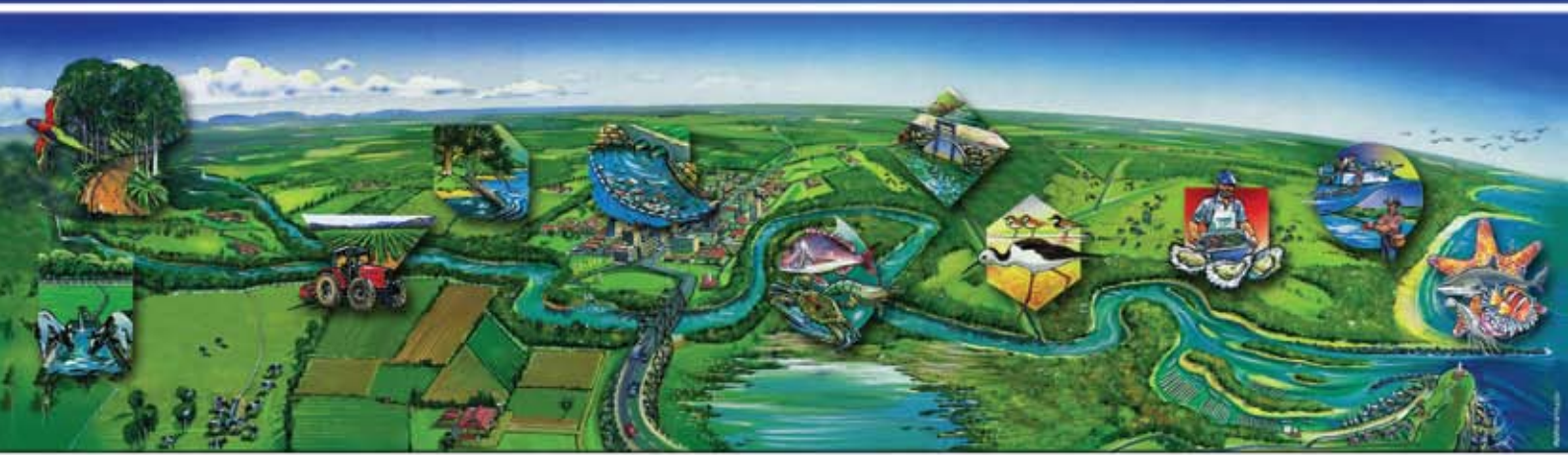




Our Valuable Estuaries, Coasts and Marine Environs – Making Connections



# TEACHING SUPPORT DOCUMENT

YEARS 7 – 10 GEOGRAPHY

5A3: ISSUES IN AUSTRALIAN ENVIRONMENTS

INCORPORATING A CASE STUDY OF  
THE LOWER CLARENCE RIVER CATCHMENT  
FOR WASTE MANAGEMENT AND LAND AND WATER MANAGEMENT

This document contains the worksheets referred to in the **Teaching Program**



# ***Our Valuable Estuaries, Coast and Marine Environs – Making Connections***

## ***Teaching Support Document***

*Years 7-10 Geography: 5A3: Issues in Australian Environments  
Incorporating a Case Study of the Lower Clarence River Catchment  
For Waste Management and Land and Water Management*

*OceanWatch Australia Ltd, 2008*

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AUSTRALIA  
[www.oceanwatch.org.au](http://www.oceanwatch.org.au)

OceanWatch Australia is a national environmental, not-for-profit company that works to achieve sustainability in the Australian seafood industry through protecting and enhancing fish habitats, improving water quality and advancing the sustainability of fisheries through action based partnerships with the Australian seafood industry, government, natural resource managers, private enterprise and the community.



This project has been assisted by the New South Wales Government through its Environmental Trust

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Michelle Perry, Southern Rivers Catchment Management Authority

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# SUPPORT DOCUMENT

## YEARS 7 – 10 GEOGRAPHY

### 5A3: ISSUES IN AUSTRALIAN ENVIRONMENTS

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# TASK 1: OVERVIEW OF ISSUES: WORKSHEET 1

	NATURE OF ISSUES	GEOGRAPHICAL PROCESSES	GROUPS AFFECTED
COASTAL MANAGEMENT			
LAND & WATER MANAGEMENT			
WASTE MANAGEMENT			

	NATURE OF ISSUES	GEOGRAPHICAL PROCESSES	GROUPS AFFECTED
AIR QUALITY			
URBAN GROWTH			
SPATIAL INEQUALITY	<p>There would be inequality in income between the following locations.</p> <ol style="list-style-type: none"> <li><b>1. Rural and urban</b> – across Australia rural incomes are lower than urban incomes.</li> <li><b>2. Within the urban areas</b> there are inequalities. Waterside and hillside suburbs usually house wealthier residents while poorer residents locate in outer suburbs, those subject to flooding or in less attractive locations.</li> </ol> <p>These spatial inequalities in income create inequalities in access to information technology (the IT divide) health care and education which in turn affects employment and quality of life.</p>	<p><b>Drought</b> has reduced rural incomes in recent years and led to a decline in some rural towns.</p> <p><b>Globalisation</b> has resulted in a loss of unskilled jobs in manufacturing.</p> <p><b>Mechanisation</b> and restructuring of farms has led to job losses in rural areas.</p> <p><b>Rural – urban migration to large cities</b> has increased created more job losses.</p>	<p>Business people and residents in smaller country towns.</p> <p>Indigenous people</p> <p>Unskilled workers.</p>

## TASK 1: OVERVIEW OF ISSUES: WORKSHEET 2

What are the main characteristics of aquatic habitats in estuaries?

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Which activities most threaten water quality and aquatic habitats of estuaries and marine environments and how?

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How important are the commercial and recreational fishing industries to the economy?

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What are the consequences of the loss of aquatic habitats and deterioration of water quality for estuarine and marine fishing industries?

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# TASK 1: SPATIAL INEQUALITY: sample newspaper article

## NATURE OF THE ISSUE

Spatial inequality is about where inequalities occur and the reasons for them. Inequalities can be shown by looking at figures for income, health, education levels, and access to the internet. The poor in Australia include a high proportion of people over 65, indigenous Australians, single parent families, unskilled youth and unemployed migrants from non English speaking backgrounds. These groups tend to be located in less affluent suburbs.

## PROCESSES

In Australia, globalisation has created an economy based on “new jobs” in information technology and business services and a loss of manufacturing jobs. There are fewer opportunities for unskilled workers. The benefits of globalisation are concentrated in large cities especially Sydney.

Lack of opportunities in rural towns has increased rural – urban migration into Australia’s large cities.

## CASE STUDY: INCOME INEQUALITY

Statistics continue to show a large gap between the incomes of those living in the capital cities and those living in the rest of Australia. In the 1990s, the incomes of city residents increased at about double the rate of those living in major urban centres and regional and rural towns. For example this is highlighted in the table below. The table shows the higher % of people on higher incomes living in cities compared to other areas.

Income group	Capital cities (%)	Major urban areas (%)	Regional towns (%)	Rural towns (%)	Rural areas (not towns) (%)
Low (Under \$15,600 p.a.)	20	25	26.7	30	22.1
Lower Middle (\$15,600-36,400p.a.)	30.8	34.7	37.6	40.8	39.9
Upper Middle (\$36,400-78,000 p.a.)	35.4	31.7	29.2	25.2	29.4
High ( Over \$78,000 p.a.)	13.9	8.6	6.5	4.1	7.4

Source: Lloyd, R, Harding, A and Hellwig, O, ‘Regional Divide? A Study of Incomes in Regional Australia’, Discussion Paper No. 51, National Centre for Social and Economic Modelling, September 2000.

