

Climate change and the risks of flood disasters in Asia: crafting adaptive and just institutions ¹

Jesse Manuta & Louis Lebel

Unit for Social and Environmental Research
Faculty of Social Sciences
Chiang Mai University
Chiang Mai, 50202 Thailand
Tel/Fax: Fax: +6653854347
(jesse@sea-user.org)

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1 Introduction

Flood disasters are the most frequent and devastating natural disaster in the Asia region, and like disasters in general, their impacts have grown in spite of our improved ability to monitor and describe them (White et al. 2001). For the past thirty years the number of flood disasters has increased compared to other forms of disaster (Dutta & Herath 2005). China and India are the most frequently affected followed by Indonesia, the Philippines, Bangladesh, Iran, Thailand, Sri Lanka, Vietnam and Pakistan.

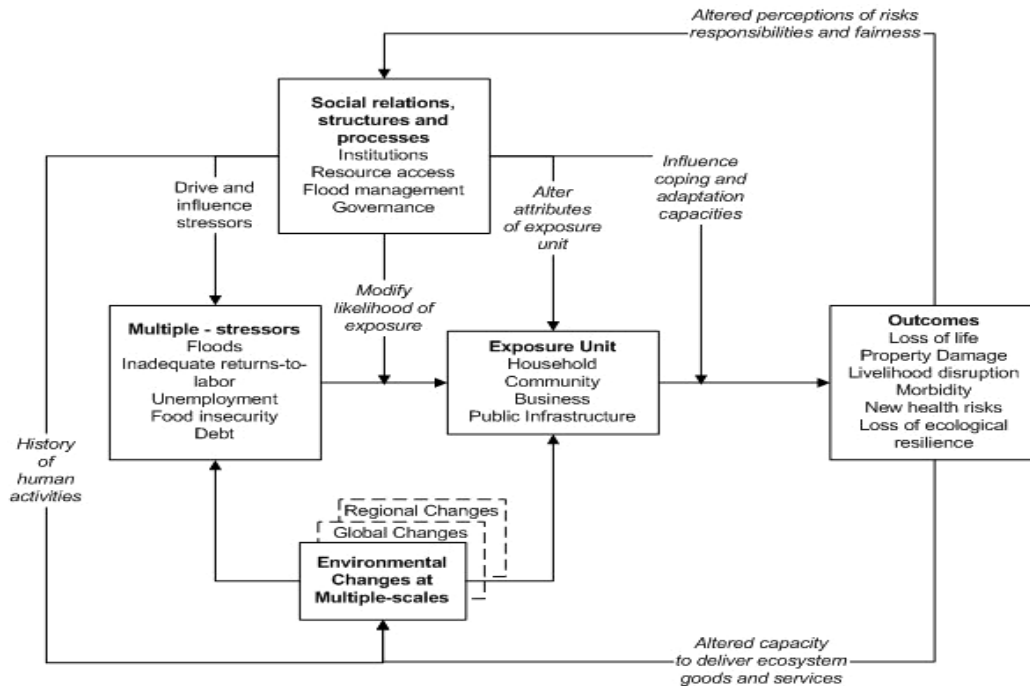
Climate change compounds the existing challenges of managing floods. Firstly, the anticipated sea level rises could have a major impact on flood risks in the coastal zone deltas of southern and eastern Asia in which many of the larger human settlements and key rice growing areas occur (IPCC 2001). Secondly, but less certainly, increases in the frequency or intensity of extreme precipitation events exacerbate risks of disastrous flooding both in upland watersheds where such events can trigger landslides, and in lower floodplains which are often densely settled (IPCC 2001; Kundzewicz & Schellnhuber 2004). Critical regions include the flood plains of major rivers like the Ganges-Brahmaputra, Mekong and Yangtze basins, and in cyclone-prone coastal region, around the Bay of Bengal and the South China Sea (Few et al. 2004). Thirdly, climate change may alter flood regimes in some basins in other more complex ways, for example, through impacts on melting of glaciers in the uppermost reaches or reduced precipitation in inland continental areas. Reductions in duration or changes in timing of onset of seasonal floods may have as large an impact on livelihoods and production systems as more discrete high water events although the former is rarely recognized as a disaster. Finally, concurrent changes in land- and water-use may exacerbate or reduce effects of changes in climate on disaster risks.

