# New Research for Effective Action

## at Paris and Beyond

### Global Climate Policy Conference

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# Contents

# About the Conference Proceedings

The conference proceedings are a collection of academic papers presented at the Global Climate Policy Conference (GCPC) 2015, co-convened by the Stanley Foundation and Climate Strategies (supported by the Oak Foundation). GCPC is an annual event convened by Climate Strategies with partners. The first edition of GCPC, held in London in 2014, and the 2015 GCPC, held in New Delhi, offered opportunities to explore areas that are at the core of climate change policy and implementation by using a mix of bottom-up (from the research community) and top-down (from the policy community) approaches.

GCPC 2015 included bottom-up experts who submitted abstracts and were selected through an open and competitive process, then presented academic papers to a diverse and influential audience to shed light on multiple issues they believe could move the international process forward with the intent to spark discussions among all conference participants. The papers presented at GCPC 2015 are chronicled in these conference proceedings. Rapporteurs captured the ideas presented by these selected authors in the Sessions Overview (Sessions 1 through 4) section of the Conference Report, which is found on the conference organizers' websites.

The Conference Report also includes the rapporteurs' summaries of the top-down presentations by research-policy experts in two parallel sessions (Session 5–Tracks 1 and 2) that were followed by two conference sessions in plenary (Sessions 6 and 7). The top-down presentations were conducted in panel format and were organized by the conference collaborators in order to advance thinking in clearly predefined areas.

For more information on GCPC 2015 please visit *www.climatestrategies.org* or *www.stanleyfoundation.org*.

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# Tilting the Balance in Favor of Climate Change Adaptation: A Microfinance and Climate Finance Perspective

Dumisani Chirambo, Ph.D. Candidate, Department of Civil and Public Law with references to Law of Europe and the Environment, Brandenburg University of Technology Cottbus–Senftenberg

## Introduction

The impacts climate variability and change will have on different countries and societies are anticipated to be far ranging and possibly detrimental to the development of many countries in Africa. Some research already points out that in comparison to developed countries, low-income countries such as those in Africa are more vulnerable to current climate variability and future climate change[1] because of factors such as the higher exposure of low-income countries to climate risk due to a heavy reliance on agriculture for their livelihoods; Africa's semiarid climate or the concentration of populations in hazard zones; and Africa's adaptation deficit as caused by a lack of institutional, financial, or technological capacity to adapt effectively to climate change.[2 3 4] Climate change can also be anticipated to prevent households from escaping poverty, or bring nonpoor households into poverty, as floods, droughts, and disasters can prevent the portfolio diversification for communities and hamper their asset accumulation (i.e., the accumulation of [1] human capital, including health and education; [2] physical capital, including housing and productive assets; [3] financial capital (currency and savings in financial institutions); [4] natural capital, especially ecosystems and subsoil resources; and [5] social capital, including formal and informal networks, institutions, and migrated household members who send remittances).[5] Africa is already noted as the only continent where poverty levels are rising (i.e., while extreme poverty rates have fallen in every developing region in the world-60 percent in 1990 to 12 percent in 2010. Africa, excluding North Africa, is the region where poverty remains most widespread, and the number of Africans (excluding North Africans) living below the poverty line rose from 290 million in 1990 to 376 million (1999) and 414 million (2010),[6] hence in the absence of measures to improve the resilience of communities to the impacts of climate change, the already rising poverty levels could be exacerbated.

Climate change adaptation is important within the climate change management arena, as it encompasses a wide range of behavioral adjustments that households and institutions make (including practices, processes, legislation, regulations, and incentives) to mandate or facilitate changes in socioeconomic systems, aimed at reducing vulnerability to climatic variability and change.[7] More importantly, various

commentators are acknowledging that greenhouse gas emission reductions are unlikely to decrease at the rate and magnitude necessary to prevent climate change that is dangerous to many, hence climate change adaptation is thus increasingly considered as essential to reducing vulnerability to dangerous climate change. Moreover, climate adaptation also has potential to address some of the mistakes and shortcomings of conventional social and economic development pathways that have contributed to social inequity, poverty, and environmental problems, and, therefore, there is a need to identify the synergies between adaptation and sustainable development so that people's livelihoods and quality of life should not be threatened.[8] However, even though climate financing for mitigation and adaptation should be addressed with the same priority, some findings show that the implementation of climate finance modalities are highly construed toward mitigation efforts, whereby 91 percent of climate finance flows are for mitigation efforts, 7 percent for adaptation efforts, and 2 percent for activities with both mitigation and adaptation objectives.[9] In order to determine if microfinance can be utilized to improve climate change adaptation funding, this paper expounds the Microfinance-Climate Finance Framework that was shortlisted for the 2014/2015 UNDP MDG Carbon Climate Finance Innovation Award. The framework provides various stakeholders with viable channels for microfinance institutions to partake in the mobilization of funds and resources from various types of funders, and redistribution of funds and resources to various types of recipients to assist with promoting climate resilient inclusive growth.

## A Microfinance-Climate Finance Framework for Inclusive Growth

While economic growth and development are important to reduce vulnerability to climate change, economic growth does not automatically reduce vulnerability, hence the need for growth policies to incorporate investment in skills and access to finance to facilitate pro-poor inclusive growth, which can indeed reduce vulnerability to climate change.[10] Poverty in Africa is characterized by three important features: (1) predominance of rural poverty: poverty is noted to be at least three times higher in rural areas than in urban areas because of poor rural infrastructure, youth unemployment, limited access to quality education, and high child labor; (2) feminization of poverty: women are noted to have limited access to productive assets such as land due to traditional restrictions on women's property rights; and (3) intensity of informality: most African workers are noted to be engaged in the informal sector as self-employees or casual employees without a contract and access to social security.[11]

Microfinance is particularly beneficial in addressing the type of poverty present in Africa since microfinance has been reported to be a development strategy that can reduce poverty, improve the social and economic situation of women, and contribute to a long-lasting increase in income by means of a rise in investments in income-generating activities and to a possible diversification of sources of income. Other benefits of microfinance to households and communities include the potential to contribute to an accumulation of assets, the potential to reduce vulnerability due to illness and drought and crop failures, and the potential to contribute to better education, health, and housing of the borrowers.[12] Moreover, increases in income lead to increases in the demand for good "climate security," reductions in the impacts of extreme events, and increases in the demand for substitutes to adaptation, in particular insurance coverage.[13] Hence, increasing per capita incomes can address climate threats for both rural and urban populations.

The Microfinance-Climate Finance Framework (Figure 1) can be considered as an adaptation to climate change since it is a revolutionized or streamlined process that microfinance institutions can use as their business model to mobilize resources and disburse funds at concessional interest rates to various kinds of stakeholders to assist with climate change management issues (e.g., promoting food security, technology transfers and diffusion), and it is a framework that can holistically address aspects that can promote climate resilient inclusive growth. The framework is also a new business model to enable microfinance institutions as well as entrepreneurs and businesseses to explore socioeconomic opportunities that can come from managing climate change. Moreover, the sustainability of some microfinance institutions could be at risk from climate-change-induced stresses (e.g., where most of the livelihoods of their customers depend on agriculture), hence, the framework highlights how microfinance institutions can mitigate these risks.

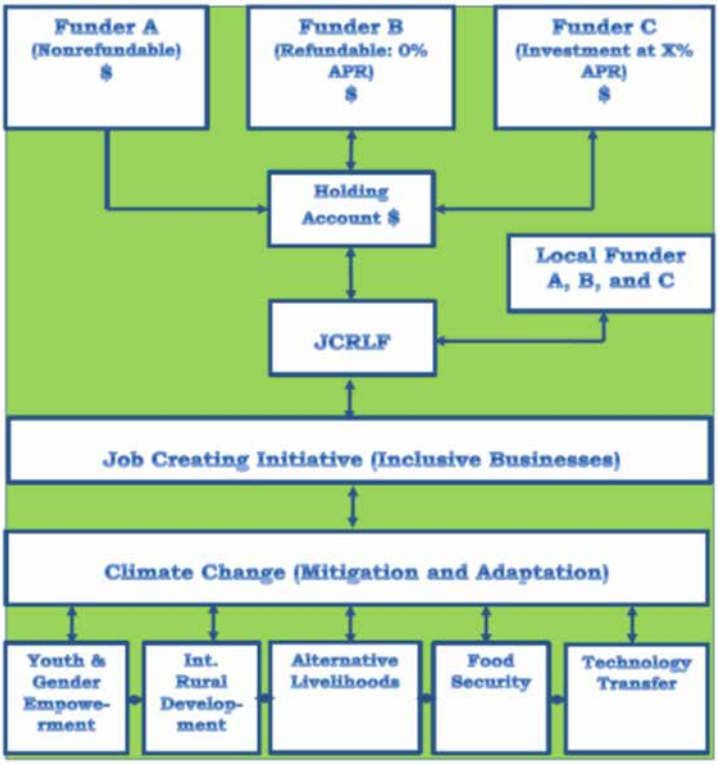


***Figure 1 – Microfinance-Climate Finance Framework for inclusive growth.*** *Source: author*

*Note: JCRLF denotes a microfinance institution or a revolving fund within a microfinance institution.*

# Discussion and Conclusions

The Global Commission on the Economy and Climate considers that countries at various stages of development can still achieve lasting economic growth and development concurrently while reducing the immense risks of climate change providing that they correct a range of market, government, and policy failures; and new technologies, business models, and financial innovations (including green bonds, risk-sharing instruments, co-investments, and crowdfunding) are implemented in order to facilitate the creation of jobs, investments, and growth.[14] Following from these observations, it can be argued that new financial frameworks, processes, and models have a significant part to play in fostering development and climate change adaptation.

Technological developments are making the sharing of information and transfer of money easier. This has facilitated the growth of crowd funding and peer-to-peer

lending/donating whereby individuals and institutions can donate directly to other individuals and institutions. As a result, the microfinance institutions become mere intermediaries or principal beneficiaries of such funding. Additionally, there are many African migrants scattered globally who currently provide around $40 billion a year in remittances. These migrants have the potential to provide more than $100 billion a year to help develop Africa, and there is also an estimated $50 billion in diaspora savings that could be leveraged for low-cost project finance.[15] However, remittance charges to and within Africa are almost double the global average; hence, if lowered to reach the world average levels and the 5 percent G-8 target, remittance transfers would increase by $1.8 billion annually.[16] In sub-Saharan Africa, an average of only 24 percent of the population has an account with a formal financial institution (in contrast to 55 percent of adults in East Asia, 35 percent in Eastern Europe, 39 percent in Latin America, and 33 percent in South Asia), subsequently leading to reduced female empowerment and productive investment in the region.[17]

Within this framework, it is therefore plausible that individuals, governments, multilateral and bilateral development banks, bilateral development cooperation agencies, the private sector, civil society organizations, research and development institutions, and social investors can fund and/or invest in microfinance institutions. Additionally, diaspora savings, investments, and remittances could therefore become a valuable source of climate financing when barriers such as high remittance costs and low levels of financial inclusion in the continent are addressed.

# Endnotes


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# Adaptation, Resilience, and "Scaling Up": Lessons for Institutional Strategies

Dr. John Colvin, Global Climate Adaptation Partnership

## Introduction

In the 20 years since the United Nations Framework Convention on Climate Change came into force in 1995, the academic community has been at the forefront of research and thinking on climate change adaptation (CCA) and resilience. In this short piece, we briefly consider the relationship between the academic and policy communities in this space, with a focus on the challenges of "scaling up" and on institutional strategies for addressing these. This policy-research relationship comes into particular focus given the growing importance of National Adaptation Plan-related activities.[1] Here there is a gradual shift away from project-level adaptation activities and toward programmatic and systemic interventions, emphasizing institutional response and the creation of appropriate enabling conditions for adaptation.

## Framings of Adaptation and Resilience Are Constantly Evolving

A brief look at the history of the relationship between research, policy, and practice in CCA and resilience shows us how this is constantly evolving. While from 1990 onward the academic community initially led on impacts-driven work and then on vulnerability assessments, during the early 2000s, the first wave of adaptation policy assessments involving a closer collaboration emerged between the academic and policy communities.[2]

Over the past 10 years, there has been an intense and ongoing debate on how to differentiate adaptation from mainstream development investments,[3] and more recently on how adaptation differs from disaster risk management. Further debate has addressed the relationship between vulnerability, a concept that had been extensively shaped by social science perspectives, and resilience, a concept with roots in psychology and engineering but which had been taken up by the ecological community and subsequently expanded to consider notions of "social ecological resilience."[4] More recent debate differentiates between—but also links—the notions of coping, adaptation, resilience, and transformation.[5] In the *Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, there is much talk of "climate resilient pathways of development" (Figure 1). While donors often pick up on these academic debates, driving them into practice, particularly at the project and community levels,[6] the pace of thinking can be confusing to many policymakers.

