criteria most generally apply if the asset will primarily deliver water services, such as water treatment, flood or drought management, or water storage, transport, or supplies.

However, there may be some cases when these lines are unclear. For instance, for an asset such as the use of riparian forests and wetlands, these ecosystems may be managed for nutrient control for agricultural runoff (Land Use Criteria) as well as for flood defense (Water Criteria).

Indeed, the link between water quality, water quantity, and forest management is a complex one. Many progressive water managers also consider themselves land managers, especially in forested areas, since land management can have a significant impact on runoff patterns and water quality. Some researchers and management institutions also claim important relationships

between forest management and the ability to increase or alter runoff, water storage, and water supply, though these claims are more controversial and probably specialized. It is presumed that we may see the emergence of offerings that integrate climate mitigation benefits from land management (e.g., forest and soil carbon storage/sequestration) designed with a water quality benefit. A clear application of how to link these two areas has not been developed as of yet.

Where sector boundaries are not clear, the issuer should discuss with CBI to determine the best sector Criteria fit. Generally speaking, the primary intended purpose should be the basis for deciding on the appropriate sector Criteria to apply.

In the case where a single issuance includes more than one asset in a portfolio, and these assets span a number of sectors, the most appropriate Criteria should be applied to the individual components of the issuance.

For example, a single bond offering may include both a stormwater control component and (quite separately) a building energy efficiency component. These individual projects may not even be directly linked except through the issuing authority. Here, the stormwater component should be evaluated against the Water Criteria, the buildings energy efficiency component under the Buildings Criteria.

4.5. What climate impacts are addressed in the Water Criteria?

The Climate Bond Standard aims to screen for assets and activities that:

- Align with a global economic transition that limits global warming to 2°C (ideally 1.5°C or less);
- Are adaptable and resilient to unavoidable climate change.

In the context of water infrastructure, climate resilience is a key concern. If the design and operation of water projects do not anticipate shifting climate conditions, the ability of water projects to function and be fit for purpose may be compromised. Climate change is altering the risk profile for water projects across all geographies and asset types.

Perhaps the best-known example of a major water project being compromised by changing climate conditions is the Hoover Dam in the USA's Colorado River Basin. The dam was planned, designed, and built in the 1920s and 1930s using assumptions of much higher mean river flows, yet over the last several decades, the timing and amount of precipitation in the upper basin have been deviating substantially from these assumptions. Under these unanticipated conditions, the dam’s ability to supply water to Las Vegas, to generate hydropower, and to meet downstream water demand is reaching operational limits, necessitating considerable investment in auxiliary infrastructure (>1 billion USD) to maintain historic levels of service.

Although the general practice of climate adaptation is still a comparatively young field in both theory and application, its role in the water sector is becoming increasingly important. This focus arises in part due to the overlap with water sustainability issues around resource security, supply and energy use.

Accordingly, the Technical and Industry Working Groups considered that climate resilience as well as mitigation must be a fundamental component of the Water Criteria under the Climate Bond Standard.

This decision reflects an emergent body of practice among water managers and professionals that will only become more widely understood and accepted as the climate adaptation sphere becomes more accurately defined and evaluated through new measuring and assessment frameworks.

With this in mind, the Water Criteria are intended screen for water infrastructure related assets and activities that:

a. Support climate mitigation (reducing the rate of climate change);
b. Will be insulated from climate impacts;
c. Will not suffer worsening environmental footprints as climate conditions continue to evolve.

Like other sector specific Criteria under the Climate Bonds Standard, the Water Criteria do not attempt to address all environmental, social and governance aspects relating to water infrastructure. They can be supplemented by other relevant standards that cover areas such as stakeholder engagement, social or human rights as desired.

4.6. How to address climate mitigation in the Criteria?

Both working groups found that climate mitigation (reducing the rate of climate change by lowering GHG emissions into the atmosphere) is an important but relatively straightforward function for most water assets.

The Criteria ask for a net reduction in GHG emissions or (at a minimum) a neutral impact in the case of investments intended primarily to buffer climate impacts — in an effort to minimize the harm of future contributions of greenhouse gases to the atmosphere. Following the 2015 Paris Accord and the increasingly widespread recognition that reducing greenhouse gases emissions must be met through more sectors and economic activities over time, these low-carbon standards and methodologies can be expected to become more stringent in coming years. As such, the role of climate mitigation in the Water Criteria should be expected to increase over time, especially for grey infrastructure.

