Planning ahead - Adapting settlements before disasters strike

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CHAPTER 16

'Planning Ahead' — Adapting Settlements Before Disasters Strike —

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1 INTRODUCTION

Civil engineers, architects, builders and urban planners[1] have the task of developing secure and sustainable settlements. However, they are unconscious—but significant—contributors to the fourfold increase in the number of disasters that has taken place during the last 30 years (UNISDR 2006). This relates to the fact that they commonly view the interlinkages between disasters and the built environment (and related planning practices) as a simple one-way, cause-and-effect relationship (figure 1). In fact, the limited perception that disasters are the (uncontrollable) cause and the destruction of the built environment is the effect, is widespread amongst those professionals, who consequently have a tendency to see disaster risk management[2] in a purely physical way. Their responses are thus very limited and mainly focused on the post-disaster context. Moreover, even preventive tools, such as building codes or land-use zoning, are currently of low relevance to the urban poor whose lives are most at risk (figure 2). With more than one billion 'slum' dwellers worldwide, who often have no choice but to live in precarious and life-threatening conditions (UN-HABITAT 2003), planners have to urgently re-evaluate their work to provide more adequate solutions.

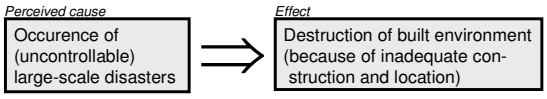

Figure 1: Common, 'erroneous' view of the interlinkages between disasters and the built environment (and related planning practices) as being a simple one-way, cause-and-effect relationship.

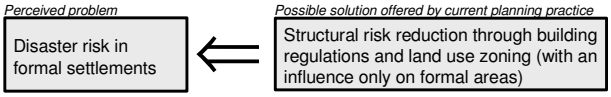

Figure 2: Common, 'erroneous' view of the interlinkages between the potential of planning practice for disaster risk management as being a simple one-way problem-and-solution relationship with limited efficiency and area of influence.

Responding adequately to disaster risk is inherently complex. Disasters occur when a hazardous event strikes a vulnerable human settlement, with the coping capacity of its inhabitants further influencing the extent and severity of damages received.[3] Unfortunately, at present, planners often

negatively influence *all three* risk components (i.e. hazard, vulnerability and coping capacity). Hence, the task of developing secure settlements cannot be achieved unless planners thoroughly understand the interlinkages between disasters and the built environment (and related planning practices) and—based on this—integrate disaster risk management into their everyday work. In fact, incorporating knowledge about how to make houses safer into their work is just one of many issues that they need to address. Against this background, the objective of this chapter is threefold:

1) *Preparing the ground*
   To demonstrate the complex interlinkages between disasters and the built environment (and related planning practices). It will be argued that the reality is much more complex than the one-way, cause-and-effect relationship mentioned above. It is, in effect, a reciprocal two-way and multifaceted relationship that, to date, has not been well understood and theorised. A new analytical framework for viewing this relationship is presented.
2) *Reality versus current planning practices*
   To show how the identified interlinkages between disasters and the built environment (and related planning practices) are currently addressed. This will be mainly discussed in the context of aid programming[4] in the fields of disaster risk management and human settlement development planning (including social housing, settlement upgrading, new settlement development and urban governance programming). The analysis covers related programmes and stakeholders, institutional structures, the discourses of experts and practitioners, their working priorities, concepts, terminology and tools, as well as the historical development of both fields of work. The challenges identified at the global, national, municipal and household levels are illustrated, as is the gap between reality and current practices, both of which can lead to increased disaster risk.
3) *A way forward*
   To show how disaster risk management could be better integrated into planning practices. A strategic and conceptual model is presented that provides guidance on how international, national and municipal (aid) organisations working in settlement development planning in so-called developing countries[5] could adopt a more proactive approach towards disaster risk management.

The following sections reflect the three objectives and follow an inherent logic: the two-step analysis of the interlinkages between disasters and the built environment and how it is tackled in practice is the necessary basis and input for the third step, namely, the development of the model mentioned above. Its aim is to overcome identified challenges and modify current planning practices so that they match better to reality (see figure 3).

This chapter summarises the results of research, undertaken from 2003 to 2007, that have been presented in different publications (Wamsler 2004; 2006a-g; 2007b,c). Here, their outcomes are incorporated within a new and comprehensive model that addresses how disaster risk management could be better integrated into human settlement development planning and programming. Sections 2 and 4 have been complemented by additional, more recent research results obtained during 2007.[6] Note that, in the following text, references are included only if the content is based on work other than the author's.

Figure 3: Inherent logic of research objectives presented in this chapter.

2 PREPARING THE GROUND

The following two sections show, first, the possible impacts of disasters on the built environment and related planning practices in cities and, second, the reverse interrelation (i.e. the influence of the built environment and related planning practices on risk and disasters). This two-way relationship has, to date, not been well understood and theorised. A framework for viewing it is thus presented as a first attempt to provide a comprehensive and exhaustive systematisation of the issues involved. The framework systematises the relationship by filtering out 12 key aspects. Tables 1–13 provide an in-depth analysis of each aspect.

2.1 The interlinkages: disasters ⇒ built environment

Natural hazards and/or disasters have widely varying impacts on the built environment and related planning practices. These impacts are not only physical but also socio-economic, environmental, organisational and institutional. In fact, disasters can:

- disrupt city functions;
- intensify urban hazards and create new ones;
- increase urban inequalities (producing 'poverty traps');
- create new challenges for future urban development;
- create barriers to sustainable urban development; and
- have a (negative) impact on the resources invested in the built environment.

Unfortunately, these negative effects, which are described in detail in tables 1–6,[7] are not only extensive, but can—over decades—negatively impact the urban poor, as well as municipal and national development. The effects can generally be categorised as 'immediate and short-lived', 'immediate and long-lasting', 'delayed and short-lived' and 'delayed and long-lasting'.

Table 1: Disrupted city functions caused by disasters.

Disaster impacts that can lead to the disruption of city functions
▪ Damage/destruction of housing stock.
▪ Damage, destruction or interruption of technical and social infrastructure (i.e. infrastructure for water supply, sanitation, energy, transport, communication, education and health services. Examples are electricity failure; blocked accesses to houses or settlements; damaged health care units and schools; contamination of drinking water wells; and destroyed bridges.
▪ Malfunctioning of technical and social infrastructure due to disaster impacts (e.g. accidents due to insecure pathways).
▪ Loss of architectural heritage (i.e. buildings and sites of cultural value), also undermining the collective quality of life, as well as national economies (e.g. because of fewer tourists).
▪ Destruction of whole cities (e.g. cities wiped out because of the rise in sea levels caused by climate change).

Table 2: Intensified and new urban hazards caused by disasters.

Disaster impacts that can lead to creation or intensification of hazards
▪ Damage to the integrity of ecosystems creating future hazards (e.g. destruction of vegetation leading to landslides, or damages to mangroves leading to erosion and increased wave energy).
▪ Aggravated environmental degradation triggering secondary hazards (e.g. soil instability and erosion caused by earthquakes leading to landslides during 'normal' rain or through waste water flows).
▪ Modification of the landscape of settlements, thus reshaping their hazard patterns (e.g. through the change of the course of a river).
▪ Contamination of the environment through recovery and/or preparedness measures creating new hazards (e.g. plastic sheets—used for protecting slopes or temporary shelter—being blown away, contaminating the environment and blocking river flows or water channels).

Table 3: Increased urban inequalities (creating 'poverty traps') caused by disasters. As the poor are disproportionately affected, disaster impacts can intensify differences in status and the patterns of social inequality.

Disaster impacts that can lead to increased urban inequalities which, in turn, could cause poverty traps
▪ Forced eviction of 'slum' dwellers affected by disaster.
▪ Direct and indirect post-disaster expenses, together with the disruption of local and household economies pushing already vulnerable groups further into poverty (e.g. loss of income earners through death or injury, interruption of production or access to markets, destruction of productive assets such as home-based workshops).
▪ Governance problems at different levels, resulting in aid budgets being skewed towards the recovery of one group or sector as opposed to another, resulting in increased urban inequalities.

Table 4: New challenges for future urban development caused by disasters.

Disaster impacts that can lead to additional challenges and even barriers to future urban development
▪ Increased number of urban dwellers, due to immigration, affected by disaster or by decreased agricultural productivity caused by climate change.
▪ Increased number of homeless people (due to loss of housing and land belonging to people affected by disaster) and hence a need for living space.
▪ At the household level, erosion of livelihoods, savings and physical capital, increasing the number of people and settlements that depend on outside assistance, for instance, to access adequate rental housing or house ownership, house and infrastructure maintenance, etc.
▪ Modification of the landscape of cities, affecting past and future planning (e.g. infrastructure planning).
▪ Construction of temporary housing/settlements that over time need to be transformed or replaced to offer permanent solutions for disaster victims.

Table 5: New barriers to sustainable urban development caused by disasters.[1] These barriers decelerate (positive) development processes.