# Institutional Strategies

A mix of institutional strategies is emerging for developing CCA, resilience, and climate resilient pathways. Through the National Adaptation Plan process, we find top-down approaches to climate risk assessment and the appraisal and selection of adaptation options. The development of Ethiopia's low-carbon, climate-resilient strategy illustrates this approach.[7] But we can also identify more collaborative, multilevel strategies in which stakeholders are involved from the outset, working with and supporting policymakers. The development of South Africa's Long Term Mitigation Strategy provides a good example.[8]

A third approach involves "scaling up" and "scaling out" of learning and lessons from local pathfinders. These pathfinders are often focused on community-based adaptation and have the benefit of addressing CCA in more holistic ways, thereby offering valuable lessons for multiple government ministries and policy domains. Pathfinders may also be focused on ecosystem-based approaches to adaptation, and sometimes on a combination of community-based adaptation and ecosystem-based approaches to adaptation. The United Kingdom Department for International Development is currently funding a £150 million program, Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED), which is looking at the scaling up of resilience approaches in the Sahel, Horn of Africa, and South Asia, while a similar but smaller program is being funded by the Rockefeller Foundation.[9]

Over the past 10 years, a wealth of research has emerged on opportunities as well as barriers to CCA, including on opportunities for effective scaling up. This research shows how ignorance of institutional factors is often responsible for creating barriers to effective CCA.[10] At the same time, recent research highlights that scaling up and scaling out is enhanced when:

- The different levels of governance up to national level support rather than constrain local innovation.
- Local initiative is encouraged and supported, for example through decentralized decision making.
- There is disbursal of funds locally to enable a flexible response to community needs.
- Evidence and learning from local experiments are documented and made available.
- There is investment in convening broader geographical networks that can enable learning to spread more easily. [11]

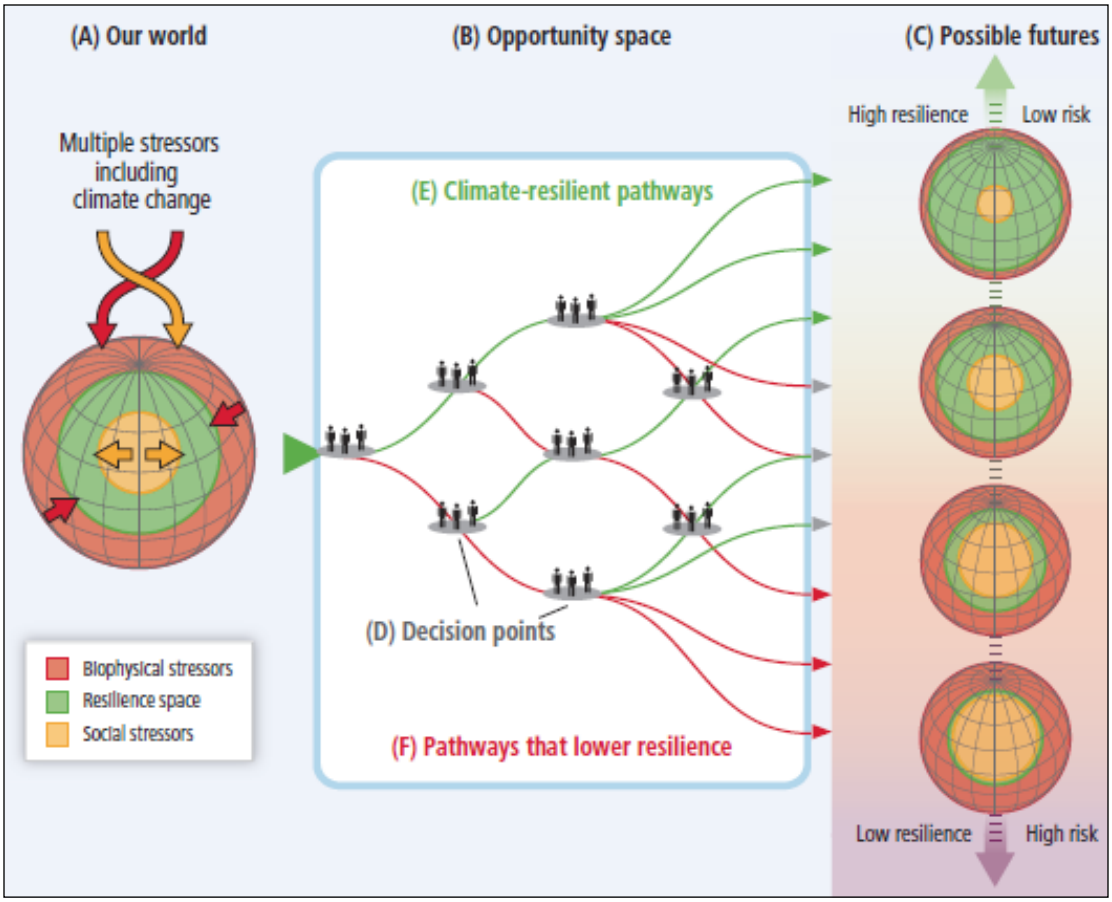


***Figure 1. Visualizing the Opportunity Space for Climate-Resilient Pathways***[12]

# The Role of Knowledge Brokers and Intermediary Organizations

A particularly interesting case study of scaling up comes from work undertaken in three states of India by the nongovernmental organization Watershed Organisation Trust (WOTR). Supported by the Swiss Agency for Cooperation and Development and India's National Bank for Agriculture and Rural Development, WOTR developed an innovative, five-year program for piloting integrated, community-based adaptation at a local level and exploring ways of scaling the emerging findings into state and national policies. As noted in the end-of-project review:

"[T]he project developed a unique approach to multi-level system innovation and systemic 'intermediation' for climate resilient development.… For example, in terms of policy formulation, the project built an important set of strategic partnerships at state and national level for the scaling-up of agro-met based advisories, in which the Indian Meteorological Department (IMD) has a key role.… In terms of policy implementation, the project influenced policy and created a significant demand at the State level in Andhra Pradesh for the upscaling of adaptive actions. Other key relationships for policy implementation included engagement with the Neeranchal programme, supported by the Government of India and the World Bank, and collaboration with the World Agroforestry Centre and the Central Research Institute for Dryland Agriculture in the context of the National Mission on Sustainable Agriculture."[13]

From a government of India perspective, this scaling up approach was particularly beneficial, helping to cut through bureaucratic approaches to researching adaptation options and to connect with real-time innovation. Use of action learning and action research approaches by WOTR was critical to the design of the innovation process.

## Articulating a Policy-Research Agenda

Case studies such the one above highlight that there are many different models of collaboration between policy and research, some involving new, "transdisciplinary" approaches as well as collaborations between multiple partners, including intermediary organizations. For example, in the 15 countries making up the Southern African region, a network of 62 public universities is seeking to mobilize as intermediaries in learning and "knowledge co-production" with governments for climate resilient development.[14]

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# Trade Law and the International Politics of Pricing and Clubs

Kasturi Das, Associate Professor, Institute of Management Technology, Ghaziabad, Delhi/NCR, India

Even as the world gears up to put together a post-2020 multilateral climate change regime in Paris later this year, it is highly unlikely that the ambition and scope of any upcoming deal would be commensurate with the breadth and depth of the climate change problem that creates unrivaled challenges of unmatched complexity.[1] Indeed, more than two decades of wrangling under the United Nations Framework Convention on Climate Change (UNFCCC) bears testimony to the extreme difficulties involved in arriving at a meaningful solution to this complex, multidimensional problem through serious bargaining among too many countries with diverse contributions to the problem, interests, and capabilities. This has triggered a stimulating discussion as to whether focus should now shift to cooperation in smaller groups in the form of "clubs."

How could such clubs or "coalitions of the willing" help? While a plethora of possibilities are being contemplated,[2] what is rather common across the board is that all of these proposed formulations attempt to address the free-rider problem,[3] which is arguably the toughest challenge confronting climate mitigation.

Addressing the free rider problem is proposed to be attempted through creation of an incentive framework that induces reluctant countries to join and discourages free riding by nonmembers. This is generally proposed to be achieved through a combination of "carrots" and "sticks."[4 5] Carrots are to take the form of certain "club goods," that is, benefits accruable only to the club members in "exclusion" of the nonmembers. Sticks, on the other hand, are penalties to be applicable on nonmembers. The whole idea is to convince club members that there are benefits to be derived from cooperation, while disincentivizing nonparticipation.

The underlying expectation is that club approaches would offer flexibilities and impact that would be way harder to achieve in a multilateral forum,[6] thereby creating room for making greater efforts in smaller groups. To the extent the club benefits succeed in generating climatic benefits, say greater mitigation, those would, of course, be public goods.

Climate folks are nervous whether any such club approaches—that are by definition discriminatory as between members and nonmembers—would conflict with the trade rules under the aegis of the World Trade Organization (WTO), which has nondiscrimination as its fundamental principle, thereby bringing the concerned trade-related aspects of climate clubs under the WTO scanner. This nervousness is attributable to the fact the WTO has got "teeth" that can bite—a dispute settlement system, which makes the WTO agreements and provisions enforceable on its member

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countries. For instance, if, as a member of a climate club, one WTO member (Country A) grants a certain exclusive trade-related benefit to a club member (Country B, which may or may not be a WTO member) but excludes another WTO member (Country C) from a similar benefit for not being a member of the climate club concerned, then this kind of trade-related discrimination on the part of Country A runs the risk of violating the most favored nation (MFN)[7] requirements of the General Agreement on Tariffs and Trade (GATT)/WTO, to the extent that it discriminates between otherwise "like" products based on their country of origin.

While benefits accruing to club members are like carrots, there are also proposals for sticks[8, 9] (i.e., penalties) to be applied on nonmembers so as to create an incentive framework that induces reluctant countries to join and to avoid free riding—in the process tackling the problem of competitiveness and carbon leakage. The form of penalty that is most widely proposed is border carbon adjustment (BCA), a trade measure whose WTO compatibility is an open question owing to ambiguities in the existing WTO jurisprudence on several counts. First, it is not clear whether a domestic tax based on the carbon content of a product could be eligible for adjustment at the border.[10] Moreover, even if a domestic carbon tax is determined to be adjustable at the border, it has to be ensured in addition that the concomitant border tax adjustment abides by the national treatment[11] requirements, which is another pillar of the nondiscrimination principle of the WTO, besides the MFN (which also has to be complied with). Another big question that comes up in this context pertains to that of "like" products: whether under the WTO jurisprudence products can be regarded as "nonlike" only on the basis of their differing carbon content. There is a significant uncertainty in the existing WTO jurisprudence on this question as well, which adds further to the ambiguities pertaining to the WTO legality of any BCA measure.[12]

Importantly, even if a BCA measure turns out to be violative of any GATT provision, it still stands a chance of being justified under the General Exceptions Provisions, as enshrined in Article XX of the GATT, which allows a WTO member to deviate from its GATT obligations for serving certain legitimate policy objectives, including environmental ones (under Articles XX [b] and [g]), provided the conditions included in the Chapeau (i.e., the introductory part) of Article XX are met. While there may be a good case for a BCA to be "provisionally" justified on environmental grounds, the trickier part would be to satisfy the Chapeau, which requires that the measure is "not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade." The ultimate determination of the WTO compatibility or otherwise of any BCA measure would lay on the nitty-gritty of the design and implementation of the measure.[13] Importantly, the purpose of the Chapeau is to prevent (ab)use of trade measures for protectionist purposes.

Several proposals are being considered in the academic and policy discussions as to how to deal with the hurdles posed by the WTO law to various climate policy and measures including BCA, among others. Amend the WTO?[14] Go for a WTO declaration/decision? Exploit the waiver provision of the WTO? So on and so forth. While the attempts to do away with the legal uncertainty have certain merits for sure, it is also important to judge the matter in light of the ground realities. The WTO Dispute Settlement Understanding (DSU) is often claimed to introduce greater "legalism" and providing a more "rules-oriented" system relative to the "power-oriented" one under the GATT, thereby representing a quantum leap in the judicialization of international

trade. When the WTO DSU was created, Professor John Jackson[15] noted that many diplomats were worried about leaving state-to-state disputes in the hands of lawyers. To what extent such anxiety has found credence in the actual experience is an open question now. Two recent disputes are worth revisiting in this context.

October 2014 was witness to two WTO disputes being settled in an "extraordinary" manner: (1) a complaint by Indonesia against the US ban on clove cigarettes[16] and (2) a complaint by Brazil against the United States regarding subsidies on Upland Cotton.[17] In both cases the United States had largely lost, and the winning parties came close to retaliating against US commercial interests. Finally, however, in both the cases the offending measures had been maintained, albeit with some limitations.[18] As observed by Simon Evenett and Alejandro Jara, the settlement of these two disputes between larger trading nations calls for a reexamination of how WTO dispute settlement works in practice; in particular whether there is a shift in the balance between law and diplomacy in the resolution of these disputes given that settlements are diplomatic solutions. Moreover, they also raise questions as to whether the system is less rules-based than it is characterized, with large players negotiating around trade rules while smaller players are compelled to comply with them.[19]

Besides, more often than not, economics also would have a significant role to play. Given that pursuing a legal battle at the WTO is a highly expensive affair that require resources and capacity, member countries may not get into full-fledged disputes unless there are some compelling economic interests at stake (often backed by domestic political lobbies and pressure groups) that could not be addressed through diplomatic negotiations or predispute consultations. Settlements, as have been observed in the aforementioned two disputes, may also be explained, at least in part, by economic equations involved.

