

# ***Rapid Environmental Impact Assessment in Mega City Disasters: Issues and New Tools***

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## ***ABSTRACT***

*Disaster operations in a mega city pose challenges in assessment, the rapid provision of appropriate assistance and survivor participation in these efforts. These challenges are all the more complicated by the complex linkages between a disaster and the environment. The standard environmental impact assessment process is not suited for disaster conditions. Until recently, there was no best practice method to rapidly identify and rank environment-disaster linkages during relief operations. The newly developed Rapid Environmental Impact Assessment in Disaster (REA) process addresses this gap in assessment tools. The REA can contribute significantly to reducing unwanted and unanticipated negative environmental impacts during and after a disaster in a mega city. The REA is based on assessments by assistance providers and disaster survivors leading to a single prioritized list of critical environmental issues to be addressed. The paper identifies specific ways in which the REA can help to improve relief operations in a mega city disaster, particularly by reducing the complexity of the combination of disaster and environmental issues, and highlights applications to Asian mega cities. Technologies such as GIS, remote sensing and PDAs can support REA use in a mega city. The paper concludes by pointing out that the REA is designed to be simple. Technology can make doing an REA easier, but the use of technology should not make the REA more complex.*

## **1. INTRODUCTION**

Mega cities and the environment are two very complex systems. Considering both together makes for a system of even more complexity. Still, this complexity can be disassembled through the use of a variety of tools and approaches to identify and define causal and contributing linkages and issues.

The disassembly process can lead to a better understanding of how urban areas and the environment are interlinked and how changes in one system can affect, positively or negatively, the other system. In turn, this understanding can lead to actions beneficial to the individuals which make up a mega city. This approach works in normal times, but doesn't work

quite as well in times of disaster or other crisis, when the environment and social and physical structures of a mega city are out of kilter and data collection and analysis difficult.

This paper considers how a disaster in a mega city is different than a normal disaster and how incorporating the environment into disaster assessment planning and operations is also different than the normal environmental impact assessment process. Unless what is different about mega city disasters is incorporated into disaster operations these operations will be less than optimally efficient. Until the environment is incorporated into disaster assessment and operations, assistance efforts risk being inappropriate and ineffective, and also risk doing more harm than good.

## **2. THE CHALLENGE OF MEGA CITY DISASTERS<sup>1</sup>**

What makes disasters in mega cities different from disasters in other types of settlements? Evidence of a difference is mostly circumstantial and focuses on how mega cities are physically and socially different from smaller cities and how disasters in mega cities have differed from disasters in other types of settlement.

One set of defining characteristics of a mega city is the size and concentration of its population. A disaster in a mega city can cover a small area but have a major impact in numbers affected and physical damage done.

A disaster in a mega city can also have a significant knock-on effect. For instance, damage to an electrical system due to flooding in one part of a city can disrupt mass transit in other parts of the city. Since a mega city is a social and economic focal point for a large periphery, knock-on impacts can affect an area much larger than the city alone.

In contrast, mega cities can absorb a considerable level of damage and still remain functional, even to the extent that parts of the city show no visible evidence a disaster has occurred elsewhere in the city. This capacity to absorb damage comes about because of the scale of physical and human resources available to address and limit disaster impact. These resources can make a mega city extremely resilient in the face of disasters which would overwhelm other types of settlements. (See Godschalk, 2003, on urban resilience.)

The human aspect of a mega city is of considerable importance. The social and economic conditions and level of services of mega cities residents can vary considerably and be spatially heterogeneous with poorer and wealthier living in close proximity. The diversity makes defining impact and

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<sup>1</sup> Section based on Kelly (1995), Kelly (1997) and Mitchell (1990).

needs following a disaster difficult. It can also make the fair provision of relief assistance a challenge.

Mega cities generally contain a large number of people on the move. These transients, ranging from street citizens to wealthy tourist, often live outside local social networks and the coverage of normal government services (Wisner, 1996; Drabek, 1996).

Transient populations can be at considerable disadvantage in a mega city disaster. For instance, most tourists have little idea of local geography or safety systems of the foreign mega city and are not normally covered in emergency plans. As a group transient populations can place special demands on emergency services during and after a disaster.

Mega cities have high media visibility. Even a small disaster in a mega city can draw considerable media attention and (often) associated political interest. This visibility can make securing assistance easier for the simple reasons that more people will be aware of a mega city disaster and thus more people potentially interested in providing assistance. But this media visibility has the disadvantage of drawing attention away from other locations outside the mega city, as well as less visible social groups in a mega city, which have suffered greater harm from a disaster.

One area in which mega cities are not usually different from other types of settlement is that disaster survivors help themselves and outsiders help the survivors despite the social, economic and other differences which may have existed before the disaster. The exception is conflict, such as war or rioting. But even in conflict, the size and diversity of a mega city can significantly reduce disruptions to social systems, permitting a degree of positive social response in a conflict disaster.

