

GHHP Curriculum Lesson Plans

Topic:

Year Level: 10, 11 and 12

Key Learning Areas: Authority subjects; Agricultural Science, Biology, Chemistry, Earth Science, Geography, Marine Science, and Science 21.
 Authority registered subjects; Agricultural Practices, Aquatic Practices and Science in Practice.

Content:

- Lesson One: Class Debate Urban, Industrial Run-Off vs Agricultural Run-Off
- Lesson Two: The science behind the Catchment Story
- Lesson Three: My Gladstone Harbour Story
- Lesson Four: How Accessible is the Harbour?
- Assessment: Extended research report on stewardship in the Gladstone Harbour

LESSON PLANS

LESSON ONE: Class Debate Urban, Industrial Run-Off vs Agricultural Run-Off	
TOPIC	Urban, Industrial Run-Off vs Agricultural Run-Off
OVERVIEW	<p>Freshwater run-off in flood plumes is a recognised cause of coral mortality owing to reduced salinity levels. Major flooding of the Boyne and Calliope Rivers, a result of heavy rainfalls associated with Tropical Cyclone Oswald in January 2013, temporarily lowered salinity levels within Gladstone Harbour. Converting temperature and conductivity data to practical salinity units (psu) for the Mid Harbour (Vision Environment Queensland 2013a,b) revealed a period of approximately three days from 27 to 29 January 2013 during which salinity levels remained below 20psu at a depth of 0.75m in the Mid Harbour. A minimum level of less than 5psu was reached on 28 January. These sustained low levels are likely to have caused high levels of coral mortality within the harbour.</p> <p>Threats to coral reefs include both natural and anthropogenic pressures that can operate at global (e.g. climate change, El Niño Southern Oscillation), regional or local scales. These pressures include negative effects from large-scale flooding, sedimentation, urban pollution and agricultural run-off. Coral reef communities within Gladstone Harbour can be exposed to freshwater run-off, elevated turbidity and nutrient levels and can be vulnerable to the negative impacts of sediments and increases in macro-algal cover (DHI, 2013).</p> <p>Seagrasses are highly sensitive to reductions in available light and are susceptible to changes in a range of water quality parameters that effect light penetration. High nutrient levels caused by agricultural or urban run-off can cause algal blooms that shade seagrass. Increases in water turbidity from suspended sediments can reduce seagrass growth and reduce the size and extent of extant seagrass meadows due to a decrease in available light and the effects of sediments settling on seagrass leaves. In Gladstone Harbour, increases in turbidity that may be associated with flooding or dredging can result in deposits of silt on seagrass.</p>

	<p>In aquatic systems, phosphorus exists in different forms such as dissolved orthophosphate, condensed phosphates, organically bound phosphate and particulate phosphate. The total phosphorus measure gives an indication of all forms of phosphorus in the water body. Key sources of phosphorus in water include cleaning products, urban run-off, fertiliser runoff, weathering of rocks, partially treated sewage effluent and animal faeces. Phosphorus is an essential nutrient for all organisms, but at high levels it can lead to algal blooms, deplete oxygen in the water (eutrophication) and impact the growth of corals.</p> <p>The element aluminium (Al) is a silvery white metal and the most abundant metal in the Earth's crust (Zumdahl and DeCost, 2010). Therefore it is common to find traces of this element in soil, sediment and water. Aluminium in seawater can be derived from sources that are natural (e.g. weathering of mineral rocks, urban run-off) or anthropogenic (e.g. mining waste, industrial discharges). High levels of dissolved aluminium in aquatic systems are toxic to algae, invertebrates, fish and other animals.</p> <p>Zinc (Zn) is an essential trace element for animals and plants. Anthropogenic sources include zinc from sacrificial anodes in ships, industrial discharges (e.g. mines, galvanic industries, and battery production), sewage effluent, surface run-off and some fungicides and insecticides. At high levels, zinc becomes toxic to organisms.</p> <p><i>GHHP Technical Report</i></p>	
TIMING	2 to 3 lessons	
TEACHING & LEARNING SEQUENCE	RESOURCES	CROSS CURRICULAR PRIORITIES DIFFERENTIATION
<p>LESSON ONE: Class Debate Urban, Industrial Run-Off vs Agricultural Run-Off Students will be able to:</p> <ul style="list-style-type: none"> • Gather information from secondary sources • Compile information and present findings in a speech • Debate a local issue <p>Lesson Plan</p> <ul style="list-style-type: none"> • Divide the class into three teams to argue each side of the argument. Give students Resource 1: Debate Instructions and give research time, students could undertake initial research as a group but write individual speeches. <i>Run-off has a great impact on the health of the Gladstone Harbour. There are many sources of run-off including urban, agricultural and industrial run-off. Conduct a class debate to discuss which source has the greatest impact on health of the Gladstone Harbour.</i> • Each student should prepare three arguments to support their position. Each argument should have three statements supported with evidence. Give students Resource 2: Student Planning Sheet to assist with their planning and 	<p>Resource 1: Debate Instructions Resource 2: Student Planning Sheet Resource 3: Debate Format Sheet Resource 4: Debate Marking Sheet</p> <p>www.ghhp.org.au Report Card Technical Report</p>	<p>Students could be given extended class/home research time or the debate could be undertaken as an impromptu debate with limited research time.</p>