The short point is that whether a potentially WTO-incompatible measure will ultimately end up under the WTO scanner would depend on a host of other political, diplomatic, and economic factors. As observed by Simon Lester, "[t]he WTO dispute system can never deal with all violations of obligations. Many cases will never be brought; some cases will be settled before there is a ruling; some rulings will be negotiated away; and some rulings will be ignored."[20]

The Montreal Protocol on Substances That Deplete the Ozone Layer, negotiated in 1987, is a case in point. It created room for the parties to the protocol to ban trade in ozone-depleting substance with nonparties unless the nonparties adopted comparable measures. This provision has always been a cause of anxiety,[21] as it is likely to violate the GATT rules on prohibition of quantitative restrictions on trade in products, as well as the nondiscrimination principles. Such nervousness notwithstanding, the fact remains that to date, no country has brought a WTO dispute against the Montreal Protocol. In fact, of the 250-odd multilateral environmental agreements (MEAs) currently in existence, over 20 incorporate trade measures to achieve their goals. Yet to date there has not been a single WTO dispute pertaining to any of the MEAs. Rather the WTO members have been discussing ways to maintain a harmonious coexistence between the WTO rules and the specific trade obligations in various MEAs under the Doha Round and beyond. The WTO-United Nations Environment Programme brief on trade and the environment[22] released in April this year on the occasion of the 20th anniversary of the WTO is perhaps symbolic of the WTO's increasing openness to work in cooperation with the environmental community and also to accommodate the environmental concerns of its members, to the extent these are genuine and not back-door entries for protectionism![23]

It may be recalled here that BCA to tackle competitiveness and carbon leakage has also emerged as a unilateral measure being contemplated by select developed countries (e.g., the United States, the European Union) in the context of their domestic policies on pricing carbon. While the jury is still out as to how big the problem of carbon leakage actually is when judged in light of the existing empirical evidence,[24] the fact remains that policy measures to deal with competitiveness concerns of domestic industries covered under any carbon-pricing scheme often turn out to be a political compulsion that a country may not be able to ignore practically while pricing carbon domestically.

At the international level, developing countries, including China and India, have expressed their strong opposition against BCA proposals—something they consider to be "green protectionism" on the part of developed countries—and have also hinted at retaliation.[25] Developing countries have also taken up the issue at the UNFCCC. In the run-up to the Copenhagen summit, the G-77 and China, for instance, called on developed countries not to adopt unilateral trade-restrictive measures against developing countries. The grouping argued that adoption of such measures by the developed countries would be tantamount to passing on the mitigation burden by them onto developing countries, and that it would contravene the principles and provisions of the UNFCCC,[26] particularly "equity," Common but Differentiated Responsibilities and Respective Capabilities, as well as the principle enshrined in Article 3.5.[27] Subsequently, the BASIC grouping (Brazil, South Africa, India, and China) also joined forces to oppose these border measures. Notably, the negotiating text for Paris released in February 2015 also includes options in this regard within square brackets.

None of the countries, however, have actually implemented any BCA measure on imports to date. Part of the reasons could be the potential political and diplomatic ramifications, as signaled by the aforementioned reactions on the part of developing countries. Meanwhile, there were lessons to learn also from the vehement international pressure the European Union (EU) had to confront in its attempt to unilaterally price carbon emissions from international aviation beyond its own territory, which eventually compelled the bloc to backtrack partially. Besides, the uncertainty pertaining to the WTO legality of any BCA has also worked as a dampener to unilateral BCAs. The EU, for instance, has preferred to rely, at least for the time being, on free allocation of emissions allowances for obviating any domestic industry resistance to carbon pricing. Meanwhile, the Waxman-Markey bill in the United States that contained BCA proposals died a premature death. Discussions and controversies surrounding BCAs, however, have gained a renewed impetus more recently in the context of the climate clubs, as mentioned above.

A threshold question worth exploring in this context is whether sticks are indeed necessary for climate clubs for achieving their objectives, if exclusive club benefits or carrots could be made attractive enough for incentivizing participation. To the extent sticks are considered to be unavoidable, the next moot question is, should trade measures be used at all for achieving such environmental policy objectives? The answer would be in the negative, if judged strictly in light of the standard public policy discourse, which suggests that policy tools should be tailored to the problem at hand. However, as Daniel Esty has argued, "lacking a global authority to managing environmental issues that makes cost internalization and other environmental policy mechanisms feasible and effective, the use of trade measures becomes politically attractive, if not strictly necessary." Even then it may still be argued that to avoid overkill, club members could have a spectrum of measures to choose from, including nontrade interventions, such as

good faith negotiations and diplomatic warnings, and withdrawal of financial assistance (if any), so as to allow them to select a measure commensurate with the severity of the environmental harm faced or the extent of noncompliance[28] resorting to stringent trade measures only when other options fail to work. It would be even better if instead of applying the sticks upfront, clubs could first exploit the positive incentives or carrots,[29] keeping the sticks only as threats or last resorts.

It may be noted here that the success of the Montreal Protocol, which is often hailed as the greatest success story of multilateral environmental agreements, is widely attributed to an effective combination of sticks and carrots: provision for trade-based disincentives coupled with side payments made to developing countries like China and India in the form of financial support and technology transfer. According to S. Barrett[30], carrots, or side payments, can promote cooperation only if the positions of the countries involved are sufficiently asymmetric and will likely work only when they are coupled with effective sticks such as trade sanctions. Since each international environmental problem is distinct, finding the correct balance will likely result in a different combination of carrots and sticks than what was written in the Montreal Protocol. The plethora of factors that China and India faced in making the decision to ratify the Montreal Protocol lend insight into how difficult it may be to achieve this balance.[31] Given the sheer magnitude and multiple dimensions and complexities involved in the climate change problem, achieving such a balance at the multilateral level would be far more difficult compared to the Montreal Protocol. Climate clubs involving a smaller number of countries may indeed be easier to handle in this respect. To the extent climate actions by certain developing countries are constrained by availability of funds and appropriate technology at affordable prices, and given that multilateral efforts toward ensuring financial support and technology transfer for such countries have been far from adequate to date, it may be worth exploring further whether club approaches could add more value by creating carrots in the form of finance, technology transfer, and other capacity-building support for developing countries, over and above what may be achievable multilaterally under the UNFCCC.

It needs to be mentioned that club approaches are not entirely new in the climate context. In fact, the past couple of decades have been witness to a plethora of bilateral and plurilateral initiatives (such as the Major Economies Forum and the Climate and Clean Air Coalition) giving rise to a decentralized "regime complex"[32] or "polycentric" system of governance.[33] Further aggressive push for club approaches will lead to further fragmentation. Indeed, one of the chief concerns about a multiplicity of clubs rather than unified multilateral agreements is that such a world could end up undermining the core principles and could lead to policy chaos due to fragmentation and conflicts in laws.[34] Such a scenario runs the risk of defeating the whole purpose of multiple club approaches: to generate greater efforts in smaller groups. The success of club approaches in achieving the stated objectives would also depend in large measure on their environmental integrity and genuineness of purpose.

Given that club approaches are by definition exclusionary, they often suffer from suspicion and trust deficit. Deliberate efforts may be made to overcome such perception biases and to send the right signals in the spirit of cooperation by encouraging expansion of membership.

Transparency is another important factor in this context. There are lessons to learn from the trade regime here—from the increasing outrage against the nontransparent negotiations on some of the megaregionals.

Another big challenge of climate clubs is that of legitimacy. Multilateral forums like the UNFCCC score far better in this respect. A question worth exploring further in this context is whether climate clubs could be hosted under the aegis of the UNFCCC. Here again one can take a cue from the WTO, which was created as an umbrella of a range of agreements—most of which are multilateral, but some are plurilateral as well. Besides legitimacy, hosting climate clubs under the ambit of the UNFCCC would allow the club approaches to utilize the governance systems and other resources of the UNFCCC, some of which have already been established, while others are in the process of evolving.

Legally speaking, there seems to be enough room in the legal text of the UNFCCC to accommodate a multiplicity of agreements,[35] some of which could be applied multilaterally while others could be club approaches involving only those parties that are willing to join a particular coalition. Provisions may be created for nonmembers of the clubs to assume "observer status." This would not only ensure transparency of club activities but would allow the much needed time and information for the nonmembers to join the league eventually once they are convinced of the benefits of membership.

While one can embark on the process of complex deal making by working in smaller groups of clubs, it is not possible to stop climate change and totally transform the world's energy system unless essentially all countries are ultimately involved.[36] It is imperative, therefore, for any club approaches not to vitiate the environment for cooperation.

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# Energy Research Within the UNFCCC: A Proposal to Guard Against Ongoing Climate Deadlock

Barry W. Brook, Faculty of Science, Engineering and Technology, University of Tasmania, Australia

Kingsley Edney, School of Politics and International Studies, University of Leeds, UK

Rafaela Hillerbrand, Centre for Ethics and Philosophy of Technology, Delft University of Technology, Netherlands

Rasmus Karlsson, Department of Political Science, Umeå University, Sweden

Jonathan Symons, Department of Modern History, Politics and International Relations, Macquarie University, Australia

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Given the broad consensus that increased energy research is necessary to improve the prospects for effective mitigation,[1] innovation policy deserves a much higher profile in climate negotiations.[2] We propose that an international Low-Emissions Technology Commitment[3] be incorporated into the United Nations Framework Convention on Climate Change (UNFCCC) negotiation process in order to promote innovation that is necessary to support deep decarbonization. The goal is to accelerate research, development, and demonstration of safe, scalable, and affordable low-emissions energy technologies. While the need for accelerated innovation is widely recognized,[4] [5] [6] there has been no concerted international effort to ensure that dense, clean, and abundant energy sources become significantly cheaper than existing fossil fuels.

In our view, a commitment to energy research should be based on three elements:

1. Research funding commitments should be incorporated explicitly into "intended nationally determined contributions" to be incorporated into a new international climate agreement to be finalized at the 2015 Paris conference of the parties to the UNFCCC. In 2015, national commitments might detail total state investment, private-sector funding mobilization targets, priority research areas, and broader mechanisms of state support.

2. Pledges should be binding and verifiable. In the longer term, states might work toward harmonizing these research commitments within an international research plan. Although states will retain control over their research agendas, if information sharing about national research efforts increases, this is likely to prompt productive coordination.

3. Expert scientific networks and participating governments should collaborate to design a coordinated global research and technology-demonstration strategy and oversee national research efforts. To this end, an Intergovernmental Panel on Energy Research, composed of scientific experts nominated by participating states, might be established that could usefully inform treaty negotiations but work independently of them. This panel would probably need to be an independent organization that operates separately from the Intergovernmental Panel on Climate Change (IPCC). While this panel's mandate would need to go far beyond reviews and forecasting, it might partially displace the current role of the IPCC's Working Group III (which reviews progress in, and projections for, energy pathways). What is needed is a technically expert body that is capable of facilitating international agreement on issues including the strategic selection and coordination of energy-technology projects and of mechanisms to support technologies through the "valley of death" to demonstration.[7]

Our proposal is intended to offer some insurance against the risk that the political impasse in international negotiations cannot be overcome. The higher cost associated with low-emissions alternatives to fossil fuels currently creates significant economic and political resistance to their widespread adoption and the displacement of fossil energy sources.[8] To breach this impasse, the creation of a mechanism supporting accelerated energy research is needed that seeks to reduce future abatement costs, share experience and "learning-by-doing" in first-of-a-kind demonstrations, and thus facilitate future widespread deployments. Crucially, these actions will also assist in addressing inequalities in energy access.

One significant aspect of this proposal is that it offers an alternative path through which capable states might discharge their leadership obligations. In addition to emissions reduction targets, setting goals for increased research support within a formal international commitment would be an important form of differentiated responsibility. Of course there is a danger that if research pledges are perceived to be a substitute for action, rather than additional to abatement pledges, this will undermine the legitimacy of the proposal. Nevertheless, research commitments complement the existing agenda supporting financing of technology transfer, provided they are additional to transfer funding; for this reason research commitments might potentially ameliorate the North-South tensions that currently contribute to negotiation gridlock. By providing opportunities for leadership not only to developed countries but also to ambitious developing states that are interested in expanding their research and innovation capacity, a low-emissions technology commitment (LETC) could create an opening for "inclusive minilateralism."[9] Moreover, an LETC might potentially minimize the negative impact of great power rivalry by prompting China and the United States to cooperate to share in the benefits of energy innovation, building on the momentum achieved at the recent Asia-Pacific Economic Cooperation meeting in Beijing. Where mitigation pledges are often perceived as imposing an economic cost that reduces relative power, pledges to accelerate innovation can be anticipated to prompt technological competition that may have the positive externality of reduced

greenhouse-gas emissions. Certainly, China's current investments in a tranche of new commercial nuclear plants, and funding for research, development, and demonstration into next-generation systems such as thorium and modular pebble-fueled reactors, appear intended to address energy security as well as climate and air quality concerns.

