# Integrating environmental safeguards into flood relief, response and recovery

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Cover Photo: http://www.timesunion.com/world/slideshow/Pakistan-floods-1271.php#photo-10
Pakistani villagers, along with their cattle, wade through a flood water to safe area in Alipur near Sukkar on Tuesday, Aug. 10, 2010. The picture highlights the relationship between humans and animals.

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Pakistan has been affected by the worst floods in living memory – according to government figures almost 14 million people have been affected. When a disaster of such magnitude occurs, saving human lives, alleviating suffering and reducing economic loss take priority. During this phase of disaster management – **relief and response** - emergency needs, water supplies and sanitation, food aid, setting up shelters, health needs must be supplied in the shortest possible time.

Environmental issues are never considered during this phase. Barring rapid environmental assessments that are carried out in the aftermath of a disaster, at best, the role of biologists is minimal; at worst, non-existent during this period. At this stage, environmental concerns are seen as an unwanted luxury. This view is held even by many biologists concerned with environmental issues.

However, it can not be over-emphasised that during this phase, much environmental damage can be caused, endangering the sustainability of recovery and, in turn, rebuilding. During this phase, there can be a great deal of over-exploitation (for example, of timber) and much habitat destruction (for example, clear-felling forests to make temporary shelters) because the immediate goal is to get roofs over people's heads, at whatever cost. Also during this phase, the rush to get food and other emergency supplies also results in much environmental damage. Often, these supplies have to be packed in non-degradable packing such as plastic. Irresponsible disposal of large quantities of such waste can create enormous ecological and health problems. Debris created by the hazard is often cleared into ecologically sensitive habitats - such as lagoons and wetlands - that sustain livelihoods, or protected areas - that provide other ecosystem services - causing further damage.

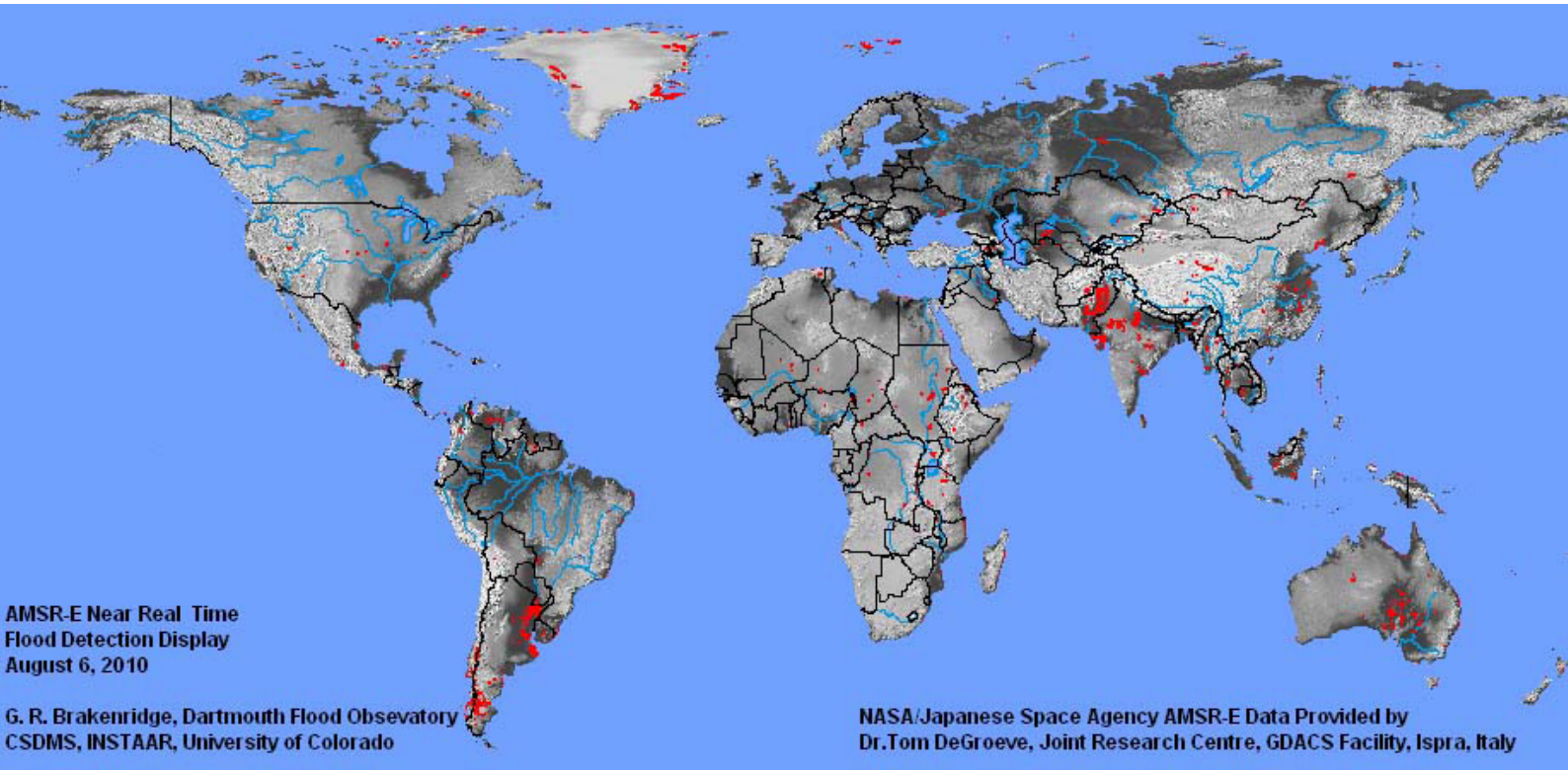
Floods occur when usually dry areas on banks of rivers, streams, lakes, or coastal areas become submerged with water. Floods can be set off by severe thunderstorms, tornadoes, tropical cyclones, monsoons or melting snow.

