WRI CONFERENCE PAPER

WORLD RESOURCES INSTITUTE

FINANCING ADAPTATION: OPPORTUNITIES FOR INNOVATION AND EXPERIMENTATION

MANISH BAPNA* AND HEATHER MCGRAY

November 2008

This paper will be published as a chapter in the forthcoming book
Climate Change and Global Poverty: A Billion Lives in the Balance?, by the Brookings Institution Press in 2009.

Climate change is upon us. The earth is warming, seasons are shifting, species are migrating, and water is flowing in new patterns. The accelerating and deepening impacts of climate change will touch everyone on earth, but those who stand to suffer most are the poor. People and governments must find the will and the means to slow, stop, and reverse the buildup of greenhouse gases in the atmosphere to avert catastrophic warming. But it is already too late to avert some serious consequences. We must also learn to adapt to a warmer world.

This question of adaptation is a particularly pressing issue for national and international agencies tasked with providing financial and technical assistance to reduce poverty in developing countries. As leaders begin to consider policies and measures to respond to mounting climate effects, it is critical that adaptation efforts be designed to support the poorest communities in their development efforts. Likewise, development assistance must foster adaptation if it is to succeed within a changing climate. That the poor are the people least responsible for global warming makes these efforts all the more imperative.

This paper explores the opportunities and challenges involved in financing adaptation efforts in developing countries. The last two years have seen a surge of interest in adaptation finance with new funding proposals floated on an almost weekly basis. But many critical questions remain. How much will adaptation cost? Which proposals are most likely to generate an adequate and predictable flow of funds? How should these funds be channeled so that they reach those most in need? How do we ensure adaptation funds are used most effectively?

This paper seeks to provide some answers, and to lay out the state of play in the fledgling field of climate adaptation finance. Section I provides a conceptual model for the relationship between adaptation and development. Section II reviews estimates of adaptation costs and the funding chasm with existing sources of adaptation finance. Section III assesses existing and emerging approaches to generating new finance from public sources. With an eye to the United Nations climate negotiations for a post 2012 international climate agreement, it also sets out guiding principles for generating funds on a scale commensurate with the challenge. Section IV looks at options for channeling adaptation funds to developing countries, and ensuring the accountability of chosen institutions. Section V highlights emerging approaches to spending adaptation funds and dissects the relative merits for the world's poor of financing specific adaptation projects or mainstreaming adaptation into development.

In Section VI, Next Steps, we use a U.S. legislative case study to explore how de-linking the three phases of adaptation finance — generation, channeling and spending — could promote innovation and political support for such initiatives around the world.

Throughout, we propose guiding principles to assure effective decision-making by the international community in tackling this most urgent of challenges of our time.

* An earlier version of this paper was presented at the Brookings Blum Roundtable on Global Poverty in August 2008 titled "Development in the Balance: How will the world's poor cope with climate change".

I. Framing Adaptation and Development

Efforts to adapt to the changing climate are intricately tied up in the broader challenges of natural resources management, poverty reduction, and equitable and sustainable growth. These interconnections have led to contentious debates about what adaptation actually is, how it should be paid for, and how to integrate it into national and international development agendas.

Two roughly distinct perspectives inform how policymakers and practitioners approach the challenge of adaptation: one focuses on creating response mechanisms to specific impacts associated with climate change, and the other on reducing vulnerability to climate change through building capacities that increase resilience to climate-related stresses. In practice, many instances of adaptation fall between these extremes.

Corresponding to this range of adaptation goals is a continuum of actions that might be taken to reduce the impacts felt from climate change--from 'pure' development activities on the one hand to very explicit adaptation measures on the other. At one end of the continuum, the most vulnerability-oriented adaptation efforts overlap almost completely with traditional development practice, where activities take little or no account of specific impacts associated with climate change. At the opposite end, activities are designed to target distinct climate change impacts, and fall outside the realm of development as traditionally defined. In between lies a broad spectrum of activities with gradations of emphasis on vulnerability and impacts (see Figure 1).

In the climate change financing debate, there has been a tendency to emphasize the right side of the continuum, where activities address the 'additional costs' of solving problems attributable directly to climate change. Many activities toward the left end of the continuum focus largely on problems not exclusively caused by climate change--yet they represent the very foundation of adaptation to climate change in many places. Failure to make investments on this "left side" would leave gaps in the landscape of adaptation efforts, especially in regions where people are acutely vulnerable. Thus, while the overarching need for 'additional' funding for adaptation is clear, designating these funds exclusively toward actions to address particular climate impacts would leave much-needed interventions unfunded. In other words, *adaptation is not just additional to development but often* ***is*** *development*.

FIGURE 1. **A Continuum of Adaptation Activities: From Development to Climate Change**

Source: McGray et al. (2007, p. 18)

II. Meeting the Cost of Adapting to Climate Change

The impossibility of disentangling adaptation from development has complicated efforts to estimate adaptation costs in developing countries. However, several "back-of-the-envelope" global cost exercises have recently been completed (see Table 1). All five estimates fall in the tens of billions of dollars per annum—a significant amount, especially when compared to current levels of official development assistance (ODA) of about US$100 billion per annum. While these estimates all carry high uncertainties (as they are based on quite rough assumptions), they make it clear that climate change will increase the costs of economic development for developing countries.[1]

TABLE 1. Annual Adaptation Costs in Developing Countries

Assessment	Annual Cost	Year
UNDP 2007	$86 billion	2015
UNFCCC 2007	$28–67 billion	2030
World Bank 2006	$9–41 billion	present
Oxfam 2007	$50 billion +	present
Stern Review 2006	$4–37 billion	present

Sources: UNDP (2007, p. 192-194); Agrawala and Fankhauser (2008, p. 69)

These estimates also point to the challenge of generating support for adaptation at a scale that can make a difference. The current level of adaptation funding for developing countries is orders of magnitude below even conservative estimates of costs. Three main flows of adaptation funds currently exist: north-south flows channeled through dedicated multilateral adaptation funds and ODA; domestic flows wherein developing countries generate and use adaptation funds; and south-south flows.

Existing North-South Resource Flows

Table 2 shows the multilateral adaptation funds sponsored by the United Nations Framework Convention on Climate Change (UNFCCC) and how much has been pledged, received and distributed (as of June 2008) for each of these funds.

Total resources pledged for these adaptation funds is $320 million while the amount disbursed is $154 million.[2] The Global Environmental Facility (GEF), an intergovernmental organization launched in 1991 to channel funding to support implementation of a number of global environmental agreements, has been entrusted with managing these funds.[3]

The World Bank has also developed its own set of dedicated climate change resources known as the Climate Investment Funds (CIF). The Bank will use the CIF to promote innovative approaches to mitigation and adaptation, including increasing climate resilience among the world's most vulnerable communities. As of September, 2008, developed countries had pledged to contribute US$6.1 billion to the funds, and the Bank planned to distribute the first round of funds by the end of 2008 (see Box 3: The World Bank Climate Investment Funds).

