ENV101 EARTH SYSTEMS

Practical Exercise 11 – Natural Hazards

1. OVERVIEW

This practical is designed to give students an awareness of the disaster management cycle through exploring the events surrounding one of five different major natural disaster events in the recent past.

1.1. Learning Outcomes

After completing this practical, students will be able to:

1. Describe the stages that comprise the disaster management cycle, and give examples of the types of activities that may occur at each stage;
2. Understand the causes and effects of a selected natural disaster; and
3. Provide a brief presentation style summary of their selected natural disaster to the class.

1.2. Preparation

Once you have determined your required data (based on your topic choice), copy the appropriate Google Earth layers to your working directory.

1.3. Required data

Your required data will depend on the natural disaster you choose (see below).

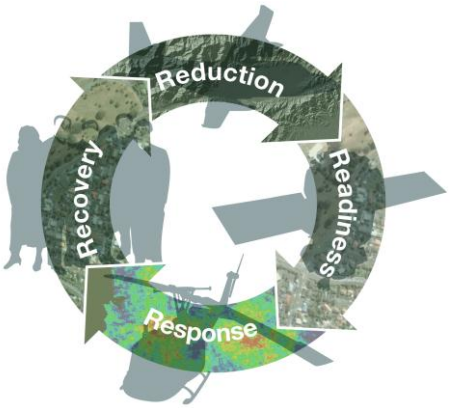
1.4. Required software

You will need to have access to the internet, and may also need Google Earth installed on your PC.

2. DISASTER AND EMERGENCY MANAGEMENT - BACKGROUND

Extract from:
Joyce KE, Wright, K, Samsonov, S, and Ambrosia, V (2009) Remote sensing and the disaster management cycle. Invited chapter in Advances in Geoscience and Remote Sensing. In-Tech Publishing, Vienna. Chapter 15, pg 317 – 346.

"Disaster management planning is structured around the disaster management cycle model. The cycle consists of four stages – reduction, readiness, response and recovery. Spatial data can provide a valuable source of information at each of these stages, helping to understand spatial phenomena, and providing scientists and authorities with objective data sources for decision making.



Reduction incorporates all measures and planning that reduce the likelihood of a disaster occurring. This is done through the process of risk identification and reduction; either by modifying the hazard process using traditional structural methods such as stopbanks or seawalls, or by modifying behaviours and the

assets at risk (Gregg & Houghton 2006). Behaviour modification includes land use planning to: prevent development in hazardous areas; incorporate good access for response and evacuation; and foster interconnected and resilient communities (Burby 1998). In theory, land use planning can reduce all risk from disasters, but centuries of settlement in hazardous locations make this option unrealistic and impractical. Modifying assets at risk includes such methods as strengthening buildings and infrastructure and raising floor heights to reduce hazard impacts.

Readiness planning accepts that some residual risk is present for communities and that measures must be in place to ensure any response to hazards is efficient and reduces hazard impacts. Readiness planning includes: public education on hazards and their consequences, and how these consequences can be reduced; training of emergency planners and responders; installing monitoring and warning systems for hazards; exercising response plans; and fostering community resilience through increased uptake in home preparedness such as learning first aid, having an emergency kit and an evacuation plan (Ronan & Johnston 2005).

The phase of disaster management that has traditionally received the most recognition, funding and planning effort is *Response* (Gregg & Houghton 2006). The reality is that most nations do not have the capability to prevent disasters occurring; the best option for reducing the chance of a disaster is through reducing risk. However, response capability is important in any disaster as it involves the processes of coordinated effort to manage resources, including life essentials and personnel, for activities such as evacuation, relief, search and rescue and needs assessment (Quarantelli 1997).

Recovery, the fourth phase of the cycle has traditionally been focussed on restoration of lifeline utilities, and building reconstruction. There is now considerable research into holistic recovery processes, which recognises that for community recovery to be sustainable, the social, economic, built and natural environments must be considered (Norman 2004). The four environments are interlinked as communities rely on:

- Natural environment for amenity (recreation, psychological wellbeing), and resources (to provide opportunities for construction and employment);
- Built environment for lifeline utilities and structures to enable people to live, work and recreate;
- Economic environment to provide goods, services and livelihoods; and
- Social environment, to provide opportunities for political participation, community building, networking and psychological wellbeing.