Not all social groups are equally vulnerable to flood-related disasters nor are they exposed to the same combinations of involuntary risks (Blaikie et al. 1994). Floods that are a disaster to an urban-based trading firm may even be a bounty for fisher-farming household. While physical geographies and livelihood dependencies matter, formal and informal institutions also help shape differences in risk and vulnerability to floods and climate change as well as more broadly adaptive capacities, and each of these influences is multi- and cross-scale (Adger 1999; Adger et al. 2005). A good example is insurance, both the formal kinds provided by large firms in industrialized economies, and the various kinds social safety nets that may exist in traditional agricultural societies.

Our primary concern in this paper is how institutions concerned with the management of floods and flood-related disaster risks will fare under a changed climate. Our approach is first to look at how well they have evolved in the recent past, and then to imagine a future where climate change through altering flood regimes is testing systems of governance. Ultimately, we are looking for insights about how the form and arrangement of current institutions concerned with the management of floods and flood-related disaster risks might be transformed in ways that would them more able to learn and adapt to a climate change as, and however, it unfolds.

Our exploration is guided by a framework based on ideas about vulnerability and resilience but which emphasizes the ways in which other actors through institutions modify the risks of flood disasters and who will bear those risks (Figure 1). For initial simplicity we focus on three main groups of pathways: (1) *perceptions* - discourses and social practices that shape how floods, risks and disasters are perceived; (2) *vulnerabilities* – institutional arrangements that influence who is at risk to flood and other interacting stressors (3) *capacities* - institutional influences on the capacity to

cope and adapt. Taken together these comprise a substantial if not comprehensive view of how governance frames risks to floods and flood-related disasters.



See Figure 1: Vulnerability to Flood Disaster Risk.

The rest of this paper is organized these three pathways and ends with a section discussing how these may be transformed to deal better with climate change.

2 Perceptions

2.1 Floods and disasters

In the tropical parts of Asia most of the major cities have grown in the deltas literally building on the foundations of a rice-growing civilization. The landscape has been managed for floods for centuries. Communities whose livelihood depends on the productive functions of “normal” seasonal flood cycles have learned to live with floods and have embraced its arrival with songs and dances. Institutions and governance arrangements often centered on the collection of crop taxes and forced labor by nobility. Institutions and cultural practices around the “management” of floods are among the most persistent, sometimes, surviving for centuries.

Over the last few decades industrialization and the accompanying processes of urbanization have led to a very different land-use patterns, economic structure and livelihood base. Political organization has also changed. Floods are now much more threatening events to powerful people for whom the idea of living with floods is anathema to modern society built on the automobile.

As the potential for floods, if they occur, to be a disaster has increased, societies have invested more in protective structural measures. Decades of economic growth also mean that the domestic resources available to households, firms and state authorities to address “disaster” risks and events have substantially increased in most countries.

At the same time what constitutes a flood disaster has correspondingly shifted from an emphasis on losses of life and famines from crop failures to losses of property and investments.

These distinctions reflect changing perceptions and beliefs about societies' relationship to nature. Floods are now more likely to be seen as a hazard that has to be controlled. Although all groups may be negatively affected by "catastrophic" floods, impacts of "normal" and some "major" floods regimes may vary among different livelihood-based groups. What is perceived and regarded beneficial by rural farmers may be disastrous and hazardous by the urban population. Therefore it is important to expose whose perspective defines a flood event "hazardous" and disastrous. Not surprisingly, an operational definition of what constitutes a flood disaster remains a contentious political issue (Few et al 2004).

Disaster is defined by ISDR as a "serious disruptions of the functioning of a community or society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources" (ISDR 2004:17). The Centre for Research on the Epidemiology of Disasters (CRED) classifies an event disaster if at least one of the following has occurred: (1) 10 or more people killed; (2) 100 or more people reported affected; (3) a call for international assistance; and/or (4) a declaration of state of emergency (2004:10). In many parts of Asia, however, a declaration of state of emergency signifies state's recognition of a disastrous event and more often it is based on loss of property and investments.

There are two main discourses on flood disasters (See Table 1). The first, and dominant view, is that flood disasters are inherently a characteristic of natural hazards (Dixit 2003; Adger 1999). Disasters arise inevitably when the magnitude of a hazard is high. This contrasts with the alternative discourse that sees flood disasters as being jointly produced by interaction of the physical hazard and social vulnerabilities. This alternative discourse brings into the fore social relations, structures, institutions and governance in understanding flood disaster. This view posits that flood disasters are not only the result of natural hazards, but also of socio-economic structures and political processes that make individual, families and communities vulnerable (Dixit 2003).