ODA represents a much larger sum of money—notionally $100 billion, although considerably less (some argue less than $40 billion) is actually oriented towards long-term development programs.[4] Current ODA levels fall far short of the commonly cited global target of 0.7 percent of gross national product

TABLE 2. UNFCCC Adaptation Funds in operation (US$ Million)

Fund	Description	Total Pledged	Total Received	Project Approvals
Least Developed Countries Fund	Supports preparation and implementation of National Adaptation Plans of Action	180	91.8	36.79
Special Climate Change Fund	Focuses on development; activities should be country-driven, cost-effective and integrated into national poverty reduction strategies	90	59.9	67.6
GEF Trust Fund Special Priority on Adaptation	Finances adaptation activities that also generate global environmental benefits	50	50	50
Total		320	201.7	154.39

Note: Figures as of June, 2008. Project approvals include those officially approved and those in process of being approved.
Source: GEF (2008)

(GNP) and donors are under heavy pressure not to use ODA funds for adaptation due to the moral obligation that developed states carry because of their contributions to the problem.[5] It is highly unlikely, therefore, that developed countries will make 'new and additional' ODA pledges above the 0.7 percent target that are sufficient to fill the existing adaptation funding *chasm*.[6] For instance, the World Bank suggests that the CIF meet the requirements for 'new and additional' ODA funds for adaptation, but it is likely that these monies will simply serve as a substitute for other ODA funding.[7]

Domestic Resource Flows

Developing countries' domestic investments in adaptation are growing, and are likely to become significant over time. Bangladesh, for example, has allocated $40 million from its national budget to set up a Trust Fund on Climate Change. The government also invited donors to make contributions, and the UK government has pledged an additional $132 million.[8] Sri Lanka is taking a different approach and passed a 2008 environment levy that would be used, in part, to fund adaptation. However, parliamentary tactics used to pass the legislation elicited widespread public condemnation, making the future of the levy highly uncertain.[9] In addition, early action is being taken by sub-national governments in many developing countries, making adaptation finance highly diverse and decentralized.[10] All in all, domestic investments in adaptation are modest at best and not yet well analyzed. Estimating how much is earmarked for adaptation and for what activities is at this point an art, not a science.

South-South Resource Flows

While the character of future south-south adaptation cooperation is difficult to assess, it is likely such alliances will increase, at least in *ad hoc* forums. Larger emerging economies (e.g. China, India) may in the future provide adaptation funding to low-income countries to help them cope with climate change. Currently, however, no significant south-south transfer of resources has been provided – in part because of the broad recognition that developed countries have the primary responsibility to compensate those less well-off.

Nevertheless, a few pilots premised on southern cooperation have been recently established. One such alliance is the Caribbean Catastrophe Risk Insurance Facility (CCRIF) which aims to mitigate a common risk (as opposed to generate new funds). This insurance scheme allows 16 Caribbean countries to receive short-term liquidity in the event of major hurricane or earthquake damage. The participating states determine the level of coverage they wish to purchase based on their risk exposure and their capacity to pay. They then contribute an annual premium proportional to their risk exposure --anywhere from US$200,000 to US$2,000,000. Payouts range from US$10 million to US$50 million.[11] The CCRIF reduces the costs of disaster insurance to these island states by an average of 40 percent.[12]

As with domestic sources of funding, south-south flows to support adaptation have not been systematically identified, much less rigorously analyzed. The potential for south-south flows in the near future will be limited at best although this may change as the cross-border risks of climate change manifest themselves more starkly.

III. Generating "New and Additional" Adaptation Funding

The expectation that adaptation funding will increase is grounded in the moral and practical claim that wealthier countries bear a much larger share of responsibility for historical and current greenhouse emissions, and have greater financial and technical resources. This obligation is made explicit in the UNFCCC, which requires developed countries to "assist developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting the costs of adaptation to those adverse effects."[13] The UNFCCC also stipulates that this support must be 'new and additional' to existing ODA pledges and targets.[14] But how will these new resources be generated? Have existing adaptation funding mechanisms fared well? Which emerging proposals are most likely to generate an adequate and predictable flow of funds?

Options for Generating Adaptation Finance

Given the level of resources required, the climate and development policymaking communities are discussing a wide range of public funding mechanisms, some more innovative than others. These can be clustered around three broad headings: (a) national budgetary allocations; (b) national market-based levies, and (c) global market-based levies.

(a) National Budgetary Allocations

Existing UNFCCC adaptation funds (Table 2 above) follow a traditional budget-line item approach to international financing. Donor countries make pledges and later generate (or not) the funding to support the pledge through domestic policy

processes, usually annual budget appropriations. At present, about $120 million of the $320 million that has already been pledged to the UNFCCC adaptation funds is still outstanding. While these pledges are generally considered to be reliably additional to other related spending, calls for outstanding pledges to be honored and funds to be fully committed would generate only modest incremental funds for adaptation.

One of the reasons that the UNFCCC funds are so small is that the UNFCCC has no specific targets for donations; the size of donor countries' contributions was left to each donor's discretion. To rectify this in the post-2012 regime, a number of countries have put forward proposals for donation targets that would begin to be commensurate with estimates of adaptation costs. China, for instance, has proposed that developed countries should allocate 0.5 percent of their GDP to support actions taken by developing countries to tackle climate change. This would currently amount to $185 billion per year for mitigation, technology transfer and adaptation together.[15] The proposal, however, does not provide details on how the funds would be earmarked, or for that matter, details on much else at all. But it does reflect an expectation by China of significant resource transfers between developed countries responsible for historical greenhouse gas emissions and developing countries who will bear the brunt of impacts from those emissions. This proposal, however, exposes a challenge in categorizing those countries that cause the climate problem and those that will face most of the impacts. With China now the world's largest emitter of green house gases (GHGs) on an annual basis but responsible for only a very small portion of historic emissions, it is not clear whether or when it should move from being a net recipient to a net contributor of such funds.

Mexico has put forward a quite different funding model which speaks in part to this fact. They advocate establishing a World Climate Change Fund, multilaterally agreed, that would scale up global efforts on mitigation and adaptation based on contributions from *both* developed and developing countries. Targets for country contributions would be determined using an objective formula based on greenhouse gas emissions, population and GDP. Responsibility for emissions and capability to pay would therefore determine each country's target contribution. An adaptation levy of 2 percent would be assessed on all disbursements from this fund, generating up to $1.9 billion annually by 2030 to support adaptation in developing countries.[16]

(b)National Market-based Levies

Several innovative ideas have emerged that would catalyze funding for adaptation through national levies on market-based transactions, instead of annual budget appropriations. The most promising of these policies have revolved around the design of greenhouse gas markets under cap-and-trade climate policies, such as the European Union Emissions Trading Scheme (EU ETS). Others would tax markets in existing goods and services, such as airplane flights. There are two defining characteristics in these examples: 1) funding is generated 'automatically' over a period of years, rather than through annual budgetary decisions that often are susceptible to the vagaries of domestic politics, and 2) funding accrues to national governments.

