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Focus on culture and risk

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Focus on culture and risk

Culture and risk

This year, the *World Disasters Report* takes on a challenging theme that looks at different aspects of how culture affects disaster risk reduction (DRR) and how disasters and risk influence culture. The report asks, for example, what should be done when people blame a flood on an angry goddess (River Kosi, India, in 2008) or a volcanic eruption on the mountain god (Mount Merapi). After the tsunami in 2004, many people in Aceh (Indonesia) believed that Allah had punished them for allowing tourism or drilling for oil, and similar beliefs were widespread in the United States regarding Hurricane Katrina, showing God's displeasure with aspects of the behaviour of the people who live in or visit New Orleans.

Most people who live in places that are exposed to serious hazards are aware of the risks they face, including earthquakes, tropical cyclones, tsunami, volcanic eruptions, floods, landslides and droughts. Yet they still live there because, to earn their living, they need to or have no alternative. Coasts and rivers are good for fishing and farming; valley and volcanic soils are very fertile; drought alternates with good farming or herding. Culture and beliefs, for example, in spirits or gods, or simple fatalism, enable people to live with risks and make sense of their lives in dangerous places. Sometimes, though, unequal power relations are also part of culture, and those who have little influence must inevitably cope with threatening environments.

Together with other organizations that engage in DRR, we in the Red Cross Red Crescent know about people's beliefs and cultures and their different interpretations of risk. However, we find it challenging to fit these seamlessly into our organizational framework and funding models. Instead we tend to assume (or hope) that the people we want to support use the same logic and rationality as we do and that they will want to reduce the disaster risk. Sometimes there is also an institutional reluctance to deal with the issues of inequality and power that make people vulnerable in the places where they make a living.

The one thing that is certain is that we will have less sustained impact if we do not adequately take account of people's cultures, beliefs and attitudes in relation to risk. With climate change leading to damaged livelihoods, and therefore more vulnerability, and making hazards more extreme and/or frequent, we have to get this right.

One important goal of this edition of the *World Disasters Report* is to bring these complex issues and clashes of cultures into the open for discussion, so that they can be much better incorporated into DRR work. The first part (Chapter 2) assesses the effects of religion and other beliefs. The next chapters (3 and 4) examine the culture of DRR organizations, showing that we are all subject to beliefs and attitudes that frame our outlooks on risk and what should be done about them. It asks why DRR actors and organizations persist in giving priority to severe hazards when they know

that most people do not mention them when asked what risks they face. It is difficult for most people to be concerned about occasional and unpredictable severe events (or climate change) when many of their problems are 'development' needs that have not been fulfilled. Fortunately, the need for convergence between DRR and development is part of the discussions of the successors to the Hyogo Framework for Action and the Millennium Development Goals. This *World Disasters Report* also explains how DRR must take account of all the causes of vulnerability – including cultural ones – as the starting point for risk reduction.

After this discussion of 'organizational culture' (including a challenge to the widespread faith that many have in doing things that are 'community based' in Chapter 4), the report assesses how to overcome these barriers for more successful disaster preparedness. This is done first in the context of how traditional cultures can help with shelter and housing (Chapter 5) and also in health and medicine (Chapter 6). These are all areas in which the Red Cross Red Crescent has immense experience and has shown leadership in recent decades.

The final chapter asks what needs to happen next, how to take account of culture for DRR and also the need to build awareness of how 'organizational culture' has to change, for example, by not assuming that the people we are supporting are 'irrational' but instead accepting that they have different rationalities. It begins the process in which we all need to develop new ways of thinking and acting for DRR so that our organizations have a much better alignment with the way people think and act.

This publication does not provide all the answers to these complex issues, which vary a great deal around the world. But it shows where the starting points are. It gives some indications of the direction in which we need to go and draws on examples of good integration of traditional and 'modern' ideas for achieving effective vulnerability reduction. Recognizing the significance of the different ways of believing and behaving will increase the effectiveness of DRR and development initiatives generally and pave the way for greater impact in our responses to the challenges stemming from climate change.

Elhadj As Sy
Secretary General

Chapter 5

Culture, risk and the built environment

Over several decades an increasing number of well-intended disaster recovery projects have failed because social and cultural elements were ignored and because external professional personnel involved in recovery efforts were ignorant or failed to consider these elements as within the scope of their primary responsibilities. In different socio-economic environments around the world, post-disaster recovery efforts have sometimes foundered on the cultural issues that arise because the needs and understandings of people were misunderstood or disrespected by well-intentioned aid personnel and Western cultural paternalism.

The principal aim of this chapter is to draw attention to the built environment (the totality of humanly created, modified or constructed spaces and places) as an important arena for disaster risk reduction and to highlight the advantages of integrating indigenous knowledge and vernacular architecture within contemporary urban development and construction techniques.

Five million survivors were left in immediate need of shelter when 1 million homes were damaged or destroyed as Typhoon Haiyan struck the central Philippines in November 2013. All disasters affect the built environment and many, like the earthquake that devastated Port-au-Prince, Haiti, in January 2010, also exacerbate a pre-existing housing crisis. The state of the built environment, particularly poor construction and inadequate maintenance in hazardous locations, is a major contributing factor in determining community risk and is often largely responsible for what makes people vulnerable in many disasters. Dennis Mileti went so far as to somewhat ironically suggest that many disasters were actually 'designed' into the nature of the modern built environment (Mileti, 1999). Others, on the other hand, squarely place the blame for this increasing vulnerability on vernacular architecture that uses traditional construction materials and techniques that are perceived as weak, unsafe and outdated.

Both 'modern' and 'traditional' technology have shortcomings as well as merits depending on context, application and circumstance. Increasingly, however, vernacular architecture is being replaced by structures built with non-traditional materials especially reinforced concrete (RC) and concrete block. In some countries, the result is often a marked deterioration in the structural integrity of buildings, a decline in traditional building skills and a loss of heritage value that exposes a growing population to future disasters.

Floods have long been a risk in the Netherlands, where the concept of protecting individual dwellings has never disappeared, as illustrated by this amphibious house in Maasbommel.

Port-au-Prince, Haiti. © Amanda George/ British Red Cross

The world's population is projected to rise to 9.6 billion in 2050 and to have reached 10.9 billion by 2100 (UN, 2013). Already more than half the world's population live in urban areas and that percentage is estimated to rise to 68 per cent (6.3 billion people) by 2050 (Swiss Re, 2013). There has always been a dialectic between attraction and risk in the determination of human settlement patterns, a trade-off between soil, resources and location on the one hand, and hazards, such as volcanoes, earthquakes and floods, on the other. But the scale of urbanization in the 21st century and the concomitant changes in livelihoods and technologies have affected most people's relationship with previous cultural norms of settlement and construction and now pose a continuous challenge to the provision of safe, sustainable and affordable buildings. A particular feature of this rapidly changing built environment is the fast-growing, sprawling urban conglomerations located mainly in the high-growth markets of East Asia. These often coastal and riverine urban areas like the Pearl River Delta in China are frequently exposed to multiple hazards such as floods, typhoons and tsunami. Many, too, are also located in seismically active areas, such as Metro Manila in the Philippines. The sheer concentration of lives and assets exposes more people more often to more risk.

BOX 5.1 Safeguarding heritage in the face of disasters

Disasters not only affect people's lives and environment but also the cultural heritage that is significant to them. Local and national communities can be affected seriously by the loss or deterioration of heritage, due to its symbolic and material importance for their identity, as a mirror of the past and the present, and for its socio-economic value. Disasters damage many heritage sites and practices. Major earthquakes devastated the citadel of Bam, Iran in 2003 and disrupted the New Year's ritual among the Qiang people in Sichuan, China in 2008. In 2010, a massive fire ravaged the Kasubi Royal Tombs in Uganda, endangering the associated beliefs, practices and knowledge of local communities.