Disaster impacts that can lead to decelerated urban development
▪ Increased need for resources for specific (already planned) urban developments because of, for instance, contamination of the environment as a result of disaster impacts (contaminated soil, wells, etc).
▪ Reduced capacity/functioning of housing/planning organisations that are directly or indirectly affected by disasters (e.g. national governmental and non-governmental aid organisations suffering through reduced reputation, damaged office buildings, disaster-affected programme measures and staff death, injuries, leave, etc.).
▪ Death, (temporary) disablement or migration of key persons (and workforce in general) at the national, municipal, local and household level, leading to an erosion of social capital for urban planning and governance.
▪ Aggravation of political stresses, leading to increased corruption, bureaucracy, political conflicts and rivalry at all levels, which affect developments at settlement, city or country level.
▪ Aggravation of social stresses and shocks such as disease and psychological shocks, which affect developments at settlement, city or country level (e.g. community distress; family disruptions; burglaries due to damaged houses and/or increased need, illnesses caused, for instance, by waste water entering houses; HIV/AIDS, trauma).
▪ Impacts on national fiscal and monetary performance, indebtedness, the distribution of income and scale and incidence of poverty, all negatively influencing the provision and financing of housing and infrastructure.

Table 6: Change of resources invested in the built environment caused by disasters. These effects are mostly negative in terms of achieving sustainable urban development.

Disaster impacts which can lead to changed investments in the built environment
▪ Reduced support/assistance by planning authorities to affected 'slum' communities because of increased and unacceptable risk levels (e.g. stopping land legalization processes).
▪ Disruption of national economies and related governance functions of planning authorities, for instance, due to post-disaster expenses and relocation of development investments (e.g. investments aiming to provide sustainable access to safe housing, drinking water and sanitation being disbursed on emergency issues).

[1] Note that there is a certain overlap between the aspects mentioned in tables 3,4 and 5, i.e. the aspects can—depending on different national contexts—be categorized differently.

Disaster impacts which can lead to changed investments in the built environment (cont.)
▪ Lower output from damaged or destroyed public assets and infrastructure, resulting in fewer resources that can be reinvested in the built environment.
▪ Increased temporary investment and hence activity in the (formal and informal) construction industry due to rehabilitation and reconstruction efforts.
▪ Disruption of local and household economies, affecting people's investments in improving their living conditions (e.g. incremental housing, including infrastructure), which immediately increases their vulnerabilities (vicious cycle).

2.2 The interlinkages: built environment ⇒ disasters

The reverse analysis indicates that the built environment and related planning practices constitute one of the main causes of disasters, not only in terms of generating increased vulnerabilities. In fact, they can:

- increase vulnerability;
- increase exposure to existing hazards;
- intensify/magnify urban hazards and create new ones;
- constantly change vulnerabilities and hazards (and thus make them hardly controllable);
- reduce the national and municipal coping capacities
  - because of inadequate disaster risk management systems, or
  - because of inadequate urban management/governance systems; and
- reduce the coping capacities of low-income households.

Tables 7–13[8] describe in detail how these effects, which can be classified in physical, socio-economic, environmental, organisational and institutional terms, can be generated. This detailed systematisation clearly illustrates that disasters are not one-off events caused solely by natural hazards but are generated by complex and interacting development processes in which planning practices play a major role.

Table 7: Increased vulnerability caused by the built environment and related urban planning practices. Increased vulnerability leads to reduced capacity to resist, absorb or recover from hazard impact. Hence, a condition is created where hazards easily create disasters.

Aspects or activities that can lead to increased vulnerability
▪ High number of inhabitant living in cities, expressed in high population densities and surface areas of cities.
▪ High concentration of social networks, buildings and infrastructure in cities, including state governments and financial centres.
▪ High concentration and overcrowding of people in hazard-prone areas (especially the poor living in 'slum' areas), both in inter-city and peripheral communities.
▪ High concentration of highly defenceless population groups in cities (for example, weakened by HIV/AIDS or other diseases, conflict or malnutrition). Note: such groups are mainly found within the lower income groups; in turn, the poor's inadequate and unsanitary housing results in ill-health. Furthermore, space restrictions can influence transmission of disease (e.g. through violations).
▪ High and increasing number of poor and destitute persons living in areas that are socially excluded and politically marginalised, leading to limited access to information (and hence knowledge) about, and resources for, housing, infrastructure, risk reduction, etc.

Aspects or activities that can lead to increased vulnerability (cont.)

- Poorly constructed residential and commercial buildings and infrastructure. Note that sub-standard buildings relate, amongst other things, to corruption in the construction sector, lack of control mechanisms and lack of financial resources and knowledge.
- Use of inadequate construction techniques because of lack of knowledge, together with rapidly changing environments (e.g. shelters being constructed of inflammable materials, or earthquake-resistant buildings being vulnerable to increased wind storms).
- Densely built settlements that, because of their layout (narrow paths for movement, many lanes and alleys with dead ends) can inhibit effective emergency services (e.g. evacuation).
- Densely built settlements, which allow damage to spread easily from one shelter to the next (e.g. fire spreading from one roof to the next, or a domino effect being created when earthquake affected houses fall on neighbouring buildings).
- Land used for residential, industrial and transport purposes at too close a proximity to each other.
- Closeness of shelter in risk areas to environmental hazards, intensifying the impacts of natural hazards, namely, the impact but not the hazard as such (e.g. leaking sewage pipes from better-off settlements passing through 'slum' areas to discharge into near-by rivers result, even during minor floods resulting in the immediate contamination of whole settlements).
- Construction of shelter on plots that are too small and have no space available for mitigation works (related to lack of living space, combined with inadequate financial resources and knowledge).
- Non-existence of infrastructure networks/services or inadequate capacity of existing ones (e.g. for waste collection, pedestrian and vehicle circulation, rain and waste water services). In 'slums', this results, for instance, in people living uphill allowing waste and storm water to flow down on to their neighbours' land, and people from inside and outside the settlement tipping solid waste down their neighbours' hills or into the nearby rivers.
- High dependency of people living in urban areas on infrastructure networks/services, with the result that the disruption of these can cause societies' to collapse completely (e.g. transportation and banking systems).
- Full dependency of many poor urban households on housing as a productive asset for pursuing their livelihoods. In fact, economic activities are incrementally related to the housing of the poor (i.e. labour and room rental).
- Importance of the informal construction sector, on which the poor are mainly dependent, which provides limited social responsibility.
- Local livelihood practices that are not suited/adapted to densely built areas (i.e. very limited space can result in substandard modification of the built environment to permit economic activities (e.g. removal of supporting walls or creation of land fills).
- Limited access to clean water and sanitation (i.e. access to this basic need is denied to around one-quarter of urban households, which undermines health and hence also causes vulnerability to 'natural' disasters).
- Restricted access of 'slum' dwellers to regular income, influenced by the segregation/marginalisation of people from specific geographical living areas. In turn, unemployment and low income levels influence the quality of housing and infrastructure within these areas (vicious cycle).
- 'Slum' dwellers' strategies/efforts to gain and expand their living space to cope not only with the growing number and size of 'slum' households but also with the lack of alternative living areas. Strategies include people living downhill felling trees or excavating the slopes below their neighbours' houses; people building latrines close to declivities; and/or claiming land from nearby rivers.

Aspects or activities that can lead to increased vulnerability (cont.)
▪ Few mutual rights and obligations within 'slums' related to the settlements' maintenance and development (e.g. no rules as regards excavation of the slopes below houses or the construction of latrines close to declivities).
▪ Lack of knowledge at all levels on how to construct safe buildings and settlements (due to poor education system, limited professional training, marginalization of 'slum' dwellers, etc.).
▪ Importance of status (expressed by the built environment) combined with the lack of knowledge resulting in the construction of modern-looking houses without technical safety features in risk areas.
▪ Conventional belief of 'slum' dwellers and partly also of representatives of planning authorities and aid organisations that disasters are purely "divinely driven".
▪ People's (false) perception of cities as secure places, influencing them not to invest money and effort in the built environment and related security measures.
▪ Planners' and builders' false perception that hazard-resistant design is too costly, while the implementation of hazard-proof measures in building and infrastructure design can be relatively inexpensive in terms of construction costs.
▪ Unwillingness of 'slum' dwellers to invest in security measures (related to insecure land tenure as well as to promises of outside help not being honoured).
▪ Many people living on land without having/access to secure tenure (amongst other things this also results in forced evictions after disaster occurs).
▪ Internal segregation within 'slum' areas expressed in the built environment (e.g. the poorest living on the ground floors, which are particularly vulnerable to flooding, or in inaccessible areas, which are virtually impossible to evacuate).

Table 8: Increased exposure to existing hazards caused by the built environment and related urban planning practices.

Aspects or activities that can lead to increased exposure to existing hazards
▪ Geographic positioning of cities on disaster-prone sites (e.g. 8 of the 10 most populous cities in the world sit on or near earthquake faults). The location of many cities was chosen in the pre-colonial or colonial eras when mainly economic or other strategic factors were considered for site selection (e.g. proximity to mineral resources, close to the coast, etc.).
▪ Development or expansion of illegal settlements in/into marginal high-risk areas (e.g. near rivers or on steep slopes), because of the malfunctioning of land and property markets in cities and the inability of formal housing and planning sectors to cater for the priorities of the population (e.g. access to work opportunities). The latter is also related to urban dwellers' priorities—they frequently 'choose' to live in hazardous locations if it provides access to work.
▪ Spread of housing and infrastructure towards risky open land (because of fast growing urbanisation and the lack of inner-city land).
▪ Increased proximity of housing and infrastructure to environmental hazards (shelter close to industries, heavy equipment, pipelines, effluent drains, toxic disposal sites, etc.).

