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Session 3. New financing modalities for climate adaptation: Towards Resilient Finance

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BACKGROUND PAPER

Our understanding of how to manage water sustainably is under rapid evolution. From technical water management fields such as hydrology, engineering, and even law and governance, a profound critique of how we invest in and make decisions about water resources is driving widespread change. In this critique, the past is a weak predictor of the future in a time of rapid climate change, and the pace and direction of climate change are increasingly uncertain. Sustainability in practice has been backwards looking — the past predicts the future. In the emerging critique, sustainability should be replaced by a concept of resilience, which includes aspects of robustness to credible, established risks, and flexibility to address emerging and uncertain risks. We cannot manage water-intensive assets that will have operational lifetimes of many decades, even centuries, without a forward-looking approach to our decisions that addresses the novel challenges associated with a shifting water cycle.

While water managers have more than a decade of accumulating technical and operational expertise to implement these concepts, the fields of economics and finance remain well behind for water-intensive investments, with few exceptions.

Valuing water in a shifting, uncertain climate presents new risks for how we prioritize and choose between alternative adaptation options. Economics as a discipline is central to how we evaluate most policy and investment decisions, but economists are only recently starting to come to terms with the valuation of non-stationary assets or new metrics, such as the value of resilience in the context of disruption, climate transformation, and high levels of uncertainty about the pace, direction, and types of impacts we can expect (Haasnoot et al. 2019). Adaptation options are highly discounted in most investments using traditional analyses, though some new approaches are emerging (Hallegatte et al. 2012).

Finance and funding mechanisms more generally are also going through a transition period as our awareness of the depth and transformative aspects of climate change become more widely understood. While "climate finance" has received much attention, how water and climate change risk is communicated to investors, donors, and other types of funders remains uneven for finance instruments that do not directly address climate impacts. However, new patterns are beginning to emerge that hold the promise to divert financial flows towards resilience and to more robust financial risk assessments that articulate expectations for those seeking finance as well as those looking for "good" investments. Indeed, existing and new finance instruments can serve as powerful signals about new types of risk and shifting expectations — and support rapid increases in climate-proofed investment.

A central thesis of this paper is that climate change represents a fundamental but still unfolding reorientation in how we make decisions around water-intensive assets, governance and allocation, and operations and resource management.

Climate Finance vs Climate Risks across Finance

Climate finance is a relatively new category of investment and aid, designed for middle and low income countries to address negative economic impacts associated with climate change. As such, climate finance is intended to directly address climate risks. Climate finance thus refers to labeled, formal channels through which aid (grants and loans) is directed for climate change mitigation, adaptation, loss and damage, and other specific targets of climate change action.

Development banks, aid agencies, some foundations, and a few commercial and private sector sources have tended to make up the bulk of climate finance. In a few cases, wholly new multilateral institutions such as the GCF and the UNFCCC's Adaptation Fund have been created to directly fund climate change-related activities, specializing in climate-directed grants and loans (often via policy vehicles such as National Adaptation Plans). Bilateral climate financing initiatives are also an emerging source of funding in both developed and developing countries, though they too focus predominantly on mitigation (Rodriguez et al., 2019). National governments, through their expenditures on Nationally Determined Contributions, have also been a growing source of climate finance since the ratification of the Paris Agreement in 2015.

The pool of international climate finance available remains relatively small in comparison to other flows of development-relevant finance. The Asian Development Bank has recently set a target of several billion U.S. dollars for annual adaptation funding, while the GCF is expected to capitalize at US$100 billion by 2020, with half of its total funding going to adaptation.

Climate-labeled investment is broader than development aid, however. Each year Climate Bonds Initiative releases a *State of the Market* report to present trends and statistics from the broader landscape of the "climate-aligned bonds" universe, reflecting private sector investment. Results from 2018 are a staggering 1.45 trillion USD in outstanding bonds. The water sector accounted for 101billion USD in outstanding climate-aligned bonds in 2018 (CBI 2018). Bonds certified against CBI's Water Infrastructure Criteria (discussed below) represent a small but growing subset of that figure, totaling about some 8 billion USD since 2016.