Human-induced hazards, including nuclear incidents and serious pollution, can also affect heritage negatively. Damage may be intentional in the case of armed conflict and terrorism, as in the destruction of mosques and churches in Kosovo in 1999 and the destruction of the sixth-century Buddha statues in Bamiyan, Afghanistan in 2001. In Mali, after the 2012 coup d'état, armed groups destroyed

16 mausoleums and 4,200 ancient manuscripts in Timbuktu, and also suppressed the local communities' customs and rituals, crafts, songs and dances, thus depriving them of a source of livelihood and expression.

Disasters may further increase the risk of illicit trafficking of movable cultural properties, as they weaken structures that protect cultural heritage, such as museums, law enforcement and local communities. The number and intensity of disasters are expected to rise, partly as a result of climate change. Human-induced disasters also do not seem to be diminishing. It is therefore of the utmost importance to prevent and reduce the negative impacts on heritage and to safeguard it in the post-disaster or post-conflict phase.

Of great significance, if less understood, is the positive role that heritage can play in reducing a disaster's impacts on people's lives, properties and livelihoods. In the event of a disaster, heritage in both its tangible and intangible forms may serve as an important source of resilience for communities to overcome challenges, materially and psychologically. Well-maintained heritage sites, including natural ecosystems, cultural landscapes and historic urban centres, may reduce disaster risks, supported by the traditional knowledge associated with environmental management and building techniques. For example, when earthquakes struck the regions of Kutch, India (2001), Kashmir (2005) and Sichuan (2008), it was observed that modern buildings constructed with reinforced concrete – but where engineering standards had not been strictly applied – experienced pancake collapse, while those constructed using traditional methods were more able to withstand the shock and save lives. Typical *bhunga* dwellings of the Kutch region survived remarkably well while many new constructions collapsed in the 2001 earthquake.

The safeguarding of intangible heritage can be equally beneficial. During the 2004 Indian Ocean tsunami, it was noted that the number of casualties among the Moken, 'sea people' living in Myanmar and Thailand, was quite low compared to other coastal communities. The Moken apparently survived better because of their knowledge and oral traditions associated with their nomadic, seafaring way of life. Thanks to the 'legend of the seven waves', reflecting the ancestral memory of previous tsunamis, they were able to run to higher ground when they saw the seawater starting to recede. Research is revealing an increasing number of examples where heritage and the continuity of traditional practices have made such positive contributions to resilience.

During the post-disaster or post-conflict phase, the rehabilitation of familiar heritage landmarks and the resumption of traditional cultural practices may contribute to the recovery of a community and help vulnerable people recover a sense of dignity and empowerment. Retaining the cultural diversity expressed in material and intangible heritage, finally, is essential to enable stable societies where differences are acknowledged.

Protecting heritage from disasters is, therefore, not a luxury, but a fundamental consideration to be given priority together with other humanitarian concerns, especially when traditional knowledge and sustainable practices that ensured a certain level of protection from the worst effects of natural hazards or human-made disasters are being progressively abandoned.

In recent decades, many international and national institutions have gathered a considerable wealth of experience in reducing disaster risks for cultural and natural heritage. Models and tools have been developed and tested. Guidelines have been prepared and will be published later this year.

Despite this, the reality is that most heritage properties, cultural or natural, still do not have any established policy, plan or process for managing the risks associated with potential disasters. Intangible cultural heritage rarely figures in disaster prevention efforts or post-disaster relief, and national and international mechanisms for combating illicit trafficking are under-resourced. Existing national and local disaster risk reduction strategies and plans, moreover, usually do not take into account the significance of heritage sites and expressions, and do not include heritage expertise in their operations. As a result, a vast number of heritage sites and expressions are virtually defenceless with respect to potential disasters, while communities worldwide are not exploiting the full potential of their heritage for reducing disaster risk.

It is therefore critical to strengthen the preparedness of cultural heritage properties to disasters, through appropriate planning and capacity building, and at the same time integrate consideration for heritage in general disaster risk management strategies and programmes at national and local levels. ■

Adapting the built environment

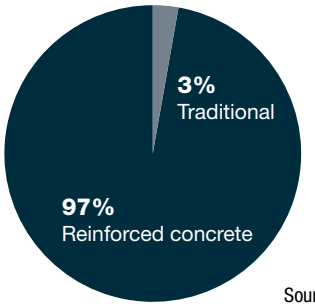
People adapt the built environment to accommodate the risk of living for many generations in places where they are regularly exposed to hazards. These patterns then become embedded in cultures over time (Moore, 1964). This cultural adaptation, however, is shown to depend on three crucial factors: that the hazard is repetitive; that it is of a nature to allow forewarning; and that it inflicts significant damage to human and material resources (Wenger and Weller, 1973). Most natural hazards reflect these criteria: storms (including hurricanes or typhoons) are seasonal; floods can be modelled; and the recurrence of earthquakes can be statistically estimated. Fire, frequently underreported, is an omnipresent threat, especially in the shanty towns and suburban–wildland interfaces of many of the world's largest cities. World heritage sites, too, are often at risk, like Dukezong in Yunnan, China, a large part of which burned to the ground in January 2014. Alerts are even issued for tsunamis.

Over the centuries, communities have adapted to risk in the shaping of their environment. Where the hazard was frequent and of a magnitude to regularly cause loss of life and property damage, people in the past developed the pragmatic and theoretical knowledge of learning to live with threat on a day-to-day basis. This accommodation is reflected in the design of buildings and the materials and construction techniques used. Vernacular architecture is often a trade-off between multiple hazards as most communities are exposed to a variety of dangers and have to prioritize risk. As an example, the traditional, stone, low-roofed houses of the Batanes Islands in the Philippines are designed to withstand the ferocious wind speeds of frequent typhoons but are dangerous during the much less frequent earthquakes. No architecture, of course, can be attributed to a single environmental threat. It is always "the consequence of a whole range of socio-cultural factors seen in their broadest terms"

(Rapoport, 1969). The main point here, perhaps, is not so much the original factor or factors that lead to the development of an architectural style, which are likely to be multiple and varied, but why in hazard-prone areas a particular method of design and construction is retained, able to adapt to new circumstances and even accommodate non-traditional materials, often for generations.

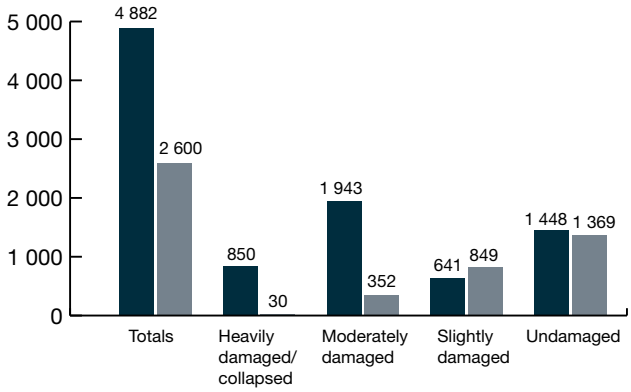
If properly maintained, vernacular architecture continues to perform well under extreme conditions. To take the case of earthquakes, the high death tolls in Izmit, Turkey in 1999, Bam, Iran in 2003 and Haiti in 2010 were due more to the failure of contemporary buildings than to vernacular constructions (Doğangün et al., 2006; Audefroy, 2011; Langenbach, 2013; see Figures 3.1 and 3.2). The performance of vernacular architecture on any occasion, however, depends on how well such structures have been maintained. The traditional *taquezal*-infilled, timber-framed houses of Nicaragua largely maintained their structural integrity during the earthquake that shook Managua in 1931 but collapsed in the subsequent 1972 earthquake as timber frames had been allowed to deteriorate badly in the tropical climate (Langenbach, 1989).