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# Paris and Then? Holding States to Account

Sylvia Karlsson-Vinkhuyzen, Public Administration and Policy Group, Wageningen University

## Introduction

So much focus is now given to getting the Paris agreement on climate change "right," particularly that the intended nationally determined commitments (INDCs) should be ambitious, effective, and fair. But what about the morning after? There is no automatism in international norms, whether legally binding or not, enticing compliance by states. Particularly in the field of multilateral environmental agreements with high ambitions in their objective and commitments that entail considerable political and financial investments, compliance is often patchy.[1] A contributing factor for this could be that compliance mechanisms tend to be an Achilles heel in international agreements in these domains.[2] If such compliance mechanisms are seen as arenas where accountability can be asked of a state by other states with regard to its compliance, their weakness indicates a poor starting point for accountability of states in this realm. Accountability has become a popular concept and is difficult to be against. It can cover a number of other concepts such as transparency, equity, democracy, efficiency, responsiveness, responsibility, integrity, liability, and controllability. Nonetheless, governments by and large are rather reluctant to be held to account for how faithfully they comply with what they have promised to do in relation to climate change in the United Nations Framework Convention on Climate Change (UNFCCC) and beyond.

The normative starting point for my discussion is that governments should be held to account for if and how they comply with the various obligations of that agreement, including their INDCs. More specifically, they should be held to account—obliged to explain and justify their conduct toward another actor with some possibility to sanction improper conduct.[3] This concept, therefore, goes beyond formal noncompliance procedures,[4] and it does so because accountability implies a social relation. It implies a social relation that can be characterized by asking five specific questions: To whom, about what, through what processes, by what standards, and with what effect is someone held answerable?[5] This means that there are several sets of actors that have the right and even responsibility to hold governments to account. Such an argument leads to the need for looking at governments' (lack of) compliance through a broad multilevel lens of accountability. Another reason to do so is that many scholars consider the low level (or absence) of accountability of states in global governance as a major contribution to the democratic (or public) deficit of such governance.[6 7 8] Among their arguments for the importance of accountability are the expectations that stronger accountability would lead to more-effective international regimes, effective in strengthening compliance of states with commitments made and contribute to their legitimacy.[9 10 11 12 13]

There is work done on how mostly legal international norms exert influence through "soft" means such as making information on actors' behavior public, extended

monitoring by inclusion of nongovernmental organization (NGO) capacities.[14] sharing/not sharing information, webs of dialogue, capacity building, learning, and the pull of legitimacy.[15] [16] [17] There is also a more legalistic comparison of noncompliance mechanisms and their (legal) impacts,[18] including specifically on the Kyoto compliance procedures.[19] However, the multilevel dynamic of state accountability has largely not been analyzed. States have different arenas where they can be held to account in relation to international commitments—domestic arenas through respective parliaments and publics, and international arenas through other states and the global public often "represented" by NGOs (for European Union members, the EU is an additional level). Some of these arenas, and associated routes of accountability, have been suggested as compensating for the low level of accountability in global governance.[20] [21] This motivates a closer look at the dynamic of accountability of state compliance once an international climate agreement has been adopted.

This paper explores three different pathways of account holding: states holding each other to account, parliaments holding their governments to account, and various publics holding governments (individual or collective) to account. Each pathway involves different arenas and mechanisms for holding governments to account, as well as a diversity of standards according to which their actions are evaluated and the reward or sanctions they receive for their actions. Together they provide for a more comprehensive understanding of what the comparative advantages and limitations of these pathways are and thus how much we can "count" on each of them as avenues for strengthening the effectiveness and legitimacy of the Paris agreement.

## Governments Holding Each Other to Account

The first pathway is the peer accountability among governments of states that have jointly entered the UNFCCC and subsequent related agreements. The formal arena for such account holding under the UNFCCC could be the recently established international assessment and review (IAR) for developed-country parties and the international consultation and analysis (ICA) for developing-country parties. The IAR was set up with a central objective to "review the progress made," and the ICA with the aim to "increase the transparency of mitigation actions and their effects" and thus with no references to accountability.[22] Most likely the review mechanisms of the Paris agreement will build on these arenas and processes. With time, it will become clear both what the formal design of such a mechanism will look like in the Paris agreement and, more importantly, if and how governments will use it to hold each other to account and whether this will have an encouraging effect on degrees of compliance (and if that varies with types of commitments). It is, however, most likely that there will be no material sanctions associated with a lack of compliance. Whatever sanctions or rewards that are provided will be of an entirely "social" nature in the forms of criticism or praise, or perhaps in many cases simply polite silence. And yet, such reputational related effects must matter, as the negotiation of such mechanisms are so highly sensitive. Much research is needed on how peer accountability mechanisms work, and whether they contribute to higher ambition in commitments and/or compliance. These are crucial questions to answer for supporting the refinement of the IAR and ICA process for the Paris agreement.

## Parliaments Holding Their Governments to Account

The second pathway of holding governments to account takes place in the domestic arena where the parliaments in many countries have a role of holding their executive governments to account for their actions. Their task is often to do this on behalf of the public as their representatives. Researchers, however, have long pointed out that this accountability relationship is particularly weak around issues of foreign affairs and global governance.[23] The concept of executive multilateralism illustrates the fact that executive governments often have considerable leeway in devising their positions related to, for example, negotiating international treaties and agreements.[24] Parliaments may, on the one hand, not be much informed about, for example, the development of national communications and other instruments relating to the compliance with commitments from international agreements. On the other hand, parliaments may not take an active interest in the implementation of such agreements. Research that I led on how the Finnish parliament engaged with the UNFCCC and Kyoto Protocol norms strongly confirmed this, with reasons both in poor formal mechanisms to do so beyond the ratification process and in the lack of interest and knowledge on the part of the vast majority of parliamentarians. There are surely exceptions to this, particularly exemplified by the active international networks of parliamentarians that support strong global climate governance. One can also expect a stronger interest from parliaments if there is an active domestic debate among the public and civil society linking this pathway strongly to the following one.

## The Public(s) Holding Governments to Account

The third pathway to hold governments to account is through various publics. This can be through domestic publics toward their own governments channeled through domestic debate in various types of media and other social spaces. It can also be through a global public sometimes channeled through expert NGOs (national or international) and coalitions of such organizations, and sometimes through broad social movements, as manifested by social media and demonstrations. This route of accountability, via people in various groupings, has been suggested as a crucial one that can at least to some degree compensate for the low level of democratic/public accountability in global governance.[25] Importantly, it is the route through which people can raise their voice and hold governments beyond their own to account for the actions that influence them across borders. It is also possibly the most effective one for putting at least public pressure on governments to justify their (lack of) actions in relation to commitments made. However, there are many questions and challenges with this pathway. Do the various publics have sufficient knowledge about the complexity of global climate governance and the commitments of governments and their degree of implementation to serve as an effective accountholder over time? And are media willing to play their part in this accountability relationship to serve as a bridge to domestic pressures via both the public and parliaments? A study I have made of media coverage by opinion pieces (editorials) of important meetings in global climate change governance show that the drama of negotiating new agreements or partnerships attracts many more commentaries compared to follow-up meetings where implementation may be discussed.[26]

# Conclusions

In conclusion, each one of these pathways looks quite weak, making it important to explore possible synergies and how such could be promoted in the design of the accountability mechanisms of the Paris agreement. Each pathway of holding governments to account for their (lack of) compliance relies on transparency, available data, and information on what governments have done on their various commitments. The attention to getting what many refer to as the "accounting" right in the agreement is therefore still crucial.[27] Each pathway also relies on a strong interest from the accountholders to indeed play that role, and not only at the time of the big climate change meetings but over years and decades to come, and this may indeed be a continuous weakness. Furthermore, accountability is a social relationship, and it may not always be one that all actors desire or accept. In the context of national sovereignty, states do not easily condone being in a relationship with other states or the global public that expects of them to be held to account for their (lack of) actions.

We need to reach a deeper understanding of what drives states' design and handling of accountability mechanisms, as well as their possible role in strengthening compliance, if we are to identify more effective and legitimate multilevel accountability mechanisms and pathways for global climate governance. The multilevel dynamic of state accountability where states can be held to account in relation to international commitments in both domestic arenas through respective parliaments and publics and in international arenas through other states and the global publics has not been systematically analyzed.

Finally, we should also not forget that these three pathways for accountability are all, to a certain degree, second best. Probably the most powerful accountability relationship would be between a government and itself; a government that takes its commitments so seriously that it engages in a continuous cycle of action (adopting policies aimed at achieving its commitments), reflection (regularly evaluating the results of those actions), and deliberation (drawing lessons learned and modifying action). Accountability is often conceptualized as retrospective—it is about actors having to answer for their conduct after the fact—and desired in order to guarantee to an anxious public that the behavior of powerful actors is subject to effective oversight and control.[28] However, this may not be the best way to use accountability, and particularly not in global governance. The most important role of accountability in this arena is for forward-looking and encouraging action.

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# Effective Pathways of Public-Private Partnerships for Adaptation Projects in Developing Countries

Mohammad Aatish Khan, Yale School of Forestry & Environmental Studies, Yale University

Global climate change impacts are immense on people, the economy, and ecosystems. The Intergovernmental Panel on Climate Change's (IPCC) fifth assessment report (AR5) finds that stabilizing the climate is critical for survival. Many diverse adaptation and mitigation strategies and options are needed to address the issue of climate change. The IPCC's AR5 also recognized that adaptation and mitigation are supported by common factors—governance, policy, innovations, investment, and technologies[1]—and are complementary to each other, as demonstrated below.

> *"Adaptation options exist in all sectors, but their context for implementation and potential to reduce climate-related risks differs across sectors and regions. Some adaptation responses involve significant co-benefits, synergies and trade-offs. Increasing climate change will increase challenges for many adaptation options."*[2]

During the fifteenth meeting of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) at Copenhagen, party members pledged to provide $100 billion of climate finance per year by 2020 to address the mitigation and adaptation needs of developing countries. The UNFCCC defines climate finance as "local, national, or transnational financing, which may be drawn from public, private, and alternative sources of finance."[3] All parties to the UNFCCC agree there is an urgent need of this finance to address mitigation and adaptation. Globally, it is considered a mechanism for supporting developed and developing countries to enable the implementation of projects and programs that would enhance adaptive capacities, reduce vulnerabilities, enhance resilience, and support low carbon growth.

Regardless, the global flow of climate finance is still far behind the committed amount and even further behind the actual required funds, according to various estimates.[4] To address this gap, the institutional idea of a Green Climate Fund[5] (GCF) was proposed, and all parties agreed that GCF is the main operating entity for financial and institutional support for mitigation and adaptation measures.

The GCF linkages with the national banking bodies would also connect with the private sector. These partnerships would enhance the overall climate finance contributions, and that would mobilize adequate finance to provide opportunities to reduce vulnerabilities, enhance adaptive capacities, and support low-carbon development of developing, least-developed countries, and small island nations.[6]

The majority of new investment financing will thus have to be attracted from diverse sources, so private and alternative financing can contribute significantly to achieving financial targets. The private sector contributed 62 percent of climate finance primarily for mitigation in 2012.[7] Public-private partnerships (PPPs) offer an alternative method to realizing the variety of climate adaptation projects by bringing in private sector investment. However, the diverse needs of climate adaptation require more than funding resources alone. Support from public funds can facilitate the upstream enabling environments for PPPs in key sectors: tourism, infrastructure, agriculture, health, and local business or enterprises.[8]

However, it is also well recognized by the parties of developing and least-developed countries (LDCs) that private finance can play an important role, but is not a replacement for public finance. Presently, the lack of any robust system—which can keep track of the private finance flow, especially for adaptation—raises key questions regarding whether it is able to address pro-poor adaptation. Also, the business case for the private-finance-led adaptation and climate-resilient projects is inadequately documented and merely presented as best practices.[9]

The proposed session discusses barriers, solutions, and successful examples to present an overview of private finance for adaptation. Also, the session would emphasize the actors and mechanisms for broader collaboration among nonstate actors and public and private agencies. The specific objectives are to explore opportunities through collaborations between public and private entities to identify, develop, and implement successful adaptation projects through private finance. The discussion would address how to assist government officials in planning and prioritizing projects and to find solutions to deal with PPP and adaptation. What are the right financial instruments for the basis of flow of the private finance for adaptation? Why, despite the potential benefits, is private sector contribution limited in investing more in adaptation and building resilience? What is the best way to present the successful models of public-private partnership and adaptation from diverse thematic areas?[10] The following barriers need to be addressed to facilitate private finance for adaptation projects.

a) **Public finance as the major financing mechanism for adaptation of highly vulnerable areas.** Although private and new additional finance would contribute significantly toward climate adaptation, for the most vulnerable regions and countries, especially small island nations and LDCs, public finance plays a considerable role as the primary source of funding. However, continuous efforts need to be undertaken to showcase the adaptation projects from these regions supported by private finance.

   i. Small island developing state (SIDS) economies are majorly based on tourism. The tourist industry will be impacted by climate extremes and climate impacts. Apart from livelihood and the local economy, tourism is vital for the survival of the SIDS nations. Hence, linking tourism with private-finance-led climate-resilient development is important.

   ii. The Climate Action Network–Europe reported that "Recent estimates indicate that approximately 47% of global climate finance goes to projects in developing countries, although it seems that most of it goes to China, India and Brazil. This suggests most developing countries face an important funding gap."[11]

b) **Significant data gaps for tracking climate finance for adaptation projects.** The Private sector has been the largest contributor to global climate finance.[12] However, due to lack of reliable data, it is difficult to track climate finance for adaptation, especially in developing countries. Presently, no standard mechanism is established to track robustly the flow of climate finance, which limits the ability to monitor and understand its impact on adaptation. Also, it is difficult to document successful models and share learnings.

