

CS4 - Stage 6 Earth and Environmental Science

Introduction

This document aims to identify activities that can be performed in the Upper Parramatta River Catchment and are relevant to modules in the NSW Stage 6 Earth and Environmental Studies Syllabus. The document will highlight opportunities created by using the Upper Parramatta River Catchment to integrate columns 1, 2 and 3 in the modules and hence enrich learning and manage teaching time more efficiently.

8.3 The Local Environment –

Contextual Outline (from syllabus)

The immediate environment has an impact on all people in ways that an Earth and Environmental Science student will learn to recognise and explain. This module allows students to draw on existing knowledge of their own local area and expand on their understanding of geological and climatic concepts through careful analysis of the area. Study of this module must include field experience in the investigation of landforms, rock and soil types as well as biological factors and how all of these interact to form the local environment.

Students will be able to identify the physical and chemical features of their local environment and relate those features to the hydrologic, lithologic and atmospheric cycles in operation. They need to be able to identify and relate landforms, rock types and soils to the resultant natural environments in which they, the plants and other animals of the area, live. In order to judge the impact of human settlement in the area, students will need to investigate the history of the local environment as evident in the rocks, soils and fossils of the area. Where practicable, they could also seek the assistance of local indigenous people in tracing the history of the area before the advent of European settlement.

Finally, students should be encouraged to analyse those aspects of the local environment that have been affected by people, describe the impacts, identify the causes of these impacts and propose realistic solutions to any problems that exist by emphasising ecologically sustainable development strategies. At least one field study will be necessary to identify the geological features of the landscape. The report on any field study should include: a statement of purpose, a clear and detailed definition of the area studied, any background material collected on the area, appropriate presentation of data collected, analysis of data, suggestions of the relationships that exist in the area and an assessment of human impact on the area.

Prescribed Focus Areas

Syllabus Objectives

Students will develop knowledge and understanding of:
the nature and practice of Earth and Environmental
Science

current issues, research and developments

Syllabus Outcomes

A Student:

P2 applies the processes that are used to test and validate models, theories and laws of science with particular emphasis on first-hand investigations in Earth and Environmental Science

P5 describes the scientific principles employed in particular areas of Earth and Environmental Science research

Domain: Knowledge and Understanding

Syllabus Objectives

Students will develop knowledge and understanding of:

the abiotic features of the environment

biotic impacts on the environment

Syllabus Outcomes

A Student:

P7 identifies and describes the physical and chemical features of the environment

P10 describes human impact on the local environment

Domain: Skills

Syllabus Objectives

Students will develop skills in:

planning investigations
conducting investigations
communicating information and understanding
developing scientific thinking and problem-solving skills
working individually and in teams

Syllabus Outcomes

A Student:

P11 identifies and implements improvements to investigation plans
P12 discusses the validity and reliability of data gathered from first-hand investigations and secondary sources
P13 identifies appropriate terminology and reporting styles to communicate information and understanding in Earth and Environmental Science
P14 draws valid conclusions from gathered data and information
P15 implements strategies to work effectively as an individual or as a member of a team

Domain: Values and Attitudes

Syllabus Objectives

Students will develop positive values about and attitudes towards:

themselves, others, learning as a lifelong process,
Earth and Environmental Science and the
environment

Syllabus Outcomes

A student:

P16. demonstrates positive values about, and attitudes towards, both the living and non-living components of the environment; ethical behaviour; and a desire for critical evaluation of the consequences of the applications of science

Core Content

Outcomes	Students Learn To:	Students:	Skills	Activities/ Teaching Learning Sequence
P7	1. Rocks are formed from different materials Students learn to: Identify and describe the geological features of the local environment that determine its landscape	Identify data, gather, process and present information as a report that identifies and describes: The purpose of the report The geological features of the local landscape	P14 P15	Activity Sheet AS16 – Geology and Geomorphology
P10	2. The properties of soils affect the local biological environment Students learn to: • analyse the ways in which the vegetation of an area can be influenced by the soil composition and climate/microclimate of a region • relate the presence of particular animals in the local environment to their requirements within the local environment	• identify, gather and process first-hand or secondary data to identify the dominant types of plants and animals in the area studied and, where possible, solve problems related to the soil types	P14	Use transparencies and maps to relate vegetation types with soil type. Relate the presence of endangered species to vegetation types Account for these relationships.
P7 P10	3. The impacts of humans on local aquatic and terrestrial environments will differ with locality. Students learn to: • summarise and assess the changes in the local environment in the last fifty years in terms of: – vegetation cover and diversity – animal diversity and abundance – water flow and quality • explain why different groups in the	• gather and process information from secondary sources to describe changing vegetation cover, plant and animal diversity and abundance, and water flow and quality in the local environment over the last fifty years • identify data, gather,	P14, P15, P16	Compare and contrast landuse and vegetation cover in 1951 and 2001 using aerial photographs. Using this and Information sheets on Impact of Urban Development, and Ecologically Sustainable Development to outline the impact of the changes on plant and animal diversity and abundance and water quality and flow. Information is also available from Parramatta Heritage Centre. Use the Streamwatch water bug detective guide to construct a key for macroinvertebrates.