<p>speech. Students then write a 3-5 minute speech to present in front of the class.</p> <ul style="list-style-type: none"> On the day of the debate follow the Resource 3: Debate Format sheet. Place the three teams in a hat and pull randomly out to decide the speaking order. Allow students to present their speeches, at the end of each team's presentation allow other students to ask questions to clarify/rebut their arguments. Teacher/Judges to complete Resource 4: Debate Marking Sheet. Can keep an individual sheet for each student or one for the team as a whole. <p>Checking for understanding</p> <ul style="list-style-type: none"> Have students conducted effective research into their topic? Have students used the planning sheet to assist them in writing their debate speech? Do all students respectfully participate in the debate? 		
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LESSON TWO: The science behind the Catchment Story

TOPIC	Water Quality	
OVERVIEW	<p>This is a story that explains how all members of our community have an effect on the health of the harbour. A catchment includes a river and all of the creeks, streams and other smaller rivers which run into it. Importantly, the catchment also includes the land around these waterways. Water runs off this land surface to enter the rivers and creeks.</p> <p>Whatever we drop into the stormwater drain, whether it be litter, paint or detergent, it goes straight to our local waterway. If we leave litter or oil from the family car on the road or in gutters it can be washed into the stormwater drain and then into the harbour. All the internal plumbing in your house is connected to the sewerage system. This means that everything which goes down the toilet, sink, bath and laundry drains goes to a sewerage system, where most of it can be treated. However, some things such as fat, detergents, chemicals, are difficult to remove from the water before it is sent into our waterways and ocean. This is bad news for our fish and water plants. Also during wet weather it is possible for stormwater to enter the sewerage system causing it to overflow and allow raw sewage to run into waterways. These are just three ways in which our houses and schools are linked to the harbour – think about farms, parks and boats on the harbour.</p> <p><i>Catchment Story</i></p>	
TIMING	1 to 2 lessons	
TEACHING & LEARNING SEQUENCE		RESOURCES
<p>Students will be able to:</p> <ul style="list-style-type: none"> Explain how specific materials released from human activities affect water quality. 		<p>Resource 5: Cause and Effect Diagram</p> <p>GHHP Catchment Story</p>
		CROSS CURRICULAR PRIORITIES DIFFERENTIATION
		Depending on the time and resources available you could select certain