   i. **Defining and estimating climate finance for adaptation.** The principal step is to define adaptation finance. Different criteria are being used to define *adaptation finance* and *adaptation activities*. While recognizing the complexities, a standardized framework to categorize and estimate adaptation would not only facilitate tracking the flow of funds but also allocating resources under adaptation finance.[13]

c) **Lack of collaborative planning of public and private actors for adaptation projects.** Planning, documentation, and sharing of successful models of adaptation projects through private climate finance are limited as compared to the cases of mitigation projects. There is a need to strengthen the case of private finance through innovative models, partnerships, and institutional linkages. Creating opportunities to leverage public funds to provide commercially attractive and secure returns to private investors would further enhance private finance.

d) **Setting the example of public-private partnership-led projects in cities.** Collaborative planning involving nonnational actors and private firms would ease implementation, especially at the cities level. Globally, 90 percent of business leaders from different industries believe that they have a role in building climate resilience and preparing cities to face impacts of climate change.[14] The collaborative projects in cities would present a better return on investment and present a win-win strategy, for both public and private entities.[15]

e) **Private sector operations are too vulnerable to climate risks.** Private finance is important because private sector is also exposed to climate risks, which can cause economic losses.[16] Unlike large companies, generally small enterprises face difficult-to-quantify climate change risks to their business.[17] Therefore, a support mechanism from public agencies to private firms would provide stability in business and sustain the flow of climate finance at various levels.[18]

f) **Sector-specific climate finance instruments, approaches, and best practices.** Private finance has shown limited successful cases in the areas of tourism, infrastructure, agriculture, disaster risk reduction.[19] For instance, the insurance industry can help governments design risk-transfer solutions, including a balanced approach by combining pre-event and post-event financing instruments.[20] Example: projects undertaken under the Public Private Infrastructure Advisory Facility[21] in the area of tourism, infrastructure, agriculture, and transport.

   i. **Investment instruments for adaptation project.**[22] Financial instruments such as grants, debt, equity, quasi equity, and derisking can be used to incentivize the private sector for adaptation projects. Whereas instruments such as market mechanisms, bonds, internalizing adaptation costs, and technology development and transfer are mechanisms designed to either raise additional adaptation finance or increase private sector investments in adaptation.

g. **Micro, small, and medium enterprises (MSME) and multinational corporations (MNCs) can play different and significant roles.** The MSME sector has been providing the highest numbers of employment and is linked with the vulnerable and poor communities better than MNCs.[23] MSMEs can be used to develop new goods and services to facilitate sector-specific adaptation. Waterlife, for example, provides clean drinking water at an affordable price to households in India that lack access to clean water due to flooding. Furthermore, "[Small and medium-sized enterprises] and informal enterprises…account for over 60% of GDP and over 70% of total employment in low-income countries, while they contribute over 95% of total employment and about 70% of GDP in middle-income countries."[24] However, many MNCs are already providing support to their supply chains to become more climate resilient—through training coffee farmers, demonstrating rain-harvesting techniques to cotton farmers, training farmers how to adapt to current and future climate conditions, and more.

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# Climate Change and Urban Water Resiliency: A Case Study of Patna, India

Shailendra Kumar Mandal, Department of Architecture,
National Institute of Technology Patna, India

India is experiencing rapid urbanization, and consequently water demand in urban areas is escalating rapidly. The city of Patna, the capital of Bihar state, is located in the central part of the Gangetic plains. The city is among the oldest surviving urban centers in the world, with a continuous recorded history dating back to the fifth century BC.[1] The city (population 1.7 million) is one of the fastest growing urban centers in India. Despite the fact that Patna is located on the banks of the River Ganga, residents are primarily dependent on groundwater aquifers for domestic water supply. Increasing pressure on groundwater supplies is exacerbated by the unregulated construction of deep tube wells, along with the development of apartment complexes to accommodate a mushrooming urban population. For example, an overall comparison among data sets for the periods 1960–1967, 1977–1986, and 2008–2010 reveals a decline in the level of the deeper aquifer, in the range of 2–4 m.[2] The decline in the piezometric head of the deeper aquifer (13 cm/year) during the previous two decades is another concern.[3] This raises concerns about the security of Patna's water supply and, hence, the economic vitality and sustainability of the city.

In this environment, with already existing pressures on water availability and use, climate change puts further stress on water management and the sustainability of water supplies. Climate change is already having impacts on temperature. Observed average minimum temperatures (annual temperature January–December) have increased from 19°C to 20.5°C over the period from 1989 to 2009. These changes are associated with the changes in population, which has increased from 0.5 million in 1971 to 1.7 million in 2011. Trends in temperature also interact with nonclimatic factors, such as the removal of natural vegetation drainage patterns, loss of rainfall-absorbing capacity of soil due to urbanization, and the provision of man-made drainage systems. These interactions complicate planning for water supply and demand and increase water insecurity. Moreover, regional annual average monthly maximum temperatures are projected to increase 1.5°C by 2049, based on the ensemble average of 41 CMIP5[4] models and assumptions of moderate future increases in greenhouse gas emissions (i.e., Representative Concentration Pathway (4.5).[5] These projected increases in temperature will put further stress on water supplies, through increased demand for water, and through increased evapotranspiration. In addition, the increasing exposure to climate change, described above, will be superimposed on existing vulnerabilities, which include a lack of groundwater regulation and monitoring. Currently, Patna lacks building bylaws to encourage water conservation. Furthermore, based on informal interviews with water-management personnel, it is clear that it lacks information on and understanding of projected climate change impacts.

In order to address these vulnerabilities, and to increase the resilience of Patna in the face of projected climate changes, the research recommends building the capacity of city water managers to understand and incorporate climate information in urban planning and development processes. According to case studies of urban water-management practices from the United States, examination of past and future long-term climate variations, including those projected by climate models, has become increasingly important to informing sustainable water planning for many cities. Thus, one simple adaptation measure is to foster the sharing of climate information and data with water managers. Groundwater monitoring, including water quality monitoring, at the ward level, and artificial recharge of Patna's deep groundwater aquifer would improve resilience to climate change and its water security. These are among several preliminary recommendations for a sustainable water-management plan for the city of Patna. The study concludes that these rudimentary measures, which are needed just to address Patna's nonclimate water-management concerns, are necessary as a stepping-stone to transformative pathways for addressing the uncertainties associated with climate change.

## The City of Patna

The municipal limits of Patna Municipal Corporation (PMC) cover an area of 100 sq km with the present population of 1.7 million as per the 2011 census. The city is densely populated and is one of the fastest growing cities of Bihar and India.

At present, Patna's urban area has 102 deep tube wells apart from individual tube wells (privately owned) in the city to meet itsown water demand. There are around 23 overhead reservoirs (OHR) in existence, but all of them are nonfunctional due to various reasons. Out of these 23 OHRs, only 15 can be reused immediately, and cracks have already been developed in other OHRs. At present, pumping is done from zonal deep tube from deep tube wells twice a day (i.e., the supply is intermittent). Pumping hours are between 5 a.m. and 1 p.m. (8 hours) and 3 p.m. and 11 p.m. (8 hours).

About 400 km of pipelines varying from 350 mm to 50 mm diameter are in existence in the PMC area. In water-scarce areas and in slums, about 20 million liters per day (MLD) of water is supplied through 1,500 stand posts connected to street water mains in the PMC area. A few slums have shallow tube wells of about 30 m depths.

## Issues

The main problem with the existing system is nonuniform supply in different areas and contamination due to various leakages. Additional issues include the following:

- The unaccounted for water loss is above 40 percent due to a poor and old supply network.
- There is arsenic in the second layer of geological strata in surrounding areas.
- The pipes are in the center of the road due to road widening and heavy traffic, resulting in a loss of carrying capacity, contamination of water, and problems in repair and maintenance.

- In many colonies, the drinking water and sewerage pipelines are intersecting each other; with sewer lines on top of water lines, there is an increased possibility of contamination.
- A multilateral institutional arrangement for managing the water supply is system.
- The water supply is highly subsidized.
- It is very costly to operate and maintain the water system.
- The total water supply demand for the Patna Planning area for 2021 is 961 MLD and for 2031 is 1,413 MLD. This water demand includes domestic water demand, nondomestic water demand, industrial demand, and losses (15 percent).

## Climate Change Projections for Patna

The average monthly maximum temperatures for the region are projected to increase 1.5° C by 2049, based on the ensemble average of 41 CMIP5 models and assumptions of moderate future increases in greenhouse gas emissions (i.e., Representative Concentration Pathway 4.5). These projected increases in temperature will put further stress on water supplies through increased demand for water and increased evapotranspiration.

## A Resilient Strategy for Patna City

All over the world, the goal for municipal water systems facing climate change is to develop more-sustainable, resilient, and equitable systems to source and supply water. Water resources and their use are governed by a variety of political, economic, and institutional systems. If these systems become hierarchical, noninclusive, power-centric, and disconnected, then governing the growing stress on water resources becomes particularly complex.

Addressing the challenges within Patna's water- supply systems would depend on a wide range of interventions to manage both social and climate tremors that involve all aspects of the formal and informal systems, including managing the resource base, supply systems, and end use. While some of the interventions would be technical in nature, many would be prerequisite to address the processes and institutions through which water is governed.

Universally, climate change will have major consequences for water-resource supplies. Climate change impacts where, when, and how much rain falls, complicating long- and short-term planning for water supply. In developing-country-cities, the impacts of climate change are compounded by fast urbanization. The combination of these processes has the potential to seriously threaten urban water security in developing world cities.

Core to improving resilience will be improving governance and the capacity of water managers in the urban-water sector. Adaptive governance is the ability to manage systems that are accountable, transparent, and responsive to change in the society, as well as those brought on by the uncertainties and unpredictability of climate change.

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# Carbon Pricing and Innovation



Axel Michaelowa, Institute of Political Science and Center for Comparative and International Studies at the University of Zurich

and Perspectives

## The Grand Design—Global Carbon Pricing as Driver of Low-Carbon Technologies

When international climate policy was emerging in the 1990s, a consensus quickly formed that a carbon price would "provide a dynamic incentive for firms to develop new technologies,"[1] as low carbon technologies would provide immediate economic benefits. Carbon prices can be generated by a wide range of instruments: cap-and-trade systems, offset-credit systems, and carbon taxes.

Economists immediately suggested that the ideal instrument to provide the global public good of greenhouse gas mitigation would be a global emissions trading system.[2] [3] Especially in the Anglo-Saxon world, a strong push emerged that the international climate policy regime should aim toward such a system, while the European Union (EU) favored an emissions tax. While in Kyoto 1997, the opposition of developing countries prevented an agreement on a scheme which would allow allowance trading by companies across all countries with commitments, nevertheless, the three Kyoto mechanisms—clean development mechanism (CDM), joint implementation (JI), and international emissions trading—made it into the Kyoto Protocol. These mechanisms became a highly interesting testing ground for carbon pricing, especially during the second half of the 2000s.

When the unanimity rule for fiscal policies in the EU stalled attempts to introduce a carbon tax throughout the 1990s, the EU Commission grasped the opportunity to introduce an emissions trading system (ETS) that only required a qualified majority of member states in the early 2000s. The EU ETS became the cornerstone of EU climate policy and drove the market for offset credits from CDM and JI. At the same time, Scandinavian countries introduced carbon taxes and raised them over time. Since the second half of the 2000s, emissions trading systems have proliferated in various countries and sub-national jurisdictions. Also, carbon taxes have spread from Europe to North America.

Some economists continue to extol the virtues of global emissions trading. Mads Greaker and Cathrine Hagem find in a game-theoretic model with industrialized and developing countries that possibility to trade globally drives strategic research and development investments by the former, which will reduce the future price of allowances and thus reduce mitigation costs for industrialized countries.[4]

Carbon taxes have gained prominence as the preferred carbon-pricing mechanism. William Nordhaus favors a globally harmonized tax over emissions trading but does not discuss its impacts on innovation.[5] Reyer Gerlagh and Wietze Lise stress that if carbon taxes induce innovation they could have a significant mitigation benefit but do not discuss under which conditions such induced innovation might happen.[6]

# The Hangover—Is Carbon Pricing a Failure With Regards to Innovation?

Already in the heydays of carbon pricing, Michael Grubb warned that pure, politically realistic carbon-pricing instruments are unable to promote innovation, as technologies in an embryonic stage will never be competitive with mature technologies unless the carbon price is differentiated according to technology.[7]

With the discovery that emissions trading systems generally suffer from overallocation that has led to a pressure on allowance prices,[8 9] emissions trading has been severely criticized as an instrument that cannot mobilize any innovation. Even before the price crash, price volatility of allowances and offset credits was seen as a deterrent to innovation. Since the failure of the Copenhagen conference in 2009 and the resulting rollback of climate policy instruments in many countries, the political risk of persistence of carbon-pricing instruments over time has taken on increased importance. Generally, the political willingness to increase carbon pricing to a level that is sufficient to mobilize new technologies is lacking.

# Taking the Pulse—Which Carbon Pricing Instrument Has Been Most Suited to Promote Innovation?

Empirical evidence for innovation performance has accumulated over several decades.