Table 1. Views on flood disaster and governing flood disaster risk

	Natural Hazard	Hazard - vulnerability
Flood Disaster	Hazard led; inherent characteristic of natural hazard;	Disaster is the result of the interaction of natural hazard and vulnerability
Disaster Risk Management	Focus on relief and control	Focus on mitigation and preparedness; mitigation measures address the political economy of vulnerability
Governance process	State-centered; technocratic and hierarchical	pluralistic

Source: modified from (Dixit 2003)

2.2 Risk management

The hazard discourse focuses on the physical event that requires experts and bureaucracy to predict the occurrence and magnitude of flood hazard and thereby to control natural disaster. Flood disaster risk is seen as the probability of harm emanating from determinable physical causes (Jasanoff 1999). This hazard led-approach focuses more on relief and emergency after the disaster occurs and technical/ engineering measures to control and contain flood. The governance process is basically technocratic and state-centered; survivors of flood disaster are not involved in the decision-making process (Dixit 2003). Most of disaster risk management institutions and arrangements across Asia have been anchored on this perspective.

The jointly produced perspective, on the other hand, focuses on disaster risk management approaches that reduce peoples' vulnerability and enhance people's social resilience. Vulnerability refers to the condition of a person or a group in terms of their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard (Dixit 2003). In addition to relief and emergency measures an increasing attention is given on mitigation and preparedness measures which encompass efforts to address the political economy of vulnerability of individual, household and community. Institutions and systems of governance that structure political, social, cultural and economic relations and transactions in a society shape and determine peoples' vulnerability. These socio-political and economic relations differentiate and influence resource allocation and people's access to resources, including capital, information and decision-making, which are crucial for survival and well-being.

The alternative discourse is beginning to change the approach of Asian states' to disaster risk management away from the purely physical framing to address more explicitly differences in social vulnerability (UNDP 2004; ISDR 2004; ADPC 2000).

Taken to its extreme the alternative discourse can lead to a politics of blame where all flood disasters are seen as having root causes in the actions of a scapegoat community. In Asia lowland flooding, thus, is often blamed on the practices of upland farmers that typically are from minority ethnic groups with distinct cultures from the urban and lowland agricultural cultures (Forsyth 1998). Myths about the impacts of land-use changes in the mountains on droughts, floods and downstream sedimentation persist because they shift the need for corrective action away from the economically dominant growth in flood plains in the lowlands (Lebel & Bach Tan Sinh 2005).²

2.3 Altered flood regimes

The IPCC Third Assessment Report is clear that opportunities for intensive precipitation increase as the water-holding capacity of the atmosphere increases with temperature. Interestingly those chapters dealing with climate science emphasize that major uncertainties remain with respect to frequency of extreme events, in part, because the science is not yet that well developed, whereas those dealing with impacts draw strong conclusions about the growth in risk of floods (Kundzewicz & Schellnhuber 2004). Even in a sophisticated assessment process differences in perspective with respect to what climate change means for the risks of flood disasters stand out.

² Insert a paragraph about the actors mandated to manage disaster risks on behalf of Asian societies and what their organizational interests are like.

Climate change, especially when it interacts with other human interventions in watersheds and channels, could alter flood onset, duration, extents and frequencies. In our analysis we reduce this complexity to two generic kinds of changes (Table 2). We outline at the outset that the impacts of changes in flood regime may not necessarily be negative for all stakeholders, but rather produce both winners and losers even within the same basin.

Table 2. The impacts of altered flood regimes depend on livelihoods and lifestyle objectives.

		Flood regime change with climate change	
		More intense, prolonged or frequent flooding	Less intense, shorter and rarer flooding
Objective of livelihood – lifestyle relationship with floods	Depend on floods	Beneficial up to a threshold of adaptation. Increased risks after	“Lack of floods” disaster
	Avoid floods	Increased risks of disaster	Reduced risks of disaster

Altered flood regimes do not translate linearly into altered risks of flood and flood-related disasters. Modest changes in a flood regime may not have much impact until a particular threshold is reached after which the impacts may be very large. Changes in flood regimes may interact with other processes of change, for example, riparian land-uses, styles of building construction or water withdrawals, which reduce or exacerbate the physical risks of disasters unfolding. Changes in flood regimes may coincide with other social factors affecting risk, like access to resources, levels of convertible assets and wealth, interacting to alter risks of disaster.