In terms of how to estimate GHG emissions impacts in grey water infrastructure, the Criteria seek to utilise the established standards and evaluation methodologies for carbon accounting in the water sector e.g. UNFCCC Clean Development Mechanism, Voluntary Carbon Standard, and the American Carbon Registry.

In terms of nature-based-solutions for water infrastructure, the picture is more complicated.

Several organizations, such as Conservation International, the Ramsar Convention, IUCN, and Wetlands International, have been attempting to describe a mechanism for accounting for the massive quantities of carbon — sometimes called blue carbon — that can be stored in near-coastal regions, such as estuaries, and in specific types of ecosystems, such as mangrove forests and seagrasses.

Forests and soils have received extensive attention at national and global policy levels for their role in sequestering and storing carbon, as well as their additional co-benefits (e.g., ecological restoration).

The UNFCCC Kyoto Protocol defined a funding mechanism to support climate mitigation efforts for such terrestrial systems called REDD. Efforts are now quickly emerging to include blue carbon into these assets.

There have also been efforts to explore the role of tropical peatlands, frozen tundra, and freshwater wetlands more generally as carbon storage mechanisms. Given that these ecosystems could become the target of funding; they may well also be a candidate for future green bonds. However, the science and assessment / monitoring methodologies are not yet ready for application.

4.7. How are climate mitigation and climate resilience balanced in the Criteria?

For longer-lived assets, the TWG suggested that the Water Criteria should *also* confirm that the climate mitigation and other environmental benefits will be robust to future climate impacts through the evaluation of a climate vulnerability or risk assessment as well as have any resulting adaptation plan to address identified climate vulnerabilities. This is explained further in Section 4.8 below.

By longer-lived, the TWG focussed on the climate risks associated with water-related assets with an intended operational lifetime longer than 20 years — a timeframe now in use with the World Bank and other major sustainable development finance institutions.[19]

4.8. How is climate resilience defined and addressed in the Criteria?

The TWG quickly stated that any Criteria should demonstrate climate resilience — the ability for the asset and its intended environmental benefits and services to endure in face of ongoing climate shifts.

[19] For example, see Ray, P., and C. Brown, 2015, *Confronting Climate Uncertainty in Water Resources Management.* Washington, DC: World Bank Group.

Globally, the mechanism to demonstrate resilience is referred to as a climate vulnerability assessment or more simply a vulnerability assessment. These analyses have become standard components for almost all long-lived investments. Vulnerability assessments essentially look at the climate related risks for some object or activity and define the level of concern or acceptable threat tolerance.

A great deal of variation between assessment methodologies exists, but the TWG did not feel that a consensus exists for recommending a single approach or tool for all contexts, asset classes, and types of institutions.

The TWG believe that requiring some form of climate risk diagnostic assessment was fair and appropriate as it has become mainstreamed for the majority of water investments. The Water Scorecard detailed in the Criteria reflects what the TWG and IWG believed to be reasonable, widespread, and meaningful aspects of vulnerability assessments, as well as to ensure that any necessary adaptation planning was explicitly linked to identified risks. These topics are explored in more detail below.

If climate risks have been identified, then a secondary analysis has also become normalized to determine the most effective response to these risks. Most often referred to as an adaptation plan, these recommendations are the “treatment“ or “response“ to any risks diagnosed through the vulnerability assessment. Often, the adaptation plan appears as a final section in a vulnerability assessment document or integrated within sections in a vulnerability assessment that address specific climate risks. If climate risks are not seen as important in the vulnerability assessment, no adaptation plan is necessary, but all significant climate risks should be addressed in an adaptation plan.

While vulnerability assessments and adaptation plans have become normalized within technical members of the water community such as engineering, science, economics, and legal-governance specialities, the reporting of these processes to financing authorities and to investors has not. Therefore, the core emphasis on reporting resilience is a distinguishing feature of these Criteria. Indeed, investors are becoming rapidly aware of the need to make real or potential climate risks explicit for a wide variety of asset classes, and the Water Criteria represent a profound shift in how these risks and efforts to reduce or eliminate those risks should be assessed and communicated more broadly.