## Carbon taxes

Philippe Aghion et al. show that car manufacturers tend to innovate relatively more when they face high fuel taxes.[10] The Organization for Economic Cooperation and Development finds that companies subject to the full rate of the United Kingdom's Climate Change Levy had a higher patent rate than companies subject to a reduced rate.[11] This is consistent with Ralf Martin et al. finding that companies improved their energy efficiency significantly after introduction of the tax.[12] For British Columbia, Adam Bumpus stresses that many "industries affected by the tax tend to consider it a compliance cost burden rather than an innovation opportunity."[13] Yasushi Ito cannot find a robust result regarding innovation impacts of the Swedish carbon tax on the pulp and paper industry.[14] However, this may be due to the inappropriate choice of the sector, which was least able to reduce energy consumption and emissions of all Swedish industrial sectors.[15]

## ETS

Tobias Schmidt et al. surveyed a large sample of power generators and technology providers under the EU ETS in 2009, thus before the price crash.[16] They found that until 2008, the EU ETS did not trigger investments in mitigation technologies or research and development. Generally, the lack of innovation in EU ETS is linked to overallocation and mistrust in long-term future of the system.

## CDM

While some climate policy specialists had stated since the late 1990s that destruction of HFC-23, a potent greenhouse gas, had a large potential, no one had engaged in

this technology. The emergence of a carbon price for CDM offset credits triggered implementation of destruction technology in all plants in India and China within less than two years, given that a single plant could generate revenues of up to $100 million per year.[17]

# Recommendations for Policymakers to Harness Innovation Benefits From Carbon Pricing

## Generate trust in persistence of pricing

During the 1990s, every observer tacitly assumed that carbon pricing would increase over time and be de facto irreversible. This has changed in the 2010s. Especially after the repeal of the Australian emissions trading system due to a change in government, the level of trust in the long-term future of carbon pricing is at a very low level. This applies both for emissions trading as well as carbon taxes.[18]

## Appropriability of innovation benefits

Given that innovation may take a long time, it is crucial that the innovator can enjoy the benefits without being copied by competitors. This cannot be assured by carbon pricing alone but requires strong intellectual property regulation.

## Complementary policies to drive innovation

Schmidt et al. found that long-term emission targets triggered innovation,[19] and that direct research and development subsidies, differentiated by technology,[20] should complement carbon pricing. Christoph Bertram et al. propose a combination of carbon tax and technology subsidies, arguing that there are no negative side effects of subsidies on the tax.[21] On the other hand, Eswaran Somanathan et al. stress that there is no "silver bullet" policy instrument to mobilize innovation.[22] The technology agreements proposed by Heleen de Coninck et al. and partially implemented by the United Nations Framework Convention on Climate Change have not yet shown concrete results.[23]

# Carbon Pricing as "Glue" of a Coalition of the Willing

The necessary conditions for carbon pricing to mobilize innovation are a clear long-term commitment, ideally by all political parties, with an increasing price level and a combination with technology support policies. Carbon pricing at significant levels—which, due to the "overallocation curse" of emissions trading systems, is more likely to be done through carbon taxes than through emissions trading—will easily harness innovation that is of an organizational nature, while innovation that requires strong technological input is more difficult to mobilize. Under such conditions, carbon pricing could provide the core incentive of a coalition of governments who are serious about climate change mitigation policies.

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# Providing Scientific Evidence for Loss and Damage

Dr. Friederike E. L. Otto, Senior Researcher and Scientific Coordinator,
Environmental Change Institute, University of Oxford,
Oxford University Centre for the Environment

Human influence on the global climate system is unequivocal. A world with rising mean global temperatures is also a world of increasing high-impact extreme weather events, including dangerous heat waves and droughts.[1] For example, one study suggests that the deaths of at least 35,000 people in Europe are attributable to the record-breaking heat wave of 2003.[2] In addition, studies find that the likelihood of such a heat wave occurring has increased considerably due to anthropogenic climate change.[3] There is no study so far directly linking such extreme events and their impacts to the loss of human life as well as damage to economic productivity. However, the science to estimate this does exist. We could estimate the influence of anthropogenic climate change on the probability of such extreme weather events, and subsequently the resulting loss and damages on a regular basis and thus create, albeit incomplete and uncertain, inventories of loss and damage.

Extreme weather events, at least in the short term, are likely to cause more loss and damage from climate change than slow-onset phenomena. If harmful weather extremes can be attributed to anthropogenic climate change, this might provide scientific evidence and help defining the term *loss and damage* in the context of the United Nations Framework Convention on Climate Change. Recent extreme weather events around the world have been associated with poor harvests, water shortages, and forced migration in communities struck by floods, droughts, and hurricanes.[4] Stories, photographs, and videos of this destruction have frequently been used as evidence of the impacts of anthropogenic climate change, for example, by journalists, campaigners, and researchers in the climate-adaptation-and-development/aid community.[5 6 7 8 9] Such coverage implies that global warming is making these extreme weather events more frequent and intense, and that every damaging weather event is influenced by humans, or as Bloomberg Business reported after Hurricane Sandy: "It's Global Warming, Stupid."[10] While we expect particular types of weather events, such as extreme precipitation, to become both more intense and more frequent with a rising mean global temperature, such general physical reasoning (e.g., warmer air can contain more water vapor, leading to more intense and more frequent rainfall events) leaves us unable to say more than an increase in such extreme events is consistent with climate change.

Many have thought we may never be able to confidently attribute the cause of a particular event to climate change, because any particular storm might have occurred due to natural variability alone. But this is rapidly changing with the development of the science of Probabilistic Event Attribution, in which very large ensemble simulations of climate models and statistical analysis are being used to attribute specific meteorological extremes to human influences on the climate system.[11 12 13]

[14] [15]The attribution of such extreme events to greenhouse gas emissions requires a different statistical approach than for slow-onset events such as sea-level rise.[16] While there is widespread agreement that slow-onset affects can be reliably attributed to greenhouse gas emissions and other anthropogenic atmospheric forcings, there is some controversy around our ability to attribute any particular extreme weather to climate change[17] or the usefulness of this.[18]

Concurrently, national governments are demanding a stronger scientific evidence base for their decision making around climate change, resilience, and disaster-risk reduction.[19] [20]

While it is now possible to assess whether climate change has altered the probability of occurrence of specific extreme events[21] [22] scientific studies have so far been limited to a small number of disasters, and in some cases the scientific community does not yet have the understanding and adequate tools to investigate the role of human influence, especially in data-poor regions. Studies undertaken so far have suggested that some extreme events have become more likely because of climate change,[23] but also that some have become less likely,[24] or that the events were caused purely by the chaotic variability of the climate system.[25] [26] [27] And for the vast majority of past extreme weather events, the influence of climate change has not been studied.

Progressing from a scientific possibility to an actual comprehensive inventory of economic and noneconomic losses from extreme events that are attributable to anthropogenic climate change is a nontrivial task even if the inventory would be restricted to loss and damage due to extreme events. Extreme events are happening all the time all over the world almost on a daily basis. Despite the considerable advancements in event attribution science, the events attributed that have been published so far[28] [29] [30] have been selected ad hoc, driven by scientific curiosity and "closeness to home" and thus are not representative for the severity of extreme events or their impacts on societies or any other objective criteria. However, if the focus of scientific attention was not driven by scientific curiosity but by the need to inform global policy, such bias could be overcome. An inventory of attributable climate change impacts could, for example, be based on disasters with the highest impacts on societies in terms of economic impacts and mortality.

Clearly there are scientific and nonscientific challenges in assessing loss and damage from extreme weather events and compiling an inventory of these, but it is worth highlighting that these are challenges that do exist for other climate change policy, notably the application of future climate change projections for adaptation. In terms of future climate, different approaches and scenarios also lead to different results, and no single best model or methodology can be identified. Nevertheless, people work with projections and ask for them to be tailored to their specific needs with the appropriate level of uncertainty communicated, although with varying levels of success. Thus, the dependency of the results on the event definition is only a problem, as with future scenarios, if the information is taken at face value, and discussions about how best to distill information from projections for decision makers could be extended to deal with event attribution results.[31] Besides these challenges, the opportunity to create an inventory of climate change impacts is compelling from scientific and societal points of view. Only if we ask attribution questions routinely and with different methods will we gain a better understanding of the drivers of extreme events and their impacts and thus enhance our understanding of the climate system as a whole.

At the same time, knowing the impact of anthropogenic emissions on society today, even if this knowledge has gaps, could allow for exploration of more appropriate mechanisms to address climate change impacts and a more realistic assessment of what is required to adapt to climate change and to deal with the residual damages societies cannot adapt to. This does not suggest that an impacts inventory would be a panacea or the only evidence taken into account in the context of adaptation or loss and damage, but it would certainly provide an insight into the impacts of anthropogenic climate change and would have the potential to contribute to a sound scientific basis to address adaptation and loss and damage.

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# Quantifying Development Needs: An Energy-Centered Approach to Climate Justice

Dr. Narasimha D. Rao, International Institute for Applied Systems Analysis
(co-author: William Lamb, U. of Manchester)

## Abstract

Despite the vast literature on global climate justice, there is a surprising lack of studies that attempt to quantify the emissions impact of basic human development, even though many of these frameworks aim, either implicitly or explicitly, to shield basic human development from the costs of mitigation.[1] Broadly, the literature that frames distributive justice in terms of emissions rights neglects to relate these rights to development needs, making them susceptible to claims of "hot air." Proposals that aim to differentiate nations' capacity to mitigate define relatively arbitrary, universal thresholds of exemption,[2] typically in terms of income[3] or emissions, which ignore the heterogeneity in countries' energy sectors, and consequently their mitigation costs.[4] Yet, achieving climate stabilization at 450 ppm or less would significantly restrict global growth in energy, whose sufficiency for even basic development is not known.[5]

This paper presents a new basis for differentiating countries' mitigation responsibilities based neither on emissions rights nor income differences, but directly linking human development needs to greenhouse gas emissions through energy. Drawing on the well-known linkages between energy and human development, this paper presents theoretically and empirically grounded quantification of countries' energy needs for achieving basic human development. Using different indicators of human development (HD), including life expectancy and a composite (new) basic needs indicator, the historical relationship between countries' energy consumption and HD are estimated, and then projected into the future. The methodology also estimates historical decoupling between HD and energy use so as to account for technological progress. Carbon intensities of energy are then separately applied based on "business as usual" as defined in the LIMITS[6] integrated assessment study.

Figure 1 depicts the cumulative per capita energy consumption required to meet development needs from 2010–2050; in comparison to Centrally Planned Asia (CPA), Africa and South Asia are likely to consume significantly less (final) energy as they progress toward meeting basic needs (approximately 28 and 29gigajoules(GJ)/capita/year, respectively, compared to 40GJ/capita/year in CPA). Of course these regions reach their maximum energy expenditure corresponding to the development threshold at a much later stage, but this does allow time for interventions to be made.

These energy "needs" might be used to define a floor of "development emissions" that is excluded from obligations to mitigate. In absolute cumulative terms between 2011 and

2050, focusing on the most expensive indicator from basic needs and life expectancy in each region, a baseline floor would constitute approximately 216GtCO2e for Africa (4.2tCO2e per capita), 442GtCO2e for China and CPA (6.7tCO2e per capita), and 345GtCO2e for India and South Asia (4.1tCO2e per capita). Note that these numbers are derived from these regions' respective starting points and historical rates of progression, and include both the emissions for achieving and maintaining the chosen human development thresholds. As such, these estimates represent emissions associated with basic human development that these regions are likely to generate by 2050 at historical progress rates. Thus, Africa would occupy the least carbon space, even though the region has the highest shortfall in human development, because of its slow rate of progress.

Compared to the global carbon budget in the chosen 450ppm stabilization scenario (1581GtCO2e for 2010–2100), development requirements in these regions constitute 63 percent of total global emissions emitted by 2050. This high figure underlines the importance of early interventions to improve the efficiency of human development. It also suggests that a development floor of emissions may be larger than currently appreciated in integrated assessment models and policy circles, particularly those that are formed on the basis of a least-cost allocation.

The cumulative emissions budgets for countries, so calculated, provide country-specific estimates of development needs for a universal set of HD standards, which can serve as a basis for deriving countries' mitigation responsibility. However, these results are only a starting point for defining a practical efforts-sharing regime. Further work is needed to build in incentives for delivering human development in the most sustainable manner, by maximizing cobenefits, for instance.