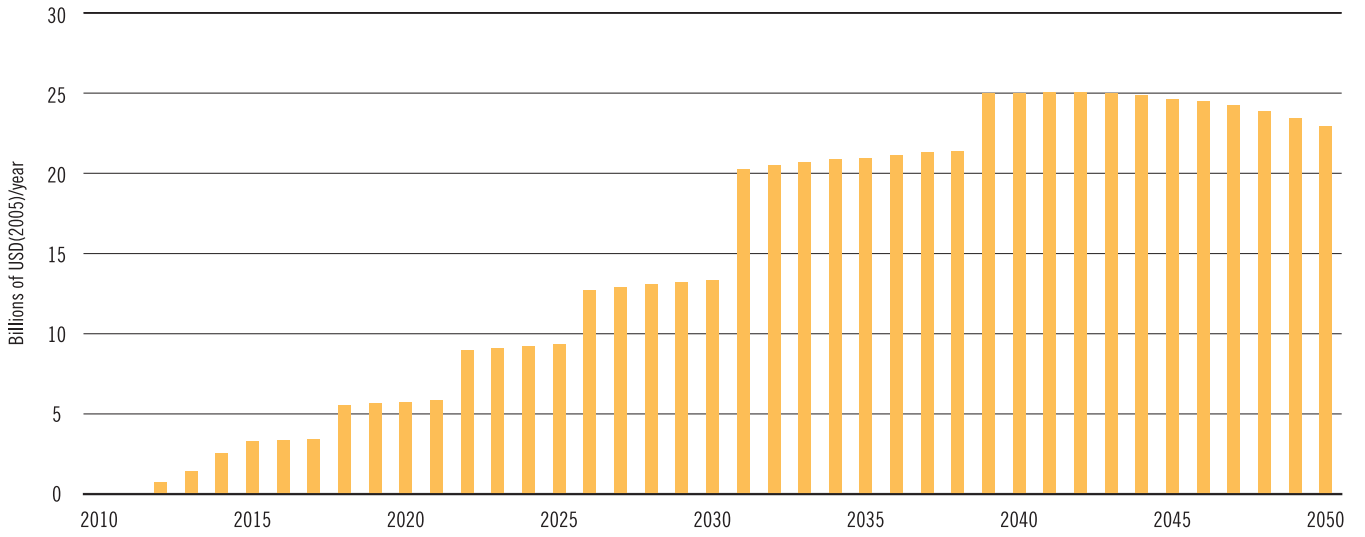
Greenhouse Gas Markets

In both the United States and the European Union, proposals are on the table to create adaptation funds that would be capitalized by revenues from auctioning emissions rights to polluters under cap-and-trade programs. Climate bills introduced in the U.S. Congress, for example, assign a certain percentage of annual auction revenues each year to international adaptation efforts (see Figure 2). The World Resources Institute estimates that the Boxer-Lieberman-Warner bill, introduced in May 2008, would generate approximately $3 billion annually for international adaptation in the first three years of the program, increasing to as much as $25 billion per year over time.[17] Although the proposed legislation did not pass, it progressed further in Congress than any other US climate bill to date, and may provide the blueprint for what ultimately is signed into law.

The EU ETS provides another potential source of adaptation funding. Annual auction revenues are estimated to reach 75 billion ($113 billion) in 2020, of which 20 percent would be dedicated to climate-change related activities, including efforts "to facilitate developing countries' adaptation to the impacts of climate change."[18] Early estimates suggest that this could generate up to €1.5 billion ($2.3 billion) annually in adaptation related revenues in 2020, although this is based on several assumptions with a high degree of present uncertainty.[19]

Figure 3 compares estimates of potential revenue in 2020 generated by US and EU greenhouse gas market proposals. The funding these proposals could generate are significant; several orders of magnitude above current funding levels for international adaptation.

FIGURE 2. **Potential annual auction revenue designated for international adaptation under Boxer-Lieberman-Warner climate bill, 2015-2050**



Note: Estimates are in 2005 dollars, derived using carbon prices published in a study by the Massachusetts Institute of Technology's Joint Program on the Science and Policy of Climate Change (see http://web.mit.edu/globalchange/www/abstracts.html#a146). While any allowance prices are inherently speculative, the MIT prices are high compared to other studies, so this paper's estimates of funds potentially available for adaptation may be higher than those in other studies.

However, a challenge in generating funds from greenhouse gas markets is that both the amount of resources and how they are allocated are vulnerable to shifting domestic political interests – although much less so than annual budget allocations (as typical of ODA).

Indeed, though this prospective source of finance looks encouraging, it is important to recognize that no such source exists as of yet. The European Union has an operational ETS, but has very little scope to influence decisions about how auctioning revenues are to be spent by the member states. Individual countries jealously guard their independence in budgetary matters: some may choose, as Germany has, to steer revenues to international adaptation, some will not. Similarly in the United States the battle over how revenues will be spent is just beginning, and many domestic constituencies will exert strong sway over policymakers. Nevertheless, in both systems the scope to raise considerable sums of finance looks promising.

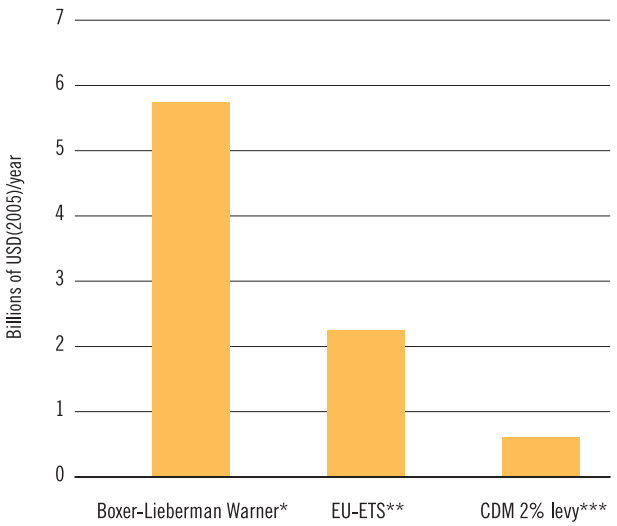
Air Travel and Shipping Levies

Levies on international air travel and shipping represent potential new sources for adaptation funding that is predictable year-on-year. Establishing a levy of $7 per passenger on each international flight, for example, would result in $14 billion in additional revenues annually.[20] An attractive feature of the international air travel adaptation levy proposal is that it is equitable. It imposes the levy on a highly-polluting activity and on individuals, irrespective of their country of origin. This proposal overcomes the more crude distinction typically made on the responsibility for emissions and capacity to pay between developed and developing countries (i.e. that irrespective of income and lifestyles, no one in developing countries should pay for adaptation). This is particularly relevant in light of the burgeoning middle classes in China, India and other emerging economies.