### Impacts

Lower income earners tend to live in areas with less access to transport, services and jobs, leading to a cycle of poverty that often passes through generations. They experience higher infant mortality rates and lower life expectancy.

### Possible Individual responses

An unskilled young person might seek job training through community based programs that are free or low cost. Another individual might respond by becoming involved in criminal activity.

### Group responses:

A community group might provide educational opportunities such as Mission Australia’s Indigenous Youth Mobility program in the Northern Territory which gives young people access to training and employment. Welfare groups might respond with food, clothing and housing assistance.

Federal, State and Local Governments have responded to this issue in many ways. Some examples are:

- The provision of education institutions in outer suburbs such as the University of Western Sydney. (State).
- Income support for the unemployed (Federal).
- Rent assistance to allow the poor to rent privately (Federal).
- Local government incentives to attract business into outer suburbs and create job opportunities.



## TASK 2: WASTE MANAGEMENT: WORKSHEET 1

Waste sources identified from the poster

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Maclean landuse map



LEGEND



Identify the waste issues for the *Lower Clarence River Catchment*

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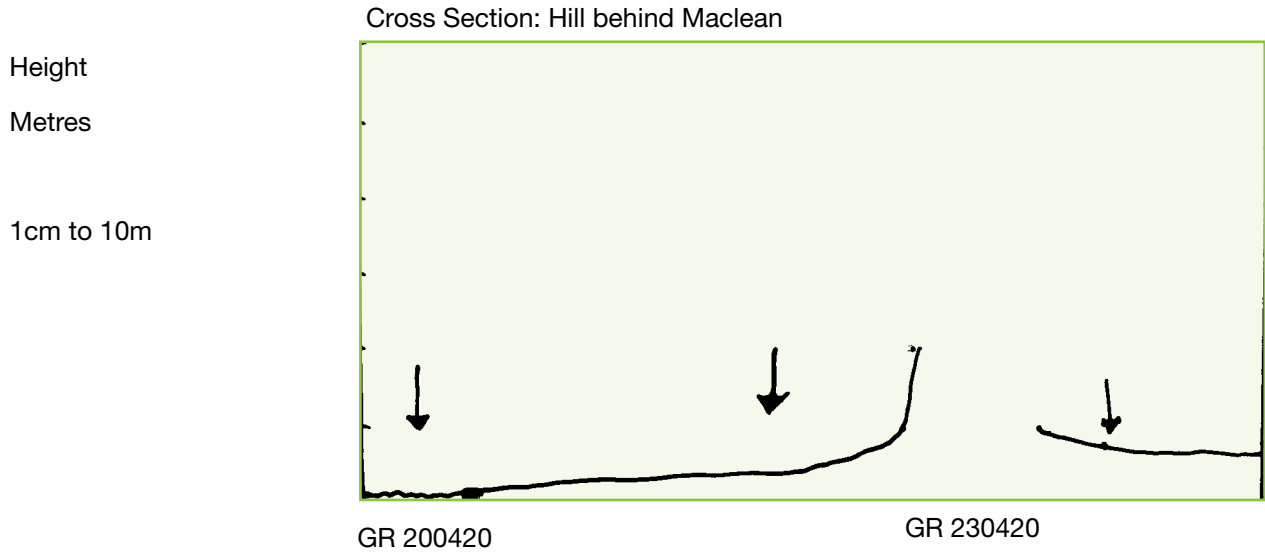
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## Geographical features that could impact on waste management

### Topography: Cross section



**At what locations might these features create waste management issues?**

Gradient =  $\frac{\text{Vertical rise}}{\text{Horizontal distance}}$

Gradient

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Local relief: Highest point minus lowest point

Topography

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Density: Buildings per square km

Building density

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# TASK 2: WASTE MANAGEMENT: WORKSHEET 2

## ORGANISATION SHEET and CHECKLIST FOR YOUR LESSON

Scope of lesson	Main ideas		Completed (Tick)
<p>What is the issue about?</p>	<p>Briefly outline the issue</p>		
<p>Where in the <i>Lower Clarence River Catchment</i> is the issue located?</p> <p>Construct a simple map</p> <p>Collect digital images to teach the students about the location and the nature of the issue</p>	<p>Location</p> <p>Do I have a map? How will I produce my own map?</p> <p>What photographs can I find?</p>		
<p>What are the main impacts of this issue on the <i>Lower Clarence River Catchment</i> and different groups in the valley e.g. fishermen, tourists, farmers, businesses?</p>	<p>Groups</p>	<p>Impacts</p>	

Scope of lesson	Main ideas	Completed (Tick)
<p>What perceptions might different groups have on the issue?</p> <p>You might interview your friends at school to see if their perceptions differ and why</p>	<p>Groups</p> <p>How will I find out the perceptions?</p>	
<p>What does sustainability mean?</p>	<p>Definition</p>	
<p>How does this issue impact on sustainability in the <i>Lower Clarence River Catchment</i>?</p>	<p>How does my issue reduce sustainability?</p>	
<p>What will happen if the issue is not addressed?</p>	<p>What will be the consequences of doing nothing about the issue?</p>	



Scope of lesson	Main ideas			Completed (Tick)
What groups are involved in decision making about this issue?  How are these decisions made?  What is the role of government in this process?				
What have individuals, groups and governments done to respond to and manage the issue?	Individuals	Groups	Governments	
Have the strategies implemented so far been successful?				
Are there any other strategies that might promote sustainability, social justice and equity?	Suggested strategies for promoting sustainability	Suggested strategies for social justice	Suggested strategies for equity	