	local society have different views of the impact of human activity on the local environment	process and analyse first-hand information and use available evidence to assess current human impact on the local biotic and abiotic environment		Visit the chosen test site. Carry out an aquatic macroinvertebrate study of the chosen creek and use the Streamwatch water bug detective guide to determine a pollution rating of the waterway. Use Streamwatch kit or other kit to perform water quality tests. Analyse results to assess human impact on the environment of the site.
P10	4. The need for governments and local councils to design and enact laws to protect the biotic and abiotic environment Students learn to: <ul style="list-style-type: none"> • identify one environmental issue that requires some government regulation or management, such as: <ul style="list-style-type: none"> – sustainable development – exploration – mining – environmental planning – air and water quality management – land use and rehabilitation • identify an appropriate local environmental document that aims to address one of the issues above (eg environmental impact study, catchment management plan) 	<ul style="list-style-type: none"> • gather, process and analyse information from secondary sources to identify and discuss the scientific basis of the issues in the chosen local environmental document • gather information from secondary sources to discuss one government regulation based on ecologically sustainable development principles on land use 	P13, P14	Information Sheet E3 – Environmental Legislation E2 - Ecologically Sustainable Development. Use Management Plans from UPRCT website and State of the Environment Reports from local government (Baulkham Hill Shire Council, www.bhsc.nsw.gov.au , Blacktown City Council, www.blacktown.nsw.gov.au , Holroyd City Council, www.holroyd.nsw.gov.au , Parramatta City Council, www.parracity.nsw.gov.au) discuss the scientific basis of the management plan. Information about latest releases of Environmental Impact Statements can be found from the Nature Conservation Council (www.ncc.org.au)
P7, P10	5. The activities of humans can cause systematic habitat destruction Students learn to: <ul style="list-style-type: none"> • recall strategies used to balance human activities and needs in ecosystems with conserving, protecting and maintaining the 	<ul style="list-style-type: none"> • gather, process and present information about the consequences of land clearing in a particular catchment • process and analyse secondary information to 	P11, P14, P15	Information Sheets: E4 - Flooding Activity: AS12 - How much stormwater makes a flood

	<p>quality of the environment</p> <ul style="list-style-type: none"> • assess the impact of human alterations to the environment, including land clearing, in terms of some specific consequences, such as increased runoff, increased soil erosion, changes in river flows, in-stream sedimentation • describe, using examples from the local environment if possible, ways in which artificial structures can disrupt natural surface processes • explain how habitat disturbance from soil degradation can advantage introduced species of plants and lead to the reduction or elimination of native flora and fauna species in affected areas 	<p>prepare a case study on the impact of an artificial structure on natural surface processes</p> <ul style="list-style-type: none"> • gather, process and present information from secondary sources on two Australian species that have been declared endangered and use available evidence to outline the reasons why the species have become endangered and the measures taken to ensure their survival 		<p>Field Trip: FT3 - Loyalty Road Flood Basin</p> <p>Use National Parks and Wildlife Service Website (www.npws.nsw.gov.au) Follow link to Cool stuff/school stuff. Choose What species live in your area and follow directions to search the wildlife atlas for threatened species in your area and then information about individual species.</p>
P7, P10	<p>6. Bio-diversity assists in keeping a dynamic balance in the biosphere Students learn to:</p> <ul style="list-style-type: none"> • use examples to describe and explain what is meant by biodiversity • outline the potential effects of a loss of biodiversity in destabilised ecosystems • discuss the importance of refugia in conserving biodiversity 	<ul style="list-style-type: none"> • gather information from secondary sources, including the Register of the National Estate (ERIN) or other databases to identify significant places of environmental importance in the local area • gather information from secondary sources to identify and describe an example of a Biosphere Reserve and the aim(s) of this reserve 	P14, P16	<p>Information Sheets: C1 - Biodiversity E1 - Biodiversity Issues C10 - Vegetation Communities Individual Catchment Sheets Use Databases at ERIN www.erin.gov.au - Link to databases on top right. (Register of the National Estate) or CANRI www.canri.nsw.gov.au - Natural Resources Atlas.</p> <p>Use transparencies of Endangered Species and Vegetation Communities. Comment on any correlation and why this may be so. How important are these areas of remnant bushland in conserving biodiversity?</p>