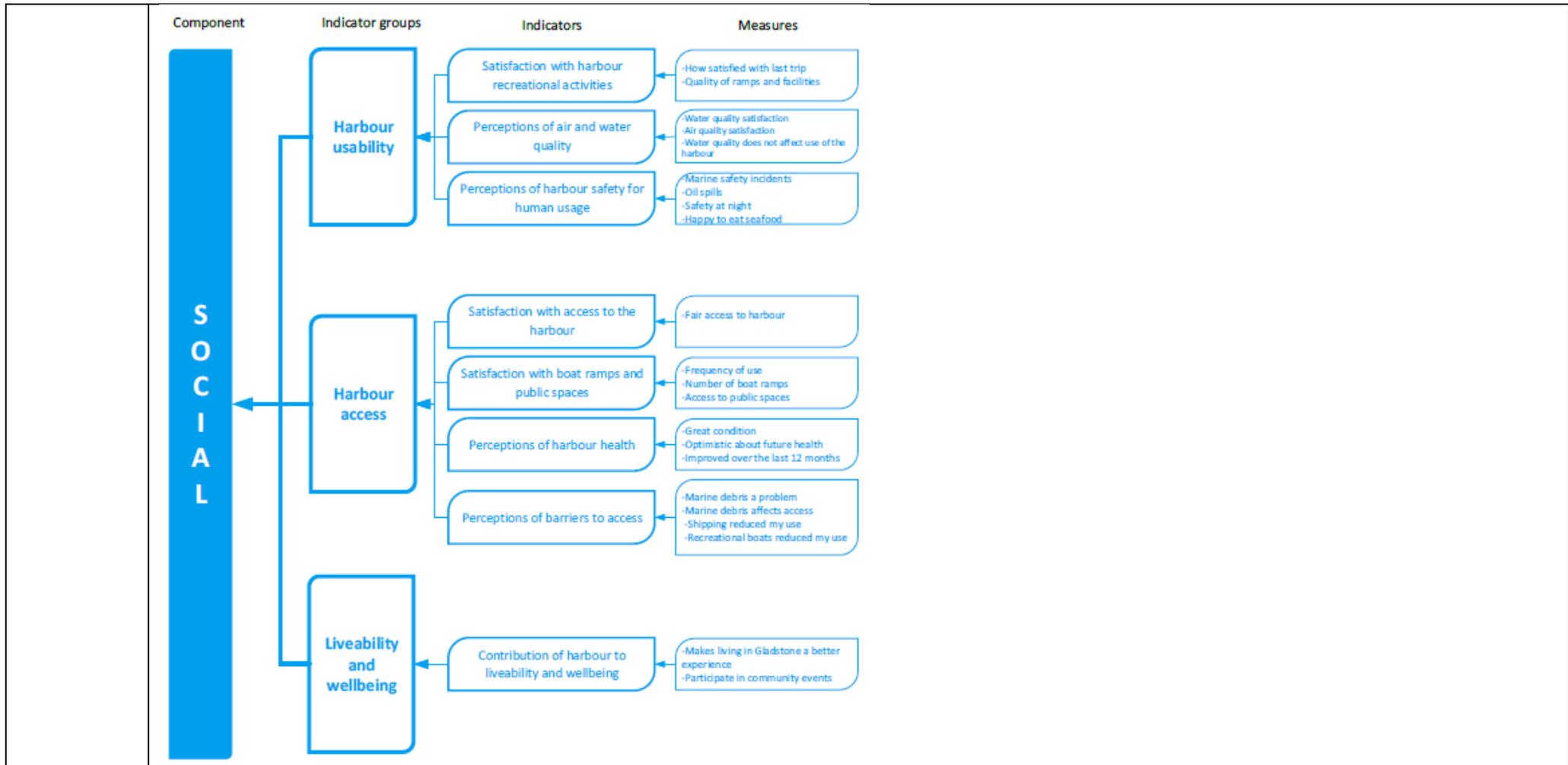
<ul style="list-style-type: none"> Identify sources of local materials that could impact on water quality. Assess human impact on aquatic/marine ecosystem and identify the consequences of this human impact. <p>Lesson Plan</p> <ul style="list-style-type: none"> Present the “GHHP Catchment Story” Students will undertake a practical Investigation into how materials released from human activities impact on water quality. Have students split into expert groups (pairs/small groups). Have each group select a different source from the catchment story and research how those materials affect water quality and local specific examples of a business/activity that could potentially release that material. Students then need to rotate around in mixed groups (jigsaw activity) to share findings; all students should finish with details for each source from the catchment story. Once students have gathered all the information, individually select the source they think has the greatest impact (or potentially greatest impact) on the Gladstone Harbour and/or catchment and complete Resource 5: Cause and Effect Diagram identifying 6 causes and the effect (problem) of their identified source. <i>Some ideas for causes could include equipment, process, people, materials, environment, management which they could elaborate. Students to fill primary causes in the <input type="checkbox"/> box, include related secondary causes along the \longrightarrow line, and explain the effect (or problem) at the end.</i> Students to research and identify 3 possible solutions or improvements to reduce the impact of the material/source on the environment. Have students present their findings in an appropriate format to the class. <p>Checking for understanding</p> <ul style="list-style-type: none"> Have students explained how specific materials released from human activities affect water quality? Have students identified sources of local materials that could impact on water quality through their research? Have students successfully assessed how humans impact on aquatic/marine ecosystem and identified logical and realistic consequences of these impacts? 		<p>source/people from the Catchment Story to focus on.</p>
LESSON THREE: My Gladstone Harbour Story		
TOPIC	Social interactions with the Gladstone Harbour	