A precedent already exists for channeling air travel levies for global public goods. France has started collecting an 'international solidarity contribution' on all its international flights to generate revenues for HIV/AIDS (see Box 1).

However, not all countries are receptive to air travel levies nor do they agree on what these levies should finance. Unlike the greenhouse gas markets, which are being created from scratch, air transit market participants already have a status quo to which they are accustomed. Moreover, they are already in the process of adjusting to a significant number of new security-related taxes and fees in their industry. Considerable political

FIGURE 3. Potential annual revenue designated for international adaptation under selected international proposals, 2020



* Estimates are in 2005 dollars, derived using carbon prices published in a study by the Massachusetts Institute of Technology's Joint Program on the Science and Policy of Climate Change (see http://web.mit.edu/globalchange/www/abstracts.html#a146). While any allowance prices are inherently speculative, the MIT prices are high compared to other studies, so this paper's estimates of funds potentially available for adaptation may be higher than those in other studies.

** Muller (2008, p. 13)

*** Fenhann (2008)

hurdles must be overcome before air travel levy proposals can seriously be considered a potential revenue source for international adaptation.

(c) Global Market-based Levies

Market-based instruments operating in the 'global' or 'international' space, outside of the purview of any single national government, represent a third category of financing mechanisms. The Kyoto Protocol levy on the Clean Development Mechanism (CDM)[21] is the iconic—though largely untested—example of a truly global funding instrument. Through this levy, 2 percent of emissions reduction credits generated by CDM projects will be placed in a global Adaptation Fund created under the Kyoto Protocol and used to support adaptation in developing countries. Total income generated by sale of the credits is estimated to be in the range of $160-950 million by 2012 and potentially much more in subsequent years, depending on prices and trade volumes.[22]

BOX 1. Taxing Air Travel to Support Development

The French "solidarity tax" on air travel provides a frequently cited example of how innovative financing mechanisms for adaptation could work. The tax of 1 to 40 euros per flight (depending on the distance traveled and class of the ticket) is used to support achievement of the Millennium Development Goals. In its first phase, the funds raised are channeled through UNITAID, an initiative of the World Health Organization, to scale up access to treatment for HIV/AIDS in low-income countries, particularly in Sub-Saharan Africa.

French President Jacques Chirac first proposed the tax at the World Economic Forum in 2005 and called on other nations to implement similar policies on behalf of the world's poor. While France remains by far the most active participant (generating nearly 90 percent of funds), 44 countries have signed on, and levies have raised over $300 million per year in a predictable and sustainable flow of funds. This allows UNITAID to make long-term plans and commitments without diverting funds from ODA budgets.

Sources: UNITAID (2007a); UNITAID (2007b)

The truly innovative feature of the CDM levy is that resources are generated from the private sector and collected by a multilateral body, not a national government. In so doing, the mechanism avoids the 'domestic capture' problem faced by national market-based mechanisms discussed above—that money raised domestically is likely to be regarded as nationally owned, and proposals to allocate these resources overseas could encounter stiff political resistance.[23]

Related proposals under discussion in climate negotiations include increasing the 2 percent levy on CDM transactions to 3 to 5 percent and extending the levy to other instruments established under the Kyoto Protocol, such as Joint Implementation (emission reduction 'offset' projects between developed countries) and Emission Trading (emissions rights trading under a cap).[24] In addition, Norway recently proposed bolstering the Adaptation Fund by auctioning a portion of the emissions allowances granted to Annex I countries under the Protocol.[25] Again, a multilateral body would oversee the auctions and collect the funds generated, while domestic regulations would pass the costs of these "Assigned Amount Units" (AAUs) off to the private sector. One benefit of this option is that it would not create the inefficient disincentives to trading quotas likely to result from an emissions trading levy.[26] Table 3 provides an estimate of the potential revenue sources for the Adaptation Fund.

TABLE 3. Projected Funding for the Adaptation Fund

Adaptation Fund	Annual Revenues	Year
2 percent CDM levy (current)	$80–300 million*	2008-2012
5 percent CDM levy (Pakistan proposal)	$200–750 million**	2008-2012
Extension of 2 percent levy to Joint Implementation and Emissions Trading	$10-50 million*** (considerably larger post 2012)	2008-2012
Auctioning of AAUs (Norway proposal)	$15–25 billion when 2% of AAUs auctioned****	2008-2012

Abbreviations: CDM: Clean Development Mechanism; AAUs: Assigned Amount Units

* UNFCCC (2007, p. 177); Fenhann (2008)
** Numbers calculated using UNFCCC 2% levy figures above. Pakistan proposal at: UNFCCC (2008b, p. 15)
*** UNFCCC (2007, p. 186)
**** UNFCCC (2008a, p. 48)

Evaluating Options for Generating Funds

Considerable discussion and debate has taken place within the climate community on how to evaluate international adaptation funding proposals. Which of the above existing and new proposals would be acceptable, and to whom? How do we balance the interests and expectations of donor and recipient countries? How do we generate funds at a scale commensurate to the challenge at hand? We offer three principles informed by the Bali Action Plan and international climate negotiation process more generally to help guide answers to these questions.

It is highly unlikely that a single mechanism will satisfactorily meet all of these principles in full. It will, therefore, be necessary to advance several of the most promising mechanisms to bridge the adaptation funding chasm in the near future.

BOX 2. Generating Adaptation Funds: Guiding Principles

Funding Generated is:

ADEQUATE: in the tens of billions of dollars

PREDICTABLE: steady flow of revenues, estimated in advance

ADDITIONAL: over and above current ODA commitments

Key Messages

- Mainstreaming adaptation into ODA is essential; however, ODA is unlikely to provide the 'new and additional' resources required to finance adaptation efforts of developing countries.
- Auction revenues derived from proposed national and regional GHG markets represent a significant potential source of adaptation finance. Ongoing debates in the U.S. and EU offer a narrow but crucial political window to pass climate legislation which includes sizable funding for international adaptation. Earmarking of auction revenues is susceptible to competing domestic priorities, but less so than annual budget appropriations. Aviation and shipping levies are at present much more speculative, and likely to face greater political hurdles.
- Market-based levies in the 'global space', such as on Clean Development Mechanism transactions, are also promising and, quite importantly, avoid the domestic capture problem.

IV. Channeling Adaptation Funding

Once funding for adaptation is generated, it has to be channeled effectively to those who need it. This is a significant challenge, given the broad spectrum of activities that may be affected by climate change (e.g. agriculture, water resources management, infrastructure maintenance, disaster management, etc.), as well as the location-specific nature of climate change impacts and adaptation needs. To be effective in this context, mechanisms for channeling adaptation funding will need to both reach a large number of different actors, and support a diverse set of activities tailored to specific places and communities.