In coastal areas, storm surges caused by tropical cyclones, tsunamis, or rivers swollen by extremely high tides can cause flooding. Floods occur in both dry and wet environments and in mountains and lowlands. In dry areas, especially those situated at the base of mountain ranges, flash flooding[1] can occur. This is an extremely dangerous type of hazard resulting from intense rainfall in a short period of time that moves, at high speed, downhill.

In temperate regions around the world, spring floods are common and occur because of melting snow. In tropical regions – particularly in Asia - monsoons bring heavy rains that cause recurrent floods (Miththapala, 2008). The Pakistani floods have been the result of heavy monsoonal rains.

'The primary cause of urban flooding is a severe thunderstorm or a rainstorm proceeded by a long-lasting moderate rainfall that saturates the soil. Floods in urban conditions are flashy in nature and occur both on urbanised surfaces (streets, parking lots, yards, parks) and in small urban creeks that deliver water to large water bodies. Other causes of urban floods are:

- inadequate land use and channelisation of natural waterways;
- failure of the city protection dikes;
- inflow from the river during high stages into urban drainage system;
- surcharge due to blockage of drains and street inlets;
- soil erosion generating material that clogs drainage system and inlets; and
- inadequate street cleaning practice that clogs street inlets' (Andjelkovic, 2001).




August 6 2010: distribution of floods in the world (Source: http://www.dartmouth.edu/~floods/index.html)

[1] Flash floods can occur after a period of drought when heavy rain falls onto very dry, hard ground that the water cannot penetrate.

## Why is the environment necessary for sustainable living?

The benefits that we amass from the Earth are enormous. The natural environment (ecosystems in a narrower sense) provides us with many services. These ecosystem services can be categorised broadly as: Provisioning services, Regulating services, Supporting services, and Cultural services.

*Provisioning services:*
These services cover the natural resources and products – goods – obtained from ecosystems. Such goods include food, wood, medicines, fuel and fuelwood, fibre and non-timber forest products. Ecosystems, therefore, provide the basis for many industries: agriculture, livestock, fisheries, lumber, and pharmaceuticals, to name a few. They also provide the basis for a multitude of livelihoods.

*Regulating Services:*
These are the benefits obtained from the regulation of ecosystem processes, such as, for example, climate and flood regulation.

*Supporting services:*
These are ecosystem services that are necessary for the production of all other ecosystem services. For example, the production of biomass, balancing gases in the atmosphere, formation of soil, degradation of waste, nutrient and water cycling and pollination.

*Cultural services:*
These are non-material benefits people obtain from ecosystems through spiritual enrichment, development of learning, recreation, and aesthetic experience.

All these ecosystem services are not only of direct value to humans, but they also offer indirect benefits by supporting and promoting the natural resource base upon which livelihood and economic activities are based.