OVERVIEW	<p>Gladstone is an industrial hub of international significance due to its large-scale production and export facilities. The Gladstone region’s social and economic growth and development patterns have been strongly influenced by the rapid development of the manufacturing, construction and retail trade sectors. This has resulted in a steady increase in Gladstone’s population from 45,479 in 2001 to 66,097 in 2014 (Gladstone Regional Council, 2015).</p> <p>The majority of the community view the harbour area as a place providing recreational facilities and an environment for leisure activities. The harbour area is seen as a producer of healthy food and a safe place to enjoy day and night. Concerns continue around pollutants (air and water) and marine debris and litter, but these do not appear to impede the community’s view on the usability of the harbour area and its resources. Air and water quality concerns may be an artefact of past issues and the proximity of industry in and around the Gladstone Harbour area.</p> <p>Gladstone Harbour remains a key area for residents to visit and recreation levels remain similar to 2014 levels. Residents’ recreation experience is not affected by public space access or the quality of boating facilities. Shipping activity in the harbour continues to be seen as a factor impacting on people’s harbour access.</p> <p>The harbour environment is viewed positively by many residents and they hold strong beliefs of this continuing into the future. In terms of the community contributing to public management decisions about the harbour, not all residents feel such an opportunity is available to them.</p> <p>Generally, people living in the Gladstone region find Gladstone Harbour provides them with a positive living experience and quality of life. Many residents participate in community events that are held in and around the harbour area (e.g. The Gladstone Harbour Festival, Ecofest and the Botanic to Bridge fun run) and their involvement supports the physical and mental health of the community.</p> <p>A socially healthy harbour is a place in which the community has civic and community pride and continues to support a sense of community (e.g. friendliness, easy access, personal relationships and lifestyle) and has infrastructure allows citizens to easily and safely use, access and enjoy the harbor and foreshore for recreation.</p> <p><i>2015 Technical Report</i></p>	
TIMING	Minimum 1 lesson (depending on class/home time)	
TEACHING & LEARNING SEQUENCE	RESOURCES	CROSS CURRICULAR PRIORITIES DIFFERENTIATION
<p>Students will be able to:</p> <ul style="list-style-type: none"> • Plan and create a story • Create a product that tells their story <p>Lesson Plan</p> <ul style="list-style-type: none"> • Students are to create a story about the Gladstone Harbour. It could be based on local animals, local people and activities, the local environment or anything they can think of. They will need to present their story in the form of a product; which could include a children’s book, comic strip, art piece, etc. 	Resource 6: Story Planning Tool Gladstone Harbour Barry and Jenny’s Expedition	Depending on timing available you could be more specific with the product students are to produce.

<ul style="list-style-type: none"> • Use Resource 6: Story Planning Tool to consider characters, theme, plot that occurs in their story and product they will produce. <p>Checking for understanding</p> <ul style="list-style-type: none"> • Have students effectively used the planning tool to help them create their story about the Gladstone Harbour? • Have they planned how their final product will tell a story? • Have they produced a good quality final product? 		
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LESSON FOUR: How Accessible is the Harbour?

TOPIC	Harbour useability, accessibility, liveability and wellbeing
OVERVIEW	<p>A socially healthy harbour is a place in which the community has civic and community pride and continues to support a sense of community (e.g. friendliness, easy access, personal relationships and lifestyle) and has infrastructure allows citizens to easily and safely use, access and enjoy the harbor and foreshore for recreation.</p> <p>GHHP use the following indicators and measures to assess the Harbour usability, Harbour access, and Liveability and wellbeing.</p>



TIMING		
	TEACHING & LEARNING SEQUENCE	RESOURCES
	<p>Students will be able to:</p> <ul style="list-style-type: none"> Examine the social components of the harbour. Design a tool to measure the social health of the Gladstone Harbour. Determine the community's views the Harbour's social health. <p>Lesson Plan</p>	<p>Resource 7: Social Wellbeing planning tool.</p> <p>GHHP Technical Report</p>
		CROSS CURRICULAR PRIORITIES DIFFERENTIATION
		Students could use the GHHP social results and methodology as a starting point to develop their own indicators, measures and survey questions.

