

# **FINANCING ADAPTATION TO CLIMATE CHANGE IN DEVELOPING COUNTRIES**

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## **ABSTRACT**

The paper explores the possibilities and challenges of international financing of adaptation in developing countries. Firstly, it reviews the estimates of adaptation costs in developing countries and – after analyzing current mechanisms for financing adaptation – contrasts them with available resources. The estimates of adaptation costs vary widely and given the methodological difficulties should be taken cautiously. However, it is clear that current international funding is significantly lower than the most conservative estimates of present adaptation costs. Moreover, as climate change intensifies, there is only a limited scope for current financial mechanisms to cover the increased adaptation needs. Traditional sources of funding should therefore be supplemented by new instruments such as auctioning of emission allowances or taxes on international transport. Finally, the paper goes beyond the issue of raising sufficient funds for adaptation to draw attention to other challenges for international adaptation funding such as efficient and equitable allocation of resources and mainstreaming of adaptation into development assistance. It is argued that integration of development and adaptation policies is usually preferable than two stand-alone policies. However, in the context of international development policy this integration should not be done at the expense of current levels of development assistance, and therefore requires increased levels of financial resources.

## **INTRODUCTION**

For a long time, adaptation to climate change was considered a second-class strategy to mitigation. With more evidence of anthropogenic climate change and limited capacity and willingness to deal with the causes of climate change

in a relatively short time, the issue of adaptation has been given more prominence in international negotiations as well as in domestic policy. On the one hand, climate change is increasingly taken as a serious threat that justifies expending costs to mitigate its impacts. However, even quick transition to a low-carbon economy cannot prevent a significant degree of climate change from being brought about by our past emissions, future emissions that we are not willing or able to mitigate, and a time lag between our actions and response of the Earth's climate system. As the climate change intensifies, it will put more pressure on human and natural systems that will require us either to spend significant resources on adapting to the impacts of climate change or to suffer those impacts directly. Though adaptation should not be understood as a solution to all climate change impacts, it is a good strategy at least to those impacts that cannot be prevented.

Climate change will have different impacts on countries depending on many factors. In general, however, developing countries are the most vulnerable. Their geographical location and structure of their economies (with a large share of agriculture) make them more sensitive to changing climate, while their socio-economic conditions imply relatively lower capacity to adapt to climate change. It is a well-known paradox that those countries that have contributed the least to climate change will suffer disproportionately from its consequences. Since most of the greenhouse gas emissions that cause climate change originated historically in the developed countries, the argument can be made that these countries should pay substantial part of the costs in affected developing countries. As the United Nations Development Programme (UNDP, 2007, p. 194) put it: "International cooperation on adaptation should be viewed not as an act of charity, but as an expression of social justice, equity and human solidarity." This paper explores the possibilities and challenges of international financing of adaptation in developing countries. It covers both the current state of adaptation funding and future perspectives.

In the first part, the paper reviews the estimates of adaptation costs in developing countries and points out why these numbers should be taken cautiously. Then, current mechanisms for financing adaptation in developing countries are analyzed, including the volumes of available resources. The next part explains the need for innovative means of funding, makes a basic classification of financing options, and points out two instruments that are both innovative

and promising as future sources of funding. Finally, the paper goes beyond the issue of raising sufficient funds for adaptation to draw attention to other challenges in international financing of adaptation in developing countries.

## COSTS OF ADAPTATION TO CLIMATE CHANGE

Impacts of climate change are related to the rate of climate change. That part of climate change that is of anthropogenic nature can be mitigated, and therefore both the rate of climate change and resulting impacts can be reduced by mitigation actions. The other human response to climate change – adaptation – does not affect the rate of climate change, but may reduce the impacts directly.<sup>1</sup> Impacts, mitigation and adaptation represent costs – since these are interrelated, it is conceptually correct to model them together and try to minimize their total amount. However, most studies do not use this framework for estimation of costs and report adaptation costs independently from the two related types of costs. Table 1 summarizes the estimates of annual adaptation costs in developing countries.