The broader pool of money available globally for water resources is difficult to tally, but is probably on the order of several trillion USD if we consider water-related investment across sectors (storage, sanitation and treatment, energy and agriculture). Single groups such as the European Investment Bank, the World Bank or national management agencies such as the U.S. Army Corps of Engineers have water-intensive portfolios on the order of tens of billions USD per year. For example, the energy sector is the largest consumer of water in the USA, France, and Japan and, as a result, is a major investor in water management. In middle- and lower-income countries, agriculture (including livestock and aquaculture)—because it often typically accounts for 50 to 90 percent of national water consumption—similarly has a major impact on water investment.

Integrating Climate Risks Within Finance Instruments

No global consensus exists among technical water professionals about how to diagnose climate risks, though some institutions have developed clear methodologies and some clear trends and patters have been visible for years. Given the complex set of issues associated with climate impacts on the water cycle, the efficacy of risk assessment for investment thus varies dramatically across portfolios.

Water-related projects make up a substantial proportion of the projects funded through formally labeled climate finance, but most institutions do not ask for or evaluate the water-climate risks and opportunities in their water portfolio. Historically, the Global Environment Facility's adaptation funds have not required detailed documentation of strategies to assess or reduce climate risk, while groups such as the UNFCCC's Adaptation Committee and many development banks may not recognize that the success of an irrigation project or

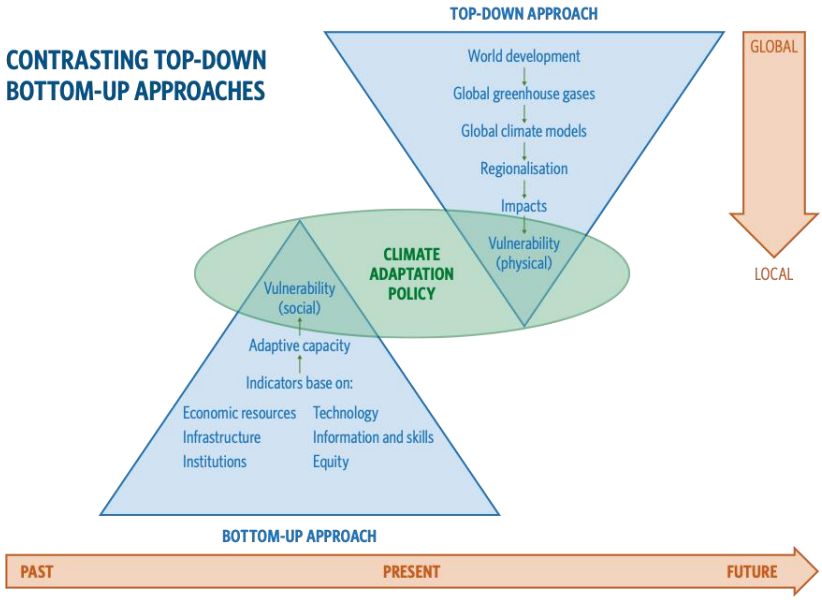
ecosystem restoration is, in fact, contingent on the application of knowledge on water and resilience, and they may be unlikely to make good use of water expertise.

Moreover, formal climate finance mechanisms often require documenting "additionality" as a means of targeting their support. To the donor community, additionality in the context of climate change adaptation means that adaptation should not bleed into or replace existing "traditional" development aid programs and should be "additional" to (i.e., above and beyond) such aid. The assumption behind additionality is that we can distinguish clearly between adaptation projects and non-adaptation projects or that specific aspects of a larger project are designed to address specific climate change impacts, such as increased flood risk or greater storage capacity to address increasing water scarcity.