<ul style="list-style-type: none"> Students are to design a method/tool to determine the social wellbeing of the Gladstone Harbour. They are to assess three social components: harbour useability, harbour accessibility, and liveability and wellbeing. Students are to establish at least three indicators that they will use to assess each component and how they will measure this by using Resource 7: Social Wellbeing planning tool. Undertake a community investigation to investigate their views on the social health of the Gladstone Harbour (this could be in the school community or wider community). They could design a written or verbal survey or another tool to investigate community member's opinions or views. Students are to present their findings to the class. Have students compare their data and findings, are their similar or different results, discuss why this may have occurred. As a class agree upon a conclusion about the social health of the Gladstone Harbour. <p>Checking for understanding</p> <ul style="list-style-type: none"> Have students selected realistic indicators to assess each component? Have they selected an appropriate measure to assess each indicator? Have they designed a simple and effective tool for gathering community opinions and views? Have they conducted this investigation effectively? Have they collated and presented their findings effectively to the class? Have students created an appropriate and realistic conclusion about the social health of the harbour from their findings? 	<p>Pascoe, S., Cannard, T., Marshall, N., Windle, J., Flint, N., Kabir, Z., & Tobin, R. (2014). <i>Piloting of social, cultural and economic indicators for the Gladstone Healthy Harbour Partnership Report Card</i>.</p> <p>Cannard, T., Pascoe, S., Tobin, R., Windle, J and Rolfe J. (2015). <i>Social, cultural and economic indicators for the Gladstone Healthy Harbour Partnership Report Card</i>.</p>	
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ASSESSMENT: EXTENDED RESEARCH REPORT

TOPIC	Stewardship in Gladstone Harbour
OVERVIEW	<p>Currently, the Great Barrier Reef (GBR) Reef Report card presents information about management practices in the agricultural sector and work is being undertaken in other regions to develop similar reporting for urban issues. However, there is currently no framework for industry and ports to report their management activities and efforts aimed at improving and maintaining the health of Gladstone Harbour. Developing such a framework has been the focus for GHHP, who have formed a Stewardship Working Group to facilitate its development.</p> <p>Stewardship has been defined by GHHP as 'responsible planning and management actions' and is intended for this purpose to capture information on management efforts by industries and port operators to maintain or improve Gladstone Harbour health. The information reported through the stewardship framework (and associated report card) will be provided to the public as transparent information about management efforts to maintain a healthy working harbour. It will also help inform future management and investment decisions by showing where leading and innovative practice is already in use and where there may be room for improvement.</p>

	<p>The focus for stewardship is around management actions, the level of effort and local, activity-related outcomes, rather than the overall health of and environmental outcomes for Gladstone Harbour. Harbour health is influenced by stewardship (environmental management activities) of port and industry, but these are not the only drivers. Therefore, there is no direct linear relationship between ‘good stewardship’ and good ecosystem health, although good stewardship is an important component of achieving environmental outcomes.</p> <p><i>Gladstone Healthy Harbour Partnership Stewardship Reporting Project</i></p>	
TIMING	2 to 3 lessons and home time	
TEACHING & LEARNING SEQUENCE	RESOURCES	CROSS CURRICULAR PRIORITIES DIFFERENTIATION
<p>Students will be able to:</p> <ul style="list-style-type: none"> • Gather information from secondary sources • Investigate current stewardship practice and evaluate its effectiveness. • Make recommendations about future stewardship practice. <p>Lesson Plan <i>“Stewardship has been defined by GHHP as ‘responsible planning and management actions’.”</i> Students are to use the Gladstone Healthy Harbour Partnership Technical Report, Gladstone Healthy Harbour Partnership Stewardship Reporting Project and other research to investigate and write a report on the current and future stewardship practices in the Gladstone Harbour.</p> <p>The report should investigate key stewardship practice across the port, industry and recreation use:</p> <ul style="list-style-type: none"> ○ Port stewardship ○ Heavy industry stewardship ○ Commercial fishing stewardship ○ Tourism and recreational stewardship 	<p>Assessment: Stewardship in the Gladstone Harbour.</p> <p>Gladstone Healthy Harbour Partnership Stewardship Reporting Project</p>	<p>Please note there is no specific marking criteria sheet for this task as it could be used in a number of subject areas (please see specific subject syllabus for relevant marking criteria)</p>

Appendix A: Links to QCAA

The following content and concept descriptors have been identified from the Queensland Curriculum and Assessment Authority senior subject syllabi which are suited to the Gladstone Healthy Harbour Partnership Year 10, 11 and 12 curriculum resources.