With this in mind, which institutions, old or new, should allocate adaptation resources? At the global level, institutional options for channeling adaptation funding fall into two categories: long-standing institutions that have traditionally funded economic development and new institutions created specifically to deal with climate change. Both offer benefits and potential drawbacks.

Multilateral and Bilateral Development Agencies

Channeling adaptation support through existing developing agencies, such as the UN Development Program (UNDP) or World Bank, would avoid the cost of creating new institutions. It would also capitalize upon the expertise and experience that these institutions have in channeling funding for international development. Moreover, the current goals of these agencies are threatened by climate change. Integrating climate considerations into their ongoing work—often called 'mainstreaming climate change' into development—is clearly an important aspect of adaptation.

However, as noted earlier, the UNFCCC stipulates that support for adaptation must be 'new and additional' to funding needed for international development. Adaptation funding is perceived by developing countries as compensation owed by wealthy countries under the 'polluter pays' principle. Given this distinction, developing countries are arguing that they deserve greater control over the allocation of adaptation funding than they typically have had through bilateral development agencies or multilateral banks. This reasoning fed the Southern outcry against the launch of the World Bank's Climate Investment Funds (CIF) in early 2008 (see Box 3), in response to which the Bank was forced to significantly redesign the funds' governance structure to provide greater voice and vote for developing countries over the use of adaptation funds.[27]

Box 3. The World Bank Climate Investment Funds

In July of 2008, the World Bank approved a portfolio of Climate Investment Funds (CIF), including a Strategic Climate Fund and a Clean Technology Fund. The Strategic Climate Fund is an overarching fund that will go toward various programs to test innovative approaches to climate change, including increasing resilience to climate change in developing countries. As of September, 2008, Australia, France, Germany, Japan, The Netherlands, Sweden, Switzerland, the United Kingdom, and the United States had pledged over $6.1 billion for the funds.

Southern governments and global civil society have been highly critical of the Bank's involvement in climate change funding. Many have expressed concerns that creation of the CIF at the Bank could undermine or predetermine the outcomes of post-2012 climate negotiations. In particular, the CIF as originally planned had contained an Adaptation Fund. This fund was perceived as a direct competitor to the Kyoto Protocol Adaptation Fund, for which a majority-Southern Fund Board had just been established in Bali after years of negotiations. Critics emphasized that adaptation funding is compensation due to poor countries who have contributed little to climate change, and as such, the Northern-controlled World Bank is an inappropriate location for significant adaptation finance. They also questioned whether poor countries could expect to negotiate in good faith with Northern partners who establish a globally agreed fund in December, then unilaterally create a competing fund the next month.

In response to the outcry, the UK government pushed the Bank to re-design the adaptation component of the CIF. By the time the Bank formally approved the CIF, it had removed the adaptation fund and added a sunset clause to the two remaining funds, to take effect when post-2012 negotiations conclude. Moreover, the Bank approved a new governance body for each fund, with equal representation of developing and developed countries. It also added explicit mechanisms for information-sharing with the Kyoto Protocol Adaptation Fund Board.

Sources: World Bank (2008b) ; World Bank (2008c); Bretton Woods Project (2008)

Climate-specific Funds

The alternative to channeling adaptation funding through development agencies is to work through new or more recently established international institutions dedicated specifically to address climate change. As noted above, the UNFCCC created a set of international funds that support adaptation in developing countries. These are managed by the GEF; however, many developing countries have expressed frustration with the unclear guidance and high transaction costs attached to GEF climate funds. Moreover, as stated earlier, these funds have not attracted resources from donor countries on the scale needed to begin addressing the adaptation needs of developing countries (see Table 2).

A different approach was taken in the creation of the Kyoto Protocol Adaptation Fund (AF). This was made operational in 2007 through decisions taken at the Bali climate negotiations that created a Southern-dominated Adaptation Fund Board responsible for the fund, with the GEF serving as its secretariat. The AF represents an interesting experiment in the creation of a new institution, in that it is a global body channeling funds generated globally, without resources under the direct control of a single country. But this experiment also requires new forms of accountability. Without dedicated domestic oversight (e.g. congressional or parliamentary committees with appropriations authority), who will care if the Fund's resources are badly misspent? This question will need plausible answers within the next few years if the Adaptation Fund is to continue to be a credible candidate for channeling resources generated through new mechanisms under discussion for the post-2012 climate agreement.

Evaluating Options for Channeling Funds

Irrespective of whether adaptation resources are channeled through development or climate institutions, we argue that the following principles of institutional accountability should apply.

BOX 4. Channeling Adaptation Funding: Guiding Principles

Transparency: Institutions need clearly established funding criteria and mechanisms for channeling resources to recipient countries. All decisions should be made publicly available.

Appropriateness: Adaptation funding is fundamentally compensation not aid. Loans are not an appropriate vehicle, concessionary or otherwise.

Southern engagement: Developing countries should be represented heavily within adaptation funding institutions and help shape allocation decisions. Climate-proofing of ODA should be aligned with Paris Declaration principles.

Capacity: Roles and responsibilities of all parties involved should be made clear and agreed. The technical and human resources needed for effective management of funds must be made available to the funding body.

Professionalism: Individuals entrusted with the management of these funds should be held to a high standard of professionalism and public accountability.

Monitoring and evaluation: Systems should be in place for monitoring the impact of adaptation investments and revising funding practices in response.

Key Messages

- Given the involvement of both ODA and climate-specific institutions, and the fact that the post-2012 negotiations are in their infancy, it seems likely that adaptation resources will be channeled through a highly fragmented landscape of funding mechanisms for the time being. This environment provides for a high degree of experimentation with a range of approaches, which is especially useful at this point in history, given the dearth of global experience with adaptation to climate change.
- The fragmentation of the adaptation financing landscape, however, poses significant coordination challenges for those responsible for generating adaptation funding, and, perhaps more importantly, for those on the receiving end tasked with implementing activities funded through a variety of mechanisms.
- An additional challenge is that of institutional accountability. Few existing institutions available for channeling funds to developing countries are fully trusted by both donor and recipient countries. Accountability mechanisms should be designed into any new institutions to prevent a replication of this problem.

V. Implementing Adaptation

How do we ensure adaptation funds are used most effectively? Given that efforts to adapt to the changing climate are connected to so many aspects of economic development, implementation of adaptation activities is intimately tied up in a wide range of other activities: natural resource management, infrastructure improvement, health systems, agricultural technology, disaster preparedness, poverty alleviation and more. In this tangled context, how to spend adaptation funding, who should spend it, and where to prioritize investments all become challenging questions.