Additionality is a problematic term for water-related investments. In theory, we could easily specify that an urban stormwater system needed to have an additional 20 percent capacity to cope with forthcoming climate change impacts. In practice, additionality often creates tension between different types of projects (for instance, disaster relief and reduction versus water supply and sanitation for the urban poor). Even within individual water-related projects, additionality is difficult to document. The uncertainties associated with the water cycle mean that effectively running two types of analyses—an investment in a world without climate change and the same investment in a climate-shifted world, with the differences constituting the additionality — seems strained and sometimes even technically ill-advised and misleading to calculate. Several institutions such as the GCF have recognized these concerns, and have highly modified or eliminated the requirement to document additionality very strictly. The major development banks have, in contrast, created an additionality reporting framework so that institutional reports follow similar reporting criteria and standards in how they track and document additionality (IDB et al., 2018).

A stronger approach than additionality to address climate risks is to mainstream climate risk assessment by creating a framework within the project development cycle. Many finance institutions are pursuing this approach.

Two broad families of frameworks are referred to respectively as top-down and bottom-up methodologies. Top-down risk assessment approaches to water resources management look at forces outside of a system, problem, or question and try to interpret the impacts. In the context of climate change, top-down approaches typically depend heavily on climate



Dessai and Hulme, 2004

model data. Top-down approaches are not technically difficult to implement as they do not substantially alter decision making processes, but they have been widely criticized for their use in quantitative analyses for projects and planning for ignoring or understating the level of uncertainty associated with climate projections.

In the context of finance, top-down approaches remain widespread and probably useful in insurance, where a broad sectoral or regional perspective is important for comparing relative risks. For assessing finance risks in individual assets, however, top-down methods have some serious weaknesses, though they remain widely used.

Since about 2007, newer bottom-up methodologies such as decision scaling, adaptation pathways, and robust decision making have been developed to more accurately assess inherent system risks and to avoid the trap of climate uncertainty (Ray and Brown, 2015). These methods build robustness by understanding the operational constraints of current ecosystems and hydrological and management systems combined with stakeholder definitions of success and failure to then provide quantitative guidance on how to maximize robustness (García et al., 2014; Brown et al., 2011). Bottom-up approaches are generally viewed as more advanced and appropriate for assessing climate risks for water management decisions and investments (Mendoza et al. 2018, Matthews et al. 2019). In some cases, bottom-up approaches are being identified as strategic shifts in policy, such as shown by a 2019 executive order by California governor Gavin Newsom to several state agencies to shift to bottom-up assessment methods.[1]

The transition to bottom-up climate risk assessment approaches within broader aspects of finance has been slowly gaining traction. The most notable finance institution to adopt and mainstream bottom-up approaches was the World Bank, with the launch of the so-called Decision Tree Framework (DTF) in 2015 (Ray and Brown 2015). The DTF is a staged approach to climate risk assessment early in the project development cycle, which identifies the relative strength and importance of climate risks relative to other potential drivers (e.g., demographic change, urbanization). If climate risks are high, the DTF guides World Bank project officers to adjust the project parameters to reduce those risks. The DTF is mainstreamed within the Global Water Practice but continues to be refined (Ray et al. 2017).

The DTF has also spawned several similar approaches. UNESCO published a guidance in 2018 that incorporates many aspects of the DTF and includes a flexibility component drawn from adaptation pathways that has been widely applied (Mendoza et al. 2018). In May 2019, EBRD and the International Hydropower Association published a more tailored approach of the DTF for hydropower investments, especially those funded through the private sector (IHA 2019). In late 2019, the Asian Development Bank launched a new risk assessment methodology for ADB loan officers by Rob Wilby and Paul Watkiss, which builds on the DTF by distinguishing between "climate proofing" traditional assets that may be vulnerable to climate risk and between adaptation-focused assets, whose primary or secondary purpose focuses on a climate adaptation benefit.