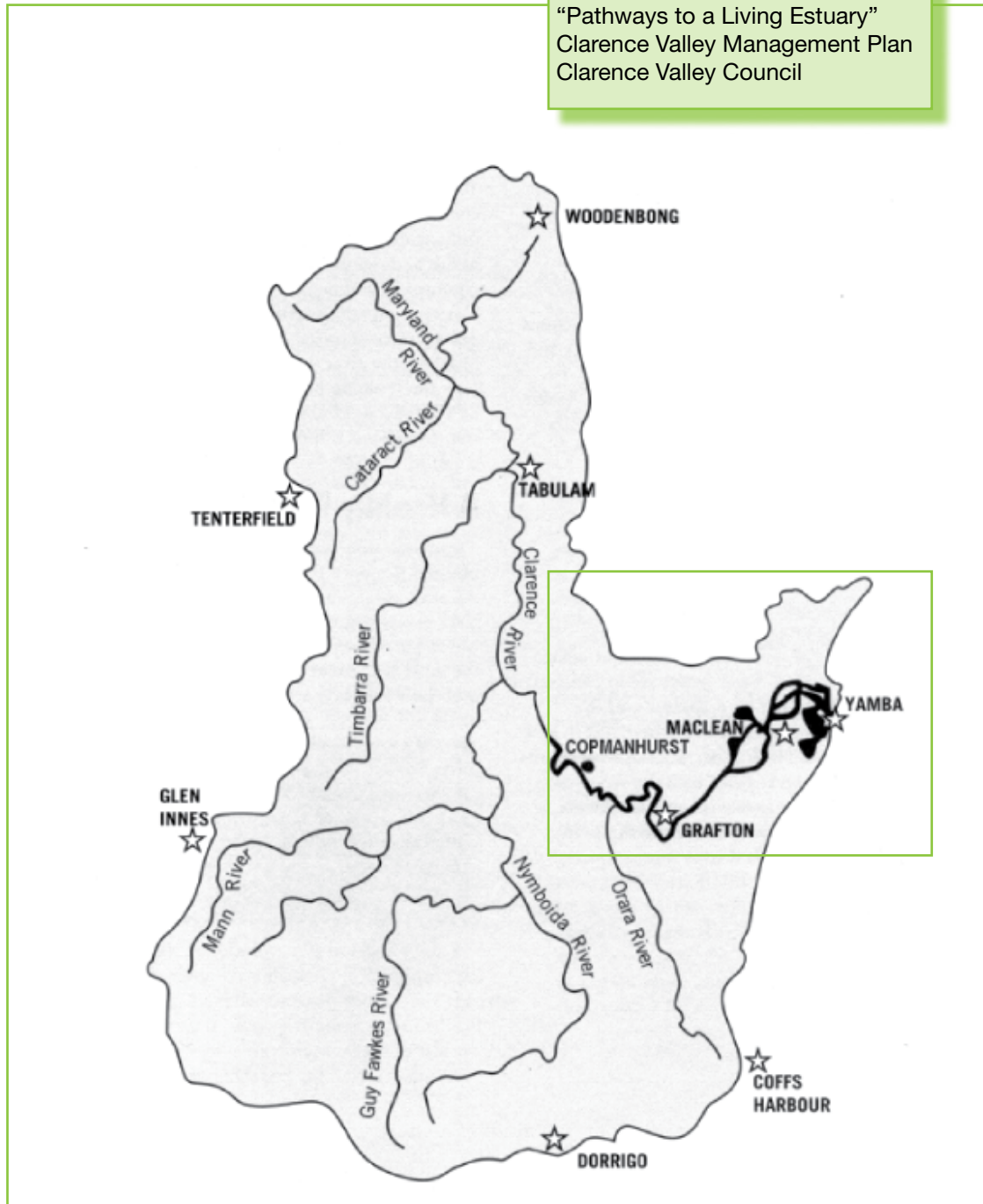
## TASK 3: LAND AND WATER MANAGEMENT: Lower Clarence River Catchment Study Area

This map shows the entire catchment area of the Clarence River and its tributaries.

This resource concentrates on the waste, land and water management issues in the *Lower Clarence River Catchment*.

**FROM:**

“Pathways to a Living Estuary”  
Clarence Valley Management Plan  
Clarence Valley Council



# TASK 3: LAND AND WATER MANAGEMENT: WORKSHEET 1

## RESEARCH ACTION PLAN

Requirement	Details	Tick
<p>Four broad focus questions</p> <p>These must cover:</p> <ul style="list-style-type: none"> <li>• Geographical processes occurring at the site, for example, flooding, erosion, siltation, pollution, urbanisation, resource depletion, habitat destruction, drought, flood mitigation, waste disposal.</li> <li>• Individual, group and government responses to the issue.</li> <li>• Management processes and strategies implemented to manage the issue, especially those promoting social justice and equity, and an evaluation of their success.</li> <li>• Perceptions of different groups on a land/water management issue.</li> </ul>	<p>1.</p> <p>2.</p> <p>3.</p> <p>4.</p>	
<p>The types of primary and secondary data required to answer the focus questions</p>	<p>Primary data required</p> <p>Secondary data required</p>	

Requirement	Details	Tick
How data (research and methodology) is going to be collected and the equipment that is needed	<p>Primary research methodologies (this may have already been done in the class fieldwork task)</p> <p>Equipment needed</p>	
How the data collected is going to be processed and analysed (graphs, tables, maps, sketches, photographs etc)	List methods used to process data	
<p>Provide the following information about the area being studied:</p> <ul style="list-style-type: none"> <li>• a map of the area (remember B.O.L.T.S.)</li> <li>• photographs or field sketches of the site to illustrate <ul style="list-style-type: none"> <li>– the water quality issue(s);</li> <li>or</li> <li>– management strategies.</li> </ul> </li> </ul> <p>A reference to the significance of this issue for the sustainability of the site and for industries dependant on water quality such as fishing, tourism, agriculture, aquaculture and recreation.</p>	<p>How will a map of the area be produced?</p> <p>What photographs need to be obtained?</p> <p>How does the issue affect sustainability?</p>	









## TASK 3: LAND AND WATER MANAGEMENT: Potential Fieldwork Sites For The Lower Clarence River Catchment

### SITE 1: Clarence River Fisherman's Co-operative Maclean

At this site students can observe the following features relevant to land and water management:

- floodplain/wetland drainage;
- modified floodgates;
- sewerage treatment plant drains into wetlands;
- sports grounds;
- levees;
- fishing boats;
- tourist activities; and
- wetland drainage.

### SITE 2: Swan Creek

At this site students can observe the following features relevant to land and water management:

- floodgates and penstocks;
- riparian zone; and
- modifications to floodgates to allow fish to migrate upstream.


### SITE 3: Hickey Island

At this site students can observe the following features relevant to land and water management:

- threatened species;
- saltmarsh;
- different riparian vegetation zones;
- unauthorised tracks;
- beach erosion;
- the marina with boats and the wake created by vessels;
- oyster farming impacts;
- stormwater; and
- tourist impacts.

**AT THESE SITES students could do any of following activities:**

- draw a map;
- take photographs or draw field sketches;
- test water quality;
- measure dimensions of drains and levees;
- do a vegetation transect (line transect or quadrant study);
- observe and explain what impact human modifications have on land and water;
- consider the impact of building a dam upstream on this site;
- consider the impact climate change may have on this site; and
- consider the impact of human modifications to the environment on downstream ecosystems and the fishing industry.



To determine different perceptions on a water issue students could interview representatives from any of these groups in relation to the recent dam proposal as an organised part of the fieldwork.

- The Clarence River Professional Fisherman's Association.
- Clarence River Recreational Fishing Representatives.
- The Clarence Valley Council.
- Clarence Valley Chambers of Commerce.
- Clarence Valley Cane Growers Association.
- Clarence Valley Climate Change Group.
- Environment Centre.
- Landcare Organisation.
- Energy Supplier.
- Transport Company.