4.9. Using a process based approach to assess climate vulnerability

How should climate vulnerability and climate risk be defined in a way that can be reported to investors? The TWG spent considerable time on this issue in Phase 1.

No single standardized definition for climate vulnerability, risk, or hazard (much less adaptation or resilience) was found. Resilience is often a negotiated property or quality, reflecting local and regional priorities and choices among often complex tradeoffs. Resilience for a water utility in Bangladesh is likely to look quite different to resilience for a water utility in the Netherlands, even one facing similar types of climate risks.

Indeed, the TWG noted that climate risk assessment is in a period of rapid evolution and development, and a set of impact or output based criteria that followed a single approach (even a majority use approach, if one exists) would likely become dated quickly and potentially reduce the likelihood of issuers from using the Criteria. Instead, the TWG suggested that we follow a process-based approach, a choice that was validated by the IWG.

Such a process-based approach considers the breadth and scope of the vulnerability assessment as well as the level of detail that is pursued. Implicit in these Criteria is the assumption that vulnerability comes from both known, predictable threats as well as uncertain, difficult to evaluate threats. The Criteria thus evaluate the depth of the vulnerability assessment rather than the specific outcomes.

4.10. What resilience qualities was if felt most necessary to address in these assessments?

The resilience qualities the TWG identified as most necessary for water assets and activities are “robustness” (the ability to span a variety of credible climate futures) and “flexibility” (the ability to alter operations and modify design as the future unfolds). These qualities are reflected explicitly through the assessment of criteria for water governance and allocation patterns (is the asset flexible?) as well as the explicit consideration of the uncertainty and credibility associated with future climate conditions as reflected in the assessment of technical eco-hydrological variables (is the asset robust?).

4.11. How might these qualities best be evaluated?

While climate mitigation claims are relatively straightforward to evaluate, even quantify, developing a clear means of evaluating the climate adaptation and resilience of assets and activities was an early challenge in the development of the Criteria.

To achieve these goals, the TWG chose to create a checklist to assess how the issuer’s Vulnerability Assessment and adaptation plan (if required) explore risks associated with both the asset itself and its environmental footprint — how the asset interacts with ecosystems even if climate shifts alter the function of the investment and/or the ecosystem.

The IWG in particular insisted that a checklist should be easy to score and transparent in terms of the content used to adjudicate each criterion. The TWG was interested in a thorough

coverage of resilience (as defined above) that was applicable to a wide class of assets. Ideally, the resilience criteria would also provide a kind of implicit decision support guidance for issuers, encouraging them to define resilience broadly and to implement comprehensively.

The checklist is divided into into three main sections with a number of subdivisions. The main sections include vulnerability assessment criteria that apply to all issuers (Allocation, Governance, Eco-hydrological qualities):

The allocation section is intended to evaluate how water resources are divided among users how any allocation mechanisms may either facilitate or reduce the ability of the issuer to adapt the asset as conditions change. The governance section explores how real or potential water conflicts may be avoided, reduced in scope, or negotiated. In most developed countries, governance and allocations systems are typically expressed through strong regulatory, legal, and institutional frameworks, and assets given such a context will score well. However, the criteria are written so as to be relevant to a global setting, appropriate for both developed and developing economies. Many of the items are derived from the OECD Water Governance guidelines. The technical section on ecohydrological qualities explores in some depth how a design and/or operations was assessed for climate risks, including the comprehensiveness of ecological, hydrological, and climate qualities.

In addition, a fourth section includes additional vulnerability assessment criteria that apply specifically to green and hybrid assets only. Adaptation plan assessment criteria apply only to those assets where the vulnerability assessment has identified specific climate impacts that must be addressed.

Specific criteria in each section were developed and elaborated recursively with both the IWG and TWG teams. The criteria are unweighted and phrased as present/absent or pass/fail, though some criteria may not apply to specific types of investments. For both phases of the Water Criteria development, the elaboration and phrasing of each line occupied the majority of the development time and attention. The initial Criteria have held up well since the completion of phase 1, but both working groups acknowledged that they may need to be adjusted or revised over time in order to remain relevant and useful.