### **3. CONSIDERING ENVIRONMENTAL ISSUES IN DISASTERS<sup>2</sup>**

It is clear that environmental conditions and impacts are important to consider when undertaking any major activity. Experience has shown that not considering the environment in a major undertaking usually leads to unanticipated negative impacts. These impacts can negate or even lead to the destruction of the activity undertaken.

The normal, non-disaster, approach to identifying possible negative environmental impacts is through an environmental impact assessment (EIA) process. However, as Figure 1 indicates, an EIA is not appropriate for use in disasters.

At root, the problem is that an EIA is based on a deliberative process intended to collect and weight all possible data to define, as precisely as

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<sup>2</sup> The following is based on Kelly (2003) and Kelly (2001).

possible, positive and negative impacts. The EIA process is not rapid, not designed to operate in hectic work environment and not able to handle incomplete or rapidly changing information, all conditions characteristic of a disaster.

The gap between normal and disaster conditions has long been recognized, and tools and procedures for a variety of disaster assessment requirements have been developed. However, until recently, there was no specific tool to consider environmental conditions in disasters.

**Figure 1: Contextual Differences: Normal & Disaster Environmental Assessments**

<u>Normal Conditions</u>	<u>Disasters</u>
<ul style="list-style-type: none"> <li>• Considerable lead time</li> <li>• Legal requirement often exists</li> <li>• Deliberate &amp; pro-active</li> <li>• Will take time, be thorough &amp; extensive: comprehensive data collection</li> <li>• 'No project' option is a possible outcome</li> <li>• Location chosen</li> <li>• Duration planned</li> <li>• Beneficiary population identifiable &amp; static</li> <li>• Environmental goals may be made compatible with socio-economic ones</li> </ul>	<ul style="list-style-type: none"> <li>• Sudden onset</li> <li>• Rarely a legal requirement but some donors may ask for it</li> <li>• Reactive</li> <li>• May need to be partial in coverage</li> <li>• 'No project' outcome is not an option</li> <li>• Unpredictable location</li> <li>• Uncertain duration</li> <li>• Beneficiary population heterogeneous &amp; dynamic</li> <li>• Priority given to 'life saving' activities sometimes difficult to reconcile with environmental goals</li> </ul>

Source: UN High Commission for Refugees and CARE International

#### **4. RAPID ENVIRONMENTAL IMPACT ASSESSMENT IN DISASTER<sup>3</sup>**

While an EIA is not appropriate in a disaster, the potential for negative links between disasters, the environment and disaster relief is real and requires resolution if at all possible. The key step in addressing these negative links is to identify and prioritize potential problems through an assessment process which matches the nature of disaster conditions. This process needs to be:

- Rapid,
- Easy to use in disaster conditions,
- Adapted to situations of incomplete data,

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<sup>3</sup> Based on Kelly (2003) and Kelly (2001).

- Include input from communities as well as relief organizations, and,
- Repeatable.

A rapid environmental impact assessment in disasters process, the REA, has been developed to meet these requirements under disaster conditions. The REA, a collaborative output of Benfield Hazard Research Centre and CARE International,<sup>4</sup> is structured around four modules: (1) **Organizational Level Assessment**, (2) **Community Level Assessment**, (3) **Consolidation and Analysis** and (4) **Green Procurement**.

The REA uses a subjective approach to data collection and analysis because, in a disaster, complete sets of quantitative data are uncommon. The REA includes input from relief organizations and disaster survivors. Survivors are clearly important to the REA process for reasons of participation and because a significant part of the relief and recovery actions are taken by survivors.

Although designed as a rapid process, the REA considers a wide range of possible environment-disaster linkages, including:

- Conditions before the disaster.
- The context of the disaster's impact on the survivors and neighbors.
- The threats of damage to the environment arising from the disaster.
- The degree to which victims' basic needs are being met.
- The potential negative impact of outside and survivor relief efforts.
- The greenness, or sustainability, of procurement actions

It can be argued that only specialists should be involved in a review of environmental conditions. But massing a complement of experts representing all major environmental fields, and asking them to make decisions based on incomplete information, is unlikely to be timely or efficient. Using just one expert carries the risk that this expert will focus solely on their area of expertise and miss other, possibly more important, environmental issues, a finding of the UN High Commission for Refugees in their operations in Tanzania.

The REA process is designed to be simple and focus on a consensus identification of salient environmental and disaster issues to generate a prioritized action list based on a wide review of environment-disaster linkages. This list creates a starting point for:

- Common sense actions to address issues identified,
- Securing specialized technical assistance if needed, or,
- Advocacy for action by another party to address critical issues.

This approach allows for specialists to be involved in the assessment process, but only after an initial identification of issues and actions. While

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<sup>4</sup> Funded by UNEP/OCHA, USAID, Royal Norwegian Ministry of Foreign Affairs, and CARE International.

there is a risk of the REA identifying issues which are not really critical, the subsequent involvement of experts engaged to address specific issues can help re-direct efforts to more appropriate concerns if this is necessary.