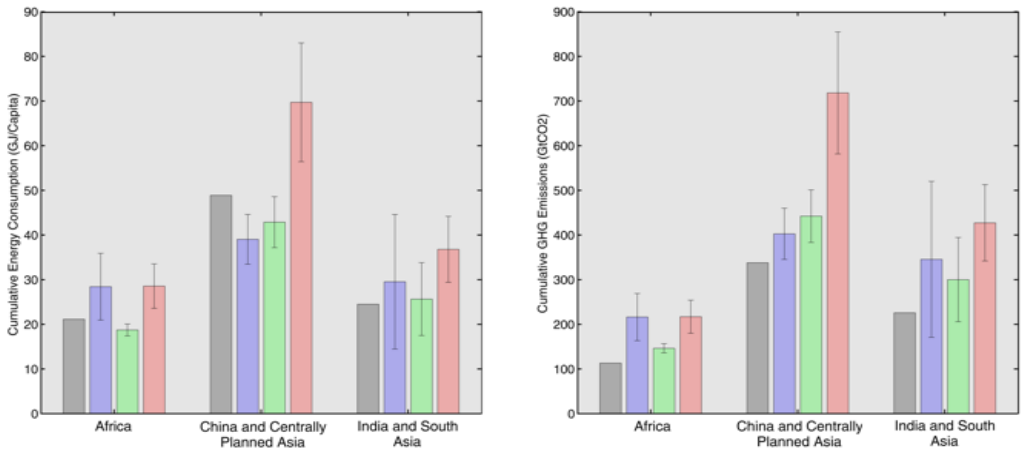


**Figure 1: Cumulative Projections of Per Capita Energy Consumption and Total Greenhouse Gas (GHG) Emissions for Human Development**

*Cumulative per capita energy and cumulative total greenhouse gas emissions required for human development in three regions in 2010–2050. The bar whiskers represent a sensitivity range, the upper bound consisting of a higher human development threshold (72.85 years, 89.99% access) and a low decoupling rate (a constant level from 2010); the lower bound consisting of low human development thresholds (70.37 years, 83.5% access) and a higher decoupling rate projected to 2020 and constant thereafter. Color code: grey: 450 ppm "least cost" allocation; purple: life-expectancy-based GHG emissions; green: basic-need-based GHG emissions; red: GDP-growth-based GHG emissions.*

This work builds on a recent publication in *Global Environmental Change*[7] and presents preliminary ideas from research commencing shortly as part of a European Research Council Starting Grant entitled "Decent Living Energy: Energy and Emissions Thresholds for Providing Decent Living Standards to All."

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# Revisiting Debt-for-Climate Swaps as an Alternative Source of Climate Finance

Tim Stumhofer, Fellow, Robert Bosch Foundation

## Overview

This paper considers debt-for-climate swaps (DfC) an "alternative" source of climate finance that has occasionally come to the fore in long-term climate finance negotiations but has largely been relegated to the fringe of this dialogue. In an effort to better understand DfC, this briefing proceeds by introducing the contemporary discourse on climate finance sources. An overview of DfC is then presented, describing the mechanism's design, history, and political advantages/limitations. The paper concludes with a brief discussion of DfC's quantified potential.

## Climate Finance and the $100-Billion Question

In 2009, at the 15th Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC COP15), the developed world introduced a significant financial commitment to assist developing countries in addressing climate change: "In the context of meaningful mitigation actions and transparency on implementation, developed countries commit to a goal of mobilizing jointly USD 100 billion dollars a year by 2020 to address the needs of developing countries."[1] Since its introduction, this $100-billion mobilization target has been central in framing long-term climate finance negotiations.[2] Guided by this text, the ensuing climate finance discourse has also been forced to confront ambiguity inscribed within it. Principally at issue is the lack of a common understanding on what constitutes climate finance. Put succinctly by the UNFCCC Standing Committee on Finance: "The UNFCCC does not have a definition of climate finance."[3]

At a methodological level, the absence of agreed upon definitional climate finance accounting rules has led to ambiguity in how to calculate and attribute ownership to specific climate finance interventions.[4] In a corollary concern, broad ambiguity persists on basic questions of scoping, particularly around which financial sources should be "counted" as climate finance. This question of permissible sources was put in open-ended terms in the Copenhagen Accord's framing of its $100-billion climate finance mobilization target: "This funding will come from a wide variety of sources, public and private, bilateral and multilateral, including alternative sources of finance."[5]

### Developing Climate Finance Pathways

Confronting the Copenhagen target's ambiguity, in early 2010, UN Secretary-General Ban Ki-moon organized a high-profile process to assess the feasibility of meeting this

climate finance goal. The so-called High Level Advisory Group on Climate Financing (AGF) brought together an executive panel of global leaders who presided over inputs from a series of expert-led technical working groups and an extensive stakeholder outreach and engagement process.[6] In November 2010, the nearly year-long process publicly released a summary report that provided quantitative projections for a number of financial sources in support of its conclusion that the $100-billion target was "challenging but feasible."[7] A full list of the AGF's work streams and the sources it considered is outlined in Table 1.

| Sector | AGF work stream (WS) | Specific proposal considered |
|---|---|---|
| Public | WS1: Carbon market public revenues | Revenues from auctioning international units (e.g., AAUs under the Kyoto Protocol) |
| | | Revenues from auctioning emission allowances for domestic schemes (e.g., EUAs under EU ETS) |
| | | Revenues from offset levies (i.e., withholding a share of offset revenues) |
| | WS2: International transport | Revenues from taxes on international aviation and shipping through creation of emissions trading scheme or fuel or ticket levies |
| | WS3: Carbon-related sources | Revenues from a wires charge, a small charge levied on electricity generation linked to production or emissions |
| | | Revenues generated from diverting developed country fossil fuel subsidies |
| | | Revenues from fossil fuel extraction royalties/licenses |
| | | Revenues from national carbon taxes in developed countries |
| | WS4: International financial institutions | Resources generated from MDBs using current balance sheet headroom |
| | | Resources created from further replenishment and paid-in capital contributions to MDBs |
| | | Fund financed by commitment of existing or new special drawing rights |
| | WS5: Financial transaction tax | Revenues from a global financial transaction tax, with a focus on foreign exchange transactions |
| | WS6: Direct budget contributions | Direct budgetary contributions |
| Private | WS7: Public-private leverage | Flows of international private finance resulting from public developed country interventions |
| | WS8: Carbon markets | Transfer of resources to developing countries to purchase offsets |

***Table 1. Climate Finance Sources Considered in the AGF Report***
*Source: Adapted from* Report of the Secretary-General's High-level Advisory Group on Climate Change Financing[8]*; AAU: assigned amount unit; EUA: European Union allowance; EU ETS: European Union emissions trading system; MDB: multilateral development bank*

The landscape of climate finance sources introduced in the AGF has been mirrored in subsequent efforts to hypothesize pathways to and track progress against the Copenhagen mobilization target.[9] [10] Notably, the AGF and the lion's share of further research initiatives on climate finance sources have excluded debt relief or debt-for-development swaps.

# Debt-for-Development Swaps

The debt-for-development swap has been a part of the development finance landscape since the 1980s. While the exact mechanics and institutional arrangements vary, conceptually debt-for-development exchanges see creditors forgive loans on the condition that debtor nations apply a portion of their canceled debt to fund agreed-upon domestic development objectives.[11] Figure 1 summarizes the financial flows and institutions involved in a typical debt-for-development swap.

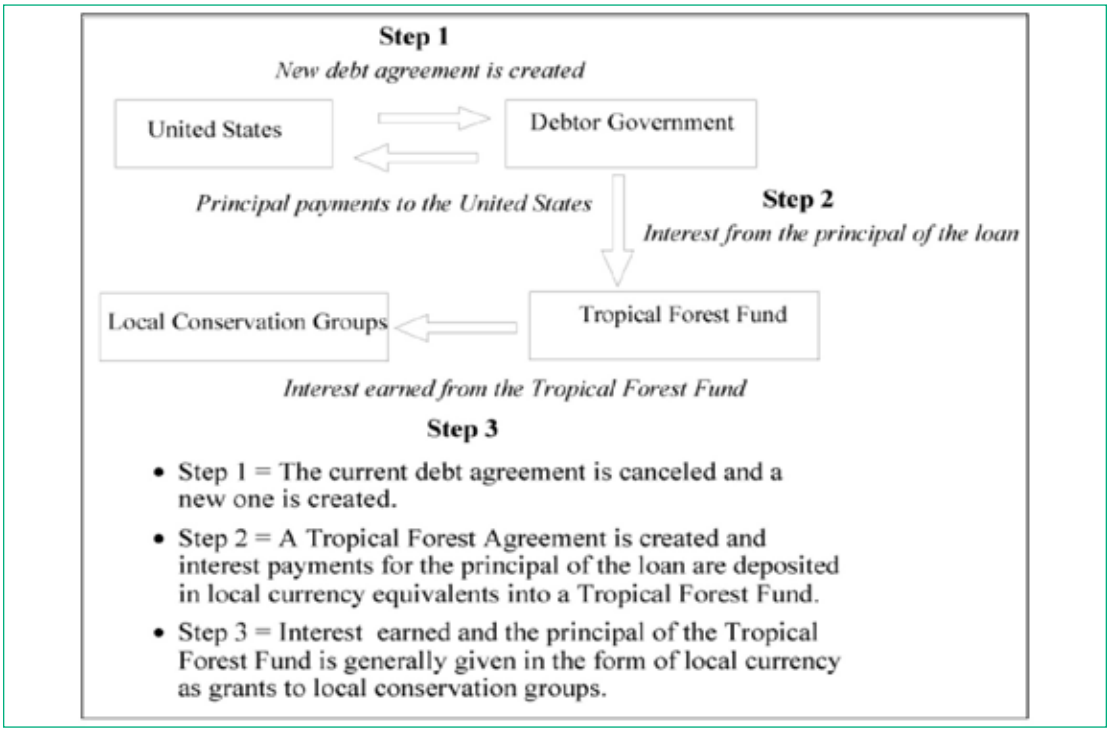


***Figure 1. An Example of a Bilateral Debt-for-Nature Transaction***
*Source: Excerpted from Debt-for-Nature Initiatives and the Tropical Forest Conservation Act: Status and Implementation*[12]

*Figure 1 describes a bilateral transaction from a US government program. Debt-for-development swaps are also often conducted in three-party configurations where a nongovernmental organization (NGO) stands in to purchase debt from the creditor. In this approach, the NGO instead of the creditor works directly with a given debtor government.*[13]

## Challenges and Opportunities for Debt-for-Climate Swaps

In a synthesis article published in *Nature Climate Change, Fenton* et al. advocate for DfC as a valuable mechanism to scale climate finance. They highlight four key advantages debt swaps present as a source of climate finance: (1) the potential to reduce strain on national donor budgets while facilitating domestic financing in debtor countries, (2) a new instrument to chip away at the $100-billion Copenhagen climate

finance target, (3) a mechanism that is well suited to meet the UNFCCC requirement for predictability (Article 4) and the call for alternative sources of finance, and (4) in a corollary to the first item, a finance stream that may be viewed as more politically palatable by countries managing budgets in austere times.[14]

At this high level, the benefits are clear. However, a review of the broader debt-for-development literature reveals a number of complexities that present potential hurdles to debt-for-climate, including:

- Fishing in the same pond—An increasing number of sectors (e.g., debt for nature, health, education) are competing for a finite number of debt conversion opportunities.[15]

- Slow and contextual—Each swap requires an appropriate debt title to be identified and buy-in on both debt relief and the swap's objective achieved by the creditor and debtor.

- Interaction with existing debt relief programs—Broad debt relief initiatives (Paris Club Highly Indebted Poor Countries Initiative/Multilateral Debt Relief Initiative under the G-8 in 2005) have reduced the volume of swappable debt and turned attention away from swaps.[16]

- Incentivizing debt taking ("moral hazard")—As with all forms of debt relief, the expectation of further debt write-offs at a later date can be seen as leading to an overwillingness to take on debt.[17] (This also links to broader moral arguments levied against debt swaps.[18])

- Creditor policies can moot political benefits—Policies in lender countries that recharacterize debt swaps in domestic appropriations accounting can limit political advantages of swaps.[19]

## Recent Politics and Practice of Debt-for-Climate Swaps

While many debt-for-nature swaps may meet a technical definition of DfC, few swaps have explicitly been labeled such. Notable exceptions include:

- Fast Start Finance (FSF)—Italy and the United States counted debt swaps in their FSF submissions, including forest conservation, Reducing Emissions from Deforestation and Forest Degradation (also called REDD+), and adaptation projects in Asia and Latin America. Together these swaps accounted for 0.3 percent of total FSF.[20 21 22]

- DfC and the Clean Development Mechanism (CDM)—At least one swap (Spain to Uruguay) was used to finance a wind farm CDM project.[23]

DfC has also been raised as a climate finance source in various forums, before and after the Copenhagen Accord.

- UNFCCC COP15—Indonesia, a country with a long background in debt-for-development agreements, added "external debt swap/relief" as a source of finance in August 2009 UNFCCC consultations. This became part of the negotiating text in COP15 but was jettisoned in negotiations.[24]

- Postcolonial groups—In 2009, the Commonwealth Secretariat and the Organisation Internationale de la Francophonie raised the issue of "debt relief to combat climate change."[25] The Commonwealth Secretariat remains visibly active on the topic, for example, producing papers in 2013 and 2015 examining the feasibility of multilateral debt relief in small island developing states (SIDS) as a source of climate finance and submitting a similar proposal to the 2014 PrepCom for the Annual SIDS Conference.[26] [27] [28]

- NGO involvement—The Nature Conservancy (TNC), an NGO with extensive experience facilitating debt-for-nature swaps, has since 2011 been advocating the potential of debt-for-climate swaps in SIDS.[29] In conjunction with JP Morgan, TNC is presently marketing a three-party, $78-million climate adaptation themed swap in the Seychelles (a Commonwealth SIDS).[30]

## Quantitatively Estimating Debt-for-Climate's Potential

This paper does not attempt to harmonize estimates on the volume or scope of participation in debt-for-development programs to date. However, it is worth noting that from 1987 to 2007, swaps exchanged a face value of $5.7 billion in debt titles for $3.6 billion of financing for development projects.[31] Estimations of the volume of debt eligible for debt-for-development swaps are heavily caveated due to data limitations exacerbated by the country-to-country nature of swaps, legal and political impediments, and interactions with many of the constraints and complexities documented earlier in this paper. Indeed, one of the more comprehensive analyses opens with the qualifier: "assessing how much debt is still available/eligible for swap purposes is a difficult if not impossible task."[32]

A complete evaluation would need to scope what type of debt titles (commercial, bilateral, and multilateral) would be eligible and parse by debtor country stage of development. Few estimates of "swappable" debt exist and should be interpreted with caution. For a sense of scale, one 2011 estimate examining only bilateral and limited commercial debt titles found $236 billion in eligible debt titles, mostly in middle-income countries.[33] Earlier this year a separate review limited to multilateral debt in small vulnerable economies identified $4.5 billion in swappable debt primarily in poorer nations.[34]

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# Networked Carbon Markets

*Developing the services and institutions needed to enable a connected international carbon market that is liquid and delivers climate-smart financing more efficiently.*

Vikram Widge, Head of Climate Finance and Policy, International Finance Corporation, Climate Change Group, The World Bank

## Summary

Around the world, countries are developing different ways to put a price on carbon to fight climate change. This is a bottom-up approach to a global problem, and countries are choosing different solutions depending on their national circumstances and what is politically feasible. While these unilateral actions are to be commended, the resulting regulatory fragmentation has made it increasingly complex to track progress, compare achievements, and link actions across jurisdictions.

