Floods Fact Sheet

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Some basic facts on flooding

➢ Rainfall, topography, soil and global change

Precipitation or rainfall is the single most important input and driving force to a watershed system where the shape and features of the watershed determine the area where water is gathered, the route water takes and the speed or rate at which it flows. Rainfall also determines how much water will flow in a stream or river. Rainfall distribution, frequency and intensity determine the continual flushing out of the underground water to streams and rivers.

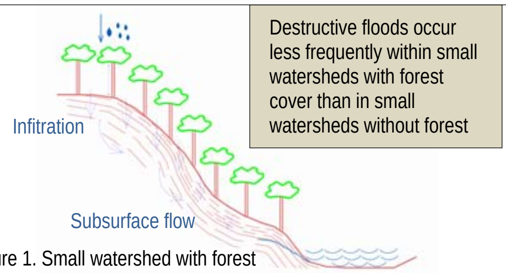


Figure 1. Small watershed with forest

Floods are due to intense short-term (hours) or long-term (days) rainfall. During prolonged downpour, the soil soaks up rain water increasingly saturating the soil and rock strata. If the amount of rainfall is way beyond the average, flooding can be expected. Under small storm events, watersheds do not flood while delivering water via the water table and streams to the main river. However, more catastrophic flooding will occur when during an extreme area storm of 10 days of continuous rains in a large area.

During intense rainfall, most damaging are the 'peak flows' – the velocity or strength of the water flow at peak flow rates. This is often identified as a 'flash flood' event that devastates an area within hours. Under similar conditions, associated debris is also carried downstream and acts as battering rams that can permanently bury or submerge areas it overflows. The expression 'flooding' has been used generally for events that are more widespread (covering hundreds to thousands of hectares) where water expands, fills and inundates an area for a time. Upon receding, floods leave much sediment and debris behind.

Apart from the peak flow damage, the height of the water and duration that water stays in an area before receding changes the land surface, increasing the instability of an area and its potential for disaster. Dramatic increases in peakflows have been noted after urbanisation or unchecked area development, esp. road construction and repeated burning of vegetation.

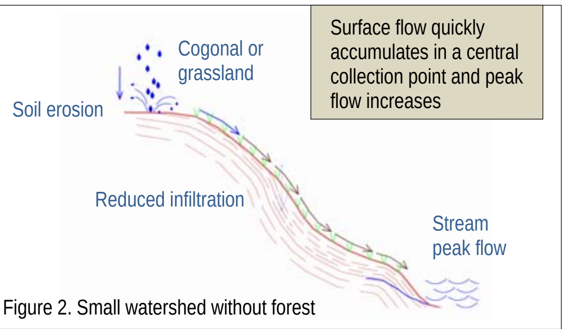


Figure 2. Small watershed without forest

➢ Flooding events and climate change

The El Niño or, more correctly, ENSO (El Niño and the Southern Oscillation) is a set of interacting parts of a single global system of coupled ocean-atmosphere climate fluctuations that come about as a consequence of oceanic and atmospheric circulation. ENSO is the most prominent known source of inter-annual variability in weather and climate around the world (~3 to 8 years), though not all areas are affected. ENSO has signatures in the Pacific, Atlantic and Indian Oceans.

El Niño causes weather patterns involving increased rain in specific places but not in others. This is one of many causes for drought. Along with global warming, ENSO is affecting the climate bringing with it many related phenomena and extreme changes in weather patterns. ENSO and global warming combined with poor land use and water use are aggravating the negative impacts of climate change.

Moisture-Related Phenomena
Intense precipitation events
Wet days
• Increase in number of days at high latitudes in winter and over northwest China • Increase of the Inter-Tropical Convergence Zone • Decrease in South Asia and the Mediterranean Sea
Tropical Cyclone (typhoons and hurricanes)
Increase inpeak wind intensities
Over most tropical cyclone areas
Increase in mean and peak precipitation intensities
Over most tropical cyclone areas, South, East and southeast Asia
Changes in frequency of occurrence
Decrease in number of weak storms, increase in number of strong storms
Extratropical Cyclones
Changes in frequency and position
• Decrease in the number of extratropical cyclones • Slight poleward shift of storm track and assoociated precipitation, particularly in winter
Change in storm intensity and winds
• Increased number particularly in winter over the North Atlantic, central Europe and Southern Island of New Zealand. • More likely than not increase windiness in northern Europe and reduced windiness in mediterranean Europe
Increased wave height
Increase occurrence of high waves in most mid-latitude areas particulary the North Sea

***Figure** 3. A summary of projected regional climate changes related to precipitation or rainfall occurrence, intensity and frequency (Adapted from source : IPCC Fourth Assessment Report (AR4), 2007)*

➢ Forests and flood debate

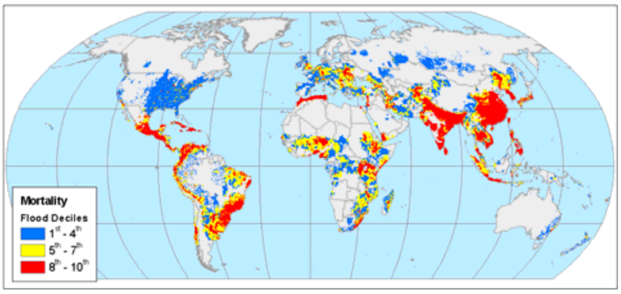
Forests are generally perceived as a "sponge" or better referred to as the "infiltration of water into the soil and on to the water table". The sponge phenomenon does work in small watersheds with forests up to a point and the capacity of forests to serve as a sponge is helpful in watershed management.

