

Some rationales for risk sharing and financing adaptation

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Abstract Current climate variability and anticipated climate change challenge our water systems and our financial resources. The sharing of economic losses due to weather related hazards and the sharing of costs that result from protecting lives and property take place in different forms, but are currently insufficient. In this paper we discuss three different rationales for financing disaster losses through public and private arrangements, as well as options for financing adaptation, with a special focus on water management. We propose that financial arrangements for risk sharing and climate change adaptation should be reconsidered, in a more structured approach, to be able to deal with both disaster losses and the costs that arise because of climate change adaptation, e.g. for water management, in both developing and developed countries.

Keywords Adaptation; climate change; finance; floods; risk management; water management

Introduction

Both the global annual number of people affected and the amount of economic losses due to weather-related natural disasters are increasing. The Red Cross has reported that although the global number of casualties due to weather related natural disasters has decreased, the number of affected people has increased from 77,000 in 1992 to over 150,000 in 2001 (IFRC, 2002). These increases are mainly due to an ever-growing population in vulnerable areas and due to environmental degradation. In areas where protection or insurance against certain natural hazards, such as river flooding, is not available, governments see themselves increasingly confronted with the costs of damage, rehabilitation and reconstruction. Climate change resulting from human greenhouse gas emissions is expected to add to the present vulnerability, particularly through changes in the frequency and severity of extreme weather events (Vellinga *et al.*, 2001). Scientific analysis has shown that efforts to reduce the emissions of greenhouse gasses will only slow down climate change in the long-term, and adaptation to weather extremes will still be needed (Parry *et al.*, 1998). This requires efforts from many sectors, such as the water sector, the agricultural sector and the energy sector.

Under the United Nations Framework Convention on Climate Change (UNFCCC) a number of funds have been established to address capacity building and costs of adaptation. However, the Adaptation Fund is currently very limited in size, when compared to the expected global adaptation costs. Moreover, few countries have at present committed themselves to supply resources. Consequently, there is increasing awareness that other ways and means for adaptation should be explored. Many authors have pointed to so-called mainstreaming (e.g. Huq *et al.*, 2003) of climate change adaptation into existing sectoral policies, including the financial services and investment sector.

The facts above lead us to believe that alternative mechanisms, besides the UNFCCC, for financing adaptation and sharing the expected losses from climate change should be explored. There are many mechanisms through which humans have traditionally tried to

deal with the financial burden from disasters and the costs of adapting to changing environments. The contribution of citizens to these mechanisms ranges from premiums for commercial insurance to cooperative community arrangements and government taxes. Hoff *et al.* (2003) argue that various financial mechanisms may help to alleviate the adverse impacts from natural disasters in the water sector. In particular existing financial mechanisms can be reconsidered or can be expanded. This paper gives an overview of rationales to share disaster losses and adaptation costs and will discuss how these rationales could be used in extending or adjusting existing policy.

Methodology

In this paper we make a distinction between costs that occur due to extreme weather events or climate variability, which may include climate change, and costs that occur due to the necessary adaptation to climate change. We base our discussion on literature that is published in peer-reviewed journals as well as on grey literature. Adaptation is referred to as mostly physical (infrastructure) and non-physical measures (e.g. early warning, awareness, education) that reduce vulnerability, although risk transfer and disaster relief can also be considered to be adaptation measures. There are a number of financial mechanisms that are currently used, and that could be applied to climate change adaptation and the coverage of costs due to weather related disasters. Each mechanism has its own basis or rationale. In this section we distinguish between three basic rationales (Table 1) and we provide a number of examples. In the next section we give some results and a discussion of these rationales. In the final section we provide some conclusions.

Rationale of mutual interest

Transfer of costs of natural disasters from affected individuals to a group facing the same risk is the focus of risk transfer schemes, for example insurance schemes. The basis for insurance can be described as a mutual interest in spreading the risk for the people participating. Conditions for risk transfer are that each individual is equally likely to be affected by the natural disaster, the frequency of a particular loss event is (roughly) known and that the total amount of premiums at least covers the losses.

New forms of risk transfer, so-called alternative risk transfer (ART) products, can shift risks from various sectors and locations to regional and global capital markets. Examples include weather derivatives, whereby profit depends on whether a certain weather index passes a certain threshold or not. ART extends the rationale of risk transfer (mutual interest in spreading risk) to a commercial interest in risk management of parties that do not have a potential to be actually affected by a disaster, apart from their stakes in the risk transfer.

Rationale of solidarity

Solidarity among individuals, or groups of individuals, can also be a basis for sharing costs, provided that an enforcing agent, such as a national government, is present.

Table 1 Basic rationales for financing climate change related costs (disaster losses or risk sharing and adaptation costs), and some examples of arrangements

		Climate change related costs	
		Risk sharing arrangements	Adaptation arrangements
Rationales	Mutual interest Solidarity Liability	Insurance, ART Disaster pooling AOSIS proposal	Mainstreaming, sector investments Disaster reduction UNFCCC Adaptation Fund

Solidarity is primarily present in situations of adverse selection; cases in which only a small group is confronted by the risk. In these situations premiums would have to be tremendously high compared to the individual probable losses, making traditional insurance schemes inefficient.