Table 9: Intensified, magnified and newly created urban hazards caused by the built environment and related urban planning practices. Hazards are being intensified or reshaped and new hazards introduced, thus increasing the number and magnitude of urban disasters.[2]

Aspects or activities which can lead to intensified or even new hazards
▪ Cities, while covering only 0.4% of Earth's surface, produce the vast majority of world's carbon dioxide emissions, thus contributing to climate change. With cities growing in population and wealth, increased production and consumption is an engine for climate change. Climate change, in turn, reshapes hazard occurrence, compounding global and local insecurity.
▪ Cities' 'heat island effect' (created, for instance, by concentration of heat and pollutants from power plants, industrial processes and vehicles) can cause and exacerbate heat waves.
▪ Layout of streets (e.g. straight streets lined with tall buildings) can result in turbulence and wind gusts, hailstorms and localised rainfall.
▪ Some building features can create new hazards (e.g. antennas and electrical equipment on top of buildings that attract lightning).
▪ Transformation of cities' environment by urbanisation processes on inadequate land (e.g. developments of new urban areas on watersheds that modify hydraulic regimes and destabilise slopes, increasing the risk of floods and landslides; or colonisation of garbage landfills, which increases landslides and unplanned urbanisation of new areas.
▪ People's construction and livelihood practices, as well as urban expansion, result in overexploitation of natural assets and environmental degradation that demolishes natural protection and magnifies hazards. (Such practices include coral reef mining, sand dune grading, mangrove cutting, conversion of mangrove coasts into intensive shrimp-farming pools or development over mangrove swamps so that the natural coastal habitats can no longer protect against storm surges. As a result, erosion and wave energy are increased, and deforestation can cause a higher risk of landslides or drought).
▪ Use of livelihood practices that are inadequate for densely built areas/housing, putting neighbours or whole settlements at risk (e.g. through dangerous production processes or cooking on an open fire).
▪ Lack of trees to purify air and stabilise soil, resulting in increased storm water runoff and erosion.
▪ Lack of open space to absorb storm water (and provide wildlife habitats).
▪ Lack of infrastructure, combined with inadequate use of existing infrastructure can create new hazards (e.g. fire through illegal electrical connections).

Table 10: Constantly changing vulnerabilities and hazards caused by the built environment and related urban planning practices.

Aspects or activities that can lead to constantly changing vulnerabilities and hazards
▪ Constantly changing extension of settlements, sometimes on inadequate land, and increased closeness to hazardous areas/elements (see also following table).
▪ Constantly changing local conditions of the built environment (e.g. through change of layout, landscape and density of settlements due to urbanisation processes, combined with the impacts of disasters and climate change) (see foregoing tables).

[2] Note that there is an overlap between the aspects mentioned in table 7 and 8 (i.e. some of the aspects listed could be included in either table as depending on the respective context (see especially last three points).

Table 11: Reduced coping capacity due to non-adequate disaster (risk) management systems caused by the built environment and related urban planning practices.

Aspects or activities which can lead to reduced coping capacity due to non-adequate disaster (risk) management systems
▪ Lack of emergency infrastructure and related back-up systems (e.g. emergency fire access and evacuation roads, adequate width of highways).
▪ Out-of-date and incompatible (paper) maps, as well as lack of maps/information on informal settlement, making effective disaster response impossible.
▪ Exclusion of the urban poor and/or other vulnerable groups (e.g. women) living in marginalised settlements from decision-making processes (resulting, for instance, in those groups being unwilling to use emergency shelters).
▪ Urban growth leading to disaster management agencies not having the capacity to provide basic supplies and assistance, especially for marginal settlements.
▪ Urban growth leading to cities growing together and merging without effectively integrating their disaster agencies; this results in confusion and in inability to coordinate disaster response and disaster risk management.

Table 12: Reduced coping capacity due to inadequate urban management/governance systems caused by the built environment and related urban planning practices.[3]

Aspects or activities that can lead to reduced coping capacity because of inadequate urban management/governance systems
▪ Use of imported and/or colonial building and planning regulations that do not consider local factors (e.g. local hazards).
▪ Use of inadequate enforcement schemes resulting in non-compliance of building and planning regulations.
▪ Use of 'best local practices' for the design and construction of infrastructure which ignore relevant considerations for hazard-resistance (for instance, as a result of local traditions, lack of knowledge/existence of building and planning codes or poor enforcement schemes).
▪ Absent or poor certification and licensing of planning professionals (who would be responsible for applying, enforcing or inspecting codes) because of, for instance, disciplinary traditions and corruption.
▪ Planning authorities' lack of political power to control the construction sector (e.g. corruption leading to the use of substandard bricks or other building materials by contractors, and inability to force developers and property holders to plan in secure areas and/or invest in security features).
▪ Out-of-date and incompatible (paper) maps, as well as lack of maps/information about informal settlements, resulting in poor planning capacities.
▪ Frequent non-compliance of planning ministries with regulations prescribing the use of environmental impact assessments (EIA) for new urban developments.
▪ Insufficient capacity of urban authorities and the private sector to supply adequate housing or basic infrastructure at the same speed as urbanisation processes (especially for poor and marginal settlements).
▪ Urban growth leading to cities growing together and merging without effectively integrating their planning agencies (resulting in confusion and inability to coordinate urban planning efforts and housing provision).

[3] Note that some of the aspects listed in this table will be further described in section 3 on 'Reality versus current planning practices'.

Aspects or activities that can lead to reduced coping capacity because of inadequate urban management/governance systems (cont.)
▪ Exclusion of the poor and other vulnerable groups (e.g. women) living in marginalised settlements from decision-making processes (resulting, for instance, in those groups being unwilling to invest in improved housing and a generally apathetic civil society). Note that 'slum' dwellers often see national and municipal governments as unhelpful, and even a hindrance, to their efforts to improve their situation. In fact, the actions taken by planning authorities and the information obtained by them with respect to the development and legalisation of planned settlements are often viewed as contradictory and unreliable.
▪ Centralised planning institutions that do not generally have institutional interlinkages with disaster agencies.
▪ Decentralisation of planning functions without decentralised technical and financial resources (also due to structural adjustment processes), resulting in erosion of living standards (e.g. through poor maintenance of rental property and funds being unavailable for housing and related risk reduction).
▪ Lack of communication/cooperation between national and municipal planning authorities.
▪ Few adequate mechanisms to finance/access safe land and housing for the poor.
▪ Unequal distribution of support by housing/planning organistations for incremental housing and infrastructure in 'slums' (this is related to individual 'slum' dwellers' relationships with planning authorities, corruption, and communities' organisation level).
▪ Politicisation of building and planning processes, as, for instance, illustrated by global bidding process between cities to attract investment, resulting in planning authorities being forced to lower environmental regulations (and security of workers).
▪ Corruption at all levels, unnecessary bureaucracy and political rivalry within and between different sectors and ministries.

Table 13: Reduced coping capacity of slum dwellers caused by the built environment and related urban planning practices. In comparison with rural areas, this is related to reduced solidarity and reciprocity, as well as a lack of resources and knowledge on adequate coping.

Aspects or activities that can lead to reduced coping capacity of 'slum' dwellers to manage risk and disasters
▪ Increased ease of mobility caused by urbanisation, which creates loose socio-economic community networks that enable dwellers to 'default' on obligations to relatives and neighbours (e.g. migrants lose traditional rural networks of family and neighbours that they could rely on during and after disasters).
▪ Vulnerable habitat, combined with high risk of suffering hazards, cause 'slum' dwellers within a settlement to frequently experience simultaneous and persistent impacts on their living conditions, a situation that negatively affects solidarity and reciprocity between neighbours.
▪ Loss of trust in hierarchical structures established by housing/planning agencies (as well as disaster risk management agencies), related to corruption, co-optation and political factionalism, which negatively affects solidarity and reciprocity (e.g. unequal assistance depending on individual's relation to housing/planning authorities).
▪ Concentration of highly defenceless population groups in urban areas (for example, weakened by HIV/AIDS or other diseases, conflict or malnutrition) results in reduced community cohesion and individual coping (e.g. with HIV/AIDS, many of the able-bodied, adult workforce who would normally engage in disaster coping activities are too weak from the disease. After these people die, households are composed of the elderly and very young, who often lack labour capacity or knowledge.)

Aspects or activities that can lead to reduced coping capacity of 'slum' dwellers to manage risk and disasters (cont.)

- Urban lifestyle results in inhabitants being unwilling to get engaged in community organisation (e.g. because of (a) frequent changes in living place within the city that result in a lack of ties to the respective place; or (b) time restrictions, for instance, due to long commuting distances between home and work, or having to work at several different jobs, combined with unsocial working hours).
- 'Slum' dwellers have very few assets that can be sold to help themselves or others (e.g. because of limited income and small plot sizes that do not allow farming or the keeping of livestock).
- Rapidly changing living environments (due to urbanisation, disasters, climate change, etc.) which negatively affect people's coping knowledge and ability.
- Lack of knowledge of urban 'slum' dwellers on adequate coping due to rural–urban migration or frequent changes of dwelling within the city.

In addition, the research undertaken at household level reveals that disasters are the outcome of a non-linear development process, with the key variables underlying the complex system of risk and disaster occurrence reinforcing each other. Hence, disasters make not only the already precarious conditions of 'slum' dwellers worse, but can also create vicious circles of increasing risk. 'Poverty traps' can be the outcome.

With growing urbanisation and climate change, the described reciprocal two-way and multifaceted relationship is becoming increasingly alarming.

3 REALITY VERSUS CURRENT PLANNING PRACTICES

The interlinkages presented in the last section indicate the powerful potential of the built environment and related planning practices for reducing (or increasing) risk and hence disaster occurrence. However, the comparison between reality and current planning practices shows that these interlinkages have not been effectively confronted by planners or by disaster risk management professionals. Furthermore, it is possible to identify an unfruitful gap—and even tension—between the related working fields, which finds expression in the respective:

- literature;
- stakeholders and institutional structures;
- discourses of experts and practitioners;
- working priorities, concepts, terminology and tools; and
- sector-specific programmes.