Figure 3.1 Marmara earthquake 1999
Heavily damaged/collapsed houses in Kocaeli and Sakarya (selected) districts



Source: Gülhan and Özyörük Güney, 2000.

Figure 3.2 Marmara earthquake 1999: number of houses damaged by type in Kocaeli and Sakarya (selected) districts



Source: Gülhan and Özyörük Güney, 2000.

Many architectural adaptations persisted well into the 20th century, even in Europe. They continue to influence housing in rural areas of some parts of low- and middle-income countries to the present, although they are fast losing ground to the 'economics of the cinderblock'. The reason for this rapid decline is due to a combination of factors including population pressure, loss of indigenous knowledge especially among the young, and fashion and status that lead to a marked preference for modern-looking houses that do not incorporate earthquake-resistant features. Another factor is the widespread deforestation of recent decades that has made timber, an integral material in most vernacular architectures, increasingly scarce and unaffordable (Hughes, 2000).

Why culture matters in reconstruction

The focus of government and non-governmental organizations (NGOs) post-disaster is often on building a large number of units with limited resources in the shortest possible time. However, to be successful, reconstruction needs to be linked to sustainable development and include local community input in the design and construction of practical and culturally appropriate houses that also improve resistance to hazards.

At its most abstract, culture is enshrined in the core values that inform the United Nations (UN) *Operational Guidelines on Human Rights Protection in Situations of Natural Disasters*: that owners of destroyed houses should, as far as possible, decide themselves how they are rebuilt (Carver, 2011). Housing is a matter of rebuilding community and restoring social and cultural capital and, frequently, livelihoods. These values are universally recognized if not always implemented and are enshrined in the Guiding Principles of the World Bank's *Safer Homes, Stronger Communities* (Jha et al., 2010).

The importance of community was, for instance, manifest in the Bam earthquake of 2003, when initially temporary units provided by the government were located in the open desert too far from damaged or destroyed homes and date-palm orchards. More than one-third of these units were left vacant because local people preferred shelters sited either on or near their own properties (Rafieian and Asgary, 2013).

Poor decisions about the site of temporary settlement made under pressure to provide emergency shelter divide communities, disrupt livelihoods and increase vulnerability. An owner-driven approach that involves community input, especially of women and marginalized groups, and that incorporates culturally acceptable building forms and traditional techniques are the foundation for reconstructing communities as well as providing shelter. Unfortunately, embracing people's preferences can sometimes also impede the reconstruction of more disaster-resistant buildings. In a study of rural Iran, families offered a choice between larger, more modern-looking homes rather than better quality, more earthquake-resistant structures expressed a marked preference for the former (Azimi and Asgary, 2013). Cultural considerations often need to be tempered by the provision of education and technical incentives.

Cultural considerations are not just embedded in decisions about transitional shelter but are also very much integral to long-term reconstruction. Vernacular architecture can provide an important guide for building new houses. For example, more than 150,000 rural units have been successfully rebuilt using traditional construction materials and techniques following the 2005 earthquake in Kashmir (Schacher and Ali, 2009). The salvaging of traditional materials (timber, iron, brick and stone) for reuse and the repair and restoration of vernacular houses wherever practical also preserves architectural heritage and constitutes an important source of community identity as well as aiding psychological recovery.

Early repair, in particular, helps to restore normality, minimizing the disruption of displacement, interrupted livelihoods and consumption of resources for temporary measures. The debate about whether to rebuild or demolish Christchurch Cathedral following the September 2010 earthquake in New Zealand was above all a matter of civic pride and community identity, demonstrating the intangible factors involved in reconstruction (Lee, 2013).

How buildings are built, the nature of the built environment and how buildings are rebuilt in the aftermath of a disaster are as much to do with culture as they are to do with the materials, the design and the means by which they are constructed. The following sections examine these issues in more detail.

Building resilience

Over the past half-century, culture, hazard mitigation and disaster recovery have primarily been associated with the protection and restoration of heritage properties. The conventional wisdom has been that historic buildings are vulnerable and need to be upgraded and protected. Observations of recent disasters, however, question this presumption and people have begun to realize that heritage structures and traditional cultures have a lot to teach today's scientists and planners about resilience and disaster recovery.

'Modern' building culture

Turning to earthquakes, the issues surrounding culture and tradition have often been neglected at great cost to both responders and affected populations. Earthquakes present two very important problems: they are the principal naturally occurring force that buildings are designed to resist (albeit not without structural damage); and they occur without warning. The first of these two problems is not often fully appreciated. Current building codes are predicated on an expectation of damage in a design-level earthquake. Nuclear power plants are an example of highly specialized structures that are constructed to remain within the elastic limit. Many of these building codes are influenced by model building codes that

were first developed in the United States. While this fact is widely known, it is often not fully recognized that North America is a region where, even in urban and suburban areas, a traditional light wood-frame construction remains predominant for new construction. Approximately 90–95 per cent of the population of Canada and the United States live in timber structures and, in general, both in North America and around the world, timber construction has proven to have a low vulnerability to earthquake collapse.

Construction in 2014 of a large four-storey apartment building near San Francisco, California, with three stories in timber construction atop a one-storey RC parking garage. © Randolph Langenbach

This contrasts sharply with most earthquake-prone regions of the world where the predominant form of construction for all buildings in urban and rural areas is now an RC moment frame (a frame constructed with rigid joints between the beams and columns designed to resist lateral forces) with unreinforced masonry infill construction. The proliferation of RC frame construction represents a transformation of the building industry around the world over the past half-century. This change has been so accepted and even applauded that its ever more apparent risks are rarely discussed, despite the increasing statistics of earthquake casualties in modern RC structures.

RC construction has become identified as strong and safe in the public mind. In India, it is now mainly what people mean when they express preferences for *puccha* (strong) houses and, in Kathmandu, Nepal, only RC buildings are allowed to exceed two stories. The problem is that the promise of RC has not been realized when it comes to earthquake safety. With each new major earthquake over the past decades, increasing numbers of fatalities have been found under the pancaked floors of RC frame structures – most notably recently in the 1999 Turkey earthquake (20,000 fatalities) and the 2008 Sichuan, China earthquake (69,000+ fatalities).

A row of collapsed buildings in Golcuk, Turkey, after the 1999 earthquake. © courtesy of United Nations

What makes criticism of RC moment frames as a system difficult is its proven strength and resilience on occasions. No one can but be impressed when looking across the Banda Aceh, Indonesia, landscape left by the 2004 Indian Ocean tsunami, where only an RC frame mosque still stood amid the otherwise total devastation. By contrast, in New Zealand during the 2011 Christchurch earthquake, a six-storey RC frame structure, the CTV building, killed 119 people when it collapsed, the biggest single loss of life and responsible for all but 35 deaths of 170 fatalities in the central city (Pomonis et al., 2011).

Image of Banda Aceh mosque still standing after the 2004 tsunami.
© US Navy photo by Photographer's Mate 3rd Class Jacob J. Kirk

BOX 5.2 Flood-proof houses in the Netherlands

Situated around the Rhine–Meuse–Scheldt delta and bordering the North Sea, the Netherlands is a mostly flat and low-lying country in the north-western part of Europe. A significant part of its urban and rural areas is situated in polders that are often below sea level and, in many cases, still subsiding. These polders and other low-lying areas risk flooding as a result of storm surges and peak river discharges.