***The bottom line is that without ecosystems, humans can not live. In short, in order to achieve human well-being, it is essential that we also have ecosystem well-being. This is the link that underpins sustainability of livelihoods and of development.***

Yet this link is being threatened by various actions of humans and ecosystems and the services that are obtained from them are being damaged and degraded.

The environment is being damaged and degraded by

*1. Over-exploitation:*
Humans are, simply, taking too much out of ecosystems, for food, medicines, as pets, as ornamentals and for other purposes. The demand for fish as food for people is increasing, resulting in major collapses of some fisheries industries. About 75% of the world's commercial marine fisheries are either exploited fully (50%) or over-exploited (25%) (MA, 2005).

*2. Habitat change:*
Almost all of the world's ecosystems have been changed by humans. Changes in the last 50 years have been more than in any other time in recorded history. More land was converted to cropland between 1950-1980 than in the 150 years between 1700 and 1850. Twenty percent of coral reefs all over the world are already destroyed and another 20% are degraded. Tropical rain forests are lost at the rate of one hectare per second (equivalent to the extent of two U.S. football fields). Up to 80% of original mangrove ecosystems and 50% of the world's wetlands are already degraded and lost (MA, 2005).

*3. Climate change:*
The result of excessive greenhouse gas emissions and increased greenhouse effect is a distinct warming of the earth. This global warming is causing climate change: melting ice caps, changing weather patterns and ocean currents, increasing extreme weather events and spread of disease. Climate change, therefore, is causing overwhelming changes to ecosystems and their services.

*4. Invasive Alien Species:*
Invasive Alien Species are introduced species that do not stay confined to the area into which they were introduced, compete vigorously with native species, become established in natural ecosystems, threaten native species and have the potential of eradicating them. When they eradicate native species and disrupt ecosystem interactions, they damage ecosystem services and cause severe economic damage (IUCN, 2000).

*5. Pollution:*
Ecosystem degradation and loss has had serious impacts on human well-being in the Asian region. Since 1950, increases in nitrogen, phosphorus, sulphur, and other nutrient-associated pollutants (often fertilisers) have become one of the most important drivers of ecosystem change. Other forms of water pollution such as domestic, industrial and marine pollution is further degrading ecosystems and damaging their services. The accumulation of non-degradable solid waste (which attracts disease carriers, pollutes groundwater and rivers and generates methane) is also adding considerably to the problem of ecosystem degradation.

**Best practice guidelines for integrating environmental safeguards into relief, response and recovery**

We propose a simple foundation, where every action taken during the phase after floods have struck, is examined under five topics as described below.

Ecosystem well-being = Human well-being

Therefore, if ecosystems are affected negatively, then human well-being is also affected negatively

Are there threats to ecosystems from our actions?
- Over-exploitation?
- Habitat Destruction?
- Pollution?
- IAS?
- Climate change

**During the Relief Phase:**

*1: Avoid contamination from pollution.*

The most immediate environmental threat from floods is contamination. Flood waters will contain of contaminants, toxins, and sewage. There may also be sharp objects.

• Avoid coming in contact with the water or contaminated surfaces.
• Once the flood waters recede, isolate and treat human sanitary waste.
• Once the flood waters recede, isolate and treat toxic chemicals and sources of pollution.
• Once the flood waters remove and dispose safely of sharp objects.

*2. Minimise chemical pollution.*

• Use absorbent material to capture spills.
• Construct bunds around spills.
• Segregate contaminated material, store in appropriate containers, and label correctly and completely.
• Site temporary storage areas away from natural habitats, the sea and historical/archaeological sites.
• Remove soil showing visible signs of contamination.
• Use waterproof material to cover contaminated soil which cannot be removed immediately.

*3. Stabilise surfaces.*

As waters recede, paths, road surfaces, bridges, buildings, homes, and other structures may be still unstable.

• Once the flood waters recede, check whether surfaces are stable.

*4. Minimise water pollution*

• Build toilets only in locations identified according the Sphere Standards: Humanitarian Charter and Minimum Standards in Disaster Response.
• Manage waste water according the Sphere Standards: Humanitarian Charter and Minimum Standards in Disaster Response.

*5. Minimise solid waste pollution.*

• Dispose of solid waste at locations identified for solid waste disposal. These areas must be identified by respective DCOs. Solid waste disposal should not be haphazard.