## GLOSSARY

acid sulphate soil	<p>Acid sulfate soils are naturally occurring soils and sediments containing sulfide minerals, predominantly pyrite (an iron sulfide). Left undisturbed, these soils are not acidic. However by draining, excavating or exposing these soils by lowering the water table, the sulfides will react with oxygen in the air to form sulfuric acid.</p> <p>Subsequent flushing or flooding of these dried out soils releases acid and heavy metals into waterways causing harm and even death of plants and animals in the river and estuaries and corrosion of concrete and steel building structures.</p>
agriculture	Cultivating the land to grow crops or raise stock for food, feed, fibre, fuel, or other useful products.
algal bloom	An explosion of algae populations often due to increased nutrient loads.
anoxic	Without oxygen.
aquaculture	The farming or cultivation of fish, other animals, or plants, in water.
aquatic	Living or growing in or on the water. A term relating to water and water environments.
benthic	Features at the bottom of water bodies – often referred to fish species that live on the bottom of the ocean, rivers and lakes.
biodiversity	Biodiversity means the range of different native animals, birds, fish present in a particular area.
brackish	Slightly salty.
buffer	An area of land between two conflicting land uses.
bycatch	Non target species that are caught when fishing (commercial or recreational) or species that cannot be sold or taken as recreational catch.
catchment	The area of land that drains into a system of rivers, creeks or streams. This area of land is usually bounded by mountain ridges or steep terrain.
catchment management	When land and water resources are managed on a catchment wide basis rather than separately.
coast	The seaward limit of land including a transition zone between the marine and land environments and includes beaches, cliffs, sand dunes and estuaries.
contaminant	Substances not naturally present in the environment or present in elevated amounts that can negatively affect the environment.
crustacean	An aquatic animal that has a hard external skeleton and jointed appendages such as lobsters, prawns and crabs.
cumulative	Increasing by successive addition.
dam	A structure built across a watercourse such as a river to hold back water.
degradation	When the quality of something is reduced. For example, land and water degradation results in poorer quality resources.
degrade	To cause a decline in the quality.
detritus	Fallen organic material such as leaves or twigs.
dissolved oxygen	The amount of oxygen dissolved in water.
downstream	Towards the direction that a stream is flowing.
dredge	Removal of sediment from the bottom of a waterbody.
ecological sustainable development	Ecologically sustainable development refers to ‘Sustainable development that meets the needs of the present without compromising the ability of future generations to meet their own needs.’ (Brundtland Report: Our Common Future).
ecosystem	A community of interacting plants and animals and the non living environment in which they are found.
effluent	Wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial outfall.
endangered	Any species in danger of extinction throughout all or a significant part of its range/habitat.
enteric	Originating from the intestines.
environment	All external conditions and influences considered together that affect the development and survival of an organism. The biophysical surroundings and the community in which people live.
erosion	Wearing away of the land by the action of water, ice or wind.
estuary	An estuary is where the river mouth meets the sea and forms special habitats for plants, animals and fish and shellfish.

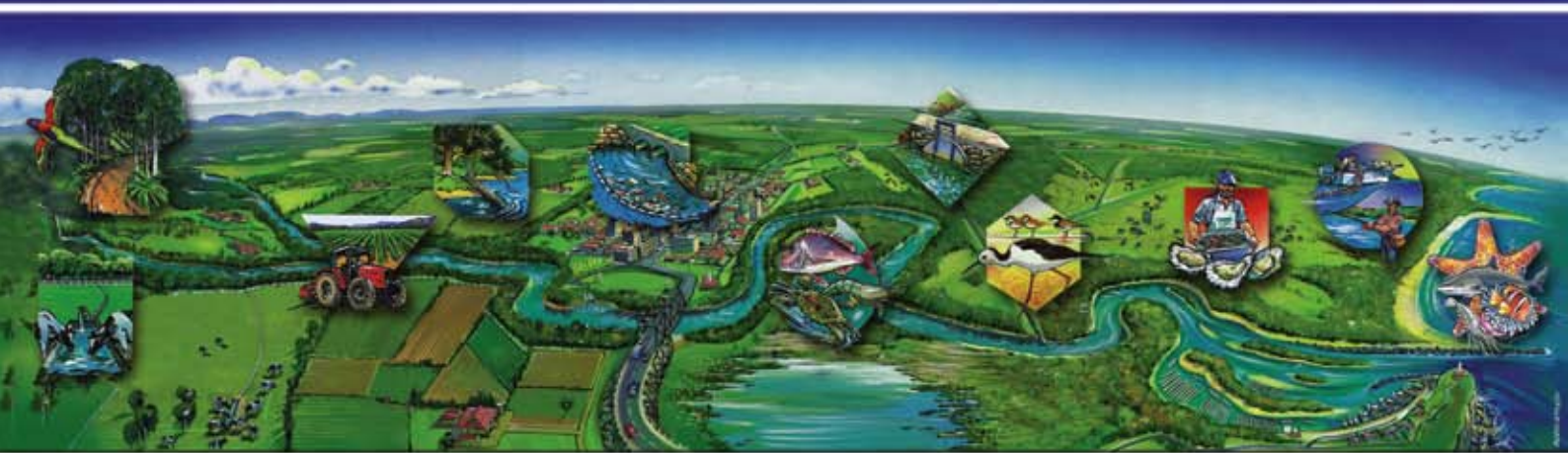
eutrophication	The nutrient enrichment of water and / or land that can lead to toxic algal blooms and loss of dissolved oxygen leaving water which cannot support much life.
fauna	Animals
fertiliser	Substance added to the soil to increase its productivity.
flood mitigation	Flood mitigation includes a range of measures designed to reduce the impact of floodwaters; like floodgates, dams, detention basins, levees and widening and deepening water channels.
floodgate	A gate designed to control water or restrain a water outburst.
floodplain	The low lying, relatively flat land within the catchment, next to a stream or a river that is covered with water during a flood.
geographical processes	Those biophysical and human actions that bring about changes to environments.
gross pollutant trap	Devices used to prevent large items polluting waterways.
groundwater	Water that flows beneath the land surface, for example, within rock, fractures or other cavities in the ground.
habitat	The place where a plant or animal species naturally lives and grows.
horticulture	Commercial cultivation of fruits, vegetables and flowers.
hydrology	The science of water relating to its occurrence, properties, distribution, circulation and transport.
hypoxic	Too little oxygen.
impervious	Unable to be penetrated.
integrated catchment management	The sustainable and balanced use of all land, water and biological resources in a catchment.
irrigation	Application of water (or wastewater) to land areas to supply the water and sometimes nutrient needs of plants.
lake	A body of fresh or salt water that is usually entirely surrounded by land, however coastal lakes often have a permanent or temporary connection to the sea
legislation	Laws created by an act of parliament.
levee	An artificial bank that protects land from flooding.
Lower Clarence River Catchment	The catchment below Copmanhurst where the estuary begins (that is, the tidal limit of the river).
mangrove	Mangroves grow along the shorelines of many NSW estuaries in areas subject to regular tidal inundation. Two most common species are grey mangrove ( <i>Avicennia marina</i> ) and river mangrove ( <i>Aegiceras corniculatum</i> ).
marine	Of or relating to the sea or ocean.
marine protected areas	Marine Protected Areas are areas of land and sea that are protected and maintained to preserve the natural habitats and biodiversity of the area. These are like marine 'national parks'.
marsh	A wetland where the dominant vegetation is non-woody plants, such as salt grasses and sedges.
mitigation	Mitigation means to make something less harsh, severe or to reduce its impact.
natural resources	Resources from the natural environment eg. Soils, forests, rivers, fish,
nearshore	From the swash zone seaward to just beyond the breaking waves where the depth is too great for wave action to be felt on the seabed.
nursery ground	Areas where fish and other aquatic animals breed and raise their young.
nutrients	Elements and chemicals, such as nitrogen and phosphorus, that are essential to plant growth. Low levels of nitrogen or phosphorus may limit plant growth in surface waters; high levels may cause excess plant and phytoplankton growth.
ocean	The great body of salt water which occupies two-thirds of the surface of the Earth. It surround the great land masses called continents.
oxidation	Combining a substance with oxygen (usually the air).
pathogens	Disease causing organisms.
perceptions	Different ways of viewing things.
pesticide	A chemical substance that kills harmful organisms and is used to control pests, such as insects, weeds or microorganisms.
plantation forestry	Logging of areas where trees are continually artificially replanted.