In small-scale events, undisturbed forests play a role in reducing surface runoff (water flowing over land) as a result of good infiltration capacities. However, as soil becomes increasingly saturated from previous storm events or prolonged rainfall, the effect of land cover or forest cover becomes insignificant.

Impacts and risks

75%	World population living in areas affected by earthquakes, tropical cyclones, floods or drought
82%	World population affected by floods as communities have been established in flood prone or exposed areas – along rivers systems, on deltas and in coastal areas
196 M	World population exposed on average every year to catastrophic floods
170,000	Deaths associated with floods, 1980 -2000

Figure 4. Global distribution of flood mortality risk



Mortality risk is expressed within a decile range with 10 being the most exposed (Decile 10= est. 300 people/sq. km and decile 9 is around 150 people/sq. km). Source: Mark Pelling, Visions of Risk, UNDP / ISDR, 2004

Eighty two percent of the world's population live in areas where flooding risk is high, usually in areas with a history of flooding such as great river systems, deltas and coasts. These landscapes and the people, whether in urban or rural contexts, are impacted by flooding in many ways. Many cities and towns have been established in high risk areas because the land is fertile and is conducive to agriculture. Economic and political power is consolidated in urban areas where there is access to major waterways to transport and distribute market goods and services to areas inland. With development comes the migration of settlers and expansion of the city or town to the surrounding watersheds.

In Asia, less than half of the population is urban yet 6 of the 10 largest cities of the world are located in this region. Asia's urban population growth rate (2.7%) is the highest in the world. With urban expansion comes the hastened transformation and degradation of natural environments that may create new hazard patterns. The inability of local governments' land-use planning and basic services delivery to cope with rapid population growth means migrants frequently locate in hazard prone locations, in waterways, unstable slopes or dense inner city slums.

The construction of new roads is a major factor in landscape transformation and migration of entire communities to previously uninhabited areas. In this context, heavy and prolonged rains can provoke local floods and landslides, the displacement of communities, and work stoppage. Poor communities suffer the greatest and recover the least from disasters because the risk is tied to a hazardous living environment without any tenurial security and limited access to emergency services, water and sanitation and livelihood opportunities.

In rural areas, where 70% of the world's poor live, the lack of opportunities for tenure and sustainable livelihoods configure the increased risk to hazards such as floods and drought. Especially in the rural uplands, migrant practices have cleared much of the remaining forests through intensive cultivation of mono-species of softwoods, high value crops, mining and grazing with little inputs to land conservation.

Social marginalisation further divests landless migrants and increasingly indigenous communities of access to technical knowledge to sustainably manage the land. Thus, rural agricultural populations are usually unprepared for the risks and impacts of 10 to 50 year events, increasingly including those related to climate change.

What can be done

National governments committed to the millennium development goals increasingly recognise that human development objectives are twined with disaster mitigation establishing community disaster resilience. In flood prone areas, shifting people may not be always practical in the short term because it uproots entire social networks and livelihoods. Therefore, policies addressing disaster resilience should not create another layer of policy but rather move toward implementing policies in place.

Long term pre-disaster responses such as building community disaster resilience and proper land zoning are often given limited attention in development projects. Capital intensive responses such as infrastructural or engineering solutions that should be the last recourse are usually the first in the agenda in most development assistance packages because they are short-term and easily measurable in impact and result. However, achieving a balance between the short term and long term remain a strong challenge to national governments and development assistance organisations.

Building competencies in community-based disaster management includes:
Developing local self-reliance in disaster preparedness by increasing community awareness of disaster risks in the area through education and training, and developing early warning systems and evacuation strategies
Capacitating local governments to shift from post-facto to pre-disaster responses in identified vulnerable areas – pre-disaster mitigation and prevention, disaster reponse and management, as well as post-disaster rehabilitation and reconstruction
Multi-hazard identification and disaster risk assessment
Area zoning and land allocation especially in resettlement and housing development projects
Establishing sustainable livelihoods or expanding livelihood options for the resettled or affected population

Sources:

- EM-DAT, University of Louvain
- Christensen, J.H et al. 2007. Regional Climate Projections in *Climate Change 2007: The Physical Science Basis. Contribution of Working Group 1 to the Fourth Assessment Report of the Interngovernmental Panel on Climate Change* [Solomon, S.D. et al (eds)]. Cambridge: Cambridge University Press.
- Pelling, Mark. 2004. *Visions of Risk: A Review of International Indicators of Disaster Risk and its Management.* United Nations Development Programme
- Walpole SJ, Peter. 2007. *Rainfall, Landslides, Debris Flows and Flooding: Understanding the Real Causes the Put Lives at Risk.* Quezon City (in press)

Photos: Peter Walpole SJ