These aspects are described briefly in the following section.

3.1 The gap between urban planning[9] and disaster risk management

Technical literature. Literature analysis shows that only a small amount of systematic research has been carried out on the linkages between disasters and the built environment (and related planning practices). As a result, on the one hand there is a large amount of literature emerging from the planning field that deals with purely construction-related issues in the post-disaster scenario of mainly large-scale disasters. Only very few publications are based on a more proactive rather than reactive attitude that also include non-structural aspects and/or consider small-scale everyday disasters. An exception to this is publications on cities and general development issues which have an ecological

and health-centred approach. However, these take account of, but do not specifically focus on, broader disaster risk reduction measures.

On the other hand, the analysis of the literature emerging from the disaster risk management field shows that general disaster studies tend to focus on the hazards themselves and hence mostly address related scientific aspects and solutions (e.g. high-tech prediction systems). However, there are also more socially oriented disaster studies that mainly look at (social) causes of vulnerability. In this respect, since the early 1990s a growing literature has emerged in Latin America and the Caribbean, Asia and Africa, born of disaster reduction research and applications carried out by developing country researchers and institutions. This literature forms the basis of many of the contemporary approaches to disaster risk management now being discussed and advocated at the international level (UNDP 2004). Nevertheless, most authors give secondary importance to the built environment and its related planning practices. In fact, more socially oriented disaster studies seem commonly to neglect planning (including social housing and infrastructure development) as a vitally important risk reduction measure, as it is perceived as a purely physical measure that only deals with the symptoms of the problem rather than the cause. Only some very recent publications fully recognize urban disasters and the importance of adequate housing and planning practices for sustainable risk reduction (e.g. UNDP 2004).

Stakeholders and institutional structures. To begin with, compared to other development sectors there are only a limited number of specialised networks, organisations and departments working on either settlement development planning or disaster risk management in developing countries. The reason for this is their marginal status at the global, national and municipal levels. Furthermore, cooperation between the few existing sector-specific stakeholders is mostly non-existent. The gap between them is expressed and further aggravated by: (a) their separate institutional and inter-institutional structures; (b) the lack of adequate channels to optimally support and coordinate their contribution to risk reduction and risk financing;[10] and (c) the separate budget lines for development and emergency relief (with the latter still being the main funding source for disaster risk management). This applies to both international donor organisations and national governmental and non-governmental implementing organisations.

In addition, at the national level in developing countries, one (by-)product of the promotion of disaster risk management on the part of donor organisations is the change to the implementing organisations' internal structures: new and separate structures for disaster risk management are often added on, without, however, being adequately integrated and/or consolidated. Increased and sustainable integration is therefore seldom achieved. Furthermore, at the household level, low-income households often perceive national and municipal planning authorities as being unhelpful, and even a hindrance, to their and other organisations' risk reduction efforts.

Discourses of experts and practitioners. The limited view of many planners as regards the correlation between disasters and the built environment was shown in figure 1. This limited perception of (large-scale) disasters being the cause and the destruction of the built environment being the effect is often combined with the erroneous assumption that pro-poor urban development automatically reduces risk. Consequently, planners do not generally perceive disaster risk management as being part of their sphere of activity.

Disaster risk management professionals, on their part, often share the perception presented in figure 1 and consequently believe that settlement development planning has no real relevance to sustainable disaster risk management. This view is also related to their understanding that urban planning is a purely structural and formal tool—related to building regulations and conventional land

use zoning—which is incapable of tackling the problems of the urban poor whose lives are most at risk (figure 2). Furthermore, the planning/construction sector is perceived as one of the most difficult development sectors with which to work, because, it is said, knowledgeable and experienced experts are rare.[11]

Working priorities, concepts, terminology and tools. The perceptions of planners and disaster risk management professionals, just described, are related to their different professional backgrounds which—due to the respective theoretical and practical training—influence the use of distinct working priorities, concepts, terminology and tools. Other approaches are met with criticism. The research indicates that together with a lack of coordination between different implementing stakeholders and the competition on the ground, this can result in the duplication of small-scale efforts (e.g. research efforts into hazard-proof construction) and higher investment costs, as well as the mutual incompatibility of their respective programme measures (e.g. risk reduction training, the plans and maps developed, and the hazard-proof construction standards promoted). As regards the latter, almost every organisation imposes different methods and approaches within their programmes (e.g. for training or the elaboration of plans and maps), thus hampering related local developments.

Sector-specific programmes. The incompatibilities between the different professional disciplines and related institutional and organisational structures impede the establishment of more integrated programmes that are needed to properly tackle urban risk. In fact, on the one hand, internationally promoted programmes in the field of disaster risk management do not seem to actively integrate planning-related issues. On the other hand, development agencies or departments, whose focus is urban settlement planning, seem mainly to overlook possible disaster occurrence in their programmes.

However, at the national, municipal and household levels, the occurrence of disasters and the resulting distress can—at least, temporarily—push forward an integration process. This was the case in El Salvador after Hurricane Mitch in 1998 and the 2001 earthquakes. Especially since 2001, relief, development and housing/planning organisations initiated a shift to include disaster risk reduction and related planning measures in their fields of action. However, because disaster risk management was promoted by most international agencies as a new and autonomous field of activity, mainly needing to be integrated into programme implementation, the actual integration within housing/planning organisations was for the most part limited to the adoption of new pilot programmes or specific programme components for disaster risk management.[12] Thus, irrespective of whether the organisations opted to ignore increasing disaster risk or to carry out direct disaster risk management work, they failed to consider the basic strategy of responding indirectly (i.e. through their core work), thus missing the opportunity to sustainably reduce risk. In addition, the following problems occurred to some extent:

- As many organisations and their staff were not well suited to undertaking such disaster risk management work, ineffective work (and even undesirable programme outcomes) resulted.
- Taking on direct disaster risk management work caused organisations' core work to suffer where they did not have sufficient human and organisational capacity to perform both tasks.
- Even if the direct work on disaster risk management was carried out effectively, there was an unproductive increase in competition with other organisations as well as duplication of effort. This was partly because most of the additional knowledge and institutional capacities required were built up independently and internally by each organisation, rather than through the creation of cooperative partnerships.

- Once the new programmes or programme components ended, the work in disaster risk management could not be continued, as it was usually not linked to the organisations' core work and not backed up by adequate operational, organisational, institutional and legal frameworks.

Research at the household level revealed further problems of partly integrated programmes being implemented by housing/planning organisations in high-risk areas. In fact, a gap was encountered between what households need and undertake to deal with disasters and risk, and how organisations support them, creating a barrier for effective disaster risk management. At the household level more than 100 coping strategies could be identified, with households spending on average 9.2 per cent of their income on reducing disaster risk and preparing for the following winter. However, while these household strategies to cope with disasters and risk include risk reduction, self-insurance and recovery mechanisms, the analysed housing/planning organisations looked mainly at how to reduce physical risk.[13] For instance, risk and loss financing is usually not integrated into housing finance mechanisms (i.e. government and non-government subsidies, microcredits and family savings, mutual or self-help). In addition, the risk reduction measures implemented were often unsustainable, as the organisations seldom analysed the key variables and causal loops underlying the complex system of risk and disaster occurrence in the programme areas, nor did they take into consideration the local risk reduction strategies that already existed.[14] Hence, after project implementation, the programme beneficiaries continued to cope—as before—without having obtained better structures for implementing and/or financing their own efforts. It has moreover emerged that some programme measures somewhat hinder future coping ability. For instance, families who wish to obtain loans for further risk reduction or general housing improvements are often not able to use their project houses as collateral, as assisted housing cannot become bank property in the event of a default in payment. Programme beneficiaries are therefore unable to use their assets effectively to reduce the risk they face. Another identified barrier for effective disaster risk management at household level is the lost trust of 'slum' dwellers in both community solidarity[15] and hierarchical structures, as well as the fear of being hoodwinked by the authorities.

Despite the described situation, the research at household level reveals that the organisational structures and mechanisms for social housing provision and financing offer a potentially powerful platform for tackling disasters and risk.

3.2 Root causes of the identified gap

The current separation between urban planning and disaster risk management, presented in the last section, does not match up with the identified reality (see section before last). The reasons can be found and are based in the roots and the subsequent historical development of the respective fields of work that is briefly described in the following.[16]

Urban planning theory and practice. Originally, one of the main functions of the city was considered to provide defence, not against natural hazards but against human threats from the 'outside', such as wars and armed conflicts. In this context, Meurman (1947) coined the term 'protective city planning' for fire and air protection, suggesting that vulnerable facilities should be 'deconcentrated' and isolated from the rest of the city.[17] Since the architectural Modern Movement, more inner-city (man-made) threats, such as assaults and accidents, have been factored into the vulnerability equation, with a move towards greater protection of cities through physical means and electronic surveillance.[18] In this regard, the term 'defensible space' was created in the 1970s by Newman (1972). In parallel, 'nature ecology' and 'urban ecology' studies gave consideration to planning that ensured compatibility between urban planning and the natural environment. However, the focus there is

mainly on the conservation of the environment and climatic design features (i.e. not on aspects relating to natural hazards). More recently, there have also been some discourses on integrated and preventive urban planning, based on consideration of climate change and related hazards. Concrete achievements, however, are still an exception.