AUTHORITY SUBJECTS					
Agricultural Science					
				AB1 Agriculture is central to national and international economies, supplying food, fibres and other products.	
PS2 The agronomy of agricultural plants determines the efficiency of production systems.		AS2 Animal husbandry and management determines the efficiency of animal production systems.		AB2 Management and strategic decision making across the supply chain determine short- and long-term success of an agricultural enterprise.	
Biology					
<p>Principle of Biology Survival of a species is dependent on individuals staying alive long enough to reproduce.</p> <p>At every level of organisation in the living world, structure and function are interrelated. Each level of organisation in the living world had its own unique aspects and there is continual interaction of structure and function between these levels.</p> <p>Continuity and change occur at all organisational levels in the living world. Changes may be cyclic or directional. The continuity of life is a balance between all the change processes.</p>		<p>Key Concept 2. Multicellular organisms are functioning sets of interrelated systems. 3. Organisms live an interdependent existence in environments to which they are adapted. 4. A variety of mechanisms results in continual change at all levels of the natural world. 5. There are processes that maintain dynamic equilibrium at all organisational levels.</p>		<p>Key Ideas 12. The set of systems comprising an organism enables it to function in its environment. 13. All systems are interrelated and interdependent. 15. Different types of multicellular organisms have different roles in an environment. 16. Malfunctioning in one system or part of a system may affect the whole organism 20. Human actions have significant impacts on interactions within an environment. 21. Different organisms perform different interdependent roles in an ecosystem. 22. An organism has adaptations specific to its environment. 26. The activity of organisms changes the environment. 27. Evidence shows that organisms and ecosystems change through time.</p>	
Chemistry					
Key concept S2 Materials can be categorised and represented symbolically and their macroscopic	Key concept R1 Specific criteria can be used to classify chemical reactions.	Key concept R2 Chemical reactions involve energy changes.	Key concept R3 The mole concept and stoichiometry enable the determination of	Key concept R4 Specialised qualitative and quantitative techniques are used to determine the quantity,	Key concept R5 Chemical reactions are influenced by the conditions under which they take place and, being

properties can be explained and predicted from understandings about electronic structure and bonding.			quantities in chemical processes.	composition and type of reaction.	reversible, may reach a state of equilibrium.
Earth Science					
1. Our Earth and its Systems	2. Hazardous Earth Processes and Materials	3. Earth Resources and Human Impact on the Environment	4. Our Earth in Space and Time		
<ul style="list-style-type: none"> major earth systems—lithosphere, hydrosphere, atmosphere common earth cycles—rock, energy, hydrologic 	<ul style="list-style-type: none"> floods adverse weather hazardous materials. 	<ul style="list-style-type: none"> forms of human impact on the environment environmental monitoring rehabilitation of environments affected by human impact. 			
Geography					
<p>Theme 1: Managing the natural environment</p> <p>1. The natural environment results from the operation and interaction of physical systems, i.e. biosphere, lithosphere, hydrosphere, atmosphere.</p> <p>2. Changes to the dynamics of physical systems because of factors such as population change over time, land use practices, attitudes and values can exacerbate or reduce impacts on the natural environment.</p> <p>3. Managing the natural environment sustainably depends on an understanding of the elements of the natural environment.</p> <p>4. Some management decisions or lack of them have increased the vulnerability of people to adverse impacts such as contamination of water supplies, landslides, inundation, loss of lives and livelihood.</p>	<p>Theme 2: Social environment</p> <p>3. Planning can assist in improving the liveability and sustainability of communities and is particularly important at times of rapid population growth or decline in a community.</p>	<p>Theme 3: Resources and the environment</p> <p>1. The world’s physical environment is composed of systems — atmosphere, (e.g. nitrogen, carbon cycles), biosphere, lithosphere, hydrosphere — that are not separate entities but interact upon each other and have a profound effect on human existence. The systems are dynamic, constantly changing in response to natural processes and human activity.</p> <p>2. The development of resources is essential to our social and economic wellbeing, but this needs to be balanced against harmful impacts on the natural environment and the potential impact on the quality of life of some people.</p> <p>3. Individuals and groups have an important role to play in influencing decision makers and in participating in</p>	<p>Theme 4: People and development</p> <p>1. Development is a complex concept that includes economic, social, cultural, political, historical, physical and environmental components.</p> <p>3. Contrasts in development between places are indicated by variable standards of living, quality of life, and levels of social wellbeing.</p> <p>4. The study of development issues focuses on synthesising concepts such as human wellbeing, social justice, equity and ecologically sustainable development.</p>		

		wise management of resources for environmental sustainability. 4. Resource management problems are often difficult to resolve, especially when there are conflicting social, economic and political values within a society and there may be changes in these values over time.	
Focus unit 1: Responding to natural hazards	Focus unit 3: Sustaining communities	Focus unit 5: Living with climate change	Focus unit 7: Feeding the world's people
Focus unit 2: Managing catchments	Focus unit 4: Connecting people and places	Focus unit 6: Sustaining biodiversity	