Current Efforts

Adaptation efforts to date have predominantly taken a project funding approach. A 2007 WRI review of 135 cases of concrete adaptation activities in the developing world found the largest number to consist of projects at the local level in rural communities.[28] At the national level, too, some of the earliest adaptation planning has focused on project activities under the aegis of National Adaptation Plans of Action (NAPAs), developed through a provision in the UNFCCC. Through their NAPAs, least developed countries identify priority activities that respond to their most urgent and immediate adapta-

tion needs. Thirty-eight of forty-nine eligible countries have completed NAPAs to date, each identifying an average of ten priority projects[29], with plans from another six countries due in fall 2008. Identification in a NAPA is supposed to fast track funding for projects via the UNFCCC adaptation funds (see Table 2 above), but by November 2007 only eleven countries had submitted NAPA projects for funding, and by March 2008, only one project, from Bhutan, had received funding. Fifteen projects have now been approved and are completing project preparation documents. [30]

The snail-like pace of funding for NAPA-identified projects has several causes, including a slow project application process and high transaction costs. In response to the latter, and to the piecemeal nature of project-by-project adaptation, emphasis has begun to shift toward integrating adaptation into ongoing development planning. A growing number of both climate and development practitioners believe that adaptation efforts are likely to be more successful if adaptation is embedded within broader efforts. National development plans in particular, they argue, must take climate into account if resources generated through fragmented international mechanisms are to result in coordinated domestic action by developing countries.[31]

To date, however, there is little consensus about *how* to integrate adaptation into development planning programs. A number of initiatives are developing methods and guidance, including work by the OECD-DAC and the World Bank. The UK government has funded pilot initiatives to promote integrated adaptation planning in a number of countries, and the Dutch government has supported efforts to build selected NAPAs into more comprehensive planning documents. There has also been speculation as to whether the Poverty Reduction Strategy Papers (PRSPs) could provide an effective vehicle for "mainstreaming" adaptation into national development planning. However, most of these efforts remain in the early stages, with little on-the-ground experience. Likewise, the national climate change plans recently released by countries such as China, India, South Africa and Bangladesh have not yet been operationalized, and it is not clear how they will interact with other national planning efforts.

Moreover, the emergence of "mainstreaming fatigue" suggests there may be limits to the effectiveness of the capacity for integrating adaptation into development. Government bureaucrats and development practitioners have in many cases been spread thin by multiple mainstreaming mandates (gender, the environment, governance, etc.), and climate mainstreaming proponents should be prepared for possible push-back. Likewise, the recently constituted Kyoto Protocol Adaptation Fund Board (AFB) seems likely to take a project based approach to its funding, at least initially, because of pressure to get funding flowing to countries before a more strategic programmatic approach can be agreed. At its most recent meeting, the AFB discussed the desirability of linking project selection to national development strategies and plans. However, a specific approach was not agreed, due in part to the diversity of methods used by countries in planning their national development.

Future Challenges

While the project based approach seems likely to persist in some contexts, the desirability of integrating adaptation into development will doubtless become increasingly clear to decision-makers, as the effects of climate change in different sectors and in specific development endeavors become better understood. We believe that programmatic funding approaches that help integrate adaptation into development planning will be critical to effective deployment of public finance, given that:

- the effects of climate change vary over time and place, creating unique, dynamic adaptation needs in each country;
- each country's unique institutional and socioeconomic circumstances affect its adaptation needs at least as much as biophysical impacts;
- climate change impacts cut across sectoral boundaries, producing effects on a wide range of development activities that will be difficult to address through a single, siloed set of "climate change" activities;
- national planning offers an important vehicle for coordinating use of the fragmented funding likely over the near-to-mid-term.

In the short to medium term, irrespective of whether a project or programmatic approach is pursued in a specific instance, we propose a set of key principles that can support effective use of resources for adaptation.

The above principles by no means represent the full spectrum of criteria that could be considered in shaping adaptation programs and prioritizing specific investments. Most decision-makers will also want to develop a range of other specific

BOX 5. Implementing Adaptation Funding: Guiding Principles

Vulnerability focus: Adaptation planning should entail the identification of the most vulnerable people and prioritize reduction of their vulnerability. This requires special attention to gender and poverty issues.

Local ownership: Adaptation priorities should not be imposed upon a country or community from the outside. Decisions should be made at the lowest possible level.[1]

Precautionary approach: Lack of full scientific certainty should not be used as a reason to postpone action on adaptation.[2]

Learning by doing: Effective adaptation requires action in the absence of complete information. Decision-makers should not wait to act, but should instead put in place flexible systems through which learning can be captured, mistakes rectified, and future activities adjusted.

Access to information: Adaptation activities should be conducted in a transparent way, with public access to relevant information for all stakeholders.[3]

Public participation: All stakeholders should be actively and meaningfully involved in adaptation decisions — including the most vulnerable, who are often marginalized.[4]

Access to justice: Adaptation decisions require mechanisms for resolving conflicts and for enabling people to seek redress and remedy when they believe their rights have been violated or they have been harmed.[5]

Notes

[1] Based on Paris Declaration (OECD 2005, p.3) and Rio Declaration on Environment and Development Principle 10 (UNEP 1992).
[2] Based on Rio Declaration on Environment and Development Principle 15 (UNEP 1992).
[3] Rio Declaration on Environment and Development Principle 10 (UNEP 1992).
[4] Ibid.
[5] Ibid.

criteria relevant to their country's particular climate impacts and development circumstances. However, these principles can support the development of an enabling institutional and policy environment that builds capacity over time, fosters adaptive action by a broad range of players (local governments, the public, businesses), and helps successful initiatives to replicate from the bottom-up. These are important spending priorities for effective adaptation, irrespective of location.

Key Messages

Funding is a necessary, but not sufficient, ingredient in successfully addressing the adaptation challenge. Choices regarding approaches to spending will play an important role in determining the extent and effectiveness of adaptation.

Approaches to spending adaptation funds have evolved, and clearly will continue to do so. At the moment, there is growing interest in integrating adaptation into development on a programmatic basis, but there is very little understanding of exactly what this means. Concrete models and approaches are needed, and lessons from past 'mainstreaming' efforts need to be taken into account. The NAPAs process also offers lessons.

While some level of project-based implementation seems likely to persist, the emerging goal of integrating adaptation into development should increasingly shape the design of mechanisms for generating and channeling funding. Given the need for building an enabling environment, for conducting comprehensive planning processes, and for providing support to a large and diverse set of actors/activities, programmatic funding and budget support may be more effective than project-based funding models.

VI. Next Steps: Decoupling Adaptation Finance — The Way Forward?

A key message emerging from this paper is the need to design adaptation finance mechanisms that can provide resources at levels commensurate to the challenge of helping developing countries adapt to the changing climate.

In designing such mechanisms, it is important to note that the generation, channeling and spending of adaptation resources each represent distinct decisions. In other words, *how* funds are generated need not determine the choice of particular institutions for channeling funds, or particular programs for spending them. This de-linking of decision-making processes could produce two key benefits: stimulating much needed innovation and experimentation in how funds are generated, channeled and disbursed; and promoting the political acceptability of supporting adaptation initiatives in both developed and developing countries.