Planning schemes promoted by international agencies. The specific history of planning theory and practice promoted by international agencies provides further important background regarding the underlying reasons of the identified gap. In the 1960s and 1970s cooperating governments in developing countries received financial support to build (conventional) housing for the poor on a mass scale. As most of these efforts were declared unsuccessful, at the beginning of the 1970s donors started to support site and service programmes. From 1972, they also assisted squatter upgrading, and in the early 1980s the development of housing-finance institutions (World Bank 1993). In parallel, urban community-development workers have championed participatory methodologies at the settlement level since the 1960s. In line with this, and because of the failure of conventional and traditional urban planning and the lack of adequate responsiveness by planners to the fast-changing needs of developing cities, Otto Koenisgberger (1964) introduced the concept of 'Action Planning' (i.e. community-based schemes supported by government agencies). This approach was subsequently further developed by Hamdi into Community Action Planning or so-called MicroPlanning (Hamdi and Goethert 1997).

During the 1970s, planners started to involve themselves in discussions on disaster management as interest was growing in the design and implementation of ways to mitigate disaster losses through physical and structural measures (for example, through building levees and flood defences, or increasing the resistance of structures) (UNDP 2004). However, with the developing concept of disaster risk management, planners' role again diminished during the 1990s (see also below). Together with the shift from 'delivering' to 'enabling' housing and settlements since the 1970s, it became even more difficult to promote and implement disaster risk management measures. Indeed, the 'enabling' approach promoted can be viewed as an obstacle to integrated risk reduction and urban settlement planning.

At the national and city level, structural adjustment programmes, which were introduced by the World Bank and the International Monetary Fund (IMF) in the 1980s and 1990s, also strongly influenced the current challenges. They not only increased vulnerability but also marginalised urban planning by decreasing the influence and political role of planners and national planning units. Based on the Millennium Development Goals and the outcomes of the World Summit on Sustainable Development, held in Johannesburg, South Africa, in 2002, international donors now promote the private sector as a leading provider of urban infrastructure and services, including drinking water and sanitation. Unfortunately, this means that programmes with a focus on settlement development planning tend again to lean towards the more structural aspects, thus obstructing more holistic planning, which would include disaster risk management. However, some recent developments have given reason to hope for better integration (e.g. trends such as the 'strengthening of local governments', 'decentralisation', and so-called Sector-Wide Approaches).

Disaster risk management. Regarding the history of disaster (risk) management, it is important to point out that this is still a relatively new area of knowledge which is developing slowly and undergoing a multifaceted process of institutionalisation. Traditionally, discussions about disasters have taken place in the emergency relief arena. Until the 1970s the dominant view was that 'natural' disasters are synonymous with natural events/hazards such as earthquakes, flooding, etc. In other words, a natural hazard was, ipso facto, seen as a disaster. The magnitude of a disaster was hence

considered to be a function of the magnitude of the hazard. Consequently, the emphasis of national governments and the international community was on pure disaster management (i.e. responding to the events and, in the best-case scenario, preparing in advance for disasters in order to improve existing response capacities). As mentioned above, from the 1970s onwards planners began to get involved in disaster discussions, focusing on the fact that the same natural hazard can have varying impacts on the built environment. A general trend evolved to associate disasters more with their physical impact than with their natural trigger, promoting conventional and traditional engineering or planning practices as an important mean of mitigating disasters. However, in many countries efforts to reduce risk by these means have been minimal (UNDP 2004).

Beginning quietly in the 1970s, but with an increased emphasis during the 1980s and 1990s, social sciences researchers triggered a shift in thinking, by pointing out that the impact of a natural hazard mostly depend on the capacity of people to cope (i.e. the ability to absorb the impact and quickly recover from loss or damage). With the advent of the term 'disaster risk management' (replacing the term disaster management), the focus of attention moved to social and economic vulnerability. This shift was further reinforced by the mounting evidence that natural hazards have widely varying impacts on different countries and different social groups within these countries (UNDP 2004). Spurred on by the International Decade for Natural Disaster Reduction (IDNDR), between 1990 and 1999, as well as by the occurrence of a number of highly destructive large-scale disasters at the end of the 1990s, many pilot programmes in the field of disaster risk management emerged in developing countries, with international agencies providing increased resources. However, the post-disaster context remained the focus of intervention. Growing experience gained within the mentioned pilot programmes, combined with ongoing development of the disaster risk management concept, meant that a common understanding gradually evolved (UNDP 2004). The causal factors of disasters are now understood to be directly linked to development processes, which generate different levels of vulnerability. The UN International Strategy for Disaster Reduction (ISDR), established in 2000, helped raise the profile of related discussions. In fact, it promoted the idea that reducing disaster risk requires a long-term engagement in development processes and, hence, an increased engagement of international organisations in this field.[19]

More recently there have been discourses to the effect that development processes are not only generating different patterns of vulnerability but also altering patterns of hazard—an argument that is causing increasing concern, especially as evidence mounts regarding the potential impact of global climate change (UNDP 2004).

Today, disaster risk management can be considered a constantly enhancing and altering paradigm that integrates the trends and perceptions mentioned above. However, while during the 1990s the—formerly promoted—purely structural planning measures were less and less seen as a solution and thus 'deleted' from the disaster risk management agenda, hardly any alternative planning strategies were developed to replace them.

4 A WAY FORWARD: HOW TO BETTER MATCH PRACTICE TO REALITY?

The two previous sections have shown (a) the interrelation between disasters and the built environment (and related planning practices); and (b) that this interrelation is not given enough attention by international and national stakeholders working in either settlement development planning or disaster risk management. This situation can contribute to increasing risk and disasters in two ways: first, through the implementation of programmes that focus only on planning *or* disaster risk management; and second, through the lack of initiatives that integrate the two fields.

While, in the meantime, implementing (and donor) organisations working in settlement development planning increasingly demand guidance on how to sustainably integrate disaster risk management within their core work, no adequate sector-specific and praxis-oriented tools are available. This is a paradox, as at a global level there is a fast-increasing number of tools for assessing progress in disaster risk management, most of them developed as a result of top-down processes created by international (and national) organisations. To make matters worse, compared to other cross-cutting issues, such as gender or HIV/AIDS, the idea of mainstreaming disaster risk management is widely underdeveloped and/or misunderstood. As a result, existing tools and ongoing discussions confuse, and hence do not differentiate between, the terms and concepts of 'mainstreaming' and 'integrating', and thus, are often very limited in their scope.[20]

To counteract the situation just described, an 'Operational Framework for Integrating Risk Reduction for Aid Organisations Working in Human Settlement Development' was developed and first published in 2006 (Wamsler 2006d).[21] The framework aims to support aid organisations with concrete tools and guidance to:

- evaluate the relevance of integrating disaster risk management within their organisation;
- identify and prioritise the different possible strategies for integrating disaster risk management;
- formulate activities to implement the selected strategies;
- evaluate possibilities for financing these activities; and
- define an implementation plan.

Based on the ongoing research, on workshops held in Central America for operational staff and programme managers, as well as on the lessons learned from organisations currently using the tool in practice, the Operational Framework was further developed during 2006–2007. The result is the conceptual and strategic integration model presented below.[22] It is based on seven complementary strategies that counter the currently incomplete approaches to integrating disaster risk management. These strategies are presented in the following sections; they are summarised in table 14 and figure 4, and are partly illustrated in box 1.

4.1 Integration strategies at the household level

The first three strategies present possible ways of integrating disaster risk management, that is, risk reduction and risk financing, into programme implementation at the household level (see figure 4, left side).

Strategy I: Direct stand-alone disaster risk management. This is the implementation of specific programmes for disaster risk management that are explicitly and directly aimed at financing or reducing disaster risk. These stand-alone programmes are distinct, and they are implemented separately from other existing work carried out by the implementing housing/planning organisation. Examples would be programmes aiming at (a) establishing early-warning systems or organisational structures for risk reduction (e.g. specialised disaster risk management committees); (b) constructing physical disaster mitigation (e.g. embankments to reduce flooding); or (c) offering independent disaster insurance (i.e. insurance policies not included in housing financing schemes being offered to the poor).

Table 14: Overview of the proposed complementary strategies for integrating disaster risk management (DRM) into the efforts of (aid) organisations working in settlement development planning and programming.

Strategies		Description	Main question to be answered by an organisation (working in settlement development planning)
N°	Name		
I	Direct stand-alone DRM	DRM programming	What dedicated programmes can be implemented separately and additionally from the organisation's core work in order to specifically address risk and disaster occurrence?
II	Direct integrated DRM	Adding DRM programming elements to core activities	What dedicated programme measures can be added to the organisation's core work in order to specifically address risk and disaster occurrence within the programme areas?
III	Programmatic mainstreaming of DRM	DRM mainstreaming (in progamme implementation)	What can be done within the core work of the organisation in order to (a) reduce risk and (b) increase the coping capacities of the programme beneficiaries? (Or at least to ensure to (a) not increase risk and (b) not reduce coping capacities).
IV	Organisational mainstreaming of DRM	Institutionalisation of DRM mainstreaming (and programming)	What can be done to sustain and back-up DRM mainstreaming (and programming)?
V	Internal mainstreaming of DRM	DRM to reduce the organisations' own risks	What measures can be taken so that the organisation, i.e. its offices and staff, become more disaster resilient?
VI	Synergy creation for DRM	Coordination and complementation for improved DRM integration	How can the DRM mainstreaming and programming activities of the organisation be coordinated and complemented with the work of other implementing (aid) organisations?
VII	Educational mainstreaming of DRM	Shift towards non-conventional settlement development planning to integrate DRM in the philosophy that drives urban planning	What has to be done so that universities and other training institutions facilitate the integration of DRM into urban actors' spheres of activity?

