

Stage 6 Geography - Biophysical Interactions

“Checking the Pulse of the Hawkesbury River”



Name _____

OUTCOMES

Senior Geography Outcomes

- P2** describes the interactions between the four components which define the biophysical environment
- P3** explains how a specific environment functions in terms of biophysical factors
- P6** identifies the vocational relevance of geographical perspective
- P8** selects, organises and analyses relevant geographical information from a variety of sources
- P9** uses maps, graphs and statistics, photographs and fieldwork to conduct geographical inquiries
- P10** applies mathematical ideas and techniques to analyse geographical data

HEALTH & SAFETY ISSUES

As you are working out in the field you need to be aware that;

- Ground materials can be slippery
- Edges of the river can be quite deep and muddy
- Some animals can deliver painful or venomous bites

Kayaking

- PFD supplied by Brewongle EEC must be worn at all times while in the water
- Old shoes must be worn in the water and kayaks
- You need to bring a change of clothes, footwear, hat, towel, water bottle and sunscreen
- Appropriate behaviour at all times and follow safety instructions

INVESTIGATION TASK

Sydney Water has requested a detailed assessment and report on the current ecological status of the river and adjacent land in the Sackville Reach. This report will inform all future decision making regarding water entitlements and provide a basis from which ecosystem rehabilitation can begin. The report will require a detailed assessment of the following areas:

- Water quality (hydrological and physio-chemical)
- Riverbank and riparian zone health (erosion, run-off and biodiversity)
- Biological characteristics via algal surveys

Background Research Tasks – to be completed before visit

Visit Brewongle EEC's website see the 360° River view and watch the Prezi.

Read the 'Natural Resource Management Issues' PDF file to answer the following questions.

<http://brewongleeec.com/resources/stage-6-resources/checking-the-pulse-of-the-hawkesbury-river/>

1. What is a catchment?

2. Identify and describe the location and nature of the Hawkesbury Nepean Catchment.

Location: _____

Size: _____

Natural habitats: _____

3. What is an 'ecosystem service'?

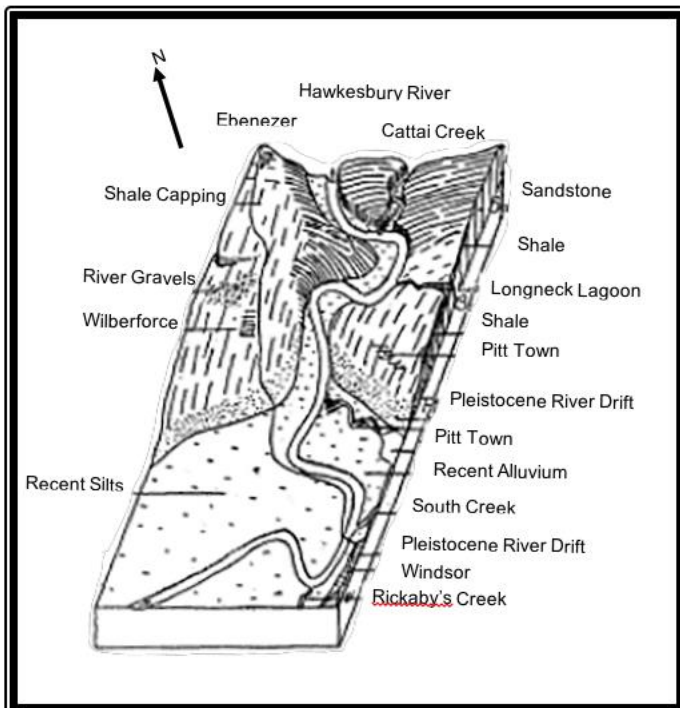
4. List 4 'ecosystem services' that the river provides:

5. Choose 1 Natural Resource Management Issue (eg "Issues affecting Land and Soil") and explain the issues below.

6. Explain why river nutrient loads are decreasing.

7. List some of the physical, chemical and biological parameters you will be measuring.

8. Using the diagram consider how adjacent landforms may influence the depth and speed of the river?

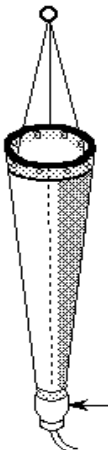



Diagrammatic representation of the Hawkesbury River north of Windsor towards Ebenezer and Sackville, showing change from lowland to highland.

