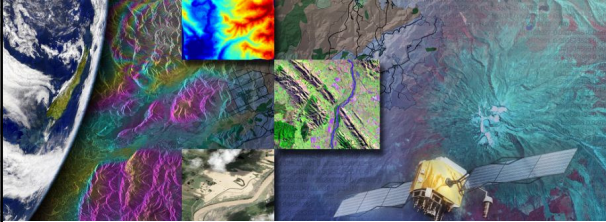
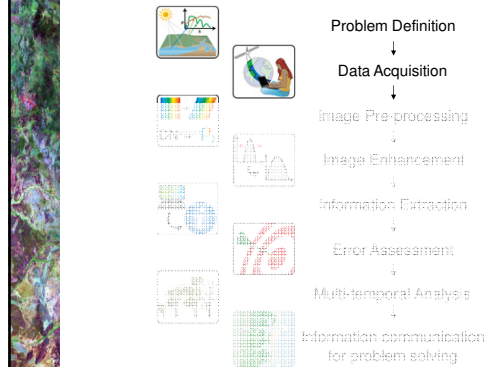


Lecture 8 – How are Maps Created From Imagery?



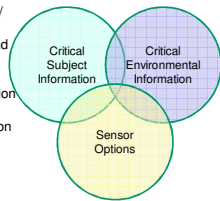
Dr Karen Joyce
 School of Environment
 Bldg Purple 12.3.09

The Image Processing Sequence

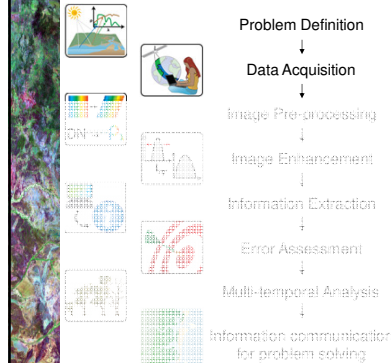


Problem Definition and Data Acquisition

- General location - accessibility
- Minimum size of feature
- Areal extent to cover
- Relevant times of the year / day
- 'Colour' – light reflection and absorption
- Temperature?
- Critical contextual information
- Accuracy requirements
- Existing data or classification schemes?



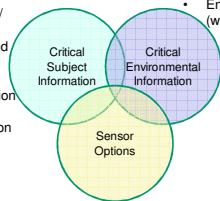
Your Job



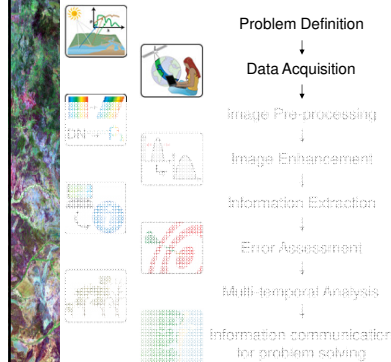
1. Select a topic that interests you:
 1. Coral bleaching
 2. Bushfires
 3. Weeds
 4. Volcanoes
 5. Algal blooms
2. Define the critical subject information requirements

Problem Definition and Data Acquisition

- General location - accessibility
- Minimum size of feature
- Areal extent to cover
- Relevant times of the year / day
- 'Colour' – light reflection and absorption
- Temperature?
- Critical contextual information
- Accuracy requirements
- Existing data or classification schemes?
- Cloud cover
- Obscuring features (vegetation, water bodies)
- Environmental movement (wind, currents)



Your Job



1. Select a topic that interests you:
 1. Coral bleaching
 2. Bushfires
 3. Weeds
 4. Volcanoes
 5. Algal blooms
2. Define the critical subject information requirements
3. Identify any critical environmental information

Problem Definition and Data Acquisition

- General location - accessibility
- Minimum size of feature
- Areal extent to cover
- Relevant times of the year / day
- 'Colour' – light reflection and absorption
- Temperature?
- Critical contextual information
- Accuracy requirements
- Existing data or classification schemes?