3 Vulnerabilities

3.1 Underlying

Vulnerability arises out of the social, economic and ecological circumstances of everyday living that result from social and power relations (Bohle 2001; Adger 1999; Blaikie et al 1994). These social relations is driving and conditioning vulnerability by impacting different social group’s access to critical resources (Adger 1999:252). For instance the agrarian relations in many Asian countries and the economic exclusion and marginalization make the poor unable to secure livelihood assets in safer areas (Dixit 2003). In many slums areas of Asian metropolis many poor people have no choice but to live in vulnerable areas in order to survive.

Blaikie et al argue that addressing vulnerability requires fundamental solutions that involve political change, radical reform of the international economic system, and the development of public policy to protect rather than exploit people and nature (1994: 233).

Some of the most important impacts of altered flood regimes may be through their impacts on ecosystem functions (Abramowitz et al. 2004), for example, productivity of fisheries and agriculture, although these changes may not be recognized easily by societies as “flood-related disasters” because they are insidious, and cumulative as

opposed to spectacularly destructive. Finally, we acknowledge that climate change doesn't just alter precipitation and flood regimes, but will also affect temperatures. How these influences might interact to alter, for example, exposure to water-borne diseases could matter greatly for risks of flood-related disasters.

3.2 Redistributing

Country studies on state institutional capacity in Vietnam and Thailand have shown that measures have been undertaken to protect the urban-industrial centers from flooding at the expense of the rural agricultural sectors (Manuta et al 2005; Nikitina 2005). These measures reflect the urban bias of policy makers. These measures are usually undertaken without consultations and public deliberation among affected communities and regions. In Vietnam, however, there is often substantial debate among state authorities over such practices, but these take place behind closed doors. Framing flood disaster risk management as a technical problem excuses state agencies from public debate and negotiations. Defining disaster as loss of property and investments rather than in terms of livelihood losses implies that protection of the urban centres as a rational priority.

How disaster risk management is financed matters for the agendas tackled. International funding to states is primarily directed towards disaster relief assistance. Rehabilitation efforts often involve the 're-labelling' of other forms of development assistance.

Private sector's involvement, in particular banks and insurance firms, is an important component of flood disaster management in industrialized countries. Often this requires support from the state in the event of very large pay-out or reconstruction loan schemes. In Japan state guarantees were crucial for involvement of insurance companies. The power of the market help spreads risks, but this may work well in developed world where the risk pool is huge. In developing world however, low-cost risk sharing through social capital networks, micro-finance and public works may be more appropriate.

In places where state assistance is limited NGOs may play a significant role. For example, Bangladesh NGOs have been important in establishing and maintaining community-based micro-finance schemes (Matin and Taher 2001).

3.3 Reproducing

Flood disaster recovery and reconstruction interventions often reproduce the social vulnerabilities that led to the initial disaster (ISDR 2003). For instance, disaster recovery programs in Bangladesh mostly focus on capital-intensive structural interventions that do little or even exacerbate efforts to reduce poverty an underlying cause of vulnerability. Economic interests of large actors dominate although these create challenges for the Bangladesh economy (Dixit 2003).³

4 Capacities

4.1 Coping and adapting

Vulnerable individuals and groups can sometimes get better at coping and adapting with flood hazards, but only if the conditions that reproduce vulnerabilities are not too strong.

³ Additional discussion on this point is needed, including some contrary forces: flood experiences in the region and democratization trends;

Studies of institutional adaptation to environmental risk under the economic transition from central planning in Vietnam showed that a shift to privatization of assets significantly altered adaptation and coping strategies (Adger 2000) of coastal communities to flooding from storm surges in northern Vietnam (Tri et al. 1998). Social vulnerability has been enhanced by the breakdown of the collective action on protection from extreme events and an increasingly skewed income (Adger 1999).

At the policy level there is a growing emphasis placed on reducing vulnerabilities and building capacities across Asia (Bildan 2003). If implemented this would shift investments away from the relief towards the livelihood security framework.