pollution	The presence of a substance in the environment that, because of its chemical composition or quantity, prevents the functioning of natural processes and produces undesirable environmental and health effects.
red spot disease	Infection of exposed flesh (of a fish) with a fungus usually associated with acidic conditions and or heavy metal toxicity.
reservoir	A pond, lake, or basin, either natural or artificial, for the storage, regulation, and control of water.
resource	A material, substance or place that is found in nature and is used by humans (oil, natural gas, beaches, forests, etc.).
riparian zone	The riparian zone is the area of vegetation that runs along the edge of a river, stream or near an estuary, lake, mangrove, saltmarsh or coastal inlet.
river	Large, natural stream of water that empties into a large body of water such as a lake or the ocean.
runoff	Water that flows over the land surface into a waterbody.
salinity	A term referring to the salt content in soil or water.
seagrass	A unique group of specialised marine plants. They have evolved from land plants and are adapted to living and reproducing entirely within sea water. Seagrasses occur in sheltered areas and shallow waters, growing in soft sediments such as sand or mud.
sediment	Fine soil or mineral particles that settle to the bottom of the water or are suspended in it.
sedimentation	Sedimentation is where a lot of dirt or silt and other material is washed into waterways, clogging the natural flow and affecting the habitat and water quality. When sediment settles over seagrass beds it can block out the sunlight to the seagrass and kill it. Seagrass is very important habitat for fish and crustaceans.
sewage	The waste and wastewater produced by residential, commercial and industrial sources and discharged into sewers - from toilets, showers, kitchens sinks and laundries.
sewerage	System of pipes to transport sewage to the place of disposal or treatment.
sewerage treatment plant	Facility designed to receive the wastewater from domestic sources and to remove materials that damage water quality and threaten public health and safety when discharged into receiving streams or bodies of water.
siltation	The accumulation of sediments transported by water.
snags	Logs or branches in a stream.
stock	Animals kept for use or profit.
stormwater	Water (typically rain water) collected from roof tops, footpaths, roads, etc, together with anything that the water picks up such as rubbish, plastic bags, animal droppings, chemicals from detergents, fertilisers, oil, organics including leaves and lawn clippings.
sustainability	When resources are used in such a way that they will still be available in the future and in a condition that allows future generations to benefit from them.
sustainable	An activity or process that able to be continued indefinitely.
swamp	A type of wetland that is dominated by woody vegetation and does not accumulate appreciable peat deposits. Swamps may be fresh water or saltwater and tidal or nontidal.
terrestrial	A term relating to the earth or land.
tidal flushing	The time required to remove or reduce any dissolved or suspended contaminant through tidal action in an estuary.
tidal limit	The upstream limit of an estuary, at which point the water no longer responds to the ocean tide.
upstream	In the direction away from the flow of a river or steam.
water quality	Water quality refers to the chemical, biological and physical characteristics of water.
water table	The level below the earth's surface at which the ground becomes saturated with water
weir	Structure across the width of a waterway to hold back or divert the flow.
wetlands	Areas, such as swamps and marshes, estuaries, that are covered with fresh, brackish or saline water (surface water or groundwater) for periods of time long enough to support vegetation or aquatic life that thrives in these saturated soil conditions.



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YEARS 7 – 10 GEOGRAPHY

5A3: ISSUES IN AUSTRALIAN ENVIRONMENTS

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## YEARS 7 – 10 GEOGRAPHY

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# TASK 1: OVERVIEW OF ISSUES: WORKSHEET 1

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WASTE MANAGEMENT			

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AIR QUALITY			
URBAN GROWTH			
SPATIAL INEQUALITY	<p>There would be inequality in income between the following locations.</p> <ol style="list-style-type: none"> <li><b>1. Rural and urban</b> – across Australia rural incomes are lower than urban incomes.</li> <li><b>2. Within the urban areas</b> there are inequalities. Waterside and hillside suburbs usually house wealthier residents while poorer residents locate in outer suburbs, those subject to flooding or in less attractive locations.</li> </ol> <p>These spatial inequalities in income create inequalities in access to information technology (the IT divide) health care and education which in turn affects employment and quality of life.</p>	<p><b>Drought</b> has reduced rural incomes in recent years and led to a decline in some rural towns.</p> <p><b>Globalisation</b> has resulted in a loss of unskilled jobs in manufacturing.</p> <p><b>Mechanisation</b> and restructuring of farms has led to job losses in rural areas.</p> <p><b>Rural – urban migration to large cities</b> has increased created more job losses.</p>	<p>Business people and residents in smaller country towns.</p> <p>Indigenous people</p> <p>Unskilled workers.</p>

## TASK 1: OVERVIEW OF ISSUES: WORKSHEET 2

What are the main characteristics of aquatic habitats in estuaries?

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Which activities most threaten water quality and aquatic habitats of estuaries and marine environments and how?

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How important are the commercial and recreational fishing industries to the economy?

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What are the consequences of the loss of aquatic habitats and deterioration of water quality for estuarine and marine fishing industries?

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# TASK 1: SPATIAL INEQUALITY: sample newspaper article

## NATURE OF THE ISSUE

Spatial inequality is about where inequalities occur and the reasons for them. Inequalities can be shown by looking at figures for income, health, education levels, and access to the internet. The poor in Australia include a high proportion of people over 65, indigenous Australians, single parent families, unskilled youth and unemployed migrants from non English speaking backgrounds. These groups tend to be located in less affluent suburbs.

## PROCESSES

In Australia, globalisation has created an economy based on “new jobs” in information technology and business services and a loss of manufacturing jobs. There are fewer opportunities for unskilled workers. The benefits of globalisation are concentrated in large cities especially Sydney.

Lack of opportunities in rural towns has increased rural – urban migration into Australia’s large cities.

## CASE STUDY: INCOME INEQUALITY

Statistics continue to show a large gap between the incomes of those living in the capital cities and those living in the rest of Australia. In the 1990s, the incomes of city residents increased at about double the rate of those living in major urban centres and regional and rural towns. For example this is highlighted in the table below. The table shows the higher % of people on higher incomes living in cities compared to other areas.

Income group	Capital cities (%)	Major urban areas (%)	Regional towns (%)	Rural towns (%)	Rural areas (not towns) (%)
Low (Under \$15,600 p.a.)	20	25	26.7	30	22.1
Lower Middle (\$15,600-36,400p.a.)	30.8	34.7	37.6	40.8	39.9
Upper Middle (\$36,400-78,000 p.a.)	35.4	31.7	29.2	25.2	29.4
High ( Over \$78,000 p.a.)	13.9	8.6	6.5	4.1	7.4

Source: Lloyd, R, Harding, A and Hellwig, O, ‘Regional Divide? A Study of Incomes in Regional Australia’, Discussion Paper No. 51, National Centre for Social and Economic Modelling, September 2000.

### Impacts

Lower income earners tend to live in areas with less access to transport, services and jobs, leading to a cycle of poverty that often passes through generations. They experience higher infant mortality rates and lower life expectancy.

### Possible Individual responses

An unskilled young person might seek job training through community based programs that are free or low cost. Another individual might respond by becoming involved in criminal activity.

### Group responses:

A community group might provide educational opportunities such as Mission Australia’s Indigenous Youth Mobility program in the Northern Territory which gives young people access to training and employment. Welfare groups might respond with food, clothing and housing assistance.