Advanced approaches to include climate risk beyond MDB institutions remain rare even though broad investor awareness of climate risk is rapidly increasing. One exception is the green and climate bonds market, inspired at least in part by the World Bank's DTF. The green and climate bonds market was launched in 2007 by the European Investment Bank and the World Bank to demonstrate to private investors that funds were being applied to environmentally friendly "use of proceeds"—typically for low-impact infrastructure projects and/or climate mitigation and adaptation projects. Typical investors in green and

[1] https://www.gov.ca.gov/2019/04/29/water-resilience-portfolio-for-california/

climate bonds are large institutional investors such as pension funds, which are interested in steady returns, long term lengths, and (increasingly) credibly "green" credentials for the investments.

The climate and green bonds market remained quite small (a few billion U.S. dollars annually) and dominated by MDBs until about 2013, when many other categories of bonds issuers began to move into this space, often mediated or led by commercial banks. For several years, the green and climate bonds market underwent exponential growth, reaching almost 200 billion USD by 2017. Europe and North America were the most significant issuers in this market until 2016, when China launched its own domestic green and climate bond market, which is now the second largest globally. Since then, growth has spread to South Asia, Africa, and across Latin America.

These bonds have largely been self-labeled, with little or no verification about their use of proceeds or if any promised climate change adaptation benefits are credible and accurate. Concerned about the systemic risks to the green and climate bonds market associated with a lack of transparency as well as the potential to leverage very large sums of money, the Climate Bonds Initiative (CBI) began creating a set of principles, verification standards, and sectoral criteria to ensure that investors could trust the climate promises made by issuers—and that the projects being financed had thoroughly accounted for climate risks.

Box 1. Netherlands Finances Nature-Based Solutions through Green Bonds

In May 2019, the Government of the Netherlands issued a certified climate bond for €5.98 billion to finance projects addressing current and future climate change impacts and an advanced low carbon economy. This is the largest certified bond to date, the first European sovereign certified green bond, and the first certified nature-based solution as well. Much of the bond focuses on using coastal and river ecosystems as a safeguard for negative climate change impacts such as high flood risk, further supporting the Netherlands's "room for river" approach.

The issuance came from the Dutch State Treasury Agency (DTSA) and was certified by CBI. The bond raised capital for projects including renewable energy facilities, low-carbon transportation systems, and water and flood defense infrastructure. Projects being financed by the bond included traditional "built" water infrastructure as well as nature-based solutions, all of which were certified under the Water Infrastructure Criteria of the Climate Bonds Standard.

The Dutch bond offering demonstrated a robust market for certified climate bonds. Within 90 minutes of the bond's issuance, investors had placed over €21.2 billion worth of orders for the €5.98 billion of certificates, making the bond oversubscribed by over three times (Anderson et al., 2019). Investor interest combined with the need to raise funds for climate resilience projects means that more certified climate bonds are on the horizon.

In 2016, a set of water-resilience criteria for evaluation of investments in built water infrastructure were developed by water and climate experts and potential issuers, verifiers, and buyers convened by CBI (Matthews et al. 2018). These criteria went live in 2017, while additional resilience criteria for nature-based solutions were added in 2018 (see Box), with criteria for hydropower expected in late 2019.

These criteria explicitly evaluate flexibility, based on governance and regulatory frameworks related to water allocation, as well as robustness, based on the thoroughness and sophistication of the climate risk assessment. One of the most critical recommendations to encourage long-term thinking is to evaluate sustainability gray and hydrid investments over the operational lifetime of the investment in question rather than over the finance period; nature-based solutions should be evaluated over at least a 100 year period. To date, these criteria have been applied and certified for at least 8 billion USD in assets for projects in the USA, Nigeria, South Africa, China, Chile, The Netherlands, and Australia, inclusive of climate-related risks with drought, inland and coastal flooding, snowpack changes, and other potential and realized impacts.

Emerging Issues to Mainstream Resilience in Finance: Volume vs Quality

Most policy discussions around climate finance focus on increasing the pool of finance available as the urgency for adaptation accelerates. However, many in the technical water disciplines are concerned about the quality of these investments — have risks been effectively identified and reduced? Have these risks been communicated to decision makers, investors, and water managers? Some of these issues have been directly addressed through the new Global Commission on Adaptation (GCA; see Box 2).