The Netherlands has a long history of flood-risk protection. Many centuries ago, houses were built on top of natural or artificial mounds in order to protect them from flooding. This system gradually evolved into today's ingenious system of dams, dykes and polders that is one of the country's trademarks. Although constructing houses on mounds became largely superfluous as a result of this evolution, the basic concept of protecting individual dwellings never disappeared. Nowadays, different types of flood-proof houses exist. Examples are the pile house, floating house, amphibious house, water-shielding or wet-proof house, and a modern incarnation of the classic 'mound dwelling'.

The pile house derives its name from piles that protrude several metres from ground level and serve as its foundation. The floating house is essentially an extended version of the traditional houseboat. An amphibious house normally rests on a foundation at terrain level and only floats when needed – in case of flooding or high tides. Traditional housing types that are adapted to prevent damage in case of flooding or high tides are called water-shielding or wet-proof houses. In the case of water-shielding, a house is transformed by adding water-shielding façades and window frames; in wet-proof houses, the construction is optimized so as to minimize damage in case of flooding. For example, by including waterproof floors, elevating electricity plugs or by applying vertical zoning rules, there are no vulnerable functions at ground level.

Effectiveness of flood-proof houses

In the Netherlands, embanked and unembanked areas have different flood-risk characteristics.

Flooding of a polder, protected by dykes, will cause the largest amount of damage. As safety levels have risen over the years, due to the gradual reinforcement and extension of dykes, the probability of a polder being flooded has steadily decreased. Flood-proof houses nowadays are considered economically infeasible and, given the level of flood-risk protection offered, are seldom constructed in polders. The consequence, however, is that if a polder is flooded, there is little protection left. Given the tremendous impact of such a flood, the recent debate in the Netherlands concentrates on using flood-proof housing techniques as a second 'safety layer', in order to reduce the consequences of a polder flooding.

Flood plains, coastal areas and other unembanked areas are frequently faced with regular water-level fluctuations. It is in these areas in the Netherlands that flood-proof buildings are economically feasible and a lot of experiments with flood-proof houses are taking place.

The mound dwelling and pile dwelling are fixed in their location. Their effectiveness from a flood-risk perspective is limited to areas where the maximum water level is somewhat predictable, as this type of dwelling is flooded as soon as the water level exceeds the height of the mound or piles. The pile house is, therefore, mainly used in areas with fluctuating but controllable water levels, such as the polders. If such a pile house is built in an area with extreme water-level fluctuations, it generally has very high piles. Building on mounds is still applied in some 'de-polderized' and now unembanked areas. However, this type of housing has little flexibility with regard to the expected increase in water-level extremes that may occur due to climate change.

The water-shielding and wet-proof houses are primarily used in areas with a high risk, or frequency, of flooding, such as historical cities and villages along rivers. These housing types are comparable to the mound and pile houses: given their fixed position, flexibility with regard to the impact of climate change is limited.

The new interest in floating and amphibious houses is due to their flexibility as far as flood levels is concerned, providing robustness with respect to climate change. However, floating houses are limited in the amount of water fluctuation that can be accommodated. Such houses are often anchored at mooring poles; if the water-level exceeds the height of the mooring poles, floating or amphibious houses will drift. In addition, most floating or amphibious houses are not autarkic; a service pipe connection to the quay is commonly used to provide electricity and to serve as water supply and sewer. This connection is flexible and able to accommodate the same fluctuation level as the mooring poles. The mooring poles and pipes can be easily adjusted.

Amphibious houses are not only suitable for riverbed areas with fluctuating water levels, but also for areas that are used for water retention. These retention areas are polders that are designated to be inundated under specific conditions, to decrease the water levels of rivers or to accommodate extreme rain water levels.

Flood-proof strategies

A global tradition of using flood-proof housing techniques exists. Often, these housing types become obsolete and disappear when large-scale flood-risk structures are developed. Flood-proof buildings, however, have many advantages and are a very robust and adaptable form of flood-risk protection. There is, therefore, a renewed emphasis on the potential of flood-proof houses among designers and policy-makers. Flood-proof buildings have the quality and potential to become an important and integral part of flood-risk protection strategies. ■

Vernacular architecture

At the opposite end of the socio-economic spectrum is Haiti, which was struck by an earthquake in 2010 that devastated the capital city of Port-au-Prince. This earthquake revealed the urgent need to address the risks attendant with RC moment frame construction as a building type. In particular, it was the perceived failure of notable RC buildings (two luxury hotels, one the UN headquarters, the historic cathedral and the National Palace), that gave rise to the initial impression that the death toll in the dense hillside informal settlements largely built of concrete block must be catastrophic. In fact, a substantially greater percentage of self-built slum housing remained standing than did the more formal, contractor-built and sometimes even engineered buildings of recent RC construction (Langenbach, 2014). Similarly, many of the 19th century 'gingerbread' houses near central Port-au-Prince constructed with walls of a mixture of brick and rubble stone also remained standing (Langenbach et al., 2010).

Non-engineered concrete block and slab houses in Jalosie informal settlement, Petionville, many of which survived the 2010 earthquake. © Randolph Langenbach

The Villa Castel Fleuri, which was constructed with walls of brick and rubble stone, was still standing after the 2010 Haiti earthquake. © Randolph Langenbach

A critically important lesson can be learned from findings about these century-old rubble stone construction and self-built slum houses that remained standing: the best insurance against collapse in earthquakes may simply be that buildings need walls, whether they are of traditional masonry, cement block or poured concrete. It is a case of simple arithmetic – a wall is simply larger than is the rigid connection between the columns and beams in a moment-resisting RC frame. If the RC frame is top quality, its performance can be extraordinary, but this standard can only be expected in a small percentage of buildings now that such construction has become so common and is undertaken in environments where quality assurance in materials, workmanship and oversight is inadequate.

'Gingerbread' house in Port-au-Prince.
© Randolph Langenbach

New *dhajji* construction in Thub, Pakistan.
© Maggie Stephenson/UN-Habitat

Another form of traditional construction in Haiti that did better than the masonry bearing wall construction was the half-timber (colombage) or timber frame infilled with a single layer of masonry. This kind of construction existed in Ancient Rome, as evidenced by the excavation of the ruins of Herculaneum. It has demonstrated its seismic resistance in a number of large earthquakes over the last two decades, including 1999 in Turkey, 2001 in Gujarat, India, and 2005 in Kashmir. Historically, versions of this form of construction were developed specifically for their aseismic qualities in Lisbon, Portugal after the 1755 earthquake and in southern Italy after the 1783 Calabria earthquake.

Today, interest in many different forms of vernacular construction is growing and, in earthquake areas, has increasingly focused on traditional construction typologies that have demonstrated a greater than expected resistance to collapse when compared with modern RC frame structures. The most impressive example of the increased acceptance of traditional construction for earthquake hazard mitigation to date is in Pakistan. There, a year after the 2005 Kashmir earthquake, the government of Pakistan approved *dhajji dewari* (half-timber) construction as compliant with government rural housing construction standards and eligible for government financial subsidy. A year later, they also approved *bhatar*, a timber-laced bearing wall masonry construction. By 2009, at least 150,000 new homes had been constructed using one of these two traditional typologies in this region of northern Pakistan (Langenbach, 2009).

From a hazard mitigation perspective, readoption of these traditional local technologies represents a potentially sustainable approach to housing construction in many low-income countries as an alternative to the now ubiquitous use of RC frames. While it cannot entirely displace the continued building of RC frame structures, it provides the basis for establishing a better balance so that every building need not be just in concrete. The embrace of only concrete as 'modern' often has been destructive of architectural and itinerant craft traditions in many parts of the world. Restoration of the kind of crafts needed for the reemergence of local vernacular architecture can also help preserve other aspects of community culture.