4.2 Resilience in ecosystems

There is a growing recognition that development that works against rather than with nature often places people at ultimately higher rather than lower risks (Tompkins & Adger 2004). There is more emphasis on integrated approach in River-basin management for risk reduction and capacity building towards an integrated water resource management integrating water and flood ecology (Bergkamp et al 2003). Avoiding repeating the same circle of mistakes and old framework of a technical/engineering emphasis, there is a shift toward broader aspect of capacity building, preparedness and mitigation and a less reliance on structural mitigation works and emergency relief efforts in flood disaster risk management cycle (Few et al. 2004).

4.3 Beyond the state

Most modern industrial societies have adopted primarily a technocratic approach to managing risks of flood disasters. Public deliberation in planning to prevent or recover from floods is limited. Public participation is, however, increasingly supported by states from an instrumental perspective: to gain public support for their shifting of risks and inconveniences from infrastructure interventions or to secure "cheap" labour for remedial works and monitoring.

Non-governmental organizations have in general not paid much attention to the way these involuntary risks from flood disasters are being distributed preferring a role in emergency humanitarian efforts.

Without being challenged and few mechanisms for information to flow from local actions back to inform policy and programmes in the area of disaster management the likelihood of institutionalized rigidities and critical gaps is high. Unlike many other areas of public management disasters are something no one wants to be held accountable for, and consequently organizational interests largely aim to shift responsibilities elsewhere. Moreover, budget allocations for reducing risks are harder to justify and hold on to than those for recovery as a result investments often fall once the short-term institutional memory of the last flood-disaster has faded.

Given mixed results of macro-level State-led technocratic structural interventions in managing flood risk worldwide, there is increasing interest in understanding how local communities perceive and respond to flood risks (Few 2003). Community-based disaster risk management allows local people to participate in local disaster risk governance (Few 2003; Yodmani 2001).

Community-based disaster risk program redefine relationships between the people and the state disaster management institutions. Acknowledging a role for communities in disaster management creates opportunities to broaden participation on the one hand, and improve accountability and responsiveness of state's institutions on the other. Community participation may focus on empowerment and linking community-based activities with local development policies (Shaw 2004). Active participation in district area planning, river-basin management, disaster preparedness plans and water and water-related disaster policy are some of the

venues for engagement. The early results of community-based flood management strategy (CFMS) pilot areas in Bangladesh have paid huge dividend in reducing vulnerability of affected communities during the 2004 flood (Ahmad et al 2004).

Overall, however, not much is really known about what makes for effective partnerships and division of responsibilities between more centralized disaster management authorities, community organizations and local government. There is always the likelihood that the community or participation discourse is manipulated in ways that shift responsibilities and burdens to community organizations or local governments without corresponding increases in resources or decision-making powers. On the other hand, decentralizing all resources and functions could be very inefficient and lead to know single community having access to level of resources when needed. Community-based flood mitigation programs are often faced with the issue of sustainability and issue of up-scaling (Shaw 2004).

5 Transformations

The way the risks of flood disasters are governed has changed with time. If societies are to be effective in dealing with climate change some of the underlying institutions and political structures may also need to change. An adaptive transition is one in which the fit between key institutions and the risks of flood disasters is maintained or improved.

5.1 Institutional traps

There are several ways in which institutional responses to floods and flood disasters may undermine longer-term capacities of societies to cope and adapt to altered flood regimes arising from climate change. These *institutional traps* could make adaptive transitions difficult.

The first is a bureaucratic tendency to make small progressive adaptations to smaller events, because these are less costly, easier to gain public acceptance about, but in doing so vulnerabilities to larger events may be increased. These small responses, however, although reducing impacts of intermediate events may reduce the environmental feedbacks on people's behaviour affectively increasing vulnerability to large events. Rising the height of the dykes after the last flood encourages additional infrastructure to be built behind them.

The second is an undue emphasis on emergency response, because this is highly visible and politically popular action, whereas investments in prevention and risk reduction pass unnoticed. The consequence is that institutional changes which could reduce risks aren't taken because the pay-offs of doing so are less immediate.

A third is the temptation to over-integrate and centralize disaster bureaucracies thereby losing the capacity and skills to handle risks of floods (as opposed to fires) in particular places. This is consistent with the "emergency response" approach to disaster risk management. Ironically the trend towards decentralized disaster management with its emphasis on local capacity and responses (Few 2003) may lead to better adaptation to small events but poorer performance for larger ones. This could especially be the case if the strategies do not strengthen "scale competencies" of local actors. Community-based approaches to disaster management especially if they combine efforts of local government with their links to higher scales with broader public contributions to prevention and preparedness may overcome this challenge. The idea is that, provided higher level authorities are downwardly accountable some important information about managing changing future risks will feed back upwards to influence, for example, financing.