There are a few “special“ criteria, such as the requirement that a vulnerability assessment be prepared and available for investors, the presence of an adaptation plan (if required) that is also available for investors to peruse, and the use of two qualifying assumptions for the use of the NBS criteria (described in more detail below). The adaptation plan need not be detailed or lengthy, and often they are quite brief and simple; the adaptation plan is intended to evaluate how the issuer plans to respond to risks that have been identified in the Vulnerability Assessment; the latter are often more detailed and technical as documents than adaptation plans.

As issuance must score a minimum of a 60 percent pass for all sections of the checklist. The working groups suggested that this threshold would be reasonable for the launch of the Water Criteria, with the recognition that the pass rate may rise or lower over time. Given broader trends among investors and infrastructure developers, it may be a safe assumption that the pass threshold will remain steady or increase in the future.

For the process of scoring, the issuer should prepare a document that makes available supporting information for the adjudication of the criteria. Guidance for the preparation of such a document is available, which is intended to promote both transparency and clarity for investors.

4.9. What are the boundaries of the assessment?

Many specific elements of the Water Criteria address a tension around scale: while most assets are conceived at a local, project scale, the TWG found that much evidence around resilience for water issues — dating back to the nineteenth century — suggest that basin or watershed scales are important for meaningful action and management. That is, resilience at one locality is often in a complex relationship with upstream and downstream entities.

This larger hydrological relationship is explored in many criteria. As a result, an issuance with a vulnerability assessment that demonstrates an awareness of basin and sub basin relationships, including allocation and governance qualities, will score much higher. Wider boundaries mean a better score. Similar patterns exist for groundwater and aquifer management. But by the same token, an asset that is conceived only as a local asset is inherently more vulnerable to a broader set of impacts, all other things being equal.

4.10. How are phase 2 Criteria relating to hybrid and green water infrastructure assets incorporated alongside phase 1 Criteria for built water infrastructure?

The general approach developed during Phase 1, focussing on built water infrastructure, was largely maintained in Phase 2, which addressed the special issues relating to nature-based solutions (NBS).

This continuity between phases was not an accident. During phase 1, we constantly confronted questions around hybrid and green infrastructure, and while we knew that some of these questions must be deferred, we also knew that a strong foundation was critical to ensure the Criteria would remain relevant across a wide range of assets, asset classes, sectors, and situations.

However, in Phase 2, the TWG identified some issues specific to hybrid and green infrastructure that needed focused treatment and a higher standard of credibility for both issuers and investors, most notably:

- Addressing the heightened difficulty of predicting future responses by ecosystems to climate impacts,
- Prioritizing the incorporation of existing ecosystems and ecological processes ("natural features") over nature-based solutions into water resources management, followed by the restoration of existing ecosystems and then the creation of "new" ecosystems, especially at brownfield sites.

These elements help ensure that the certification of nature-based-solution (NBS) assets will not result in greenwashing or the endorsement of low credibility, low resilience, or high risk assets.

Conceptually, the TWG was very concerned about the basis for green and hybrid infrastructure. There were concerns that there might be investments that might degrade existing ecosystems or that funded assets without a clear water services benefit for human communities. Since ecosystems are often very sensitive to climate shifts, many of the criteria emphasize ecological *processes* and functions, which are less dependent on specific set of species (which might alter or shift with ongoing climate change).

The criteria also distinguish between natural features (which are existing ecological processes and ecosystems) and nature-based solutions (which are somewhat broader, and include designed and reconstructed and ecological analogue approaches, such as "new" wetlands on brownfield sites).

As a result, the issuer must meet two basic assumptions before proceeding to the NBS criteria. These ensure that the issuer is intentionally using ecosystems and/or ecological processes to meet human needs as well as that the issuer has prioritized existing and restored systems and processes over modified or new ecosystems. These qualifying aspects are derived from well-developed concepts definitions of the use of ecosystems as infrastructure elaborated recently by IUCN[20] and the US Army Corps of Engineers.[21]

The six NBS specific sub-sections of the checklist explore the issuer's depth and quality of knowledge about the site, its ecosystems and relevant species, the larger spatial context beyond the project site, monitoring and management capacities, and (optionally) ecological climate mitigation assurance. These sections were proposed through the TWG as elements necessary to ensure a credible and sustainable green or hybrid asset. As with other criteria, these criteria should be scored and transparent for potential investors.