Retrofitting reinforced concrete buildings

The question remains as to how to deal with the problem of now proven risk presented by the many existing RC moment frame buildings. Of the 37 countries represented to date in the United States National Science Foundation-funded World Housing Encyclopedia, 23 have submitted reports on seismically vulnerable RC structure with masonry infill construction. They have also produced a useful open-access, 70-page tutorial on the correct design and construction of buildings with RC frames with infill (Murty et al., 2006). While this document aims at improving future construction and discouraging the untrained and unregulated use of this technology, its observations touch on the scale and severity of the risk of existing buildings worldwide that are vulnerable to sudden collapse. For example, when the World Bank did a study of the potential collapse hazards in Istanbul after the 1999 earthquake, it determined that funds were simply insufficient to correct the problem and turned its attention to schools, hospitals and other critical buildings (Yanev, undated).

A multi-storey RC frame apartment house in Golcuk, Turkey partially collapsed by the 1999 earthquake. The lack of adequate moment connections and very thin columns is evident. © Randolph Langenbach

A ten-storey RC frame with infill structure in Istanbul with an extremely weak and vulnerable ground floor. © Randolph Langenbach

New construction in Turkey increasingly includes RC shear walls, which are designed to resist shear, the lateral force that causes most damage in earthquakes. This promises a substantial reduction in the risk of collapse. Confined masonry is a viable alternative. However, retrofitting the vast numbers of existing moment frame buildings with shear walls is very costly and involves the removal of the occupants for extended periods. Other, less disruptive but effective methods are beginning to be proposed for these types of buildings to address and correct the systematic exclusion of the infill masonry walls from the conventional engineering analysis and calculations used for such buildings. It is increasingly clear that if seismic retrofit

of these structures known to be vulnerable is not undertaken, it will take at least a century for the normal cycle of building demolition and replacement to reduce the hazard that now exists.

After the 1999 earthquakes in Turkey, people in Istanbul started carrying whistles in their pockets, so they could be heard if caught between the pancaked slabs of their own homes. Unfortunately, they still need them.

Post-disaster reconstruction

The impact of a crisis is not only death, injuries and physical damage to property but may also involve a perception of the failure of and loss of confidence in local systems, local building culture, local organizational structures and traditional values (Oliver, 2006). The aim of post-crisis assistance is to enable affected populations to recover rapidly their pre-crisis status. In some instances, this aim is extended to 'build back better' including risk reduction at the level of settlements or safer building construction.

Determining appropriate shelter solutions

The disaggregation of shelter recovery into distinct phases and activities described as relief, transition, rehabilitation and reconstruction does not reflect the experience of many households for whom (re)making a home is more of a continuum. For some, reconstruction starts the day after a disaster; for others, many steps may be involved to get to a durable housing solution, including temporary shelter, staying with relatives, mobilizing resources and construction over several years. The challenge for shelter assistance actors is to acknowledge the complexity of shelter recovery and to ensure shelter support (financial and technical) optimizes local capacities and adds value strategically to enhance those capacities for the future.

During the relief phase, the emphasis by external assistance agencies on needs rather than capacities, the description of affected communities as 'victims' and the importation of standardized solutions can be counter-productive to the dynamics of local recovery. Likewise the control of resources and assumption of responsibility and authority by external relief actors on issues such as shelter and housing recovery can inhibit the initiative of local households, local leaders and local institutions to propose and implement solutions in their own way. This is particularly critical in areas of frequent disasters, such as cyclones and floods, if the population is to attain a degree of resilience and avoid repeated losses and dependence on external assistance.

Optimizing local capacities may involve technical experts using their wider access to information to share appropriate technological know-how to address shortcomings or achieve improvements in local building practices. These weaknesses may

be inherent to the technology, to loss of traditional knowledge and skills or to the poor execution of modern technology. Each case requires different technical support strategies. For example, the IFRC's Sahel shelter project responded to the need for more culturally and environmentally appropriate shelter solutions for populations displaced by disaster and/or crisis in West Africa following concern about the poor performance and cost of imported tents and shelters. After flooding in Burkina Faso (in 2008, 2009, 2012 and 2013) and regional conflict, drought and food security issues in the Sahel from 2011 to 2014, the project replicated the familiar rectangular form with a domed roof based on traditional Tuareg semi-nomad shelters but achieved greater structural stability and reduced timber requirements. The specification of local mats ensured local procurement and sewing skills were used and the project development benefited from traditional knowledge of details for rapid assembly and dismantling, important in a nomadic culture (IFRC, 2012).

Unfortunately, the exigencies of shelter programming often tend to exclude such approaches. If time is a key constraint to using local solutions in emergency shelter, it might be expected to be less so in rehabilitation and reconstruction activities. In practice, however, bias about saving time continues in reconstruction projects where advocates for prefabrication, industrialized techniques and contractor construction promote their apparent advantages and efficiencies including time.

The danger of losing traditional skills

Building cultures are always in a process of development and evolution. In particular, the shift from rural to urban culture has been a change from agriculture and subsistence to a largely cash-based system. Rural cultures are also in transition, usually less dramatically, but often with significant losses of traditional skills, sometimes due to the arrival of modern materials.

Girl organizing shelter in Kashmir, 2005. © Maggie Stephenson/ UN-Habitat

Disasters occur within this context of transition and may accelerate aspects such as urbanization, adoption of new materials and change from joint to nuclear family households. A major crisis may also precipitate conscious and deliberate change, for example, local masons devising solutions to address weaknesses in buildings, institutions or authorities introducing policies or regulatory measures to drive changes in practices, or assistance actors promoting change through training or subsidies.

There is a risk in this accelerated period of change that valuable assets, knowledge and skills are lost, including through the demolition of traditional buildings rather than their rehabilitation. Local building culture may be further undermined through exclusion from the menu of choices for reconstruction and from standards and technical guidance.

The time following a disaster is critical in the definition and redefinition of building cultures. It is a period of exceptional focus on construction issues and decisions, a process that can either validate, promote or improve local and traditional skills, or reject them as invalid and replace them by alternatives.

BOX 5.3 Women: a crucial role in housing recovery

Women carry the largest burden of an inadequate home. The bond between women and their built environment is particularly important for women from cultures where the home remains the primary site of their social and cultural practices, largely because they spend most of their time in and around the home. Moreover, as women are often the primary caregivers to children and other vulnerable people, their ability to manage their household is paramount to the entire family unit. Women and the people they care for benefit disproportionally from decent housing and settlement planning.

Shelter agencies operating in post-disaster situations find it much easier to identify local needs than to identify and unleash the potential of local assets. This is a general problem but is particularly true for women. The IFRC recognizes that the potential of women to play an active, rather than a passive, help–recipient role should receive particular attention. The organization says: "In a disaster, women in general may be affected differently from men because of their social status, family responsibilities or reproductive role, but they are not necessarily vulnerable. They are also resourceful and resilient in a crisis and play a crucial role in recovery" (IFRC, undated). So how can shelter agencies ensure that women play this positive role and contribute fully to the process of housing recovery that means so much to them?

Women and housing

Disasters come with loss of homes, homes that denoted and carried the family structure and its practical, social, economic, religious and cultural relations to the larger community. As a representative of SNEHA, a local NGO active in reconstruction after the 2004 Indian Ocean tsunami, stated, "We are not building houses, but it is a way of life that needs to be restored."

In many cultures, women are given full command of their households and ample autonomy to manage them. They can act as the primary homemakers providing for the household, cook, bring up children and perhaps also manage livelihoods activities from the house. Women are also involved in many ways in building, as labourers during construction and as supervisors. They might be responsible for preparing their houses for harsh weather and for beautifying their homes as an expression of individual and collective cultural identification.

In times of upheaval, women have proven to be crucial partners to humanitarian agencies during the housing recovery process. Their role can span the entire housing process, from planning and homemaking to construction depending on their culture and context.