Solidarity can come in various forms. In the US, the Federal Emergency Management Agency (FEMA) manages a fund to cover extensive losses. Between 1990 and 2003 it provided on average 3 billion US\$ per year for disaster losses. In The Netherlands, a similar scheme exists. Under the Dutch WTS act, property losses due to freshwater flooding and earthquakes that go beyond insurance policies are covered under a government-funded pool from which damages are financed (De Vries, 1998). However, whether actual compensation from such funds takes place often largely depends on the willingness of politicians. For example, analysis of historic payments of FEMA has shown that the number of disaster declarations towards the end of the president's term of office typically exceeds the number of declarations at the beginning (Downton and Pielke, 2001). Other constructions in which national governments participate include reinsurance schemes, such as those by the French government (CCR, 1999). At the multinational level, increasing efforts are made to distribute losses between different states. The European Commission has recently proposed a fund for financing catastrophes based on solidarity among different EU member states (EC, 2002).

Not only do governments finance large shares of disaster losses, they also largely contribute to disaster reduction and adaptation. Most often, the efforts of the national government and local water managers are funded from public funds. But constructions also exist in which local citizens directly contribute to the funding. For example, in The Netherlands, water boards are concerned with water management and protection against floods and droughts at the local level. Financial contributions to their efforts were originally based on the area of the land that was owned within the water board, thereby reflecting the owners' relative profit of the land. Nowadays it has been changed to a tax for individual households, regardless of their use of space within the area.

Rationale of liability

Some authors have argued that countries responsible for enhanced global warming should assume the responsibility for the damages; the so-called polluter pays principle. Such responsibility or liability in the case of climate change could be a basis for compensation for either the damage costs or the costs of adaptation. A classic example is the proposal by Association of Small Island States (AOSIS) to compensate ("insure") nations for damages due to enhanced sea-level rise (Wilford, 1993). A subsidy of risk transfer for developing countries, increasing the insurability of risks, is another example that is based on responsibility of industrialised countries (Linnerooth-Bayer *et al.*, 2003).

Despite the fact that the UNFCCC mentions that the Conference of Parties (COP) shall seek to mobilise financial resources (Article 7.2h), it does not explicitly include an obligation to finance adaptation. At the sixth Conference of the Parties in Marrakech in November 2001, three funds for adaptation were created and a mechanism for disbursement was agreed upon. US\$ 413 million was provided by a number of countries for the Special Climate Change Fund and the Least Developed Countries Fund. These two funds however are to be used mostly for transfer of knowledge and capacity building. The third fund, the Adaptation Fund, would finance actual adaptation measures, but at present has a limited budget.

Against this background, a number of non-governmental organisations (NGOs) have developed plans for litigating for climate change damage, i.e. hold companies or governments responsible for damaging the climate. This can be either based on actual damages

(tort; see e.g. Grossman, 2003), or based on company and government activities with regard to prevailing environmental legislation (see <http://www.climatelaw.org/>). Possibilities for lawsuits based on actual damages are currently mostly limited by the fact that it is difficult to attribute actual damages at the local scale to greenhouse gas emissions (Bouwer *et al.*, 2004). Therefore current efforts focus on attracting media and increasing pressure on politics rather than on actual compensation.

Results and discussion

Above we have described a number of rationales that can provide a basis for dealing with costs that are expected to occur due to extreme weather events and climate change. In this section we first discuss the coverage of costs due to weather related disasters according to the three types of rationales defined above; in particular in relation to developing countries. Secondly, we discuss coverage of costs related to climate change adaptation.

Options for mutual interest

Risk transfer appears to be most appropriate where there is a mutual interest in sharing risks. This would imply that traditional insurance mechanisms could be expanded, e.g. from nationally operating insurance companies to multinational companies. This is already the case for reinsurance companies that spread risks from various hazards and various locations. Insurance companies have the advantage that they are able to raise premiums or adjust policies on an annual basis, thereby reducing their risk. In some cases this may lead to a reduction in insurability. In particular flood risks are often regarded as uninsurable and are typically covered by national governments or publicly operated arrangements. Insurance penetration is generally low in developing countries, and the coverage of disaster losses mainly takes the form of disaster relief and rehabilitation by international donors, government spending or development bank lending. In cases of large disasters governments also often act as an insurer of last resort. Micro-insurance and micro-credits are increasingly used in developing countries to provide a financial buffer at the household level.

Options for solidarity

Government support on the basis of solidarity seems to be appropriate for risks that are not commercially insurable. However, support is often politically motivated, and in many instances it can be questioned whether government support is as effective as a private mechanism. Moreover, in smaller sized and developing economies, solidarity in dealing with disaster losses within one nation could seriously affect public finances. For smaller economies, regional sharing between states could potentially reduce the risk in individual countries. Coverage from public budgets could also be expanded with private efforts. For flood risks one can envisage different levels of participation of the private sector in flood insurance, for instance based on spatial risk mapping and consequently varying levels of coverage (Swiss Re, 2002). The net share of the private sector can thereby be relatively increased and the public share reduced. The government can also participate by capping of total losses; i.e. when total losses cross a certain thresholds, additional losses are financed from public sources.