Given the challenges, the World Bank Group's (WBG) Networked Carbon Markets (NCM) initiative is exploring alternative visions for how a future international carbon market could accommodate a patchwork of different, domestic climate actions. The NCM initiative has a long-term vision, and its focus is not to "harmonize" but rather to facilitate cross-border trade based on a shared understanding of the relative value of these different climate actions. The end goal is to develop a framework for enhancing transparency, comparability, and fungibility of heterogeneous climate actions, for a connected international carbon market that is liquid and delivers climate-smart financing more efficiently.

## Context

A warming planet is not just an environmental challenge—it is a fundamental threat to any effort to end poverty and threatens to put prosperity out of the reach of millions of people. The Intergovernmental Panel on Climate Change has warned of the extreme risks to future human well-being resulting from a rise in temperature above 2°C. In response, governments are designing and implementing greenhouse gas (GHG) mitigation efforts that address climate mitigation that best suit their unique contexts. This is very different from the top-down approach of the Kyoto Protocol, where countries signed on to a regime/plan to lower their emissions by 2012 using common metrics according to international standards and procedures set by the United Nations Framework Convention on Climate Change (UNFCCC). The bottom-up development of low-carbon efforts has led to a certain amount of regulatory fragmentation and heterogeneity across jurisdictions. As a result, it has become increasingly complex for stakeholders to compare and contrast climate mitigation programs, policies, and commitments across jurisdictions. In addition, all evidence suggests that current and planned actions are far from sufficient to achieve a 2°C target. The challenge, therefore, is to identify the relative value of mitigation actions in jurisdictions and to incentivize a "race to the top" to bridge the (expected) very large gap between GHG mitigation commitments and the climate mitigation needed to limit global warming.

## Principles Guiding the NCM Initiative

Governments are deciding on the carbon pricing approaches that best suit their jurisdictions, including coverage, design features, and level of ambition. They are also making decisions on quantitative and qualitative restrictions and deciding whether or not to allow assets from other jurisdictions into their markets for compliance. Governments may also determine which emission reductions should be "retained" domestically and which could be sold into an international market. While efforts to share information and experience will continue to be valuable inputs to domestic decision making, ultimately each government is making and will continue to make decisions based on what is the best fit for its specific situation.

Two key principles of the NCM initiative are driven by the above considerations. First, the NCM initiative builds in the principle of flexibility so that a wide range of approaches and designs can be accommodated, rather than aiming to enforce elements of system choice, design, or scope of linking. Second, participation would be on an opt-in basis. Governments would choose to participate if they see value. Implementation could begin with a small number of participating jurisdictions, and others could opt in as the benefits are demonstrated.

A third principle is to be inclusive and to encourage broad participation, rather than excluding some countries due to domestic choices or inability to meet potentially unattainable standards. In doing so, the NCM initiative seeks to take account of the different respective circumstances in which climate mitigation efforts are made. And a fourth principle is to attract private sector participation and catalyze private sector financing of low carbon investments. To avoid unpredictable delays or regulatory obstacles in market operations, the NCM initiative aims to limit to the extent possible requirements for international public sector approvals in domestic markets.

A fifth principle is to support transparent, value-based fungibility of carbon units in the international market. Fungibility of carbon units presumes that there is a way of evaluating and comparing the relative values of the diverse carbon units being traded. The way in which it is proposed to bring about this evaluation and comparison of carbon units is by assessing the mitigation value of a carbon unit. Assigning a mitigation value to a carbon unit means that it can be compared with other climate actions that also have a mitigation value assigned to them. Assigning a mitigation value to a carbon unit also allows for adjustments to be made based on policy and institutional heterogeneities among countries. The mitigation value of a carbon unit would translate into a rate of exchange at which the carbon unit can be traded internationally.

Finally, the NCM would be compatible with global climate change agreements negotiated through the UNFCCC process but could also move forward while the negotiations are ongoing.

## Key Components of the NCM Initiative

The NCM initiative requires (1) a transparent, reliable, efficient approach to providing the information needed to determine the relative climate change mitigation value of units to be traded internationally and (2) infrastructure to assist jurisdiction to

manage carbon-market-related risks and a mechanism to keep track of the international exchanges and potentially provide a clearinghouse function.

Corresponding to these requirements, the key components of the NCM initiative are:

- An independent assessment framework to determine the mitigation value of different carbon units.
- An International Carbon Reserve (ICAR) to help domestic regulators manage market risks or address market failures by offering buy/sell services to participating jurisdictions.
- An International Settlement Platform to track cross-border trades and potentially provide a clearinghouse function.

## Independent Assessment Framework to Determine Mitigation Value

Civil society, governments, and the private sector are exploring how to assess different climate mitigation actions, to enable comparability and improve the prospects of limiting global warming. Through the NCM initiative, the WBG is helping to convene these stakeholders to explore how to enhance the usefulness and acceptance of the assessment outcomes such that they provide reliable and well-synthesized information about the mitigation value of different climate actions. As outlined in Figure 1, mitigation value is a function of risks relating to the characteristics of a specific program, risks relating to the characteristics of a jurisdiction's collective low-carbon policies, and risks relating to the characteristics of a jurisdiction's contribution to global climate change.

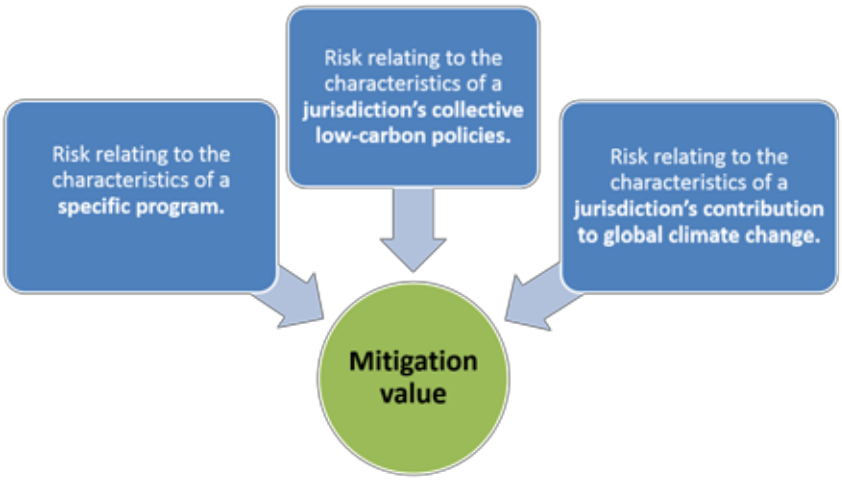


***Figure 1. Key Elements of Mitigation Value***

**Program level—Carbon integrity risk.** Carbon integrity risk relates to the extent to which a specific low-carbon program or activity (e.g., regulatory instrument, price instrument, and quantity instrument) will achieve its intended outcome. The challenge is to establish an approach that can accommodate the wide range of new and heterogeneous low-carbon programs that are now emerging. Currently, systems like the Clean Development Mechanism provide only a binary "yes" or "no" outcome on the validity and verification of emissions reductions. However, this limits

the ability to differentiate among projects that have met minimum requirements or to evaluate to what degree projects perform, vis-à-vis the threshold. As a result, there is a wide range of low-carbon programs and activities whose overall benefits/risks are not captured by this approach. This is evident in certain sectors, geographies, and areas of activity with the highest sustainable development potential or those that contribute most to transformational change (e.g., activities with high cobenefits).

**Jurisdiction level—Policy/regulatory risk.** Policy/regulatory risk relates to the extent to which a jurisdiction's collective low-carbon policies will achieve the intended outcomes. It involves technical considerations, such as the extent to which the set of policies designed to achieve the mitigation target within the existing policy context are likely to achieve the intended outcome. It also involves political considerations, such as the extent to which the government has the political will, track record, and institutional strength to maintain or adjust policies to achieve appropriate mitigation targets.

**Global level—Relative climate mitigation contribution.** Assessing a jurisdiction's relative climate mitigation contribution relates to the extent to which its climate mitigation targets are perceived as a sufficient contribution to the global effort to limit global warming. The objective of this approach is to incentivize jurisdictions to increase their level of effort.

The mitigation value of a carbon unit would translate into a rate of exchange at which the carbon unit can be traded internationally.

## Institutional Structures

The WBG is also exploring institutional structures to support a network of carbon markets. One possible structure is a pooled reserve of carbon assets, or an ICAR, that could provide a source of liquidity or play a market-maker function. The ICAR builds on the idea that carbon markets and the mitigation of their inherent risks can be made more efficient by increased connectivity and pooling of risk mitigation measures on an international level. These risks can include carbon-price-related risks such as the risk of high prices, low prices, and/or volatility in prices. These risks are also nonprice related and include the risk of invalidity of issued and allocated carbon units, the risk of non- or underperformance of mitigation activities, and/or the risk of nonpermanence of carbon units.

While many risks may be addressed at the local level, there are other risks that may benefit from pooling at an aggregated level. For example, pooling risk mitigation measures may benefit those jurisdictions with limited capacity to design and operate a price stabilization scheme, which can be time consuming, difficult, and require numerous capacities and skills. Aggregation may be a simpler option (particularly for smaller jurisdictions) and allow participants to benefit from the know-how and expertise of different carbon markets. Aggregating a diverse pool of carbon units whose values do not move up and down in perfect synchrony can also enhance overall risk mitigation efforts. This is because by aggregating carbon units that represent a variety of jurisdictions, sectors, and programs, the risks embedded in the pool are lowered. The lower the correlation between carbon units, the greater the reduction in risk that can be achieved.

Numerous functions, structures, and design options for an ICAR may be considered. However, the process of jurisdictions coming together to negotiate on the role and function of an ICAR may bring benefits in itself. For example, the exchange of information on different carbon markets and negotiations on how risks can be efficiently managed in a joint approach may help regulators in different jurisdictions better understand the different systems and make their own carbon markets more comparable and robust.

It is intended that an ICAR would not replace but rather complement and support market stabilization instruments on the level of individual jurisdictions/markets. The services offered by an ICAR, regardless of how it is designed, should also not be viewed as a substitute for structural reforms that are needed to address fundamental market imbalances.

In addition to an ICAR, another structure to support a network of carbon markets is an international settlement platform to track cross-border trades and potentially provide a clearinghouse function.

## Role of the World Bank Group

Since March 2013, the WBG has launched a global discussion and prompted alternative visions about the services and institutions needed to connect carbon pricing systems in the future. It has held extensive stakeholder consultations on NCM, which have included two international working group meetings comprising representatives from the UNFCCC, private sector, developed and developing country governments, academic analysts, nongovernment organizations, foundations, and intergovernmental organizations. It is not envisioned that the WBG would play a role in assessing jurisdictions. Rather, it seeks to convene stakeholders, develop general principles, help pilot early stages, and promote compatibility with UNFCCC negotiations and agreements. NCM complements the World Bank Group's ongoing low-carbon development activities and its efforts to promote carbon pricing as critical to achieving climate mitigation at large scale in an effective and cost-efficient way.

## Next Steps

Work planned to December 2015 includes coordinating, facilitating, and organizing initiatives that assess climate mitigation efforts through partnerships; an analytical work program focused on the design of methodologies, case studies, and concept development; and stakeholder consultations and outreach. It also involves developing knowledge products to explore how potential institutional structures can enable the key components to enhance the flow of finance toward the ongoing effort to limit global warming.

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Climate Strategies is an international organisation that convenes networks of leading academic experts around specific climate change policy challenges. From this it offers rigorous, independent research to governments and the full range of stakeholders, in Europe and beyond. We provide a bridge between research and international policy challenges. Our aim is to help government decisionmakers manage the complexities both of assessing the options and of securing stakeholder and public consensus around them. Our reports and publications have a record of major impact with policy-makers and business. Online at *www.climatestrategies.org*.

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The Stanley Foundation
209 Iowa Avenue
Muscatine, IA 52761 USA
563-264-1500
563-264-0864 fax
*info@stanleyfoundation.org*