Achieving these two goals will be critical, as both experimentation and political acceptability are ultimately essential to grow the adaptation resources available, and to promote their

effective use on the ground. The case study below provides a window into understanding how differences among generation, channeling and spending of adaptation finance can assist in navigating the complex politics involved in building support for adaptation initiatives. It also provides a detailed example of how such a de-linked approach might prove effective in practice - by improving the political acceptability of US funding for adaptation through the use of its emerging domestic climate policy.

In the spring of 2008, the Environment and Public Works committee of the U.S. Senate drafted the "Boxer-Lieberman-Warner" climate change legislation, which included provisions for funding adaptation in developing countries. While the legislation failed in the end to move forward, its story provides a taste of the future debate that will shape prospects for adaptation funding from the United States, and illustrates the political distinctions among the generation, channeling, and spending of adaptation resources. Using the example of Boxer-Lieberman-Warner (B-L-W), we draw some conclusions on the politics of adaptation funding, with reference to the principles outlined in each of the sections above.

The Politics of Adaptation Finance: A U.S. Case Study

Funding Generation

The B-L-W legislation, as noted earlier, proposed to use proceeds from the auctioning of emissions allowances to fund adaptation in developing countries. The funds would have been generated from newly created greenhouse gas markets, and therefore clearly additional to existing development assistance. The design of the legislation also would have created a relatively predictable, long-term funding stream, though revenue flows would shift with the market price of carbon. While the funds by themselves cannot strictly be considered "adequate," given the scale of global adaptation needs, the amount of resources that would have been generated compares favorably with other sources (see Figure 3 above).

Most observers attribute inclusion of this funding provision in the B-L-W legislation to the influence of the US religious community. Religious interest groups have not typically played an important role in U.S. environmental legislation, and their influence often is strongest with Republican lawmakers for whom environmental protection is rarely a high priority. However, the religious community's traditional concern for the poor has prompted growing awareness of climate change, and their influence persuaded key Republican Senator Warner to reinstate adaptation funding allocations in the draft legislation.

Channeling Funds

Once provisions for funding generation had been established in B-L-W, a key question became which domestic institutions should control the funding. The draft legislation at one point specified the creation of an inter-agency committee for this purpose; later, the task was given to the Department of State, in collaboration with the Administrator of USAID.

Another challenging question concerned whether the resources should be channeled through multilateral funds. Environmental interest groups supported putting the money into UNFCCC funds on grounds that this would best reflect the 'compensatory' nature of adaptation support, and that these institutions include developing countries in fund governance. However, multilateral institutions have little political support in the U.S. Senate, particularly among more conservative senators such as Warner. Adaptation proponents therefore faced a difficult trade-off between the legislation's provision for the generation and channeling of funds. Support for provisions to create large, additional, predictable sums of funding could be undermined by the political unacceptability of multilateral channeling provisions, although the latter would better meet the principles of compensation (not aid) and Southern engagement. The final draft bill negotiated a middle way - protecting the generation of funds by avoiding an out-and-out debate on multilateral funding channels, while creating an option that would allow the USAID Administrator discretion to participate in a UNFCCC fund using up to 60% of adaptation allocations.

Spending Funds

The B-L-W legislation listed a wide range of eligible adaptation spending options, rather than specifying priorities. This accommodated the fact that a diversity of different activities (planning, capacity building, technology transfer, natural resource management, infrastructure development, etc.) might be needed for effective adaptation, depending upon specific problems and needs in particular places. The approach also promoted political acceptability of adaptation funding by encompassing the interests of many stakeholders and decision-makers. However, in effect, it delegated substantial decision-making authority to USAID which meant that the B-L-W implementation program would not take shape until long after the legislation passed. This prompted skepticism from some

lawmakers about using climate legislation to generate so much funding for adaptation when it was unclear precisely how the money would be spent.

However, procedural provisions for accountability in B-L-W were included to balance the high level of discretion allowed in the bill's spending provisions. These elements addressed a number of the principles articulated in Section V of this paper, and included: a monitoring and evaluation program, emphasis on vulnerability reduction, requirements for information disclosure, provisions for local consultation, and alignment with host country development priorities. The legislation also required USAID to develop a process for identifying the most vulnerable developing countries, using vulnerability factors outlined within the UNFCCC.

Ultimately, the B-L-W climate legislation failed for reasons that had little to do with adaptation. However, it provides some useful lessons for thinking about future adaptation finance decisions. In particular, it illustrates how the politics of adaptation finance may be quite different in the three key phases of the decision-making process, since different issues and principles come into play when deciding about funding generation, channeling and spending. To the extent that these decisions can be made separately, doing so may provide flexibility to most effectively engage the distinct set of actors, issues and concerns relevant to each stage.

However, our case study also illustrates the significant interplay that can emerge between the three stages of finance decisions, and suggests that this interplay works in multiple directions. On the one hand, failure to generate substantial adaptation funding would certainly constrain options for channeling and spending funds. On the other, channeling and spending decisions also can significantly influence the political will needed to generate funding in the first place. The larger lesson for donor country policymakers is that effective approaches to adaptation finance will require attention to all three phases of decision-making, and to the interplay among them in any given political context.

Notes

1. Agrawala and Fankhauser (2008, p.75).
2. WRI, Forthcoming
3. Ibid.
4. Kharas, (2007, p.1)
5. UN (2003, p.14); Müller (2008, p.4)
6. Müller (2008, p.4)
7. World Bank (2008a, p. 3)
8. Lovell, J. 2008. "Britain, Bangladesh Urge Climate Change Action." *Reuters UK* Sep. 10.
9. Samarajiva, R. 2008. "What is best for Sri Lanka's environment: Tax or incentives?" *Lanka Business Online*, March 31. [http://www.lankabusinessonline.com/fullstory.php?nid=1625942485].
10. For example, see the local government actions highlighted by the International Coalition for Local Environmental Initiatives at a three-day workshop in Bali in 2007 at http://www.iclei.org/index.php?id=7127.
11. US$6.3 million was paid to the government of the Turks and Caicos Islands after Hurricane IKE hit in September 2008.
12. CCRIF (2008)
13. UN (1992, p. 8, Article 4:4)
14. Ibid. p.8, Article 4:3.
15. Müller (2008, p.7).
16. Ibid. p. 11
17. Estimates are in 2005 dollars, derived using carbon prices published in a study by the Massachusetts Institute of Technology's Joint Program on the Science and Policy of Climate Change (see http://web.mit.edu/globalchange/www/abstracts.html#a146). While any allowance prices are inherently speculative, the MIT prices are high compared to other studies, so this paper's estimates of funds potentially available for adaptation may be higher than those in other studies.
18. Müller, 2008.
19. Ibid, 13.
20. UNDP (2007, p.195)
21. The Clean Development Mechanism (CDM) is the world's largest functioning "carbon offset" program. Through the CDM, emission reductions in developing countries are financed by industrial countries to offset a portion of their own emissions, which are capped. Under Kyoto Protocol rules, credits issued for these offsets allow industrialized countries to increase their emissions (effectively increasing the "cap"), on the premise that net emissions to the atmosphere remain the same. The projects through which emissions are reduced are also supposed to support sustainable development in the host country. See UNFCCC "Clean Development Mechanism" at http://unfccc.int/kyoto_protocol/mechanisms/clean_development_mechanism/items/2718.php
22. UNDP (2007, p.189)
23. Müller (2008, p.6)
24. UNFCCC (2007, p.195)
25. UNFCC 2008c, p.11
26. UNFCCC (2008a, p.48)
27. Nakhooda (2008, p.3)
28. McGray et al (2007).
29. Cape Verde graduated out of the LDC grouping but still completed a NAPA. Somalia is an LDC but not party to the UNFCCC.
30. These statistics were cited by staff of the UNFCCC Secretariat during the workshop on "Advancing Adaptation Through Finance and Technology, Including NAPAs," held in Bonn on 2-3 June, 2008, as part of the global climate negotiations; Jallow (2008)
31. Parry et al. (2005, p. 2,3)