Strategy II: Direct integrated disaster risk management. This is the implementation of specific risk reduction and/or risk financing activities alongside, and as part of, other sector-specific programme work. The only difference from *Strategy I* is that this work is carried out in conjunction with, and linked to, other programme components. An example would be the establishment of a local disaster risk management committee or the offer of capacity building for socio-economic risk reduction within the framework of a self-help housing project. Another example could be the implementation of disaster awareness campaigns and simulations alongside a settlement upgrading project.

Strategy III: Programmatic mainstreaming. This is the modification of sector-specific programming in such a way as to reduce the likelihood of any programme measures actually increasing risk, and to maximise the programme's potential to actually reduce and/or finance risk. Hence, the objec-

tive of programmatic mainstreaming is to ensure that the ongoing core work is relevant to the challenges presented by natural hazards and disasters. In contrast to the two strategies described above, the programme's main objective is not risk reduction or risk financing as such. The modifications can be of a physical/structural, environmental, institutional and organisational nature. An example of this strategy could be a settlement upgrading programme that adjusts its loan system to the specific needs of vulnerable households at risk (e.g. offering smaller credits with different conditions and integrated risk insurance, considering beneficiaries' limited capacity for payment). Programmatic mainstreaming can also result in the elaboration of new activities within the organisation's working field that are needed to take existing risk into account. An example of this would be a social housing organisation becoming engaged in land use planning and urban governance issues for risk reduction or the offer of risk and loss financing schemes through their existing housing financing mechanisms.

4.2 Integration strategies at institutional levels of implementing organisations

Compared to *Strategies I–III*, presented in the last section, the following two strategies (i.e. *IV* and *V*) do not refer to the integration process at household level, but aim to counter the challenges identified at institutional levels (figure 4, right side, middle). This section refers to both the donors' national counterparts and their implementing partners. The latter are often governmental authorities (e.g. municipalities and decentralised ministries of education and health), together with microfinancing institutions (MFIs). *Strategy IV* has direct relevance for programme implementation at the household level; *Strategy V* is only indirectly related.

Strategy IV: Organisational mainstreaming. This means modification of the organisational management, policy, working structures and tools for programme implementation, in order to back up and sustain (direct and/or indirect) disaster risk management at project level, and to further institutionalise it. In fact, if integrating disaster risk management into programme work is to become a standard part of what an organisation does, then organisational systems and procedures need to be adjusted. The objective is to ensure that the (implementing) bodies are organised, managed and structured to guarantee that risk reduction and risk financing are sustainably integrated within their core programme work. This includes, for instance, the adaptation of institutional objectives as well as programme planning tools already used, such as logical and results-based frameworks or vulnerability and capacity analyses.[23] A summary of issues to be taken into account in the programming, identification and appraisal stages of construction projects is presented by Benson and Twigg (2007:147–9) and Rossetto (2006:9–14). In addition, organisational mainstreaming also means the adoption of new tools needed for adequately integrating disaster risk management into settlement development programming. Examples are risk mapping or causal loop diagrams for analysing the key variables—and their causal relations—underlying the complex system of risk and disaster occurrence.

In the case of governmental organisations, for instance, housing and planning ministries and municipalities, organisational mainstreaming importantly includes the following activities: (a) revision or creation of national or municipal legislation and policies; (b) the formal standardisation of methods and approaches to elaborating maps and plans for urban planning and disaster risk management; and (c) the creation of improved institutional structures between the national and municipal levels and the respective disaster risk management bodies.

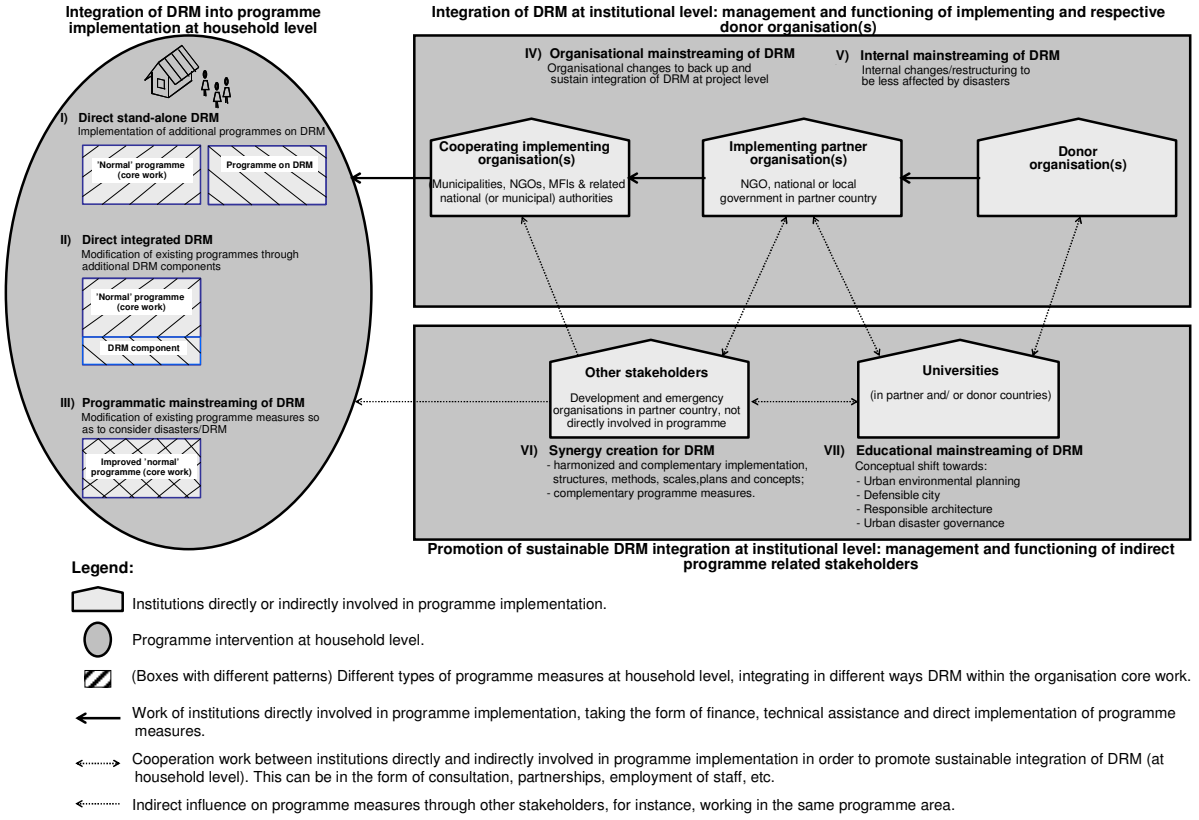

Figure 4: Strategic and conceptual model for integrating disaster risk management (DRM) into human settlement development projects, at both household and institutional levels.

Strategy V: Internal mainstreaming. This means modification of the organisation's functioning and internal policies so that it can reduce/finance its own risk to impacts created by disasters. The focus is on the occurrence of disasters and their effect on the organisation itself, including staff, head office and field offices. The objective is to ensure that the organisation can continue to operate effectively in the event of a disaster. In practice, internal mainstreaming has two elements: (a) direct risk reduction and risk financing activities both for staff and for the physical aspects of the organisation's offices, for instance, the establishment of emergency plans and retrofitting; and (b) modification of how the organisation is managed internally, for example, in terms of personnel planning and budgeting.

4.3 Integration strategies at institutional levels of donor organisations

Donor organisations that wish to promote the integration of disaster risk management through and within their partner organisations need, themselves, to be committed to disaster risk management and its integration. This is a precondition if they wish to prove effective in supporting their partners in doing the same. To that effect, not only the national partner and their cooperating implementing organisations, but also donor organisations, would have to integrate risk reduction and risk financing within their work. In sum, the *organisational* and *internal mainstreaming Strategies (IV* and *V)* also apply to international donor organisations (see figure 4, right side, top).

One important organisational change within a donor organisation, to be effected as part of the organisational mainstreaming process, would be the allocation of (primarily) development resources to push forward the integration of risk reduction and risk financing into urban planning and housing. Importantly, these resources would need to be channelled in such a way that they do not promote integration only in programme implementation at the household level. Indeed, it is equally crucial to promote integration at the institutional levels of implementing governmental and non-governmental organisations, which would affect related national and municipal legislation, operational instruments and internal structures (without separate ones necessarily being added).

To better illustrate the differences between the presented concepts *I–V* in practice, a hypothetical example is presented in box 1. It describes how a Mexican housing/planning organisation was pushed towards applying the different strategies to its work. In contrast to this hypothetical example, aid organisations could, and should, take a more proactive approach for the design of an adequate and sustainable integration strategy. In this context, the Operational Framework mentioned above can assist an organisation in 'planning ahead' before disasters strike, by guiding the selection and prioritisation of the appropriate strategies. Once the strategies are selected, the framework provides matrixes for the formulation of related programme measures. These matrixes include: (a) input and process indicators to get the integration process started; (b) input and process indicators in the form of benchmarks (i.e. the operational state that an organisation should seek to achieve); and (c) output indicators. The matrixes are organised into different subsections. Those for *Strategies I–III* include indicators related to human resources and capacity building; risk identification and community research; and physical, socio-economic, environmental, institutional and organisational programme components. The matrixes for *organisational* and *internal mainstreaming* (i.e. *Strategies IV* and *V*) include indicators regarding human resources and capacity building; risk identification and staff research; working structure and procedures, policy and strategy; financial management; and external relations.