*Table 1: Estimates of adaptation costs in developing countries (US\$ billion)*

	<b>Annual costs (US\$ billion)</b>	<b>Time frame</b>
World Bank (2006)	9–41	present
Stern Review (2006)	4–37	present
Oxfam (2007)	> 50	present
UNDP (2007)	86–109	2015
UNFCCC (2007)	28–67	2030

Source: Agrawala and Fankhauser 2008

Having the estimates of adaptation costs, we see that they differ considerably. At the same time, we might reach a rough conclusion that while

<sup>1</sup> As the World Bank (2006a, p. 143) states, there are three types of costs (mitigation costs, adaptation costs, costs of impacts) that "interact in that mitigation can reduce the extent of the hazards related to climate change and adaptation can reduce the cost of the impacts that result from any residual climate change hazards. The costs of adaptation can be reduced by simply not attempting to adapt to climate change, but this would lead to high impact costs. Mitigation costs could be reduced but this leads to higher impact and/or adaptation costs."

present adaptation costs are in the order of a few tens of billions of dollars per year, this will increase to about 50–100 billion dollars in one or two decades. Looking at the methodology of the studies, we shall note that their results are not strictly comparable – the studies differ in underlying assumptions, time horizons and methods of calculation. On the other hand it is not the case that all of these studies used a completely different methodology. Most of them are based on the climate-proofing of investment flows method developed by the World Bank. As the World Bank (2006a, p. 144) explains, the methodology starts with “the core flows of development finance, makes an estimate of the proportion of the investment that is sensitive to climate risk and estimate of the additional cost to reduce that risk to account for climate change”.

If most of the studies employ the same method, why then do their results differ so much? Firstly, some studies went beyond the climate-proofing method to include other items as adaptation costs.<sup>2</sup> Secondly, the studies used different shares of climate-sensitive investments and/or mark-ups for climate-proofing – parameters that significantly affect the estimate of adaptation costs. However, there is little empirical information about these parameters – in the first study by the World Bank, these estimates were mostly *not* based on empirical findings and the subsequent studies that changed the parameters often did so without proper substantiation (Fankhauser, 2009).<sup>3</sup> The study by the United Nations Framework Convention on Climate Change (UNFCCC, 2007a) used a different method to estimate adaptation costs. In a recent review of the study (Parry et al., 2009), the authors concluded that UNFCCC adaptation costs are underestimated by a factor of two to three, and would be even more if more sectors were included in the analysis. Having reviewed the methodologies, it is hard to avoid a conclusion that at this time the estimates of adaptation costs shall be regarded as no more than order-of-magnitude figures. Further research is needed to make the methodology for estimating adaptation costs more robust. However, it seems likely that annual adaptation costs would amount to at least several tens of billions of US dollars in two decades, possibly going beyond 100 billion US dollars.

<sup>2</sup> For example, the UNDP study included in adaptation costs also adaptation of poverty reduction programs to climate change (\$40 billion) and strengthening the disaster response system (\$2 billion).

<sup>3</sup> The World Bank estimated that between 2% and 40% of investment flows are climate-sensitive depending on the type of flow, while the cost of climate-proofing these flows is between 10% and 20%. How did the World Bank arrive at the latter percentage range? “The 10 to 20 percent ‘estimated cost of adaptation’ is purely an estimate.” (World Bank, 2006a, p. 144)

## FINANCING MECHANISMS FOR ADAPTATION AND AVAILABLE RESOURCES

Under the UNFCCC, developed countries committed themselves to “assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects” (UNFCCC, 1992). The Convention further states that the financial resources provided to developing countries shall be “new and additional”. This is usually interpreted in a way that financial resources related to climate change shall be above (and not instead) the current levels of financial flows from developed countries to developing countries, in particular not substituting the Official Development Assistance (ODA).<sup>4</sup> Though the convention does not contain binding commitments, it has served both as a building block for development of a climate change regime and as an expression of moral obligation.