References

Agrawala, S. and S. Fankhauser, Eds. 2008. *Economic Aspects of Adaptation to Climate Change: Costs, Benefits, and Policy Instruments.* Paris: OECD.

Bretton Woods Project. 2008. *World Bank Climate Funds: "A Huge Leap Backwards."* London, UK: Bretton Woods Project. April 3. Online at http://www.brettonwoodsproject.org/art-560997.

CCRIF (Caribbean Climate Risk Insurance Fund). 2008. *What is CCRIF?* Online at http://www.ccrif.org/main.php?main=9.

Fenhann, J. 2008. *CDM Pipeline*. Roskilde, Denmark: UNEP Risk Centre. Online at http://cd4cdm.org/.

GEF (Global Environment Facility). 2008. *GEF Funding for Adaptation to Climate Change.* PPt. for 13th Poverty and Environment Partnership Meeting, Manila, June 9-11.

Jallow, B.P. 2008. *Status of NAPA Preparation and Implementation and the LEG Work Programme*. Presentation at NAPA side event SB28, June 4. Bonn, Germany.

Kharas, H. 2007. "The New Reality of Aid," in *Global Development 2.0: Can Philanthropists, the Public, and the Poor Make Poverty History?* eds. L. Brainard and D. Chollet. Washington, DC: Brookings Institution Press: 1.

McGray, H., A. Hammill, R. Bradley, E.L. Schipper and J.Parry. 2007. *Weathering the Storm: Options for Framing Adaptation and Development*. Washington, DC: World Resources Institute.

Müller, B. 2008. *International Adaptation Finance – the Need for an Innovative and Strategic Approach.* Background Policy Paper for the Climate Strategies Project on Post-2012 Policy Framework: Options for the Toyako G8 Summit. Oxford, UK: Oxford Institute for Energy Studies.

Nakhooda, S. 2008. *Correcting the World's Greatest Market Failure: Climate Change and the Multilateral Development Banks.* Washington, DC: World Resources Institute (WRI).

OECD. 2005. *Paris Declaration on Aid Effectiveness.* New York. Online at http://www.oecd.org/dataoecd/11/41/34428351.pdf.

Parry, J., A. Hammill and J. Drexhage. 2005. *Climate Change and Adaptation: Summary.* Manitoba, Canada: International Institute for Sustainable Development (IISD).

UN (United Nations). 1992. *United Nations Framework Convention on Climate Change (UNFCCC).* Bonn, Germany: UNFCCC Secretariat. Online at http://unfccc.int/resource/docs/convkp/conveng.pdf.

UN (United Nations). 2003. *Monterrey Consensus on Financing for Development.* New York.

UNDP (United Nations Development Program). 2007. *Human Development Report 2007/2008: Fighting Climate Change: Human Solidarity in a Divided World.* New York.

UNEP (United Nations Environment Program). 1992. *Rio Declaration on Environment and Development.* Nairobi. Online at http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=78&ArticleID=1163.

UNFCCC (United Nations Framework Convention on Climate Change). 2007. *Investment and Financial Flows to Address Climate Change.* Bonn, Germany. Online at http://unfccc.int/files/cooperation_and_support/financial_mechanism/application/pdf/background_paper.pdf

UNFCCC (United Nations Framework Convention on Climate Change). 2008a. *Ad Hoc Working Group on Long-Term Cooperative Action under the Convention (AWG-LCA) Third session, Accra, 21–27 Aug.* Bonn, Germany. Online at http://unfccc.int/meetings/items/4381.php.

UNFCCC (United Nations Framework Convention on Climate Change). 2008b. *Ad Hoc Working Group on Long-Term Cooperative Action under the Convention (AWG-LCA) First session, Bangkok, 31 March to 4 April. Item 3 of the provisional agenda.* Bonn, Germany: UNFCCC. Online at http://unfccc.int/resource/docs/2008/awglca1/eng/misc01a01.pdf

UNFCCC (United Nations Framework Convention on Climate Change). 2008c. *Views from Parties on extending the share of proceeds to assist in meeting the costs of adaptation to joint implementation and emissions trading.* FCCC/KP/CMP/2008/Misc.1 Online at http://unfccc.int/resource/docs/2008/cmp4/eng/misc01.pdf.

UNITAID. 2007a. *The Air Ticket Levy.* Geneva: UNITAID, World Health Organization. Online at http://www.unitaid.eu/index.php/en/The-air-ticket-levy.html.

UNITAID. 2007b. *UNITAID Budget.* Geneva: UNITAID, World Health Organization. Online at http://www.unitaid.eu/index.php/en/UNITAID-budget.html.

World Bank. 2008a. *Q&A: World Bank Climate Investment Funds.* Washington, DC. July 1.

World Bank. 2008b. *Donor Nations Pledge Over $6.1 Billion to Climate Investment Funds.* Sep. 28th. Washington, DC. Online at http://go.worldbank.org/36H73DPMV0)

World Bank. 2008c. *World Bank Approves Climate Investment Funds.* Washington, DC. July 1. Online at http://go.worldbank.org/38LJMD2BX0.

WRI (World Resources Institute). Forthcoming. *How to Read the Numbers: Financial Flows for Climate Change Mitigation and Adaptation.*

Acknowledgments

The authors would like to thank Lauren Withey for her exemplary research assistance in developing this paper. We also would like to acknowledge contributions from Aarjan Dixit, Jenna Goodward, Stefanie Woodward, John Larsen, and Robert Heilmayr. Useful feedback on earlier drafts was provided by Annett Moehner, Rob Bradley, Hilary McMahon, Janet Ranganathan, and Jacob Werksman.

About the Authors

Manish Bapna is the Managing Director and Executive Vice President of the World Resources Institute

Heather McGray is a Senior Associate in WRI's Climate and Energy Program. She currently leads WRI's project on vulnerability and adaptation to climate change.

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