Federal, State and Local Governments have responded to this issue in many ways. Some examples are:

- The provision of education institutions in outer suburbs such as the University of Western Sydney. (State).
- Income support for the unemployed (Federal).
- Rent assistance to allow the poor to rent privately (Federal).
- Local government incentives to attract business into outer suburbs and create job opportunities.

## TASK 2: WASTE MANAGEMENT: WORKSHEET 1

Waste sources identified from the poster

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Shoalhaven Heads landuse map



LEGEND



Identify the waste issues for the *Lower Shoalhaven River Catchment*

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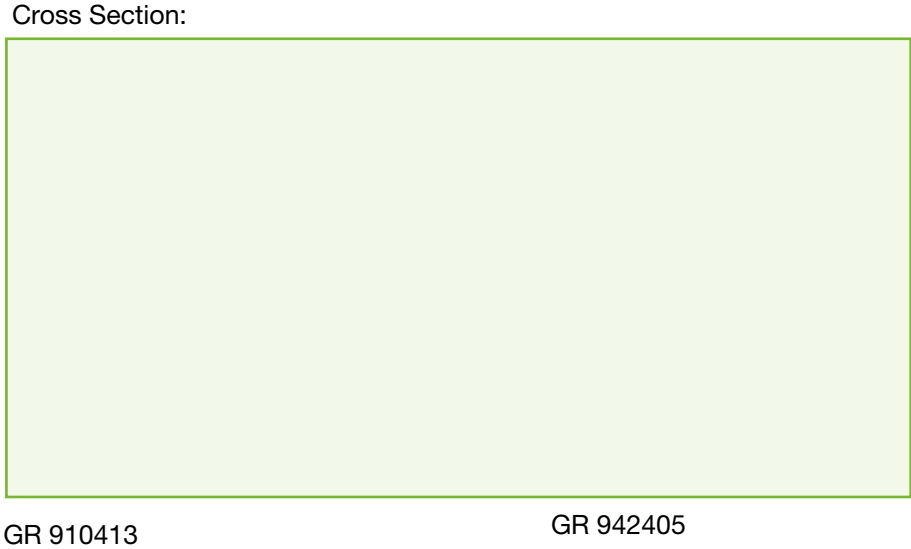
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# Geographical features that could impact on waste management

## Topography: Cross section

Height  
Metres  
  
1cm to 10m



**At what locations might these features create waste management issues?**

Gradient =  $\frac{\text{Vertical rise}}{\text{Horizontal distance}}$

Gradient

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Local relief: Highest point minus lowest point

Topography

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Density: Buildings per square km

Building density

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# TASK 2: WASTE MANAGEMENT: WORKSHEET 2

## ORGANISATION SHEET and CHECKLIST FOR YOUR LESSON

Scope of lesson	Main ideas		Completed (Tick)
<p>What is the issue about?</p>	<p>Briefly outline the issue</p>		
<p>Where in the <i>Lower Shoalhaven River Catchment</i> is the issue located?</p> <p>Construct a simple map</p> <p>Collect digital images to teach the students about the location and the nature of the issue</p>	<p>Location</p> <p>Do I have a map? How will I produce my own map?</p> <p>What photographs can I find?</p>		
<p>What are the main impacts of this issue on the <i>Lower Shoalhaven River Catchment</i> and different groups in the catchment e.g. fishermen, oyster farmers, tourists, farmers, businesses?</p>	<p>Groups</p>	<p>Impacts</p>	

Scope of lesson	Main ideas	Completed (Tick)
<p>What perceptions might different groups have on the issue?</p> <p>You might interview your friends at school to see if their perceptions differ and why</p>	<p>Groups</p> <p>How will I find out the perceptions?</p>	
<p>What does sustainability mean?</p>	<p>Definition</p>	
<p>How does this issue impact on sustainability in the <i>Lower Shoalhaven River Catchment</i>?</p>	<p>How does my issue reduce sustainability?</p>	
<p>What will happen if the issue is not addressed?</p>	<p>What will be the consequences of doing nothing about the issue?</p>	

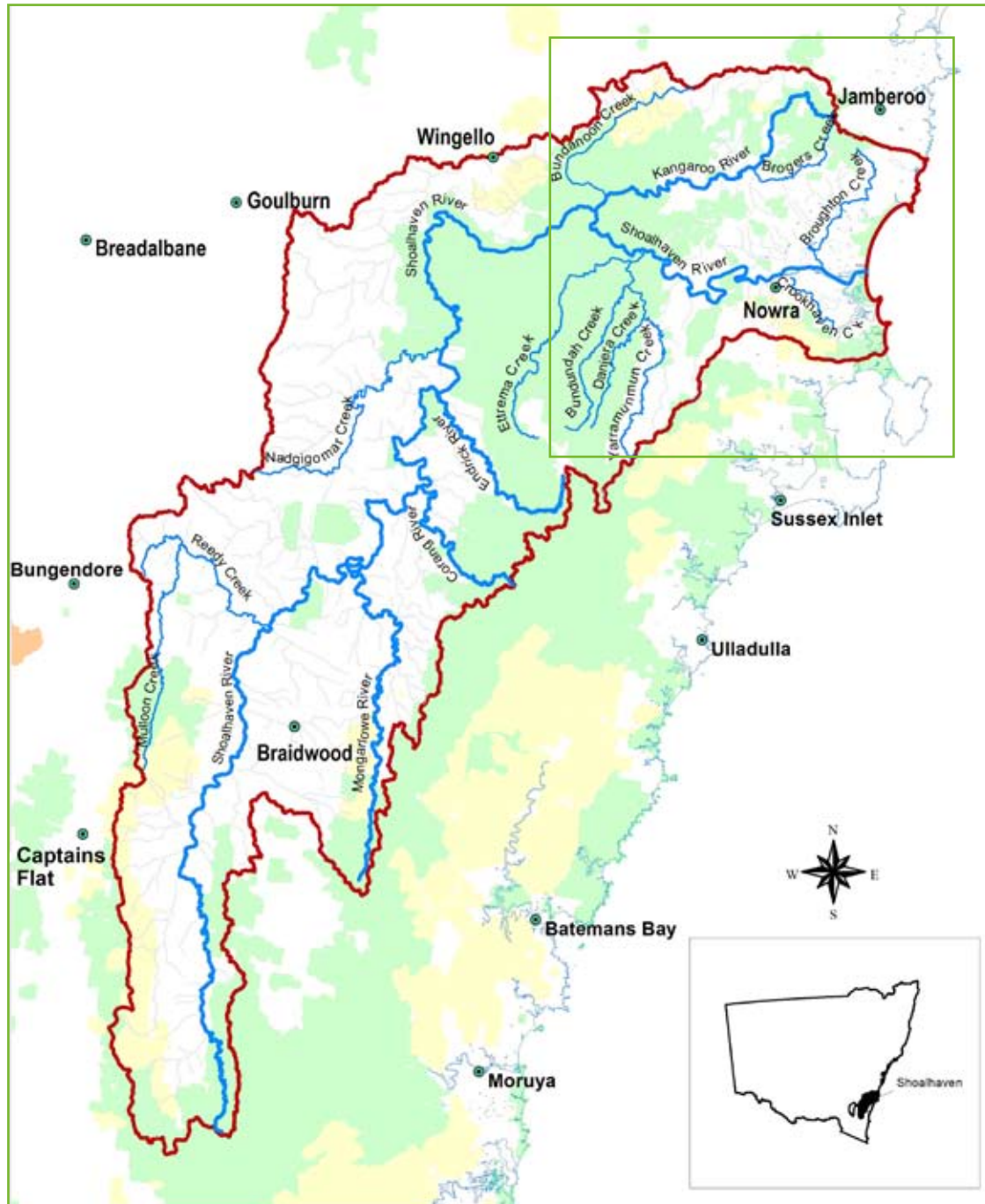


Scope of lesson	Main ideas			Completed (Tick)
<p>What groups are involved in decision making about this issue?</p> <p>How are these decisions made?</p> <p>What is the role of government in this process?</p>				
<p>What have individuals, groups and governments done to respond to and manage the issue?</p>	Individuals	Groups	Governments	
<p>Have the strategies implemented so far been successful?</p>				
<p>Are there any other strategies that might promote sustainability, social justice and equity?</p>	Suggested strategies for promoting sustainability	Suggested strategies for social justice	Suggested strategies for equity	

## TASK 3: LAND AND WATER MANAGEMENT: Lower Shoalhaven River Catchment Study Area

This map shows the entire catchment area of the Shoalhaven River and its tributaries.