• Start a process of separating degradable from non-degradable waste and recyclable and reusable waste.
• Ensure that incineration is not used as a method of waste disposal, as this contributes to global warming and air pollution.
• Actively train persons at shelters to dispose of waste responsibly.
• Provide safety training and involve communities in sorting waste.
• Ensure that those who are engaged in clearing debris have adequate protection in the form of gloves and boots as well as anti-tetanus coverage.

**Guiding principles of Solid Waste Management:**

• Waste needs to be separated into biodegradable (vegetative) waste and non-biodegradable in a rapid manner.

• Waste needs to be disposed of safely, both for humans and for the environment.

• Recycle and reuse wherever possible.

| Type of waste | Potential use | Comments |
|---|---|---|
| Non-biodegradable waste | | |
| Construction and demolition debris: such as aggregates, gypsum, tiles, asphalt, concrete, bricks, road masonry and stone. | Reuse tiles and bricks wherever possible. Impact and use for landfill and for road bases. | The debris should not contain hazardous chemicals or by-products. |
| Wood | Use in reconstruction or as part of vegetative matter. (See below.) | |
| Dirt (non-specific, including sand deposited by the floods) | Use as fill for potholes and eroded areas. | The dirt needs to be screened to remove other waste products. |
| Plastic (non-specific) | Send for recycling. | The debris should not include hazardous chemicals. |
| Metal (all types) | Send for recycling. | Cut or crush for easy transportation. |
| Asbestos | For careful disposal. | Should be handled very carefully when wet, bagged and buried. Masks should also be worn when handling asbestos. |
| Glass | Send for recycling. | |
| Biodegradable waste | | |
| Vegetative waste, paper, spoilt food items etc. | Compost for land regeneration | Most waste should be shredded before composting in order to quicken the composting process. |
| Adapted from: Pasche and Kelly (2005), in IUCN 2005. | | |

*6. Avoid over-exploitation of natural products.*

• Ensure that fuelwood and timber are obtained according to legally managed, plantation forests and not simply extracted unsustainably from the nearest natural habitat.
• Ensure that natural resource extraction for shelter and food is carried out according to existing legislation.

*7. Avoid unplanned habitat change.*

• Put up shelters only in areas that have been identified for the purpose.
• Avoid clearing natural habitats if they have not been identified for clearance.
•Avoid destroying connectivity of existing habitats.

**During the Recovery and Rebuilding Phases:**

**Recovery** is the activity that returns humans and built infrastructure to minimum living/operating standards and guides long-term efforts designed to return life to normal levels after a disaster. This includes building temporary housing and provision of basic household amenities.

**Rebuilding** is the long term response to a disaster. In this phase, permanent infrastructure is rebuilt, ecosystems are restored and livelihoods are rehabilitated.

*1: Ensure that a post-disaster integrated assessment is carried in order to obtain a complete picture of the state of the ecosystem well-being and human well-being after the floods.*

• If baseline data are available, comparison with these data will allow for clear analysis and informed decision-making.

*2: Ensure that there is no over-exploitation of species.*

• For example, is timber and sand extraction sustainable and legal?

*3: Ensure that existing legislation is followed.*

• Sometimes there are only a few laws related to building and protected areas; in contrast, sometimes there are a plethora of relevant laws. Be familiar with them.

*4: Ensure that proper design standards are followed.*

• Avoid using designs that are not appropriate and lack use of environmentally-friendly materials and climate-proofing.

• Avoid forcing culturally unsuitable designs onto communities. i.e., designs should be drawn up with community input.

• Ensure that gender concerns are integrated into designs, while making them environmentally-friendly and climate-proof.

*5: Minimise habitat change.*

• Ensure that sensitive areas/ecologically and economically valuable areas are not cleared for buildings or resettlements.

• Ensure that coastal/mountain morphology is not changed by built infrastructure.

*6: Minimise pollution.*

• Check whether contamination from the flood has been cleared completely.

• Check whether the area is being polluted by the process of rebuilding and restoration.

• Check whether there is collection of non-biodegradable solid waste.

• Check how solid waste is being collected and disposed.

• Check whether an effort is being made to reduce, reuse and recycle waste.

• Check whether the air is being polluted by the process.

• Check whether air pollution control measures are in place.

*7: Be careful about disposal of debris.*

• Before disposing debris, contact the relevant authorities for identification of recommended disposal sites.

• Prevent irresponsible dumping of waste.

• Provide safety training and involve communities in sorting waste.