Critical Subject Information

Critical Environmental Information

Sensor Options

- Cloud cover
- Obscuring features (vegetation, water bodies)
- Environmental movement (wind, currents)
- Spectral resolution – number of bands, location, width
- Spatial detail
- Spatial extent
- Overpass frequency
- \$\$

ENV202/505 – Introductory Remote Sensing Wk 8 7

Your Job

- Select a topic that interests you:
 - Coral bleaching
 - Bushfires
 - Weeds
 - Volcanoes
 - Algal blooms
- Define the critical subject information requirements
- Identify any critical environmental information
- Determine the ideal sensor dimensions

ENV202/505 – Introductory Remote Sensing Wk 8 8

Problem Statement: Linking to Potential Data Sources

Information Requirement

	Spatial	Spectral	Temporal
Low	National	Vegetation-building boundaries	Annual
Medium	Regional	Landcover types, biomass	Seasonal
High	Local	Plant species recognition, minerals, water	Daily

Potential Data Source

	Spatial	Spectral	Temporal
Low	MODIS, AVHRR	Panchromatic	All sensors / platforms
Medium	SPOT, Landsat, ASTER	Multispectral - SPOT, Landsat, ASTER, Quickbird, IKONOS	Most sensors / platforms
High	Quickbird, IKONOS, aerial photography	Hyperspectral - HyMap, Hyperion	MODIS

ENV202/505 – Introductory Remote Sensing Wk 8 9

Your Job

- Select a topic that interests you:
 - Coral bleaching
 - Bushfires
 - Weeds
 - Volcanoes
 - Algal blooms
- Define the critical subject information requirements
- Identify any critical environmental information
- Determine the ideal sensor dimensions
- Select an appropriate sensor for the role – Use your table from assessment 2

ENV202/505 – Introductory Remote Sensing Wk 8 10

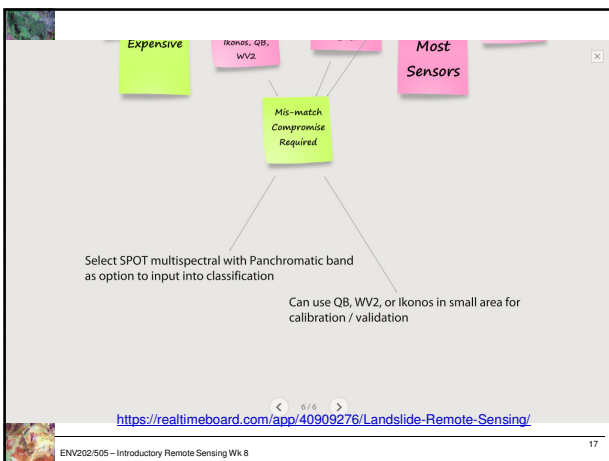
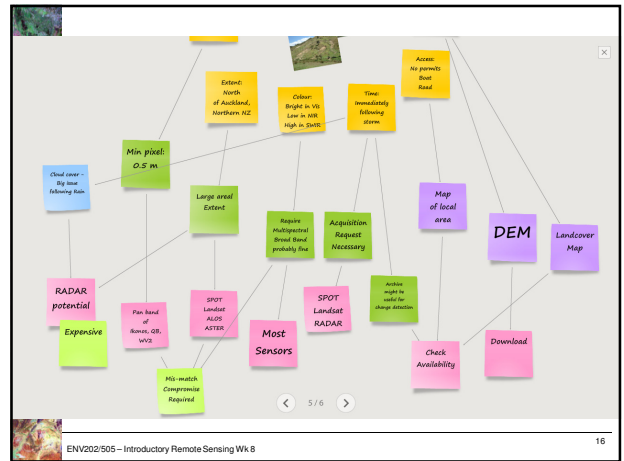
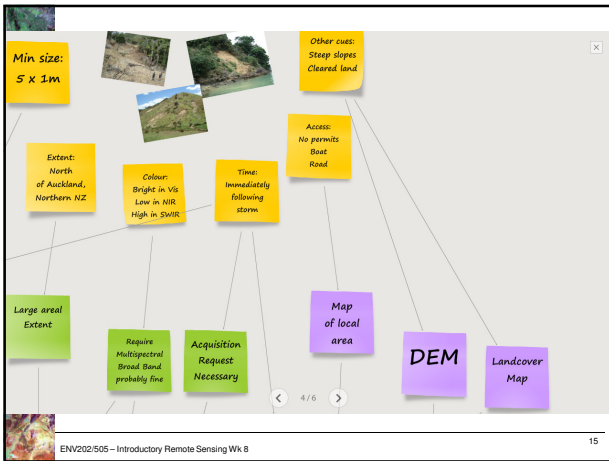
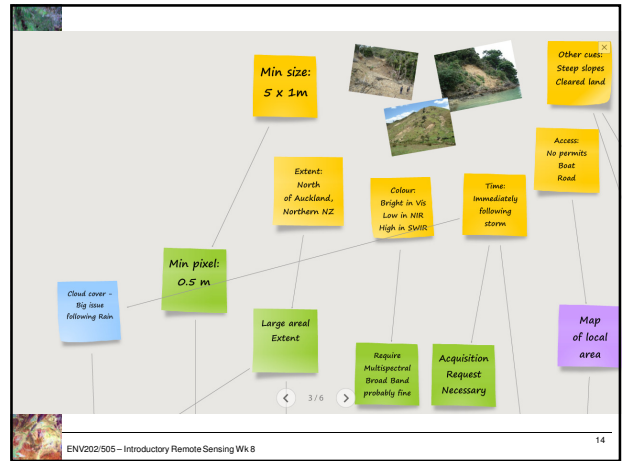
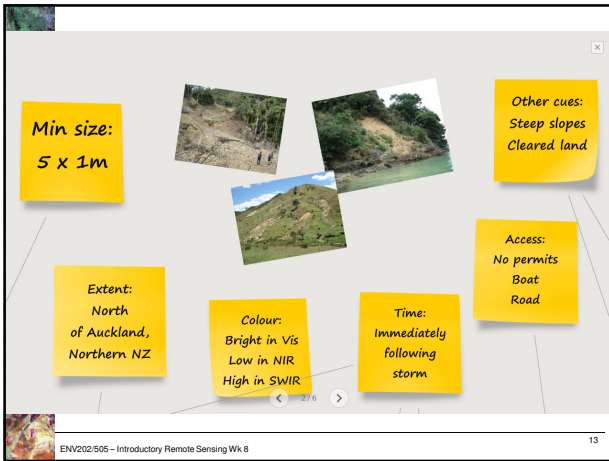
Landslide Remote Sensing