In the case, for example, of planning displacement camps, especially if cooking and bathing are organized through institutional arrangements, assuring privacy and security can be addressed in a culturally appropriate way through planning together with the women. But as Swarna Rajagopalan from an Indian-based feminist thinktank reflects, "Agencies tend to see the inclusion of women through their gender framework, and miss the women's own efforts for change. All relations within a community are trade-offs between power structures on the one hand and kinship, security, etc. on the other. It is important to reflect on whose vision of a women's inclusion are we promoting?"

Rehousing propels a change in cultural practices and people find themselves living in dwellings that have little, if any, relation to their original houses. If women's roles include safeguarding traditions, the home can become the place of resistance to guarantee their values and rebuild their community identity. During times of crisis, cultural practices related to homemaking, such as cooking according to their own traditions, often become treasured mainstays for the affected people. Women frequently become key players in ensuring that their cultural practices do not dissipate with the pressures of adjustment.

Mother and children prepare dinner in a makeshift shelter in Kashmir.
© Robbie Reynolds/GOAL

Housing recovery: an active role for women

As the culture of 'not being able to talk it' remains rife, agencies try to ensure that women are included as members of staff in humanitarian organizations and represented in community-level meetings, as well as during policy elaborations. Women immersed in the local community are preferred (e.g., rural women if rural knowledge is required). It is sometimes useful to avoid bringing everyone together to make joint decisions; instead planning sessions are broken down into focus groups and committees with women-only participants to better discuss women's specific needs. Other measures include anonymous lines of communication and placing gender protection advisers at shelter clusters. There are boundaries to talking in public about what are considered private activities such as bathroom habits. Women's specific needs are still a taboo in community planning sessions, even in agency and inter-agency meetings among 'professionals'. Some women may not talk to men outside their family or community about private issues without the consent of community leaders or husbands.

Disasters tend to shift the housing process from a feminine or domestic realm to a masculine or public realm. In many communities women are not the official household representatives, resulting in their underrepresentation in decision-making structures. Furthermore, women and their organizations might find it difficult to

get heard, as they are usually less assertive and networked. Similarly, women are given less influence in financial decisions in communities where they are less likely to have a regular income. Agencies counter this, for example, by giving women specific responsibilities within community organizations.

Laws may discriminate against women. In some societies women are given few rights in terms of ownership of land and property, making it difficult for their voices to be heard. Elsewhere, properties are registered in the name of a woman in the family, a custom derived from a more protective attitude towards women. Disasters are often seen by agencies as an opportunity to redress differential gender practices and, for example, they try to ensure women are signatories on any documents and introduce joint ownership of property. Housing microfinance often provides an opportunity for women to have more input into the development of their homes.

In short, the female role of homemaker is put under great pressure in post-crisis situations because so much depends on it. This heightens the need for cultural sensitivity and understanding from agencies. Unless it is deliberately identified, the challenges of the homemaker role may simply go unnoticed. Shelter agencies will also typically be more focused on the familiar challenges of giving women a public role. As measures are taken by agencies to ensure that women play this crucial role in recovery through gender-sensitive programming, challenges remain for shelter agencies. What is particularly taxing for agencies is to ensure women play that crucial role devised by their particular culture and context when there is no stereotypical cultural model or women's role on which to base procedures. ■

The role of assistance agencies

Assistance agencies and technical professionals involved post-disaster are key participants in the process of deliberation about building cultures and choices. Their activities include technical research; the review or development of standards, training and public awareness; support for owner-driven shelter and housing rehabilitation, retrofitting and construction; and settlement protection and mitigation works. The majority of these actors may have no previous knowledge of the local area or building culture, and their introduction post-disaster is at a time when local systems are weakened.

External 'experts' generally arrive in the role as pathologists, to right the wrongs of inadequate and inferior technology. They assume superior expertise and solutions rather than recognizing there is as much to learn as to impart. While many experts quantify losses, few investigate damaged buildings qualitatively to understand the causes of poor performance in consultation with local building professionals. Fewer still document the local buildings that performed successfully.

There are exceptions, however, when agencies have successfully identified, promoted and regenerated local knowledge. One example is the use of *quincha*, a traditional system of lightweight cane panels, for both shelter and permanent construction post-earthquake in Peru by Practical Action. Another is the integration of traditional typhoon-resistance principles of framing and tying down roofs promoted in new and hybrid construction techniques by Development Workshop in Viet Nam. In both

cases, local knowledge was valued and replicated but also interpreted in accordance with the evolving economic context. These two examples also illustrate key factors in the valorization and regeneration of local building cultures: the importance of an iterative development process in close partnership with local communities particularly with local master artisans.

The greater proportion of post-disaster shelter and housing reconstruction is built by the affected population with their own resources, and their continued construction and settlement decisions determine their future vulnerability or resilience. Longer-term benefit can be achieved if external technical and financial resources add value to existing local building processes, including facilitating the regeneration of local knowledge and skills, developing appropriate improvements.

Imparting local building practice

Coordination and policy development support should ensure access to the wealth of knowledge held by key resource people and institutions, promoting the voice of local artisans and the advice of national experts for external cross reference. The continuation of research and development work before and after a crisis ensures a greater understanding of the normal construction context, expands knowledge of the engineering performance of local technologies through empirical testing and analysis, and establishes greater awareness among technicians and decision-makers of the potential of vernacular construction. Continuous research and advocacy, for example, by the Catholic University of Peru and others on adobe construction has sensitized a generation of engineering students about earth construction nationally, regionally and worldwide (Hardy et al., 2006). Likewise, research into the conservation of historic stone structures in Italy has provided valuable knowledge for the rehabilitation of traditional housing elsewhere (World Housing Encyclopedia, undated).

Traditional carpenter: learning through inter-generational transfer.
© Maggie Stephenson/ UN-Habitat

However, educating local masons, carpenters and households requires creative engagement with and understanding of local culture. Simplification and illustration of conventional engineering language, for example, into posters is a common approach but may not acknowledge that local units of measurement (for example, in Swahili-speaking areas of Africa, measurements are based on the span of a hand) do not follow engineering conventions (Oliver, 2006). In some building cultures, specialization is fundamental to the preservation of tradition, with formalized terminology and rules; skills are learned and traditional practices sustained through

the repeated copying of agreed models. Models establish not only construction principles but also associated form and design principles which comprise the architectural vocabulary which may endure even as construction technologies change.

The demonstration or model pattern of transmission may be one of the most effective post-disaster. Full-scale construction of test or demonstration buildings is easy to understand, enables inclusive experimentation including modifications with real materials, is accessible for feedback and generates information on time, cost and other aspects which are critical for decision-making by both masons and households. Demonstration buildings can revitalize and valorize local skills when master artisans construct to model standards afforded by supportive sponsors. Participating engineers and architects should be encouraged to learn from the artisans about topics not covered by formal engineering education. The central role of master artisans in this process reinforces their cultural position as reference and best practice. However, master artisans may not be willing to lose their specialist status by sharing knowledge or may not have good communication and mentoring skills, issues which need to be taken into account as part of the cultural context.

BOX 5.4 Tackling corruption

For many years disaster officials have commented on the problems of corruption, such as disaster assistance that is diverted into large pockets or the construction of shoddy, unsafe buildings due to building inspectors being bribed to approve the construction of reinforced concrete beams with missing steel reinforcing bars. However, over recent years, hearsay, gossip and suspicion are being replaced with potent evidence of a 'culture' of corrupt practice with governments and their political leaders and public officials openly being identified.