This resource concentrates on the waste, land and water management issues in the *Lower Shoalhaven River Catchment*.





# TASK 3: LAND AND WATER MANAGEMENT: WORKSHEET 1

## RESEARCH ACTION PLAN

Requirement	Details	Tick
<p>Four broad focus questions</p> <p>These must cover:</p> <ul style="list-style-type: none"> <li>• Geographical processes occurring at the site, for example, flooding, erosion, siltation, pollution, urbanisation, resource depletion, habitat destruction, drought, flood mitigation, waste disposal.</li> <li>• Individual, group and government responses to the issue.</li> <li>• Management processes and strategies implemented to manage the issue, especially those promoting social justice and equity, and an evaluation of their success.</li> <li>• Perceptions of different groups on a land/water management issue.</li> </ul>	<p>1.</p> <p>2.</p> <p>3.</p> <p>4.</p>	
<p>The types of primary and secondary data required to answer the focus questions</p>	<p>Primary data required</p> <p>Secondary data required</p>	



Requirement	Details	Tick
<p>How data (research and methodology) is going to be collected and the equipment that is needed</p>	<p>Primary research methodologies (this may have already been done in the class fieldwork task)</p> <p>Equipment needed</p>	
<p>How the data collected is going to be processed and analysed (graphs, tables, maps, sketches, photographs etc)</p>	<p>List methods used to process data</p>	
<p>Provide the following information about the area being studied:</p> <ul style="list-style-type: none"> <li>• a map of the area (remember B.O.L.T.S.)</li> <li>• photographs or field sketches of the site to illustrate <ul style="list-style-type: none"> <li>– the water quality issue(s);</li> <li>or</li> <li>– management strategies.</li> </ul> </li> </ul> <p>A reference to the significance of this issue for the sustainability of the site and for industries dependant on water quality such as fishing, tourism, agriculture, aquaculture and recreation.</p>	<p>How will a map of the area be produced?</p> <p>What photographs need to be obtained?</p> <p>How does the issue affect sustainability?</p>	







Requirement	Details		Completed
<p>Determine the impact of the issue on different groups</p>          <p>Determine the perceptions of these groups on the issue. Interviews with stakeholders should be considered.</p>	Groups	Impacts	
	Groups	Perceptions	
<p>Consider the impacts of climate change on the site</p>	List possible impacts		
<p>Consider the impacts of dam building on the site.</p>	List possible impacts		

## TASK 3: LAND AND WATER MANAGEMENT: Potential Fieldwork Sites For The Lower Shoalhaven River Catchment

### SITE 1: Shoalhaven Heads / Berry Beach

At this site students can observe the following features relevant to land and water management:

- Aboriginal occupation
- Recreational management of natural resources
- Urban development/encroachment
- Dual water system
- Oyster farming impacts
- Tourist impacts
- Wine industry impacts
- Storm water impacts
- Wetland/mangrove regeneration
- Recreational fishing
- Riparian vegetation
- European heritage
- Coastal littoral rainforest management
- Sand mining
- Beach erosion
- Coastal dune succession
- National Park

### SITE 2: Bomaderry Creek Regional Park


At this site students can observe the following features relevant to land and water management:

- Threatened species
- Aboriginal occupation
- Fish migration
- Damming of river
- Littoral rainforest / dry sclerophyll forest
- Recreational management of natural resources
- Unauthorised tracks
- Impact of fire
- Geological history

### SITE 3: Greenwell Point

At this site students can observe the following features relevant to land and water management:

- Recreational management of natural resources
- Urban development/encroachment
- Oyster farming impacts
- Tourist impacts
- Storm water impacts
- Wetland/mangrove regeneration
- Recreational fishing
- Riparian vegetation
- Dairy industry impacts



AT THESE SITES students could do any of the following activities:

- Draw a map and a field sketch (and take photos)
- Test water quality
- Record biotic factors
- Draw a cross section
- Do a vegetation transect (line transect or quadrant study)
- Construct a soil profile
- Consider the impact of human modifications eg dam
- Consider the impact of climate change of the site

To determine different perceptions on a particular issue students could interview representatives from any of these groups as an organised part of the fieldwork:

- Ulladulla Fishermen's Co-op Society
- Southern Rivers Catchment Management Authority
- Shoalhaven Water
- Shoalhaven Business Chamber
- Shoalhaven City Council
- Local Landcare Organisation
- Shoalhaven Oysters

## GLOSSARY

acid sulphate soil	<p>Acid sulfate soils are naturally occurring soils and sediments containing sulfide minerals, predominantly pyrite (an iron sulfide). Left undisturbed, these soils are not acidic. However by draining, excavating or exposing these soils by lowering the water table, the sulfides will react with oxygen in the air to form sulfuric acid.</p> <p>Subsequent flushing or flooding of these dried out soils releases acid and heavy metals into waterways causing harm and even death of plants and animals in the river and estuaries and corrosion of concrete and steel building structures.</p>
agriculture	Cultivating the land to grow crops or raise stock for food, feed, fibre, fuel, or other useful products.
algal bloom	An explosion of algae populations often due to increased nutrient loads.
anoxic	Without oxygen.
aquaculture	The farming or cultivation of fish, other animals, or plants, in water.
aquatic	Living or growing in or on the water. A term relating to water and water environments.
benthic	Features at the bottom of water bodies – often referred to fish species that live on the bottom of the ocean, rivers and lakes.
biodiversity	Biodiversity means the range of different native animals, birds, fish present in a particular area.
brackish	Slightly salty.
buffer	An area of land between two conflicting land uses.
bycatch	Non target species that are caught when fishing (commercial or recreational) or species that cannot be sold or taken as recreational catch.
catchment	The area of land that drains into a system of rivers, creeks or streams. This area of land is usually bounded by mountain ridges or steep terrain.
catchment management	When land and water resources are managed on a catchment wide basis rather than separately.
coast	The seaward limit of land including a transition zone between the marine and land environments and includes beaches, cliffs, sand dunes and estuaries.
contaminant	Substances not naturally present in the environment or present in elevated amounts that can negatively affect the environment.
crustacean	An aquatic animal that has a hard external skeleton and jointed appendages such as lobsters, prawns and crabs.
cumulative	Increasing by successive addition.
dam	A structure built across a watercourse such as a river to hold back water.
degradation	When the quality of something is reduced. For example, land and water degradation results in poorer quality resources.
degrade	To cause a decline in the quality.
detritus	Fallen organic material such as leaves or twigs.
dissolved oxygen	The amount of oxygen dissolved in water.
downstream	Towards the direction that a stream is flowing.
dredge	Removal of sediment from the bottom of a waterbody.
ebb tide	The falling tide when the water moves out to sea.
ecological sustainable development	Ecologically sustainable development refers to 'Sustainable development that meets the needs of the present without compromising the ability of future generations to meet their own needs.' (Brundtland Report: Our Common Future).
ecosystem	A community of interacting plants and animals and the non living environment in which they are found.
effluent	Wastewater, treated or untreated, that flows out of a treatment plant, sewer, or industrial outfall.
endangered	Any species in danger of extinction throughout all or a significant part of its range/habitat.
enteric	Originating from the intestines.
environment	All external conditions and influences considered together that affect the development and survival of an organism. The biophysical surroundings and the community in which people live.
erosion	Wearing away of the land by the action of water, ice or wind.