Currently there are several instruments for financing adaptation in developing countries. They differ in a number of aspects, mainly whether they belong under the UNFCCC or are outside this framework, whether they are bilateral or multilateral, and whether they can be classified as ODA. The next section is organized according to the first criterion though the two other criteria will be handled throughout the text. We start with financial instruments under the UNFCCC and progress to bilateral and multilateral funds established to finance climate change related activities.

The UNFCCC financial instruments are the Least Developed Countries Fund (LDCF), the Special Climate Change Fund (SCCF), the Strategic Priority for Adaptation under the Global Environment Facility Trust Fund (SPA), and the Adaptation Fund.<sup>5</sup> The funds differ in scope of operation, eligibility, governance, and sources of finance. However, the first three instruments are rather similar in terms of governance (they are managed by the Global Environment Facility, GEF) and sources of finance (their budgets rely on voluntary contributions from donor countries). The main objective of the LDCF

<sup>4</sup> However, the term “new and additional” allows for several interpretations. Additionality may be interpreted as being additional to (a) existing adaptation financing provided by developed countries, (b) existing ODA flows, or (c) existing ODA commitments (Harmeling and Bals, 2008).

<sup>5</sup> The Adaptation Fund belongs under the Kyoto Protocol rather than the UNFCCC. However, since the Kyoto Protocol originated under the UNFCCC framework, it is classified in this paper as one of the UNFCCC funds.

since its inception has been to support developing countries in designing of National Adaptation Programmes of Action. As its name implies, only the 49 Least Developed Countries are eligible for support. The SCCF has both a wider scope of action (mainly mitigation, adaptation and transfer of technology) and eligibility (all developing countries). The SPA was a three-year program that supported pilot adaptation projects.

The establishment of the Adaptation Fund was agreed by the UNFCCC parties in Marrakech in 2001 together with the LDCF and the SCCF. However, due to its different type of financing and other issues, the fund has not been operational as of mid 2009. The Adaptation Fund will finance adaptation activities in developing countries “that are particularly vulnerable to the adverse effects of climate change” (UNFCCC, 2009). What differentiates the Adaptation Fund from the other UNFCCC funds is its autonomous source of funding. Instead of being dependent on voluntary contributions from donor countries, it receives 2 percent of proceeds from transactions under the Clean Development Mechanism (CDM). Current assets of the Adaptation Fund consisting of financial resources and Certified Emission Reductions (CERs) are about \$120 million while the UNFCCC (2007a) estimated that selling the 2% of issued CERs might generate \$80–300 million per year in 2008–2012, i.e., \$400–1,500 million for the whole period. The UNDP (2007) and the World Bank (2006b) arrived at lower range estimates for the period: \$160–950 million and \$100–500 million respectively.

Going beyond 2012, any estimates must be taken cautiously since they depend on whether the same system of financing is maintained and on demand by developed countries for CERs from developing countries. That is why the UNFCCC (2007a) estimates for 2030 are very wide and range from \$100–500 million per year for a low demand scenario to \$1–5 billion for a high demand scenario. Resources of funds within the UNFCCC framework are summarized in Table 2.

**Table 2: Resources of UNFCCC adaptation funds (US\$ million)**

	<b>Fund</b>	<b>Budget</b>	<b>Expenditure</b>	<b>Period</b>
1	Least Developed Countries Fund	176.5 <sup>a</sup>	97.6	As of May 7, 2009
2	Special Climate Change Fund	121.1 <sup>a</sup>	79.2	As of May 7, 2009
3	Strategic Priority for Adaptation	50 <sup>a</sup>	50	3 years
4	Adaptation Fund	18.4 <sup>a</sup> / 124.2 <sup>a</sup> 100–1,500 <sup>b</sup>	0	As of August 6, 2009 budget estimated until 2012