Box 1: Hypothetical example of how an aid organisation—a Mexican housing/planning organisation called UNAGI—was triggered to apply the different strategies for integrating disaster risk management (DRM) into its work.

After a recent disaster, and in response to the increased funding for disaster risk management being offered by international donors, UNAGI employs a new staff member with expertise in risk reduction and financing and designs and implements a pilot programme on disaster risk management. The pilot programme aims to raise community awareness about disaster risk through the distribution of leaflets and the establishment of local disaster risk management committees. Thus, UNAGI becomes engaged in the **stand-alone direct DRM strategy**.

With the experience gained from the pilot programme, UNAGI then starts to include risk reduction and financing activities in its ongoing housing projects. For instance, it begins to raise risk awareness and promotes community emergency funds alongside its community training for self-help housing. Thus, it becomes involved in the **direct integrated DRM strategy**.

One year later, UNAGI's managers decide that all programmes should take greater account of disasters and seek to maximise their positive effects on reducing and financing risks. Accordingly, UNAGI carries out research analysing the links between its social housing activities and disaster risk. In one project area, it finds that basing housing credits on income capacity makes it impossible for the people most vulnerable to disasters to qualify for UNAGI programmes. Without doing any direct risk reduction work, UNAGI responds to this finding by offering them partial housing subsidies and smaller credits for physical mitigation measures in existing houses. In another area, community research provides evidence that beneficiaries are vulnerable to disasters because of their dependency on informal vegetable trading and that past housing projects had increased their socio-economic vulnerabilities by resettling them far from their income-generating activities. It is also discovered that these housing projects used very expensive roof tiles that were not durable. Acting on these findings, UNAGI sets up a local production workshop for concrete roofing tiles to provide a more disaster-resistant and cheaper construction material. At the same time, the workshop allows some households to diversify away from vegetable trading. In addition, in both project areas, advice on disaster-resistant construction techniques is provided, disaster insurance mechanisms are included in the housing credits and neighbourhood and women's associations are established which campaign for greater transparency in government and grassroots participation in urban planning decision-making. Thus they increasingly build up a stake in municipal development planning (e.g. as regards legalisation of land). In this way, UNAGI becomes involved in the **programmatic mainstreaming strategy**.

Over time, UNAGI realises that its various efforts in risk reduction and financing are not sustainable in the long term because they are not institutionalised and/or anchored within the organisation's general management and project planning cycle. It thus starts to engage in the **organisational mainstreaming strategy**. As an initial step, the organisation revises its policy to formalise its commitment to integrating risk reduction and financing, and develops a financial strategy to sustain this integration. In addition, risk assessments and capacity analyses (including the analysis of local coping strategies) become routine tasks in the planning phase of all social housing programmes.

Several months later, there is an earthquake in Mexico. Unexpectedly, UNAGI is affected: its head office is damaged, four staff members are severely injured and there are problems communicating with field offices. This forces the organisation to engage in the final strategy***: internal mainstreaming***. A team is formed to predict the likely impacts of future disasters on the organisation's finances and human resources, analysing potential direct and indirect losses (e.g. costs related to damaged buildings, vehicles, reduced reputation, staff absences and sick leave). Based on this work, UNAGI acquires an organisational insurance policy and improves its working structure by installing an enhanced communications system, introducing better processes for information sharing, and revising its workplace policy. In addition, the head office is retrofitted to become more disaster-resistant.

4.4 Key changes for integrated housing and settlement development

For each of the *Strategies I–V*, the Operational Framework offers sector-specific guidance for housing/planning organisations by providing specific reference activities and recommendations. Looking at programme implementation, while it is impossible to provide universal guidance that fits all types

of programmes, most housing/planning organisations would probably need to modify their programming and functioning to, first, improve the content and scope of their (direct and indirect) risk reduction measures so as to better reduce potential disaster impacts at the household and institutional levels and, second, integrate adequate (self-)insurance and recovery mechanisms. The latter is crucial to improving the chances of people and institutions 'bouncing back' quickly, and to a reasonable level, after disasters strike. To achieve the described changes in practice, the following four key aspects would have to be considered:

1) Implementation of additional/modified sector-specific measures for supporting disaster risk management during, and also *after,* [24] programme implementation through:
   - the integration of risk and loss financing into the organisation's housing financing mechanisms (i.e. microcredits, government and non-government subsidies and family savings); and
   - the expansion of existing housing financing mechanisms to support the financing of risk reduction, (self-)insurance and recovery measures for the urban poor.
2) Improvement of programmes' sustainability by taking careful consideration of the perceptions, capacities and needs of the beneficiaries as regards risk reduction and risk financing. It is essential within programme implementation to consider encouraging and scaling up selected coping strategies, as well as offering better alternatives, where needed. Coping strategies can be divided into: (a) those that can increase the capacity of low-income communities to manage urban disasters and disaster risk in both the short and long terms; (b) those that increase capacities in the short term but decrease them in the long term; (c) those that decrease capacities in both the short and long terms; and (d) those that decrease capacities in the short term and increase them in the long term. Naturally, those under (a) should be the main ones considered for support. In this context, careful attention should be given to the cost-effectiveness and sustainability of assistance.[25]
3) Reduction of barriers to coping. This is another important aspect related to people's coping strategies. An example would be giving permission to use project housing as collateral when applying for specific credits (e.g. for risk reduction).
4) Improvement of programmes' sustainability by ameliorating the social relations among the 'slum' dwellers, national and municipal authorities and local-level organisations, as well as within communities themselves. This is crucial because of the lack of trust and the tensions identified between and within the different levels. Measures related to this could be the improvement of communication and decision-making structures for integrated planning and the creation of related community rights and obligations. In fact, enabling the achievement of social cohesion, inclusiveness and open participation in decision making is crucial to improving communities' coping capacities and to reducing urban vulnerability.

4.5 Promotion of sustainable disaster risk management: coordination with other implementing organisations

As mentioned above, the gap between the distinct working fields and related professional groups, together with a lack of coordination with other stakeholders carrying out programmes, can result in competition, the duplication of small-scale efforts, higher investment costs and mutual incompatibility of programme measures. Unsustainable disaster risk management is the outcome. *Strategy VI* aims to counter this situation.

Strategy VI: Synergy creation for disaster risk management (integration). This is the promotion of 'harmonised' risk reduction and risk financing into the management and functioning of other

implementing organisations, including both relief and development organisations. The idea is to create synergies instead of competition through coordinating and complementing each other's work (figure 4, bottom, middle). Coordination among the work of different organisations could be achieved by: (a) working with unified implementation structures (e.g. municipal committees for local development along with political and operational focal points for programme implementation); (b) the standardisation and unification of methods, scales and contents for the development of specific maps and plans; (c) the standardisation or flexible adjustment of the concept of disaster risk management within the different organisations; and (d) the coordinated inclusion of activities for capacity building and socio-economic development for risk reduction and financing. Complementation and compatibility could be achieved by: (a) working through different municipal/local commissions (e.g. for relief, risk reduction, programme implementation); (b) the development of compatible products and services, such as maps and plans with different contents and scales; and (c) the implementation of additional sector-specific activities (that take risk indirectly into account).

4.6 Promotion of sustainable disaster risk management: cooperation with universities and other training institutions

The work on disaster risk management is a field of activity where interaction or cooperation between academia and practice can, and must, complement each other so that sustainable solutions for the urban poor can be developed. This can be by means of partnerships, by consultation, or by employing professional staff. Thus, in parallel to the integration processes described so far, a partly independent process needs to take place to generate a more proactive approach on the part of planners towards disaster risk management. This is crucial so that their work will match up with settlements' current challenges. Hence, the focus of *Strategy VII* are universities and other training institutions (figure 4, lower right side).

Strategy VII: Educational mainstreaming. This is the development of a conceptual shift in the philosophy that drives urban planning towards non-conventional settlement development planning to allow disaster risk management to be incorporated into urban planners' spheres of activity. In fact, planners require a different knowledge base and radically different skills. This will assist in bringing planners and disaster risk management professionals closer together by helping them to move towards an understanding of the risk that urban dwellers face. The four concepts presented below can help to initiate the required shift. Donor organisations could promote such a shift directly by supporting, for instance, universities or ministries of education as their counterparts. Another more bottom-up approach would be the involvement of universities and training institutions in local programme implementation.

Urban environmental planning. This concept expresses the need for the interconnection between urban planning and broader environmental development aspects, thus incorporating both large-scale and small-scale everyday hazards/disasters. Examples of concrete measures could be: (a) the use of participative and broader environmental impact assessments as well as more adequate performance indicators for selecting and designing integrated planning measures; (b) the integration of legal frameworks and agendas related to urban planning and environment protection; and (c) the adaptation of planning codes based on climatic area-specific characteristics.

Defensible city. This concept expresses the need to integrate protection (against natural hazards and disasters) as a key aspect of integrated urban planning. This strategy includes innovation and the use of structural as well as non-structural planning measures. Examples could be: (a) the construction of firebreaks, flood defences, access and evacuation roads to and from specifically vulnerable

areas, escape routes to emergency shelters, protected rooms in basements (for hurricanes) or top floors (for tsunamis); (b) the setting up of back-up facilities (such as transportation systems) when structural/physical measures fail; or (c) the creation of incentives to build in a safe manner (e.g. tax inducements, exchanging rights and insurance schemes).