Options for liability

Although an attractive tool to settle costs, perhaps also to encourage mitigation efforts, scientific evidence is not (yet) strong enough for court cases to pursue payments on the basis of liability, in particular where it comes to local damages and their attribution to emissions from a single company, country or group of countries.

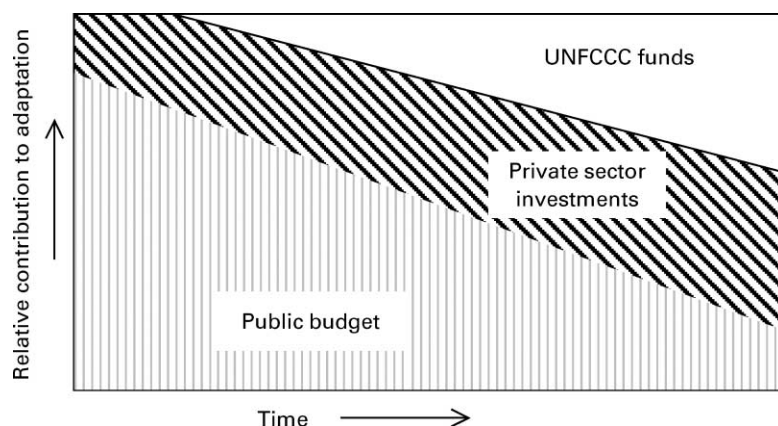


Figure 1 Relative contribution to adaptation from different sources over time

Options for adaptation

Adaptation costs in developing countries can potentially be financed from the funds under the UNFCCC, provided that considerable efforts will be put into negotiations in order to arrive at more meaningful commitment of developed countries. This is needed to create a potential for funding of actual adaptation measures. At this stage, funding under the UNFCCC would be limited to incremental costs (i.e. those adaptation costs arising as a result of human induced climate change only), which is logical from a “liability” standpoint (see previous section) but these costs are at present very difficult to estimate. Simplified rules for least developed countries could speed up the process, in particular if this would imply 100% funding of adaptation, as is the case for pilots that have started under the GEF strategic priority on adaptation. Alternatively, ways to mainstream climate change adaptation into sectoral policies will have to be sought. In particular the water sector holds a number of opportunities to do so (Kabat and Van Schaik, 2003). Funds for adaptation in developed countries will have to come mainly from these countries themselves, given the limited funds under the UNFCCC and the relatively high adaptive capacity in developed countries.

We consider disaster losses in developing countries to continue to be covered by national public budgets, as well as by ad-hoc raising of funds by donors. Funding of adaptation in the present situation is largely confined to the public sector, with some contributions by the private sector (Figure 1). Increasing efforts can be put in the mainstreaming of climate adaptation aspects in various development projects. Over time, the attribution of impacts to human induced losses is likely to become more certain, and the contribution of funding under the climate convention (UNFCCC) would consequently increase, thereby expanding the part of funding under the argument of “liability”. At the same time the contribution of public expenditures could be reduced.

Conclusions

The management of costs due to extreme weather events and investments in physical measures under climate variability and climate change demands appropriate decisions. We argue that there is no need to invent new strategies, but existing rationales should be reconsidered, should be expanded or combined instead. Most importantly, a structured approach is needed in order to arrive at appropriate decisions concerning the most efficient mechanisms. Such an approach could consist of a series of consecutive activities.

First, the requirements of such arrangements for risk sharing have to be investigated. These are often: a) insurability; b) levels of premium; and c) level of subsidies or

involvement of the public sector. Such factors in turn depend on the level of economic development and the government structure of the country in question, the regional risk market, etc. Secondly, a better insight into the local risks is needed. In particular risk mapping, for instance for floods, and the assessment of historic disasters and their losses can aid decisions on which disasters need attention and in which locations. This requires the involvement of both scientists and experts from the financial services sector. Thirdly, by considering different arrangements for different locations (and their risk levels) different levels of sharing between public and private partners can be decided upon. Fourthly, such an approach can help in deciding between sharing losses or investment in adaptation: 1) investment in “physical” adaptation to reduce current and future risks, thereby reducing disaster losses and the need for insurance and government support; 2) increasing use of insurance, or coverage of losses through pooling, in case investments to reduce risk are too high to be justified; and 3) adjustment of “safety levels” for specific locations and thereby potentially influencing decisions concerning land-use.

We are aware that this is a merely theoretical framework and that in many countries and locations land-use planning and decisions regarding investment in adaptation, disaster pooling and insurance are often not centrally coordinated. However, research efforts and pilots in the field using such an approach can provide insights into the advantages of such a structured decision framework. In general, better insight into the current practices of funding of disaster losses that exist in various countries and their efficiency is needed. There is a need for the public and private sector to increasingly acknowledge climate variability and climate change as an important aspect in their financial planning and risk management strategies. The scientific community, together with the relevant private sector partners, can provide analyses that may help to integrate safety levels and appropriate land-use planning into decisions relating to risk sharing and investments in adaptation in the water sector.

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