Notes: Budget means either (a) financial resources as of a given date (pledged, deposited or generated, whichever is higher), or (b) estimated level of funding for the period. (1) (2) Numbers show total budget/expenditure of the funds though part of the resources is not designated for adaptation. However, adaptation forms clear majority. (4) The Adaptation Fund is financed through 2% proceeds from the transactions under the CDM. From first two sales of CERs in 2009, the Adaptation Fund received \$18.4 million. Since the amount of CERs sold constitutes 17.4% of the currently held CERs, the value of its current holding of CERs (calculated with the average price for the first two sales) amounts to an additional \$105.8 million (Climate Funds Update, 2009). Budget for 2008–2012 is calculated as the lowest and highest range of estimates (\$400–1,500 million, \$160–950 million, \$100–500 million).

Sources: Climate Funds Update, 2009, GEF, 2009a, 2009b, UNFCCC, 2007a.

The UNFCCC envisaged that developed countries might provide developing countries with “financial resources related to the implementation of the Convention through bilateral, regional and other multilateral channels” (UNFCCC, 1992). These funds were initiated both by bilateral donors and multilateral agencies. Table 3 summarizes funds outside the UNFCCC framework and their resources for adaptation.

**Table 3: Resources of non-UNFCCC adaptation funds (US\$ million)**

	<b>Fund</b>	<b>Provider</b>	<b>Budget</b>	<b>Period</b>
1	MDG Achievement Fund (Environment and climate change thematic window)	UNDP Spain	45	2008–2011
2	Cool Earth Partnership	Japan	1,000	2008–2012
3	Global Climate Change Alliance	European Commission	42	2008–2010
4	International Climate Initiative	Germany	210	2008–2012
5	Climate Change and Development – Adapting by Reducing Vulnerability	UNEP-UNDP Denmark	9	2008–2010
6	Africa Adaptation Programme	UNDP Japan	92.1	2009–2011
7	Pilot Program for Climate Resilience	World Bank	546	As of May 1, 2009 (2009–2012)
8	Global Facility for Disaster Reduction and Recovery	World Bank	83.3	As of Dec 15, 2008 (2007–2010)

Notes: Budget means either financial resources pledged or deposited as of a given date or estimated level of funding for the period when such information was available. Some of the funds have multiple objectives, typically supporting adaptation as well as mitigation activities. Therefore, data are calculated or estimated by the author to include only resources for adaptation. (1) The total budget of the fund amounts to €528 million, the environment and climate change window amounts to \$90 million when converted into US dollars. The author estimates 50% of this budget to be allocated for adaptation. (2) The fund (\$10 billion) will finance mitigation of climate change (\$8,000 million) and adaptation to climate change and improved access to clean energy (\$2,000 million). Half of the \$2,000 million budget shall be allocated for adaptation. (3) Supported activities are divided into five areas: adaptation, reducing emissions from deforestation, enhancing participation in CDM, promoting disaster risk reduction and integrating climate change into poverty reduction efforts. The author estimates 50% of the €60 million provided by the European Commission to be allocated for adaptation (\$42 million). Additional €220 million are planned under the 10th European Development Fund in 2008–2013 mainly for disaster reduction; however, these funds are not accounted for in the table. (4) Resources are generated by auctioning emission permits under the EU Emission Trading Scheme. Though the total amount of resources is dependent on auctioning emission permits, €120 million (\$168 million) have been earmarked in 2008 and 2009 for the international component of the fund that finances emission reduction, adaptation and conservation of climate-relevant biodiversity. The author estimates that the same amount will be earmarked each year in the period 2008–2012 and 25% of the resources to be allocated for adaptation.