Responsible architecture. This concept encapsulates the need for planners to engage not only in large-scale structural improvements of the formally built environment but also to directly target informal settlements, thereby combining large-scale structural improvements with structural and non-structural small-scale measures. Examples for the latter are (a) the exchange of dwellings between low- and high-risk groups; (b) awareness raising and door-to-door advice offered by 'barefoot planners' regarding the design and use of buildings; (c) technical training of informal builders; and (d) the creation of local construction centres. The active use of small-scale measures could enable a better link to be forged with other development professionals as well as with disaster preparedness experts, which might generate further positive outcomes.

Urban disaster governance. This concept contains the idea of the combined domain, where disaster and urban planning are coordinated, mediated and altered through joint governance practices. The domain of urban disaster governance is hence the realm in which the interrelationship between disasters, urban planning and society becomes apparent. To facilitate timely, equitable and strategically coherent decisions in resource mobilisation and supply, it is important to identify those governance tools that will be likely to simultaneously benefit disaster risk management and settlement development planning by, amongst other things:

- fostering equality in participation in decision making across genders, religious and ethnic groups, and casts and economic classes;
- engaging with the local knowledge of individuals and communities at risk;
- combining such knowledge with scientific information (for instance as regards hazards and disaster-resistant structures); and
- reforming governance practices that might inadvertently contribute to the generation of vulnerabilities. For instance, coordinating disaster risk management networks that are often in unproductive competition with one another.

5 CONCLUSIONS

Increased disaster risk is possibly one of the greatest threats to sustainable urban development that developing countries face today. Paradoxically, the built environment (and related planning practices) are not only affected by disasters; they can also constitute one of its main causes, creating:

- increased vulnerability to natural hazards;
- greater exposure to existing hazards;
- intensified and/or magnified hazards;
- newly created hazards;
- constantly changing vulnerabilities and hazards (thus making them quasi uncontrollable);
- reduced coping capacities of national and municipal institutions; and
- reduced coping capacities of urban low-income households.

Although growing urbanisation and climate change make these negative effects even more alarming, organisations working in settlement development planning have, as yet, not tapped into their full

potential to address disasters risk. Even worse, these organisations are partly contributing to increasing disaster risk.

Merely developing and implementing hazard-proof measures is not tantamount to integrating disaster risk management into planning practice. In fact, structural adaptation of this kind needs to be combined with and backed by an integral 'take-up system'—at both the household and institutional levels—that integrates structural and non-structural, large- and small-scale measures. 'Institutional level' refers to the following institutions:

- governmental and non-governmental implementing organisations;
- donor organisations;
- other stakeholders working in programme implementation; and
- related universities and other training institutions.

The Integration Model presented here offers such a 'take-up system', providing a new concept for integrating disaster risk management into the efforts of (aid) organisations working in settlement development planning and programming. If implemented into practice, it could help to (a) overcome the constraints that these organisations currently face to get disaster risk reduction translated into their working practices; and (b) enable planners to take on the role of developing secure and sustainable communities.[26] They could thus considerably contribute to the reduction of post-disaster destruction and, hence, the forced evictions of the urban poor whose lives are most at risk.

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ENDNOTES

[1] In the following the umbrella term 'planners' will be used for all the mentioned professional groups.

[2] Disaster risk management includes risk reduction and risk financing. Risk reduction has become a popular term used to bring together those measures to minimise disaster risk throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards within the broad context of sustainable development. It is also a component of successful reconstruction. In fact, risk reduction can be implemented and is essential before, during and after disasters. See http://www.unisdr.org/eng/library/lib-terminology-eng%20home.htm. However, to limit the scope of the study. the term as used in this chapter pertains mostly to prevention, mitigation and preparedness measures in a developmental, pre-disaster context. The term risk financing describes measures to transfer or share risk, such as formal and informal disaster (self-)insurance.

[3] Risk is defined by UNISDR as: 'The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions.' See http://www.unisdr.org/eng/library/lib-terminology-eng%20home.htm. Conventionally, risk is expressed by Risk = Hazards x Vulnerability x Lack of coping capacity. Note that in other existing definitions coping capacity is part of vulnerability.

[4] Note that the term 'programme' is used as an umbrella term for programmes, projects, and other type of sector support/assistance. In the following, all terms are used synonymously.

[5] Note that from now on, the umbrella term housing/planning organisations will be used for this type of organisation.

[6] The research undertaken since 2003 analysed at different levels the interlinkages between disasters and the built environment (and related planning practices) and how it is tackled in practice. In fact, step by step the global, national, municipal and—finally—the household level were the focus of the enquiry. El Salvador in Central America, which is one of the most disaster-prone regions in the world (Lavell 1994), was the focus country for the case studies at the national, municipal and household levels. At all levels, the methods included text review, group discussions, semi-structured interviews, walk-through analyses and observation. As regards the interviews, at the global level, 64 programme and project managers, operational or academic staff from 33 organisations were interviewed; at the national and municipal level around 70 project managers and operational project staff from 40 organisations; and at the household level 62 households, comprising 331 persons, living in 15 disaster-prone 'slum' communities. Research trips were made, amongst others, to Geneva, Switzerland; Stockholm, Sweden; Washington DC, USA; Rio de Janeiro, Brazil; various locations in the United Kingdom; Manizales Colombia, San Salvador, El Salvador; and Manila in the Philippines.

[7] The sources of all tables are Wamsler (2004, 2006a-g, 2007b,c), complemented with additional research outcomes gained during 2007, as well as information obtained from World Watch (2007) and UNDP (2004). Note that the different aspects listed separately in the tables are interconnected, as they are partly causes and/or effects of other aspects mentioned. In Wamsler (2006a) system analyses of different aspects, including feedback loops, were carried out for the household level in El Salvador.

[8] See footnote 7.

[9] Note that the terms 'urban planning', 'planning', 'settlement development planning' and 'settlement planning' in the text are used synonymously. They mainly refer to social housing, settlement upgrading, new settlement development and urban governance programming.

[10] Definitions of the terms risk reduction and risk financing can be found under footnote N° 2.

[11] This statement is based on Wamsler (2006g:155). In addition, Wamsler (2004:21) states that disaster risk management professionals repeatedly referred to the planning/construction sector as a 'bad experience' and/or a 'nightmare' to work with.

[12] As described in Wamsler (2006e) partial integration was to some extend also achieved as regards national and municipal legislation, as well as the organisations' operational instruments, and institutional and organisational structures.

[13] The socio-economic, environmental and institutional vulnerabilities were seldom considered.

[14] This also relates to the fact that the participatory and community-based approaches used, which also utilise capacity analysis, generally relate only to the construction process and not to disaster risk management. Hence, people's coping strategies are not looked at.

[15] 'Slum' dwellers reported, for instance, on neighbours downhill felling trees or excavating the slopes below their houses, or neighbours uphill building latrines close to the declivity and allowing waste and storm water to flow onto their land.

[16] For a more thorough description see Wamsler (2007a). Important reference literature is Tannerfeldt and Ljung (2006), Smith et al (2007), and Mumford (1961/98).

[17] Meurman was the first teacher of urban planning at Helsinki Technical University (1936) and the first professor of the discipline (1940).

[18] Note that others such as Mumford (1961) offered a more pessimistic perspective of urbanism, referring to the development of cities racked by war, famine and disease.

[19] See, for instance, www.unisdr.org/eng/about_isdr/isdr-mission-objectives-eng.htm.

[20] 'Mainstreaming' is a specific type of integration. Generally, 'mainstreaming' signifies the modification of a specific type of core work (e.g. within a specific type/sector of development assistance) in order to take a new aspect/topic into account and to act indirectly upon it. Thus, the term 'mainstreaming' does not mean to completely change an organisation's core functions and responsibilities, but instead to view them from a different perspective and carry out any necessary alterations, as appropriate. Other types of (disaster risk management) integration are described below under Strategy I and II. These integration strategies are commonly confused with mainstreaming measures, partly resulting in competition and the duplication of efforts of organisations that specialise in different humanitarian and development sectors.

[21] Compared to most tools already in existence, it was developed in close collaboration with practitioners with a focus on sector-specific, project-level implementation. Based on growing experiences in the field, it can create over time a bottom-up development that can nurture the development of proper monitoring and evaluation tools for assessing progress in disaster risk management at both the national and international levels. Note that the Operational Framework is currently under revision and a second version will be published by Benfield Hazard Research Centre at the end of 2007.

[22] From now on called 'Integration Model'.

[23] To date, housing/planning organisations have used capacity analysis; however, this is used only in respect of people's existing capacities for housing financing and construction and not for coping with risk and disaster occurrence.

[24] Offering related mechanisms that work or come into effect after programme implementation is crucial, given the incremental development processes in 'slums'.

[25] Wamsler (2006c) presents an analysis framework and methodology for viewing local disaster risk. Wamsler (2007b) includes a framework for analysing and supporting local coping strategies (assisting in the selection of adequate programme measures).

[26] Note that the development of the Integration Model and related frameworks, concepts and guidelines to stimulate the integration of disaster risk management in sector-specific development programming is not sufficient in itself. In fact, two important key factors for 'translating' technical (policy) instruments such as the Integration Model into practice are related (a) scientific input, and (b) political will/commitment. The former refers for instance to information on existing hazards, the development of past disaster impacts, as well as knowledge on how to adequately construct disaster resistant structures. As regards the latter, the political commitment of national and municipal authorities, civil society as well as international and national aid organisations for disaster risk management and its integration in settlement development planning/programming is a pre-requirement for implementing the Integration Model. However, the model itself, i.e. the proposed conceptual shift and resulting activities could assist in this regard (see also Wamsler 2007a).