[20] Cohen-Shacham, E., Walters, G., Janzen, C. and Maginnis, S. (eds.) (2016). Nature-based Solutions to address global societal challenges. Gland, Switzerland: IUCN.
[21] Bridges, T.S., K. A. Burks-Copes, M. E. Bates, Z. Collier, C. J. Fischenich, C. D. Piercy, E. J. Russo, D. J. Shafer, B. C. Suedel, J. Z. Gailani, J. D. Rosati, T. V. Wamsley, P. W. Wagner, L. D. Leuck, E. A. Vuxton. 2015. Use of Natural and Nature-Based Features (NNBF) for Coastal Resilience. ERDC SR-15-1. Washington, DC: US Army Corps of Engineers and U.S. Army Engineering Research and Development Center.

4.11. Dealing with complexity and uncertainty

Water management systems, especially water infrastructure, can have relatively long operating lifespans —usually decades, sometimes centuries or more— and these long life cycles have important implications for how we conceive of sustainable and climate resilient infrastructure.

This longevity presents significant challenges to defining what climate resilience should look like. These challenges are especially large given the sensitivity of the water cycle to ongoing climate change and the difficulties in how we can determine future climate impacts with accuracy, precision, and confidence. The water cycle is both very sensitive to even minor climate shifts, and trends in how the precipitation, seasonality, intensity, and flows will evolve are notoriously difficult to predict with confidence, especially for periods of interest further away in time. This makes designing, maintaining and operating water infrastructure challenging.

While the science of climate change is relatively new, the practice of ensuring that water management practices are resilient is even newer. In the words of a recent technical publication:

> *Today, water resources managers must account for much more complexity in their technical decisions. Many aspects of that complexity have rippling, interacting waves of uncertainty: emerging socio-economic circumstances, demographic and urbanization trends, and eco-hydrological conditions. Globalization, population increases, and economic cycling and transformation also stress water resources systems with risks that are hard to estimate and balance. Even the science of the water cycle and our vision of "sustainable use" of water have altered in profound ways since the [the modern era] began in 1955; many of the most important management insights from eco-hydrological science are less than 20 years old.*[22]

As a result, professionals in the water field have been actively developing methodologies to determine the best means of designing and operating water infrastructure that will function safely, profitably, and sustainably in a highly uncertain future.

While the techniques to assess and reduce water and climate change risks are evolving quickly, there is no clear consensus about best practices in the engineering, water management, climate science, or finance communities. Defining Water Criteria therefore faces the added challenge of knowing that current insights are likely to evolve significantly and rapidly in the near future, even as finance mechanisms, financial flows, and policy priorities direct increasing attention to both climate mitigation and climate adaptation.

For this reason, the Technical and Industry Working Groups view these Water Criteria as a starting point, to which additions and revisions will be needed over time including potentially broadening the climate focus. We therefore recommend that the Water Criteria be reviewed at least annually in the first three years of its use.

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[22] Mendoza, G., J.H. Matthews, A. Jeuken (eds). 2017. *Collaborative Risk Informed Decision Analysis (CRIDA): Water Resources Planning & Design for an Uncertain Future.* ICIWaRM Press: Alexandria, Virginia, USA.

Annex 1: Technical Working Group and Industry Working Group members

Water Criteria development has been led by a consortium consisting of the Climate Bonds Initiative, AGWA, Ceres, CDP, World Resources Institute (WRI) and the Stockholm International Water Institute (SIWI). To develop the phase 1 Water Criteria, focusing on engineered or built or engineered water infrastructure, the consortium convened a Technical Working Group (TWG) and an Industry Working Group, with representatives from investors, public utilities, water NGOs and international policy bodies from around the world.