Sources: Climate Funds Update (2009), Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Germany (2009), GFDRR (2008), UNEP (2009), UNFCCC (2007a), UNDP (2009)

As noted, the estimates of annual adaptation costs in developing countries vary widely and have to be taken cautiously given the methodological difficulties. However, it is clear that current international funding is significantly lower than the most conservative estimates of present adaptation costs (and even more so for future costs). Out of financial instruments shown in Table 2 and 3, only the Adaptation Fund, Japan's Cool Earth Partnership and the World Bank's Pilot Program for Climate Resilience can be expected to provide resources in the order of hundreds of millions dollars per year until 2012. Surprisingly, in this period, bilateral or multilateral initiatives outside the UNFCCC framework might handle higher amounts of resources for adaptation than the funds under the UNFCCC. Though much greater resources for adaptation will be needed in future, the funds have a short-time horizon to allow for new climate change architecture after 2012. As Porter et al. (2008) argue, rather than a fixed element of a long-term climate change regime, this may be understood as a piloting phase where experience from operating the funds might be valuable for evolution of a long-term system of financing.

## INNOVATIVE FINANCIAL INSTRUMENTS

In 2007, the Bali Action Plan reiterated the need for new and additional financial resources, and since the traditional sources of funding were not assumed to be able to deliver sufficient resources for adaptation, it called for “[i]nnovative means of funding” to assist developing countries (UNFCCC, 2007b). It could be argued that current financing instruments can be enhanced to deliver the amount needed without new funding instruments. However, there are political reasons why it might not work. On the side of developed countries, there is a “domestic revenue problem” – domestic taxpayers perceiving domestic tax revenues to be nationally owned and therefore spent in the country – which makes it unlikely that a significant increase in funding for developing countries, or for that matter, any other countries, could be realized from national budgets (Müller, 2008). On the other side, recipient countries might not like to be dependent on voluntary contributions of donor countries and would rather prefer an autonomous source of funding. This is because most developing countries perceive adaptation funding “not as a matter of ‘donations’ but as one of costs imposed by developed countries, and as such as debt incurred by them” (Müller, 2008, p. 4). Discretionary financing

is more prone to be perceived by developing countries as aid rather than compensation.

The current instruments for financing adaptation are designed until the first Kyoto commitment period expires in 2012. The new system of adaptation funding after 2012 is not yet established though its contours might be clearer after the Copenhagen conference in December 2009. Various proposals for funding have already been made and discussed. Since the most important aspect of any funding is how to raise financial resources, all proposals will be classified as either budgetary contributions or economic instruments.

Most of the current funding for adaptation comes from budgetary contributions of countries, either in the form of designated climate change funds or other ODA. All of the current budgetary financial flows are discretionary, i.e., their provision is voluntary and depends on countries' decisions and as such suffers from domestic political capture. The other option is to define countries' contributions to adaptation, or more generally to climate change relevant activities, as a specified percentage of their gross domestic product (GDP). This may be extended to differentiate countries' contributions according to their responsibility (e.g., cumulative greenhouse gas emissions) and ability to pay (e.g., GDP per capita). The responsibility criterion clearly refers to the compensatory nature of these payments. Given the negative experience with developed countries' pledges to provide 0.7 percent of their national income as ODA (few countries meet the target in any year), an argument can be made that for the commitments to be honoured, they need to be binding. However, this presumes that countries are willing to make such commitments binding in principle and are able to agree on the formula for the differentiation of contributions – both of which are rather unlikely.

Instead of relying on allocations from the national budgets, economic instruments can be used to raise resources for adaptation. One alternative is auctioning of emission allowances (or Assigned Amount Units in Kyoto-speak). Norway proposed that a small share of emission allowances could be withheld before allocation to national registries and auctioned by an international institution. The revenue is then placed in a fund and used for adaptation or other climate change relevant activities. The proposal assumes that the Kyoto system of emission allowances is extended beyond 2012, which makes it unworkable if it is not. If the present system is maintained, however, using the current institutional setting is clearly an advantage since institution-building is difficult

and lengthy. The proposal also escapes the domestic revenue problems since the money would be collected by an international body.