- Widespread landsliding frequently occurs following significant storms in Northern New Zealand. Can remote sensing be used to identify the extent of the areas affected?

<https://realtimeboard.com/app/40909276/Landslide-Remote-Sensing/>

ENV202/505 – Introductory Remote Sensing Wk 8 11

ENV202/505 – Introductory Remote Sensing Wk 8 12



Coral Bleaching

- Coral bleaching events have been linked to prolonged periods of above average water temperatures. How could remote sensing be used in a coral monitoring program for the Great Barrier Reef? Consider both the water temperature monitoring, as well as the health / status of the corals themselves.

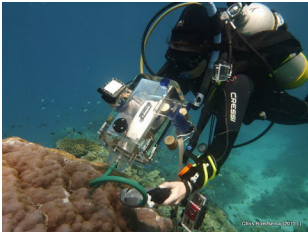


Image source: C. Roelfsema

ENV202/505 – Introductory Remote Sensing Wk 8 18

Bushfire Frequency

- The Australian Government is looking to create a new 'State of the Environment'. The figure on the left needs to be updated with current and accurate information. Devise a plan for remote sensing to address this.

Occurrence of large bushfires	Season
once in more than 20 years	1 winter and spring
once every 20 years	2 spring
once every 10 years	3 spring and summer
once every 5 years	4 summer
once every 3 years	5 summer and autumn

Source: Australia: State of the Environment 1996. An Independent Report Presented to the Commonwealth Minister for the Environment by the State of the Environment Advisory Council

ENV202/505 – Introductory Remote Sensing Wk 8

Weeds

- Gamba grass is an introduced plant pest in the NT, causing widespread environmental problems. How can remote sensing be used to map and monitor its spread?

Source: S. Setterfield

Tree-grass balance is altered in savanna sites invaded by gamba grass. Native grass fires (a) burn the grassy understorey while gamba grass productivity results in 5x times the fuel load with crown fires resulting (b). Savanna trees species are killed by such fire intensity and invasion results in a C3 to C4 transformation with an unknown biomass converted to pyrogenic carbon (c). (Source: L.Hutley)

ENV202/505 – Introductory Remote Sensing Wk 8

Volcanic Eruption

- Large volcanic eruptions have the potential to create huge and widespread disasters. In addition to the immediate hazards they present to local communities, eruptions can also cause mass disruption and chaos in the aviation industry. Consider the recent eruption of Mount Kelud in Indonesia, and how remote sensing could be used to map and monitor associated ash and gases.

VIIRS image courtesy NASA Earth Observatory
<http://earthobservatory.nasa.gov/IOTD/view.php?id=83144>

ENV202/505 – Introductory Remote Sensing Wk 8

Algal Blooms

- Algal blooms are typically composed of hundreds of thousands of microscopic phytoplankton cells. Trichodesmium (sea sawdust) is an example of a bloom that has been evidenced in Darwin Harbour and in local coastal and open ocean waters. How can remote sensing be used for the detection and monitoring of these blooms in NT waters?

Image source: ohnemusatsea - Flickr

ENV202/505 – Introductory Remote Sensing Wk 8