Technical Working Group Members:

Lead: John Matthews, Alliance for Global Water Adaptation (AGWA)
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Bob Morgan, Beaver Water District
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Chris Webb, HERRERA
Eric Schellekens, Arcadis
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Manisha Singh, Wiselion LLC
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Monica Reid, Kestral Consulting
Nicole Hardiman, Illinois River Watershed Partnership
Paul Fleming, Seattle Public Utilities

Paul Wood, Water Fund LLC
Piet Klop, PGGM
Roman Gomez, IFC
Simon Petley

Annex 2: About the Water Criteria Consortium Members

About the Climate Bonds Initiative
The Climate Bonds Initiative is an investor-focused non-profit organization working to mobilise debt capital markets for climate change solutions.

It works as an independent resource for the green bond market with the aim to educate, inspire, convene and steer a global collaboration of institutional investors, governments, development banks and industry to shift capital to climate investments – at speed.

It has established and manages the Climate Bonds Standard & Certification Scheme, the only certification scheme globally for green bonds. In 2016, 10% of all green bonds issued around the world were certified under the Climate Bond Standard. As part of the roll out of the Standard, the Climate Bonds Initiative convenes technical and industry experts to develop the sector specific eligibility Criteria (or 'green definitions') which form the backbone of the Climate Bond Standard.

About Ceres
Ceres is a non-profit organization advocating for sustainability leadership. Ceres works to mobilize a powerful network of investors, companies and public interest groups to accelerate and expand the adoption of sustainable business practices and solutions to build a healthy global economy.

About CDP
CDP works to transform the way the world does business to prevent dangerous climate change and protect our natural resources. We see a world where capital is efficiently allocated to create long-term prosperity rather than short-term gain at the expense of our environment.

CDP holds the largest collection globally of self-reported climate change, water and forest-risk data. Through our global system companies, investors and cities are better able to mitigate risk, capitalize on opportunities and make investment decisions that drive action towards a more sustainable world.

About World Resources Institute
World Resources Institute (WRI) is a global research organization that spans more than 50 countries, with offices in Brazil, China, Europe, India, Indonesia, and the United States. Our more than 450 experts and staff work closely with leaders to turn big ideas into action to sustain our natural resources—the foundation of economic opportunity and human well-being.

Annex 3: Existing green assessment frameworks and processes for water assets and projects

For water management, relevant frameworks for the assessment of water climate bonds are not common or widespread. A number of relevant resources exist that have been reviewed to determine what might be leveraged in a set of water related criteria for bonds. These are briefly described here.

World Bank Green Bond Criteria

The World Bank established green bonds in 2007 with explicit reference to climate mitigation and adaptation. They have an internally defined process for qualifying bonds that engage directly with Bank clients (normally countries), often involving regional and technical support divisions of the Bank. Water projects to date have varied over an order of magnitude in the size of bond offerings (up to several hundred million USD), spanning irrigation, hydropower, and many multi-purpose infrastructure projects.

Sustainability is defined quite broadly by the Bank; sustainability criteria include consideration of the disruption to social and natural systems. Indeed, water bonds issued by the Bank have included money for resettlement of populations due to creation of new reservoirs (though this may not be viewed as a social consideration for some audiences). Generally, the Bank's procedures are not described in detail and it is unclear how these are applied in principle or what types of internal criteria are used to define offerings.

Ceres Green Bond Principles

These principles have been proposed as an overall reporting basis for green bonds for transparency. If investors and bond issuers follow the principles then we may expect a reporting standard to develop so that bonds can be compared and potentially ranked according to how they meet sustainability and resilience measures.

Barclays MSCI Green Bond Index

The Barclays MSCI index provides a measure for fixed income securities where the funds are used on projects with direct environmental benefits. This index was launched on 14 November 2014 following the trend of corporate investment in green bonds that began towards the end of 2013. The Barclays MSCI index, like other indices of this type, follows the principles laid out by Ceres.

Eligibility and classification is defined by the MSCI ESG Research group, and is based on the use of funds. To be eligible the use of proceeds must fall into one of the five specified categories or have 90 percent of the issuer's activity encompass one or more of the categories.

One of these categories is Sustainable Water, described as

- Products, services, and projects that attempt to resolve water scarcity and water quality issues, including minimizing and monitoring current water use and demand increases,

improving the quality of water supply, and improving the availability and reliability of water.