*Market-based levies* are in principle taxes on market transactions, but differ from general taxes in that the revenue is not part of countries' general budgets but is used for specific purposes (adaptation). This group includes various proposals such as extension of 2% CDM levy to other flexibility mechanisms under the Kyoto Protocol (Joint Implementation, International Emission Trading), global carbon tax, or taxes on specific goods or services such as international air travel or international currency transactions. The easiest option seems to be extending the CDM levy to other Kyoto trading mechanisms. In principle, however, it is preferable to tax polluting activities themselves rather than trading in pollution. Carbon tax is a case in point – if carbon is the problem, it makes sense to tax goods according to their carbon content. Since most goods would be liable to the tax, it could bring an adequate and rather predictable flow of resources. However, many countries are likely to oppose an internationally coordinated tax since it overly interferes with national tax sovereignty. Also, since the revenues need first to be collected by a national body, the revenues would be susceptible to domestic capture. A tax on international financial transactions might be another source of adaptation finance. There is no strong consensus between economists whether discouraging international financial transactions through a tax is a good policy in itself, though this view might be gaining ground with the current financial crisis. Even if the answer is positive, the lack of a direct link between financial transactions and climate change makes it difficult to justify the revenues being spent for climate change. From this perspective, taxing activities that contribute to climate change is more relevant. Aviation and shipping has been proposed as two activities that are suitable for taxation – they contribute to the problem, have not been included under the Kyoto Protocol framework so far and might be less susceptible to the domestic revenue problem. Müller (2008) also argues that since the international tax on passenger air travel is based on *individual* responsibility and capability to pay, it is superior – in terms of equity – to funding schemes where responsibility and capability to pay are judged at a level of *countries*.

All funding options have both strengths and weaknesses that should be carefully assessed, including their political viability. However, it seems that auctioning of emission allowances and taxing international transport are two

innovative sources of funding that might provide significant resources and are not politically infeasible.

## CHALLENGES FOR FUTURE FINANCING

This paper focuses mainly on the costs of adaptation, available resources and financing mechanisms. Though the adequacy of financial resources is the most visible and likely also the biggest challenge of international adaptation policy, it is not the only one. Issues of governance and ownership have been increasingly on the agenda of international development policy. In funds administered by the GEF, large donor countries have more weight in decision making. Though it might be understandable that donor countries want to have control over the use of provided funds, this logic changes once the funds are perceived as compensation rather than donation. What distinguishes the Adaptation Fund from the three other UNFCCC funds is not only the autonomous source of finance of the former but also different governance structures – the majority of the Adaptation Fund Board members come from developing countries. Proper representation of developing countries thus lends the Adaptation Fund higher legitimacy from the perspective of developing countries.

Any governance structure, however, will be finally judged in terms of efficient and equitable use of resources. This might be difficult in cases where the two criteria conflict and where countries do not reach consensus on what allocation of adaptation funding is fair. For example, climate change will impact disproportionately on some very poor countries, yet these countries might not have sufficient absorptive capacity to use the adaptation finance effectively. The system of international adaptation funding is fragmented rather than compact. It might be politically difficult to merge all financing instruments into one fund. However, countries and multilateral organizations should coordinate their efforts in order to make the system of financing coherent and complementary rather than fragmented and overlapping.

Finally, the relation between financing adaptation under the UNFCCC and financing development under ODA should be given careful consideration. It should be noted that the border between adaptation and development is in part artificial. Bapna and McGray (2008) show that there is a continuum of adaptation actions, with actions that respond to specific impacts of climate change on the one end and actions that reduce vulnerability to climate change

on the other. It might be argued that investment in education and health reduces general vulnerability, including vulnerability to climate change. Overlapping of development with adaptation implies that integration of adaptation concerns into development activities is likely to bring more efficient use of resources than independent climate policies (Klein et al., 2005). In the context of international development policy, this means that mainstreaming adaptation into development assistance is usually preferable than two stand-alone policies.<sup>6</sup> Developing countries are concerned that this may divert financial resources from traditional priorities of development assistance such as education and health care to adaptation to climate change. However, rather than trying to separate development activities from adaptation activities, developing countries should support their integration (where relevant) but with increased levels of international funding.<sup>7</sup>