The recovery phase of a disaster can be considered to have several steps, the initial restoration of lifeline essentials, and the longer term rebuilding of communities. The recovery phase is often considered to be an optimal time to include measures that will reduce the risk of future disasters (Becker et al. 2008).

The four phases of the disaster management cycle are not discreet; they are interrelated and ideally integrated throughout the planning process. Decisions about risk reduction methods will affect the degree of readiness planning and response that will be required. Readiness levels of affected communities and responders can determine whether an event becomes a disaster, as can be seen in the failure to provide evacuation options for the 20% of the New Orleans population with no vehicle or resources to leave the city prior to hurricane Katrina's landfall (Laska & Morrow 2006/7). The effectiveness of the response phase will play a significant role in how affected communities recover, both physically and psychologically. Lessons from the response phase can be incorporated into risk reduction and readiness

planning. Finally, the recovery phase can include risk reduction measures to increase resilience and reduce future vulnerability."

3. DISASTER AND EMERGENCY MANAGEMENT – ACTIVITY

Select a major natural hazard or disaster event:

Hurricane Katrina
Tsunami – Banda Aceh
Victoria bushfires, Feb 2009
Brisbane Floods, Jan 2011
Christchurch Earthquake, Feb 2011
Japan Earthquake and tsunami

As part of a group of 2-3 students, spend an hour discussing and researching your event on the internet, covering the following points:

a. Description of the event – what, where, when, extent, severity etc.
b. Specific features, systems, or processes involved in the event occurrence (e.g. plate subduction, fault rupture…) – i.e., why did it occur?
c. Primary and secondary effects on the environment (built and natural) and the people
d. Activities associated with the disaster management cycle (reduction, readiness, response, recovery) before, during, and after the event. In cases where there was limited activity within a specific phase, provide your recommendations for what you think should have occurred.

Prepare a brief presentation (5-10 mins) to give to the class about your findings. External students – please either post your findings to the discussion board or email me a powerpoint file that I can upload and share your findings.

You are encouraged to make your presentation as interesting and visually appealing to the class as possible. You may use the whiteboard or data projector with power point, Google Earth, ArcView, or any other software in the lab.

4. HINTS ON SPECIFIC EVENTS:

4.1. Hurricane Katrina

Fly to 29.96, -90.025 in Google Earth. Use the image date time slider to view different images over time, before, during, and after the event. What is the extent of the damage that you can see? Why do many houses have blue roofs? How can you use this type of information in the disaster management cycle?

There is also a Google Earth layer available in this week's practical folder to explore.

4.2. Tsunami – Banda Aceh

Zoom in to Banda Aceh in Google Earth, particularly focussing around the coastal area. Use the image date time slider to view different images over time, before and after the event. What is the extent of the damage that you can see? How can you use this type of information in the disaster management cycle?

4.3. Victoria Bushfires

Geoscience Australia runs the Sentinel Hotspot bushfire observation and monitoring system: http://sentinel.ga.gov.au/acres/sentinel/index.shtml. It is worthwhile looking at this site to understand the monitoring systems currently in place for Australia. The current hotspots can also be viewed in the Google Earth layer available in this week's practical folder.

4.4. Christchurch Earthquake

http://mw1.google.com/crisisresponse/2011/christchurch_earthquake/earthquake/geoeye/Christchurch_GeoEye-1_2011-02-26/Christchurch_GeoEye-1_2011-02-26.kml

http://sertit.u-strasbg.fr/SITE_RMS/2011/03_rms_nz_2011/03_rms_nz_2011.html

4.5. Japan Earthquake and tsunami

http://www.maproomblog.com/2011/03/japan_earthquake_and_tsunami_maps.php#

4.6. General

These websites may be of use:

http://earthobservatory.nasa.gov/NaturalHazards/
http://www.disasterscharter.org/home
http://www.abc.net.au/catalyst/stories/by-topic/NATURALDISASTERS.htm
http://www.ga.gov.au/hazards/