Transparency International (TI), the German-based NGO, has performed an outstanding service to the global humanitarian community though their investigations and their courageous naming and shaming of those held responsible (Maxwell et al., 2008; TI, 2013). For example, they revealed a massive US$ 500 million shortfall of unaccounted money in the US$ 1.2 billion received as aid by Sri Lanka after the 2004 Indian Ocean tsunami for which the government has never provided any adequate explanation (TI, 2007a; 2007b).

A probing analysis of corruption in Sri Lanka conducted by the Humanitarian Policy Group in 2008 concluded that: "…the vast amount of humanitarian assistance that entered Sri Lanka after the tsunami exacerbated corruption risks…[and] that many politicians at the national, provincial and local levels and other non-state actors used the large influx of resources as an opportunity to increase their political capital amongst their constituencies and for personal enrichment" (Elhawary and Aheeyar, 2008).

Corruption also blights disaster risk reduction in certain countries. Transparency International has stated that 60 to 70 per cent of the £640 million spent by the Pakistan government's Federal Flooding Commission since 1977 has been embezzled. The consequence of this theft, resulting in the failure

to construct vital flood defences, can be partly held responsible for the loss of the 1,600 people who perished in the Pakistan flooding of 2010 (Hunt, 2010).

In 1976, a world authority on engineering seismology, Professor N.N. Ambraseys, began his talk at a Royal Society conference in London on the Guatemala earthquake, where 22,000 people died due to collapsed buildings, with the cryptic statement: "Today's 'Act of God' will be regarded as tomorrow's 'Act of Criminal Negligence'." It took a further 35 years for him, working with another eminent seismologist, Roger Bilham, to substantiate his prophecy and provide conclusive evidence of corruption as a major cause of earthquake deaths and damage: "Of all earthquake fatalities attributable to building collapse in the past three decades, 82.6 per cent occur in societies that are anomalously corrupt." Their explosive conclusion came from an examination of earthquake fatalities in building failures within countries that are assessed as corrupt by Transparency International (Ambraseys and Bilham, 2011; TI, 2013.)

Corruption is particularly rife in reinforced concrete dwellings. Damage assessments conducted in China, Haiti, Pakistan and Turkey reveal that reinforcing steel is regularly omitted from concrete beams and columns, and that cheap sea sand containing corrosive salt is substituted for more expensive quarried sand (Krimgold, 2011).

The United Nations Office for Disaster Risk Reduction (UNISDR) produced a book of advice to journalists covering risk reduction issues and addressed the corruption issue by raising the critical concern that only independent and regular inspection can ensure the integrity of building construction. They noted that: "… the main perpetrators may not be site workers. Pressure for omissions, to cut costs or to save time, may be applied by managers as a consequence of backhanders to obtain the work and to secure the contract, an increase of overheads only redressed by cutting costs and reducing quality in the process" (Leoni, undated).

Actions to prevent corruption

An ambitious series of linked approaches are needed from varied sources and sectors of society to prevent corruption (Davis, 2014):

Education

- Ethical education from primary schools onwards in schools, mosques, temples and churches
- Ethics to be part of the higher education curriculum for building and infrastructure professions
- Ethics to be built into staff training and ongoing professional development
- Training opportunities of enforcement officials by the NGO sector to be expanded.

Professional standards

- Professional codes of practice for engineers and architects established – perhaps using the examples of ethical medical codes
- Governments setting an example of exemplary practice in all their dealings, contracts, buildings, etc.

Adopting anti-corruption practice and procedures

- Tendering procedures for contracts
- Developing building and planning code supervision as a key requirement of governance
- Paying enforcement officials good living wages so that they do not need bribes as income supplements
- Ensuring strong legal support, with sanctions imposed for failures
- Avoiding large contracts where possible, since corruption is minimized when contracts are kept small with tight community financial control and surveillance

- Avoiding 'middlemen' in the allocation of funds: direct cash grants to affected people in disaster reconstruction projects have been found to reduce corrupt interception of grants or loans
- Building specific anti-corruption measures into guidelines: the World Bank's *Safer Homes, Stronger Communities* handbook provides an excellent example (Jha, 2010).

Public awareness to promote advocacy to avoid corruption

- Recognition of the vital role of an informed media, to draw attention to corrupt practice.

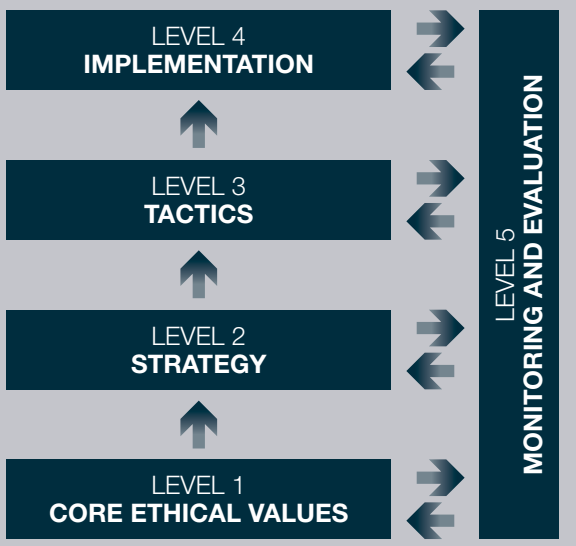
Official pressure from international organizations

- Key agencies responsible for risk reduction and adaptation to climate change (UNISDR, United Nations Development Programme, IFRC, World Bank, etc.) need to boldly build this issue into their agendas and put pressure on countries with serious corruption problems to comply with internationally recognized building practices and standards.

Summary

Given the scale of the entrenched problem of corruption being a major 'risk-driver', valid solutions need to be as wide-ranging, on the lines of the approaches above. Concern followed by actions cannot be confined to government leaders and public officials but needs to extend far deeper into civil society and involve key professions, religious leaders, trade unions, teachers, the media, etc. A concerted commitment is needed from all stakeholders to insist that every project needs to start from an ethical base of core values (honesty and integrity, transparency, accountability, equity, protection of the vulnerable and maintaining professional codes and standards) and not merely from a planning strategy and tactics (see Figure 1). A further ethical concern includes independent supervision of building siting, design and construction to ensure that safety factors are assured and maintained.

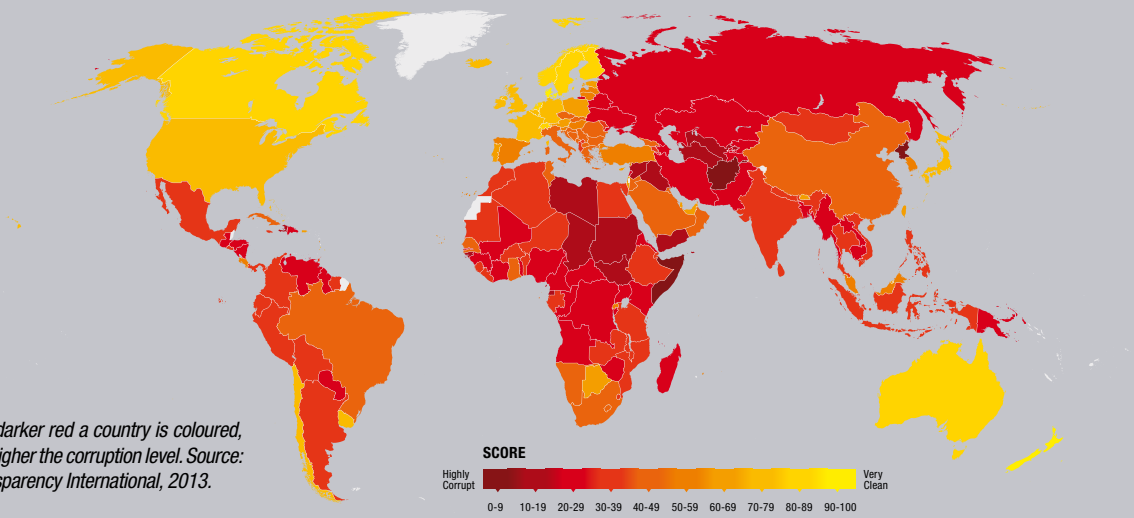
FIGURE 1 Project planning and implementation model



Source: Alexander and Davis, forthcoming.