## CONCLUSION

Climate change might well be the biggest challenge of our generation – a financial, technological as well as distributional challenge. As climate change intensifies, more resources will be needed in developing countries to adapt to these changes. Estimates of adaptation needs in developing countries vary significantly; however, it is unlikely that they would be less than several tens of billions of US dollars in one or two decades. Current financing mechanisms can be enhanced to deliver some additional funding, but probably not as much as will be needed. Therefore, traditional sources of funding should be supplemented by new instruments such as auctioning of emission allowances or taxes on international transport. Finally, it was argued that the challenge of adaptation goes beyond the adequacy of financial resources to include, among others, efficient and equitable allocation of resources and mainstreaming of adaptation into development assistance.

<sup>6</sup> Two OECD studies (Agrawala, 2005; Levina, 2007) indicate that a significant share of development assistance is sensitive to climate change or relevant for adaptation.

<sup>7</sup> Integration of development and adaptation raises a related question of reporting – whether and to what extent UNFCCC funds should be counted (also) as ODA, and whether and to what extent ODA with adaptation component should be counted (also) as adaptation finance under the UNFCCC.

## REFERENCES

- AGRAWALA, S. (ed. 2005): Bridge over troubled waters: linking climate change and development. Organisation for Economic Co-operation and Development. Paris.
- AGRAWALA, S., FANKHAUSER, S. (eds., 2008): Economic aspects of adaptation to climate change: costs, benefits and policy instruments. Organisation for Economic Co-operation and Development. Paris.
- BAPNA, M., MCGRAY, H. (2008): Financing adaptation: opportunities for innovation and experimentation. WRI Conference Paper. World Resource Institute. Washington, DC. [http://pdf.wri.org/financing\\_adaptation.pdf](http://pdf.wri.org/financing_adaptation.pdf). [24-10-2009].
- CLIMATE FUNDS UPDATE (2009): <http://www.climatefundsupdate.org>. [20-10-2009].
- FANKHAUSER, S. (2009): The range of global estimates. In: Parry, M., Arnell, N., Berry, P., Dodman, D., Fankhauser, S., Hope, C., Kovats, S., Nicholls, R., Satterthwaite, D., Tiffin, R., Wheeler, T. Assessing the costs of adaptation to climate change: a review of the UNFCCC and other recent estimates. International Institute for Environment and Development and Grantham Institute for Climate Change. London. <http://www.iied.org/pubs/pdfs/11501IIED.pdf>. [10-10-2009].
- FEDERAL MINISTRY FOR THE ENVIRONMENT, NATURE CONSERVATION AND NUCLEAR SAFETY, GERMANY (2009): The International climate initiative of the Federal Republic of Germany. Berlin. [http://www.bmu.de/files/english/pdf/application/pdf/brochure\\_iki\\_en\\_bf.pdf](http://www.bmu.de/files/english/pdf/application/pdf/brochure_iki_en_bf.pdf). [15-10-2009].
- GEF (2009a): Progress report on the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF). GEF/LDCF/SCCF.6/Inf.3. <http://www.gefweb.org/>. [20-10-2009].
- GEF (2009b): Status report on the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF). GEF/LDCF.SCCF.6/Inf.2. <http://www.gefweb.org>. [20-10-2009].