The REA has been formalized into the *Guidelines for Rapid Environmental Impact Assessment*, available along with other related documents, at:

[http://www.benfieldhrc.org/SiteRoot/disaster\\_studies/rea/rea\\_index.htm](http://www.benfieldhrc.org/SiteRoot/disaster_studies/rea/rea_index.htm)

## 5. APPLYING THE REA IN MEGA CITY DISASTERS

The most obvious application of the REA in a mega city is to reduce the complexity of the disaster-environment situation. The REA has been shown to be a good tool for identifying possible environmental impacts across a range of sectors. This outcome results from the fact that the environment is near all-encompassing. Experience suggests that few other disaster assessment tools have the same scope of coverage as found in the REA.

The REA functions through a process which links the views and perspectives of assistance providers with the disaster survivors. This facet of the REA is important in a mega city where large numbers of survivors and assistance providers can be expected.

A danger, common to all disasters but exacerbated in a mega city, is that the survivors and assistance providers will get out of sync in their relief efforts, resulting in inefficiencies and conflict. The REA can minimize this problem by bringing together the views of both groups and generating a single list of environmental issues and actions related to the disaster.

The REA clearly has a key role in directing relief efforts to the most salient environmental issues. It is to be expected that (1) Significant environmental issues exist in many mega cities before a disaster; (2) Some of these issues are closely linked to the disaster, and, (3) Addressing some of these issues is critical to the relief and recovery process. The REA provides results which can direct assistance to the more salient of these issues even in the middle of the chaos of a mega city disaster.

Using the REA in a mega city disaster does present challenges. A major challenge is the time and effort needed to conduct a REA. Experience in non-mega city disasters indicates that basic REA results can be generated in less than six hours by one person, or can require up to two weeks and a staff of tens of individuals if a full scale community survey is conducted. In reality, the time needed for a REA is somewhere in between, particularly as a large part of the REA can be based on information collected in other assessments.

In fact, a mega city REA should be conducted on a repetitive basis, with each repetition based on the newest information available. This takes

advantage of the large flows of information commonly associated with a mega disaster, and recognizes that assessments need to change as conditions of the disaster and recovery process also change over time.

Another challenge to the REA process in a mega city is to assure community input to the assessment process. Ideally, this input comes through group meetings in which participants are able to express their views with as little outside structuring as possible. In a mega city disaster, trying to suspend relief operations (and other essential social and economic activities) to conduct socially representative group meetings is impractical.

However, the REA is a best practice process rather than a hard-and-fast procedure. While semi-structured group meetings may be suggested in the *Guidelines*, short questionnaires administered on a random basis are equally acceptable (if based on a representative sample) as input into the assessment process. The REA focus is on getting quick and representative input rather than on being a slave to one method or procedure.

## 6. CLOSING COMMENTS

The REA is at the lower end of complexity when it comes to technical tools used in disaster management. This simplicity is intentional.

This does not mean that the REA cannot take advantage of complex technological tools. A clear link between the REA process and remote sensing is evident. The use of geographic information systems (GIS) to record and reference the often overwhelming but rarely complete wealth of environmental data produced in a disaster can make doing an REA easier.

A GIS can also make repeating an assessment and the integration of results into decision making and disaster management systems easier. Graphic GIS outputs are useful in collecting information from survivors about environmentally unique locations and passing on this information to assistance providers.

Automating the REA process has been suggested, ranging from developing macros for the rating tables at the heart of REA to having the whole process run automatically. So far, there is a strong tendency to keep the REA as simple as possible. However, it is likely that turning the REA forms into macros and loading the *Guidelines* and references onto a Personal Data Assistant (PDA) would make the REA easier to use in some field settings. But the adoption of technology should not diminish the fact that the REA is designed to be as simple as possible.

The REA's advantage is in reducing the complexity of disaster-environmental linkages to simple issues and actions, which has clear advantages in dealing with mega city disasters and the environment. The advantages which simplicity brings to complex operations, as well as the

REA's role in promoting survivor participation, should not be lost in efforts to find more uses for technology.

Finally, this paper has not directly discussed the use of the REA in Asia. The diversity of Asian mega cities requires extensive analysis on which to base such a discussion, something outside the scope of this paper.

However, as a de-complexing tool, the REA provides a way to handle pre-disaster environmental issues related to a disaster and to promote survivor participation. This application is likely very useful in Asia mega cities with serious existing environmental problems and which have socially and economically diverse but heterogeneous populations.

Similar benefits can come with from using the REA in more socially and economically homogenous Asian mega cities. These cities often face an overload of information where the de-complexing aspect of the REA can come to play. While pre-disaster environmental issues may not be significant, citizen concerns about environmental impact of the disaster and recovery efforts may be important. The REA process can incorporate this input into the assessment and action prioritization process.

In the end, the REA is a process which can be adjusted to reflect the characteristics of the mega city, environment and disaster to which it is being applied. No two mega cities or disasters are the same, and the REA can be adapted to these differences to improve the identification and response to environmental issue during disasters in mega cities.

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