estuary	An estuary is where the river mouth meets the sea and forms special habitats for plants, animals and fish and shellfish.
eutrophication	The nutrient enrichment of water and / or land that can lead to toxic algal blooms and loss of dissolved oxygen leaving water which cannot support much life.
fauna	Animals
fertiliser	Substance added to the soil to increase its productivity.
flood mitigation	Flood mitigation includes a range of measures designed to reduce the impact of floodwaters; like floodgates, dams, detention basins, levees and widening and deepening water channels.
floodgate	A gate designed to control water or restrain a water outburst.
floodplain	The low lying, relatively flat land within the catchment, next to a stream or a river that is covered with water during a flood.
flood tide	The rising tide when the water comes in from the sea.
geographical processes	Those biophysical and human actions that bring about changes to environments.
gross pollutant trap	Devices used to prevent large items polluting waterways.
groundwater	Water that flows beneath the land surface, for example, within rock, fractures or other cavities in the ground.
habitat	The place where a plant or animal species naturally lives and grows.
horticulture	Commercial cultivation of fruits, vegetables and flowers.
hydrology	The science of water relating to its occurrence, properties, distribution, circulation and transport.
hypoxic	Too little oxygen.
impervious	Unable to be penetrated.
integrated catchment management	The sustainable and balanced use of all land, water and biological resources in a catchment.
irrigation	Application of water (or wastewater) to land areas to supply the water and sometimes nutrient needs of plants.
lake	A body of fresh or salt water that is usually entirely surrounded by land, however coastal lakes often have a permanent or temporary connection to the sea
legislation	Laws created by an act of parliament.
levee	An artificial bank that protects land from flooding.
Lower Shoalhaven River Catchment	The catchment below Copmanhurst where the estuary begins (that is, the tidal limit of the river).
mangrove	Mangroves grow along the shorelines of many NSW estuaries in areas subject to regular tidal inundation. Two most common species are grey mangrove ( <i>Avicennia marina</i> ) and river mangrove ( <i>Aegiceras corniculatum</i> ).
marine	Of or relating to the sea or ocean.
marine protected areas	Marine Protected Areas are areas of land and sea that are protected and maintained to preserve the natural habitats and biodiversity of the area. These are like marine 'national parks'.
marsh	A wetland where the dominant vegetation is non-woody plants, such as salt grasses and sedges.
mitigation	Mitigation means to make something less harsh, severe or to reduce its impact.
natural resources	Resources from the natural environment eg. Soils, forests, rivers, fish,
nearshore	From the swash zone seaward to just beyond the breaking waves where the depth is too great for wave action to be felt on the seabed.
nursery ground	Areas where fish and other aquatic animals breed and raise their young.
nutrients	Elements and chemicals, such as nitrogen and phosphorus, that are essential to plant growth. Low levels of nitrogen or phosphorus may limit plant growth in surface waters; high levels may cause excess plant and phytoplankton growth.
ocean	The great body of salt water which occupies two-thirds of the surface of the Earth. It surround the great land masses called continents.
oxidation	Combining a substance with oxygen (usually the air).
pathogens	Disease causing organisms.
perceptions	Different ways of viewing things.



pesticide	A chemical substance that kills harmful organisms and is used to control pests, such as insects, weeds or microorganisms.
plantation forestry	Logging of areas where trees are continually artificially replanted.
pollution	The presence of a substance in the environment that, because of its chemical composition or quantity, prevents the functioning of natural processes and produces undesirable environmental and health effects.
red spot disease	Infection of exposed flesh (of a fish) with a fungus usually associated with acidic conditions and or heavy metal toxicity.
reservoir	A pond, lake, or basin, either natural or artificial, for the storage, regulation, and control of water.
resource	A material, substance or place that is found in nature and is used by humans (oil, natural gas, beaches, forests, etc.).
riparian zone	The riparian zone is the area of vegetation that runs along the edge of a river, stream or near an estuary, lake, mangrove, saltmarsh or coastal inlet.
river	Large, natural stream of water that empties into a large body of water such as a lake or the ocean.
runoff	Water that flows over the land surface into a waterbody.
salinity	A term referring to the salt content in soil or water.
seagrass	A unique group of specialised marine plants. They have evolved from land plants and are adapted to living and reproducing entirely within sea water. Seagrasses occur in sheltered areas and shallow waters, growing in soft sediments such as sand or mud.
sediment	Fine soil or mineral particles that settle to the bottom of the water or are suspended in it.
sedimentation	Sedimentation is where a lot of dirt or silt and other material is washed into waterways, clogging the natural flow and affecting the habitat and water quality. When sediment settles over seagrass beds it can block out the sunlight to the seagrass and kill it. Seagrass is very important habitat for fish and crustaceans.
sewage	The waste and wastewater produced by residential, commercial and industrial sources and discharged into sewers - from toilets, showers, kitchens sinks and laundries.
sewerage	System of pipes to transport sewage to the place of disposal or treatment.
sewerage treatment plant	Facility designed to receive the wastewater from domestic sources and to remove materials that damage water quality and threaten public health and safety when discharged into receiving streams or bodies of water.
siltation	The accumulation of sediments transported by water.
snags	Logs or branches in a stream.
stock	Animals kept for use or profit.
stormwater	Water (typically rain water) collected from roof tops, footpaths, roads, etc, together with anything that the water picks up such as rubbish, plastic bags, animal droppings, chemicals from detergents, fertilisers, oil, organics including leaves and lawn clippings.
sustainability	When resources are used in such a way that they will still be available in the future and in a condition that allows future generations to benefit from them.
sustainable	An activity or process that able to be continued indefinitely.
swamp	A type of wetland that is dominated by woody vegetation and does not accumulate appreciable peat deposits. Swamps may be fresh water or saltwater and tidal or nontidal.
terrestrial	A term relating to the earth or land.
tidal flushing	The time required to remove or reduce any dissolved or suspended contaminant through tidal action in an estuary.
tidal limit	The upstream limit of an estuary, at which point the water no longer responds to the ocean tide.
upstream	In the direction away from the flow of a river or steam.
water quality	Water quality refers to the chemical, biological and physical characteristics of water.
water table	The level below the earth's surface at which the ground becomes saturated with water
weir	Structure across the width of a waterway to hold back or divert the flow.
wetlands	Areas, such as swamps and marshes, estuaries, that are covered with fresh, brackish or saline water (surface water or groundwater) for periods of time long enough to support vegetation or aquatic life that thrives in these saturated soil conditions.