- GFDDR (2008): Donor pledges and contributions. Global Facility for Disaster Reduction and Recovery. [http://gfdrr.org/docs/GFDRRDonorPledgeandContributions\\_15Dec08.pdf](http://gfdrr.org/docs/GFDRRDonorPledgeandContributions_15Dec08.pdf). [21-10-2009].
- HARMEILING, S., BALS, C. (2008): Adaptation to climate change – where do we go from Bali? An analysis of the COP13 and the key issues on the road to a new climate change treaty. German Watch. Bonn. <http://www.germanwatch.org/klima/adapt08e.pdf>. [24-10-2009].
- KLEIN, R. J. T., SCHIPPER, E. L. F., DESSAI, S. (2005): Integrating mitigation and adaptation into climate and development policy: three research questions. *Environmental Science & Policy* 8, pp. 579–588.
- LEVINA, E. (2007): Adaptation to climate change: international agreements for local needs. Organisation for Economic Co-operation and Development and International Energy Agency. Paris. <http://www.oecd.org/dataoecd/15/11/39725521.pdf>. [28-10-2009].
- MÜLLER, B. (2008): International adaptation finance: the need for the innovative and strategic approach. Oxford Institute for Energy Studies, EV 42. <http://www.oxfordenergy.org/pdfs/EV42.pdf>. [30-09-2009].
- PARRY, M., ARNELL, N., BERRY, P., DODMAN, D., FANKHAUSER, S., HOPE, C., KOVATS, S., NICHOLLS, R., SATTERTHWAITE, D., TIFFIN, R., WHEELER, T. (2009): Assessing the costs of adaptation to climate change: a review of the UNFCCC and other recent estimates. International Institute for Environment and Development and Grantham Institute for Climate Change. London. <http://www.iied.org/pubs/pdfs/11501IIED.pdf>. [30-09-2009].
- PORTER, G., BIRD, N., KAUR, N., PESKETT, L. (2008): New finance for climate change and the environment. <http://www.odi.org.uk/resources/download/2980.pdf>. [27-10-2009].
- UNDP (2007): Human development report 2007/2008: fighting climate change: human solidarity in a divided world. United Nations Development Programme. Palgrave Macmillan. New York.
- UNDP (2009): Africa adaptation programme. United Nations Development Programme. <http://www.undp-adaptation.org/africaprogramme/>. [20-10-2009].

- UNEP (2009): Negotiating adaptation: international issues of equity and finance. Copenhagen discussion series. Paper 3. United Nations Environment Programme. <http://www.unep.org/climatechange/Home/CopenhagenDiscussionSeries/tabid/836/language/en-US/Default.aspx>. [20-10-2009].
- UNFCCC (1992): United Nations Framework Convention on Climate Change.
- UNFCCC (2007a): Investment and financial flows to address climate change. United Nations Framework Convention on Climate Change. [http://unfccc.int/files/cooperation\\_and\\_support/financial\\_mechanism/application/pdf/background\\_paper.pdf](http://unfccc.int/files/cooperation_and_support/financial_mechanism/application/pdf/background_paper.pdf). [20-10-2009].
- UNFCCC (2007b): Report of the co-facilitators of the dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention (“Bali Action Plan”). United Nations Framework Convention on Climate Change. [http://unfccc.int/files/meetings/cop\\_13/application/pdf/cp\\_bali\\_act\\_p.pdf](http://unfccc.int/files/meetings/cop_13/application/pdf/cp_bali_act_p.pdf). [20-10-2009].
- UNFCCC (2009): Report of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol on its fourth session, held in Poznan from 1 to 12 December 2008. Addendum. Decision 1/CMP.4. Adaptation Fund. FCCC/KP/CMP/2008/11/Add.2. United Nations Framework Convention on Climate Change. <http://unfccc.int/resource/docs/2008/cmp4/eng/11a02.pdf>. [20-10-2009].
- WORLD BANK (2006a): Clean energy and development: towards an investment framework. DC2006-0002. World Bank. Washington, DC. <http://siteresources.worldbank.org/DEVCOMMINT/Documentation/20890696/DC2006-0002%28E%29-CleanEnergy.pdf>. [20-10-2009].
- WORLD BANK (2006b): An investment framework for clean energy and development: a progress report. DC2006-0012. World Bank. Washington, DC. <http://siteresources.worldbank.org/DEVCOMMINT/Documentation/21046509/DC2006-0012%28E%29-CleanEnergy.pdf>. [20-10-2009].