Box 2. Finance Recommendations from the Global Commission on Adaptation, Adaptation's thirst: Accelerating the convergence of water and climate action (Smith et al. 2019)

Align "climate finance" and "water finance" by using complementary investment criteria to expand the pool of finance available to accelerate mainstreaming of climate-resilient water management;

Evaluate how to reduce financial risks related to transboundary water cooperation at the project development stage, given the potential for conflict as water regimes shift;

Expand access to insurance products to manage residual risks of water-related disaster losses, and to broaden the pool of investors sharing shifting risks.

Treat climate change impacts on water availability, quality and risks as a critical factor in economic analyses, as well as for social and environmental responsibility assessments, giving consideration to the uncertainties of these impacts over both the financing term and the operational lifespan of the investments.

Water efficiency is often an important consideration in finance and in economic evaluation, but efficiency should more often be seen as one part of a larger suite of adaptation actions, and not all forms of water efficiency result in robust and flexible adaptation. Moreover, efficiency can also promote a net increase in water consumption or the loss of co-benefits that may derive from some less-efficient approaches to water management.

Obstacles to mainstream more effective approaches to assessing climate risk within a broad array of finance instruments and institutions fall into two categories: conceptual and procedural.

Technical disciplines such as engineering, hydrology, and ecology quickly appreciated that climate change presented new types of risk to how we manage water resources and water-intensive assets sustainably. Insights from these disciplines have taken time to diffuse into the worldview of financial institutions. These insights in many cases have required translation into the language of economics and finance, which preceded testing and implementation by early adopting institutions.

The most progress has occurred in institutions with pre-existing long-term risk frameworks and a strong corporate learning culture. The World Bank's DTF required more than five years of development, and the methodology continues to be refined and expanded within the World Bank. The insurance sector too has identified climate change as a strategic and systemic risk requiring a major reassessment of how risk is measured and evaluated. The conceptual basis of this work has been strong and multidisciplinary, with attention to consider how to include climate-relevant insights into the process of designing and funding investments.

These intellectual investments have paid off for other institutions willing to learn from early adopters, such as the ADB's climate risk assessment framework's advance in distinguishing between the level of effort required to "climate proof" all investments and the greater level of attention and consideration for assets intended to provide specific climate adaptation benefits.

Unfortunately, beyond MDBs and insurance, most finance institutions retain a low level of conceptual understanding around how to best appreciate the special risks and challenges around water and climate change, retaining relatively weak top-down assessment methodologies. Worse, many institutions continue to handle climate risks as the responsibility of ESG and CSR staff rather than as issues that directly influence value and financial credibility.

Procedural issues are also important obstacles. Concern over transaction costs with approaches such as the DTF and investing in approaches that may require more intensive staff resources are also likely slowing adoption of more effective and progressive approaches to climate risk assessment.

The major exception in this area has been the CBI water infrastructure green bonds criteria, which uses a simple checklist approach to communicate standards and expectations for bonds issuers and potential risks and strengths to investors. Although the volume of certified issuance (~8 billion USD since 2016) has been significant, most bond issuers are not disclosing their climate risks. Recent signals from Moody's, Ernst and Young, and other bond rating agencies may trigger a long-term shift among both investors and issuers, however.[2] Several recent bond issuances have actually shown higher bond ratings (and thus lower interest rates) for certified issuances that make climate risks explicit — effectively paying for any transaction costs associated with the process of certification.

Conclusions

Climate finance will remain an important category of aid, but the pool of finance available for climate finance is and is likely to stay relatively small and targeted on LDCs. Through some national and multilateral institutions, we are beginning to see institutions that recognize that all water-intensive investments should be assessed for the special risks

[2] http://427mt.com/2019/07/24/four-twenty-seven-receives-majority-investment-from-moodys-corporation/

associated with the water cycle. The transition to converting water finance into water-climate finance is challenging and uneven in application. The broader investment community has been even slower. However, if we wish to make water sustainability meaningful in a time of rapid climate change, our investment instruments should be aligned to build climate change resilience.

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