- Infrastructure and engineering projects developing new or repairing existing water and sanitation pipelines, including equipment and technology providers resulting in improved quality and/or water use efficiency
- Technologies and products that reduce, reuse, or recycle water as a means of conservation (smart metering devices, low-flow equipment, and rainwater harvesting systems).
- Advanced materials, equipment, technologies, and services that filter or chemically treat wastewater for consumer or industrial use, including desalination
- Investments in protection of land, forests, and other vegetation in the upper watershed as means to improve the quality of water bodies and groundwater recharge areas
- Other -- Includes climate resilience projects (flood relief, mitigation) and sustainable forestry/afforestation

Not eligible under this category: distribution of drinking water without measurable improvements to water quality, water efficiency, or climate change resilience component

Although the index defines water sustainable projects as addressing both quality and quantity, currently these terms are not well defined. For example, projects that have an efficiency component are eligible, potentially conflating efficiency gains with sustainability. Similarly, water conditions are implicitly defined as static and fixed, unchanging in the future, which is problematic for projects that involve long-lived infrastructure.

Water Utilities Standards

Perhaps the best organized and defined group for integrating climate mitigation and climate adaptation are water utilities. Groups such as the Water Utilities Climate Alliance (WUCA) have been active for more than a decade, while professional organizations including the International Water Association (IWA), the International Water Resources Association (IWRA), the Chartered Institution for Water and Environmental Management (CIWEM), the American Water Works Association (AWWA), and the American Water Resources Association (AWRA) have all actively been developing guidance on how to implement and integrate climate mitigation and adaptation, often led with the support of particular members (e.g., Seattle Public Utilities and DC Water in the US). Some cities have even published urban standards along these lines (e.g., San Francisco Public Utility Commission) or guidelines to connect resilience to broader management standards, such as the European Union‘s Water Framework Directive. Over time, we can expect these local and sectoral initiatives to become regulatory frameworks, but these remain some years away at this stage.

Annex 4: Guidance on Water-Related Human Rights and Social Risks for Issuers, Underwriters and Bond Buyers

Many investors recognize that water-related projects can be linked to complex social issues, given that access to drinking water is a basic human right and negative impacts on water resources can significantly affect other human rights (e.g. livelihoods, health etc.). The Climate Bond Standard focusses on issues relating to climate change and does not cover the full spectrum of environmental, social or governance issues that may relate to water related green bonds.

For information, a number of well established guidelines or standards related to broader social and environmental impacts of water infrastructure are listed below.

The Human Rights to Water and Sanitation:

In 2010, the United Nation's (UN) General Assembly and Human Rights Council explicitly recognized that water and sanitation are essential human rights.23 There are various duties that states have with respect to ensuring the provision of sufficient, safe, clean, affordable and accessible drinking water and sanitation services to those within their jurisdiction.24 Where companies have taken on this role, they have particular responsibilities. For companies that do not act as water service providers, their responsibility is to respect their rights –i.e. to avoid negatively affecting them through their operations or those of their suppliers or other business relationships. Several resources have been developed to help guide action in this area:

UN Office of the High Commissioner for Human Rights, *Realising the Human Rights to Water and Sanitation: A Handbook by the UN Special Rapporteur Catarina De Albuquerque,* 2014,

UN Office of the High Commissioner for Human Rights, *Guiding Principles on Business and Human Rights*, 2011.

Interfaith Center on Corporate Responsibility, *The 2013 ICCR Water Roundtable: Stakeholder Responsibilities in Managing Access to Water*

UN Global Compact, The CEO Water Mandate*, Guidance for Companies on Respecting the Human Rights to Water and Sanitation: Bringing a Human Rights Lens to Corporate Water Stewardship,* January 2015.

[23] United Nations General Assembly, *Resolution 64/292,* August 3, 2010. http://www.un.org/waterforlifedecade/human_right_to_water.shtml

[24] UN Global Compact, The CEO Water Mandate*, Guidance for Companies on Respecting the Human Rights to Water and Sanitation: Bringing a Human Rights Lens to Corporate Water Stewardship,* January 2015. http://ceowatermandate.org/files/business-hrws-guidance.pdf

This Annex was reviewed by the following individuals. Any errors, omissions or otherwise are our responsibility.

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