Just over 200 countries were signatories to the 2005 Hyogo Framework for Action to indicate their commitment to the high ethical ideal of disaster risk reduction. Yet 69 per cent of the 177 countries listed in the 2013 Transparency International Corruption Index (see Figure 2) 'indicate serious corruption problems'. The regional picture is particularly alarming with 95 per cent of countries in Eastern and Central Asia, and 90 per cent of countries in sub-Saharan Africa perceived as having serious corruption problems (TI, 2013). It is now essential to undertake correlation studies of disaster casualties and damage with national corruption levels.

FIGURE 2 Transparency International corruption index 2013



The darker red a country is coloured, the higher the corruption level. Source: Transparency International, 2013.

Despite mounting evidence of widespread corruption in building practices, this deadly 'risk-driver' still awaits the serious attention of international agencies on account of its political sensitivities (Alexander and Davis, 2012).

Corruption needs to be rescued from the obscure sidelines of polite discourse concerning disaster risk reduction and placed centre-stage as a principal concern. It has to be accurately described as a form of criminality that demands urgent international and national action by all who seek to reduce risks. ■

Conclusion: Sustaining cultures

The sustainability of local building cultures including their continued practice after a disaster is closely linked to the sustainability of natural resources used in their construction, including extracted materials like stone and earth, and renewable materials like timber, bamboo and the like. However, increasing pressure on resources has made their continued use in construction controversial, a debate heightened by blaming environmental degradation as a contributing factor in disaster losses. In fact, a disaster may galvanize political and social will to take action to improve environmental management. Where this is a feasible proposal, it may be a key initiative for the assistance community to support. For example, investing in settlement-level mitigation may be more technically and cost effective than focusing on individual household mitigation as, for example, in the case of flood protection.

Critics of traditional construction on environmental grounds tend to miss a number of related issues such as the environmental impact and often poor climatic performance of alternative modern and imported materials, the relative energy efficiencies of modern versus traditional housing, and the potential to increase the lifespan of buildings through improved construction methods, repair and rehabilitation.

Local populations do not make decisions regarding their homes and settlements based on a single criterion. They are balancing social, economic, physical and cultural criteria according to their own preferences and perceived choices. After a disaster, the humanitarian community can distort this decision-making by imposing or prioritizing certain criteria over others, biasing technical over cultural criteria. It is important that external assistance and interventions serve to help people make informed decisions about the built environment but not at the expense of cultural criteria they value more highly than outsiders do.

BOX 5.5 Trees in a tropical lifestyle: a neglected factor in reconstruction

Following a disaster, most agencies involved in reconstruction focus primarily on housing while the importance of preserving or restoring the natural resources that constitute an integral part of human habitats is commonly neglected. Rehousing disaster-affected people in multi-hazard-resistant houses is thus considered the priority, often without taking into consideration local culture, livelihoods and social organization, and how these factors relate to people's natural and built environment. This was the case for example in Tamil Nadu, India, where reconstruction in the aftermath of the Indian Ocean tsunami of December 2004 was characterized by an emphasis on building houses without realizing the importance of trees (Duyne Barenstein, 2010).

Before the tsunami, Tamil Nadu's coastal villages were embedded in a large number and variety of trees whose importance for people's culture and lifestyle can hardly be overemphasized. Like all Hindu communities, fisherpeople consider trees a symbol of life, immortality, fertility and generosity.

Beliefs associated with trees are expressed in practices such as the tree-planting ritual during wedding ceremonies, where the newly married couple jointly plants a tree. Tree products are essential ingredients for the performance of various rituals. They can be sacred, temples where gods reside, or represent human beings who have passed away.

Tree products are extensively used in every home and are also a valued source of income. They are connected to notions of health, protection, beauty and sacredness and are an important source of food, fodder, medicine and construction materials for housing, furniture and utensils. The products of trees are often sold to complement the income earned from fishing. For elderly men and women who can no longer engage in fishing and related activities, the products of trees may constitute their main source of income. Trees are a source of fodder for goats, which are a particularly important livelihood resource for widows and elderly people; they may be considered as poor people's savings as they can be sold in times of stress.

Trees are also related to the need for protection. In cyclone-prone areas they provide protection from the recurrent strong winds and many people were saved from the tsunami by holding on to trees. Trees surrounding houses provide privacy and are often planted in rows to grow into natural fences, to demarcate the homestead plot and also to serve as landmarks.

Mending nets in the shade of the trees in a Tamil Nadu village, India.
© Jennifer Duyne Barenstein

But perhaps the most important role of trees in coastal Tamil Nadu is to provide shade and thermal comfort (Duyne Barenstein and Pittet, 2013). In a tropical climate, the importance of shade cannot be overemphasized. Fishing communities' lifestyle is closely related to the availability of shaded areas; most of their productive and recreational activities take place outdoors under the shade of trees and, during the summer months, people often sleep outside. Trees define community spaces where people meet and nurture their social cohesion. Men traditionally mend their nets collectively under the shade of trees, while women and children relax and play under the shade of trees after completing their domestic chores. Under the trees people share information, joys and sorrows, and provide each other emotional support.

Most agencies involved in post-tsunami reconstruction did not recognize the fundamental importance of trees for coastal communities' well-being. Due to the need to maximize the number of houses to be built in a plot and to enable contractors to build more efficiently, in many villages thousands of trees were felled, while many new settlements were built on saline soils where no trees can grow. People thus found themselves in concrete houses with RC flat roofs in grid-patterned settlements without any trees and no shade. The absence of trees was described by many villagers as one of the worst consequences of agency-driven reconstruction as it was perceived to have severe consequences on their health, livelihoods and well-being. People commonly describe their new habitats to be "burning like fire" and associate

many of their health problems such as frequent fever, headaches, jaundice and skin diseases with the absence of trees and the fresh air and breeze that they used to provide. Many elderly people are severely affected by having lost an important source of livelihood. Due to lack of space and fodder, keeping goats has become very difficult. The loss of trees also affected people's diet; they now eat fewer fruits because they need to be bought, brought from other places and are expensive. The exchange of fruits and other tree products among relatives, friends and neighbours was previously a common practice that also contributed to social cohesion.

The felling of trees led to an annihilation of community spaces, which had detrimental effects upon the well-being of the people: loneliness, boredom, physical and mental health problems, worry about children, discomfort, tension, alcoholism, deep sadness and a sense of uprootedness were experienced by many people and were directly associated with the loss of the trees and related community spaces. People not only felt lonely, but actually can no longer rely upon reciprocal help, at least not to the same extent as before. What took place under the trees was not merely a sharing of news and fostering of friendship; the bonds created translated into a personal feeling of security and materialized in the various favours people performed for each other every day. The loss of community spaces has led to reduced interactions among people and to the weakening of social capital. For example, it used to be common and important, in particular among women, to borrow and lend each other small sums of money. The distance among them caused by the absence of communal spaces has now made it very difficult, if not impossible, to borrow money from others (Naimi-Gasser, 2013).

If reconstruction agencies had given more importance to understanding the local culture and life-styles they would have realized the fundamental role of trees, that coastal communities have a strong housing culture and building capacity, and that with adequate support they would have been able to rebuild their villages by themselves. Sensitivity to people's needs and capacities would have resulted in more serious attention being paid not only to the construction of houses, but also to the social, economic and cultural significances of private and public spaces and to the many important functions of trees. ■

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