ACTIVITY 1

Water Quality Assessment Field Data Collection Sheet				
Sample Site Location:		Hawkesbury River at Sackville North		GPS Easting
				GPS Northing
Sample Collection Time:			Sample Collection Date:	
Weather Conditions:	previous 24hrs;		previous 48 - 120hrs;	
Tide: ebb tide [running out to low] / flood tide [running in to high]				

Hydrological Parameters				
Parameter	Units of measurement	Site number	Site Description Hawkesbury River at Sackville North	
Width of the River	metres	all	How wide is the river?	
Depth at Sample Site	metres	1	Depth near beach on south side of river bend	
	metres	2	Depth in the Middle	
	metres	3	Depth at Cave	

Biological Collection Method	
	<p>Collection of algae, phytoplankton and invertebrates.</p> <p>Method 1: Attach plankton net to rear of kayak with length of rope. Drag net through water while kayaking. Empty sample into bottle.</p> <p>Method 2: From shore line use scoop net by dragging across surface in zig zagging motion. Empty sample into bucket.</p>
	

ACTIVITY 2



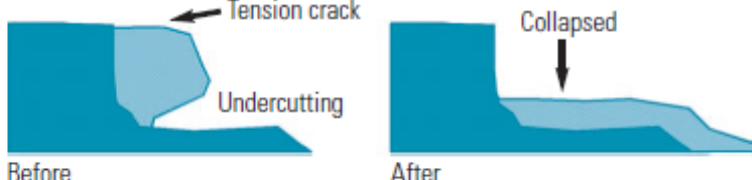
Environmental Conditions			
Date:		Time:	
Current weather conditions:			
Date of last rain:		Rainfall mm:	
Visual Observations	river water quality:		
	riverine vegetation:		
	hillside vegetation:		
Human impacts:			

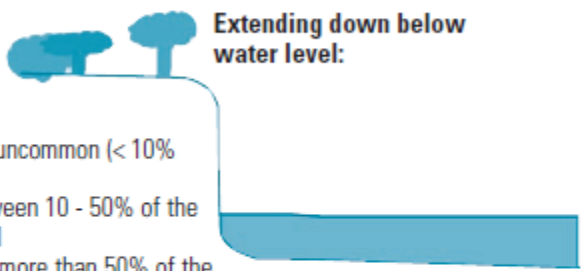
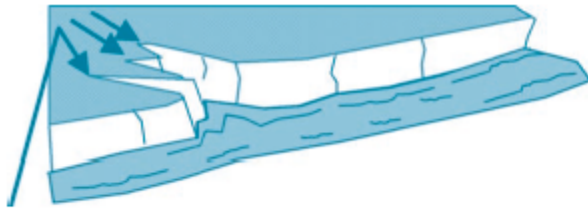
Physio-chemical Water Quality Parameters					
Location – Brewongle River Block Sackville North	Parameter & Units of Measurement	ANZECC Trigger Values for Ecosystem Protection	Sample Depth		What is the mean / average level
			0.2m	1m	
	Temperature (Temp) oC	N/A			
	pH	6.5 - 7.5			
	Dissolved Oxygen (DO) mg/L	>5			
	Dissolved Oxygen (DO) % saturation	85 - 110			
	Electrical Conductivity (EC) uS/cm	200 - 300			
	Turbidity ntu	200 - 300			
	PO4 mg/L	0.02			
	NOx mg/L	0.04			

Current Erosion Condition Assessment

Checklist 7: Riverbank Erosion Condition

Types of Erosion – does your site show any of these features?