*8: Create awareness among communities about responsible disposal of waste.*

• This is very important for long term mitigation.

*9: Prevent the spread of invasive alien species.*

• Check whether IAS are spreading. Building equipment is known to a mechanism through which IAS spread.

*10: Ensure that water is not polluted.*

• Are resources protected from further contamination, such as faecal waste?

• Are organic and inorganic debris disposed of in a proper manner so that water bodies are not polluted?

• Do housing and new construction ensure good sanitation facilities and sewage systems?

• Do construction designs ensure good drainage systems in place as approved by relevant local authorities?

*11: Ensure that measures are taken to mitigate the impacts of and to adapt to climate change.*

• Are communities that are most vulnerable to natural disasters identified?

• Have women been identified as an important group for climate change mitigation and adaptation?

• Are energy conservation measures being adopted? For example, is there through-flow ventilation in hot climates? Are energy-saving bulbs and alternate energy sources-such as solar power-being used where ever possible?

• Are water conservation measures are being adopted? For example, in drought prone areas, is there provision for rain water harvesting?

• Is waste water managed hygienically? Are toilets being built at safe distances from drinking water sources?

• Are environmentally-friendly materials used as much as possible?

*12: Ensure that ecosystems and natural habitats are conserved, restored and created.*

• Are efforts being made to replant and landscape during structural changes?

• Is ecosystem restoration being carried out with reference to existing national laws and with reference to existing resource maps?

• Is ecosystem restoration being carried out by matching local needs and priorities the services that ecosystems provide, rather than implementing land use patterns in a top-down manner?

• Are native, multiple-use and locally beneficial species being used while carrying out restoration?

- Are efforts being made to ensure that replanting is carried out only in suitable areas? For example, mangrove replanting in many areas in Asia was carried out in areas where there previously had been no mangroves or where sand dunes - essential for the prevention of coastal erosion - were flattened for this purpose.

- Are efforts being made to ensure that only indigenous species - native to the specific area - being used? For example, using plant species found in the wet zone of a region to replant areas of the dry zone will be doomed to fail, as these plants will lack adaptations necessary for the dry zone.

- Are efforts in place to ensure that identified IAS are never used?

- Are all relevant government departments - such as the Forest Department, the Coast Conservation Department, Environmental Authority, Urban Authority and the Department of Wildlife Conservation - consulted from the beginning and do they play a central role in restoration together with the local communities?

- Is a landscape approach to restoration adopted? Ecosystems do not function as closed units but as open systems that are affected by ecological process that occur on a larger scale. Because of this, it is necessary to look at the broader picture, not just the specific restoration site alone.

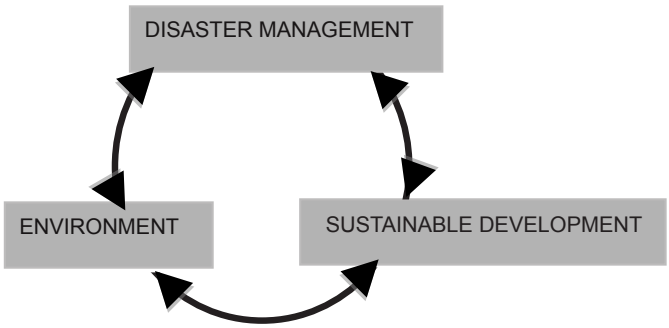
There should be a checklist of environmental safeguards for every step of disaster management. These checklists can be for a given location or a given hazard, but should use the steps provided in this manual as a guideline. The ultimate goal is to incorporate environmental safeguards into both disaster management and sustainable development.

The entire global community or civil society - which includes, *inter alia*, donors, policy makers, governments, communities, development agencies, humanitarian agencies, the private sector, media and academics - must be sensitised to this need. In order to do this, advocacy, awareness and science-based knowledge generation - that result in changes in governance - are essential. Empowerment through capacity building, institutional strengthening and training makes this possible.

A knowledgeable and empowered civil society will know how

- to sustain healthy ecosystems that facilitate the reduction of natural disasters;
- to facilitate sound practices of land use planning;
- to reduce social, physical, attitudinal and environmental vulnerability to natural disasters;
- to safeguard livelihoods;
- to ensure human well-being;
- to empower highly vulnerable groups;
- to enhance overall resilience; and
- to have access to the right to information and services.

The end result should be that environmental safeguards are integrated not only into disaster risk management but also into every facet of development.

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