A fourth is to downplay the importance of monitoring precipitation and river levels, or assessing the impacts of past flood events. The consequence is that changes in flood regimes will not be recognized nor the implications of further change explored. Under these conditions institutional “responses” to flood disasters will have little to do with shifts in risk and be inefficient and non-adaptive.

A fifth is elite capture of the governance process. Society using the best science and engineering available gets better and better at maintaining low risk levels for wealthy usually urban enclaves and business districts, that is, high economic value activities, by shifting risks onto low-income housing areas and farmers fields through structural measures. This kind of institutional trap applies across countries as well and undermines risk governance because decisions about what is an acceptable risk and who should bear them are made by a narrow set of interests.

Finally, social and economic changes that lead to breakdown of collective action institutions in which a society trusts without adequately replacement by state or civil society efforts can create huge barriers to crafting adaptive institutions to manage flood risks (e.g. Adger 2000).

5.2 Adaptive transitions

In the previous section we discussed several kinds of institutional traps that need to be avoided for adaptive transitions to be plausible. Here we consider how changes to governance may help avoid these traps while also building capacities of societies to cope with and adapt to altered flood disaster risks from climate change.

Efforts to *go beyond the state* in managing water governance risks while they should help prevent rigidities or elite capture may not prevent the trap of adapting to small changes, but increasing vulnerabilities to larger events (Lebel & Bach Tan Sinh 2005). Smaller more local levels of organization whether part of, or independent of formal state structures, are likely to be able to evolve faster. On the other hand, the amount of resources they can access may be less if their scale competencies are low.

Cross-scale linkages are undoubtedly of great importance for emergency response capacities as floods typically have a patchy distribution leaving some communities heavily impacted and others less so. With access to broader institutional structures functional losses and resources can be compensated for by drawing on other places. Mobilizing such resources often requires going up political hierarchies not just across. Scale competencies may matter a lot (Adger et al. 2005).

Efforts to *link efforts across* government agencies or among communities seem mostly likely to be beneficial at preventing all three traps, but could cause problems of slowing down rates of institutional change. Networks among non-state actors highlighting the elevated risks of socially vulnerable groups could help draw attention to the new risks created by climate change for these groups which would otherwise pass unnoticed because relative economic value may not be so large.

Efforts to *foster institutional learning* may also fall into the trap of ignoring the big rarer risks, but don't guarantee wider public interests are well served. Studies of organizational learning suggest that there are many obstacles to learning under conditions where evaluating costs and benefits of different adaptation options is difficult and there is little feedback on success or failure of measures (Berkhout et al. 2004). Societies learn about climate change and its impacts on flood regimes and the uncertainties therein in different ways and this is likely to have different repercussions for institutional responses. Learning by analogy, for example, from past disaster events is likely to be crucial, but must match as far as possible social and cultural contexts (Tompkins & Hurlston 2005). Societies that are anticipatory and cautionary invest in forward-looking research looking for ways to build coping and adaptive capacities of the most vulnerable groups, sectors and places. Societies that

are reactionary may delay actions until a crisis is of sufficient magnitude that action is seen as unavoidable. What specific characteristics will be important for capacities to adapt to floods will always be uncertain (Adger & Vincent 2005) making learning crucial. Democratizing approaches to disaster management appear important for creating learning institutions.

Efforts focussed on *reducing risks for socially vulnerable groups* appear to be necessary to ensure that transitions are both adaptive and just. This is especially the case for climate change related influences on floods because ultimately, part of the responsibility for altered flood regimes lies with the wealthy societies whose history of emissions has committed the world to climate change. They have benefited from fossil fuel use while exposing huge areas of the impoverished world to elevated risks of flood disasters. The poor have a right to demand significant compensatory investments for these involuntary risks which they will bear. Efforts to reduce risk for socially vulnerable groups are necessary for a just adaptive transition.

Finally, the way rules of disaster management come about may matter as much as the final institutional arrangements (Lebel & Bach Tan Sinh 2005); if most stakeholders view the process as fair they may be quite pragmatic about accepting some inequalities in the distribution of involuntary risks, compensation, and recovery investments. At least up to a point.

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