School of Geography and Environmental Science

Name: _____

Tute Day & Time: _____

ATS1310 – Natural Hazards and Human Vulnerability

Tutor: _____

Practical Class Week 5: Sea Level Rise and Floods at Lakes Entrance

AIMS

- To explore the nature of sea level rise on geological and human timescales
- Discuss at greater length the notion of hazards and vulnerabilities
- Look at how hazards and risks are assessed, and particularly the vulnerabilities identified by the Intergovernmental Panel on Climate Change (IPCC)
- Examine, in high spatial resolution, the impact on Lakes Entrance in Victoria

INTRODUCTION

In ATS1310 we explore a number of Hazards which can be described as 'natural', a number of Hazards which are 'human' and others which are a combination of the two – when the human and 'natural' world are intrinsically linked. We also know that some of the changes that humans can and will make to global ecosystems have happened previously. Climate change and associated sea-level change is one of those areas. The difference is however, the cause, nature and temporal scale of these changes. In this prac we will be looking at how sea level has changed in the past, how it may change in the future, and the possible Hazards and Vulnerabilities associated with sea level change.

Exercises:

In your web-browser, open the page:
http://sahultime.monash.edu.au/GippslandLakes-tute.html
This is an interactive flash program which allows you to explore how sea level change associated with glacial and interglacial cycles have influenced the coastline of Australasia (and the world). Spend some time exploring the features of this page – turn on the layers to see archaeological sites in Australia, and the routes of human dispersal out of Africa, and into Australia.

a) The archaeological evidence indicates that Australia has been continuously inhabited for around 50 thousand years. What changes have occurred within Australia and Southeast Asia over that time? What impact would such changes have had on how people lived and moved around Australia? How might people have adapted to these changes?

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Use the button on the right to zoom-out and see the whole world, then scan through the timeline. What is causing global sea-level to fluctuate so dramatically?

You'll find a placemark pointing to the Gippsland Lakes in eastern Victoria. Double-click it to zoom in to this region on the half-million-year timescale. Describe the process of the lakes' formation.

Is the sediment budget for this section of the Victorian coast net-erosional or a net-depositional? What processes might be responsible for situation?

At the east end of the lakes system is an artificial entrance for shipping, built in 1890. Zoom in and scan through the timeline to see how the entrance has changed over the past few decades. You can see the marks from dredging operations, which are trying to keep the entrance clear for shipping. A graph on the timeline shows the volume of sand present in the entrance over time.

Why does the entrance keep filling up with sand?

The Gippsland Lakes flooded in June 1998, flushing plenty of water through the Entrance. What effect did this have on the amount of sand clogging the Entrance? Did this alleviate the problem?

Case study: Flooding in Lakes Entrance

Next we will explore the impact of flood events on a local community.
In your web-browser, open the page: http://sahultime.local/LakesEntrance/

This is a prototype for an interactive flood model for Lakes Entrance, a community situated close to the artificial entrance we saw earlier (you can see the entrance in the lower left of the flood model). When there is a large rainfall event in the nearby catchment, the level of the Gippsland Lakes system rises and may inundate houses in low-lying areas. On this interactive flood model, you can raise the lake level at will, and explore which parts of the community will be affected. The 'flood photos' layer provides aerial and ground-based photos from actual flooding events, and the corresponding lake height is shown on the flood meter.

By altering the sea-level bar on the left of screen, note the level of impact of a 50cm rise, a 1m rise, a 1.5m rise and a 2m rise. Describe and account for the differences in impact on four sites with a sea level rise of 1m (use the flood photos too).

The flood model includes layers for the stormwater and sewer networks. Why are these networks important to the impact of flooding?

Flooding is caused by major rain events in the Gippsland Lakes catchment, but the severity of a flood event involves other factors such as concurrent king tides and storm surges. Accounting for all of these factors, a flood risk assessment arrives at the size of flood likely to occur once every twenty years (the 1:20-year flood level), every fifty years (the 1:50-year level), and every 100 years(the 1:100-year level). These are marked on the interactive flood meter in the prototype, and you can click on each symbol (eg. 

) to see a simulation of likely flood events over 100 years.

If you have bought a house on the edge of the 1:50 envelope, and you've been told that it was flooded 10 years ago, when are you most likely to next get flooded?

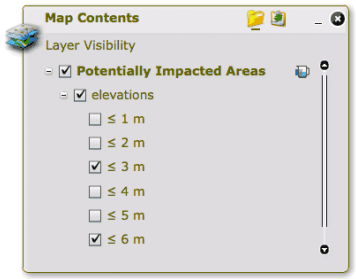
Global sea-level is projected to rise by up to a metre over the coming century. Open the Victorian Coastal Strategy document (available on Blackboard) and turn to page 13, which deals with climate-change and sea-level rise. What planning policy does this document recommend to account for future sea-level scenarios?

Go back to the Lakes Entrance prototype and click the 'climate-change projection' button at the bottom. Explore the effect of different sea-level-rise scenarios. Notice that not only does the lake-level rise, but the 1:20, 1:50 and 1:100-year flood levels rise also.

If your house is on the edge of the 1:50-year flood envelope today, how often will it flood in the year 2050? (Use the VCC's recommended scenario.)

Similar challenges are facing many other parts of the world. On the following site you can explore a world map showing areas at risk from a 1 to 6 metre rise in sea-level:
http://climategem.geo.arizona.edu/slr/world/index.html

Note: you need to turn on the 'Map Contents', and expand the 'elevations' layer, then you can tick one or more of the elevation layers (as shown on the right).



Choose and discuss three examples of areas at high risk from sea-level rise. Consider both the quantity of land under threat and the density of population in that area. Some islands (eg Tuvalu and Maldives) may be wiped off the map!.