<p>SLUMPING</p>  <p>Before bank slump After</p> <p>Big slumps high up on the bank, or extending further back</p> <ul style="list-style-type: none"> • Not present = 0 • Present but uncommon (< 10% of bank) = 1 • Occupy between 10 and 50% of the bank length = 3 • Occupy more than 50% of the banks length = 5 <p>Potential cause is flood damage. Manage by revegetating with deep rooted native trees.</p>	<p>Score</p>
 <p>Before bank slump After</p> <p>Localised smaller slumps either on the base, slope or top of the bank</p> <ul style="list-style-type: none"> • Not present = 0 • Present but uncommon (< 10% of bank) = 1 • Occupy between 10 - 50% of the bank length = 3 • Occupy more than 50% of the banks length = 5 <p>Potential causes are lack of vegetation, flood damage, stock or human access on sandy banks. Manage by planting deep-rooted natives and controlling access.</p>	<p>Score</p>
 <p>Before After</p> <p>Undercutting of bank base and toppling</p> <ul style="list-style-type: none"> • Not present = 0 • Present but uncommon (< 10% of bank) = 1 • Between 10 - 50% of the bank length = 3 • Common on more than 50% of the banks length = 5 <p>Potential causes are lack of deep rooted native vegetation, wind or wave action in larger rivers or speed of stream flow in smaller streams. Manage by paying special attention to protecting the toe of the bank. Plant native vegetation which does not mind wet feet. Encourage in-stream vegetation and retain snags against the bank if they are not causing erosion.</p>	<p>Score</p>

<p>VERTICAL BANK SECTIONS</p>  <p>Extending down below water level:</p> <ul style="list-style-type: none"> • Not present = 0 • Present but uncommon (< 10% of bank) = 0 • Occupy between 10 - 50% of the bank length = 1 • Common on more than 50% of the banks length = 3 <p>Potential causes of channel widening are speed and volume of water flow. Manage by revegetating with native plants from the top of the bank.</p>	<p>Score</p>
<p>GULLY EROSION</p>  <p>Running perpendicular to the river down the face of the bank:</p> <ul style="list-style-type: none"> • Not present = 0 • Present but uncommon (< 10% of bank) = 0 • Impacts between 10 - 50% of the bank length = 1 • Common on more than 50% of the bank length = 2 <p>Potential causes are runoff from adjacent land, poor drainage, lack of vegetation in appropriate areas and stormwater. Manage by addressing drainage issues. Plant water soaking native shrubs and trees at heads of gullies.</p>	<p>Score</p>
<p>TOTAL SCORE (SUM OF SCORES) =</p>	

Assigning an Erosion Risk Class

TOTAL SCORE (SUM OF SCORES ABOVE) =			
<p>Current Erosion Condition Class assigned from above Total Score</p>	<p><input type="checkbox"/> Erosion Condition Class 1 Total score 0-4</p> <p>Bank generally in good condition with little or no erosion.</p>	<p><input type="checkbox"/> Erosion Condition Class 2 Total score 5-8</p> <p>Bank in a fair condition with erosion becoming a significant problem</p>	<p><input type="checkbox"/> Erosion Condition Class 3 Total score 9 to 21</p> <p>Bank appears to be significantly degraded with most of the bank suffering some form of erosion</p>

What measures would you recommend be undertaken to reduce the erosion risk of this site?

Activity 3 - Biological Parameters

Parameter	Species Diversity	Species ID	Taste and Odour imparting	Filter Clogging Organisms	Polluted Water Species	Other surface water phytoplankton
Phytoplankton identification	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

Vertbrate ID	1		4	
	2		5	
	3		6	

Conclusions and Recommendations

1. List any physio-chemical water quality data results that were outside ANZECC trigger values:

2. Explain why you think these results fell outside the 'normal' range set by ANZECC

3. Describe some management actions that you would recommend be undertaken to improve water quality outcomes in the Hawkesbury River. (eg. how can our community continue to reduce nutrient loads in the river?).

4. How many different Algal species did you identify? What does this indicate about river health?

5. What did your 'erosion risk' and 'current erosion condition' assessment indicate about the site?

6. What management actions would you recommend to reduce erosion risk and improve the current conditions?

7. Discuss how reducing erosion will improve water quality in the Hawkesbury River.