Marine Science

MB1 Marine environments support an abundance of diverse life, which is classified according to a range of characteristics.	OC1 The world's oceans and coastlines have many unique geological features.	CS1 Human activities can affect the marine environment in a variety of ways	MS1 Safety is a primary concern in marine research skills.
MB2 Marine organisms are shaped by their environments and interactions.,	OC2 The world's oceans are involved in the dispersal and cycling of all matter.	CS2 Sustainable management practices are essential for the protection of marine resources	MS2 Boating, snorkelling and field techniques enable engagement with marine environments.
MB3 The marine environment consists of dynamic and complex relationships between organisms and ecosystems.		CS3 Gathering and interesting scientific information is necessary to make informed decisions on sustainability.	

Science 21

Structure and properties of matter	Living systems	Earth and space	Energy	Information and communication
SP1 The molecular nature of matter SP2 Gases, liquids, solutions, solids	LS3 Ecosystems	ES2 Global cycles and the atmosphere		

AUTHORITY REGISTERED SUBJECTS

Agricultural Practices

Animal studies	Plant studies	Safety and management practices
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<p>C1.1 Fundamental information is essential for success in animal industries. E1.1 Animal production requires infrastructure for water. E2.5 Aquaculture has specific considerations. E3.4 Successful animal industries are run as businesses.</p>	<p>E4.1 Plant industries have water infrastructure requirements. E4.2 Some plant industries have additional infrastructure requirements. E6.4 Successful plant industries are run as businesses.</p>	<p>C3.1 Commonwealth and State rules, regulations and recommendations control agricultural contexts and activities. C5.1 Agricultural industries require sustainable practices.</p>
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Aquatic Practices

Environmental	Recreational	Commercial	Cultural	Safety and management practices
<p>E1.2 Oceanography and riparian processes shape aquatic environments. E2.1 Aquatic ecosystems include biotic and abiotic components. E2.2 Aquatic habitats are the places where organisms live. E2.3 Particular organisms are suited to aquatic ecosystems and habitats. E2.4 The condition of aquatic ecosystems varies as a result of the biotic and abiotic components. E3.1 Marine and freshwater pests and threats, including pollution, impact on aquatic environments. E3.2 Actions conserve, sustain and bioremediate aquatic environment E4.1 The scientific method involves asking questions about the natural world and collecting</p>	<p>R1.1 People engage with the aquatic environment in different ways. R2.2 Specialised skills are required to safely participate in aquatic activities.</p>	<p>C1.2 There are different career opportunities and pathways in aquatic industry and businesses. C1.3 Employers expect employees to build and update their knowledge and skills. C2.2 Water quality is essential for animal/plant production.</p>	<p>Cu1.1 People source a range of resources from waterways. Cu1.3 There are different social and cultural attitudes to industries and activities associated with and impacting on aquatic environments. Cu2.1 Aquatic industries and activities were, and continue to be economically, socially and culturally significant.</p>	<p>SM1.1 Commonwealth and state legislation, rules and regulations control activities in aquatic environments. SM1.2 Commonwealth and state legislation, rules and regulations are administered by government departments and authorities. SM1.3 Observation of workplace health and safety practices is essential when participating in aquatic activities. SM2.1 The natural environment impacts on reliable and safe operation of equipment. SM4.2 Completion of aquatic activities requires a range of management skills.</p>

<p>data systematically to address the question.</p> <p>E4.2 Citizen science programs engage volunteers and the public in scientific research programs.</p> <p>E4.3 Citizen science allows scientists to gather data over time, across large geographic areas to answer significant research questions.</p>				
Science in Practice				
<p>Scientific literacy (C1.1). Scientific methodology (C1.2). Thinking scientifically (C1.3).</p>	<p>Workplace safety (C2.1). Risk assessment (C2.2). Safe working procedures (C2.3).</p>		<p>Communication (C3.1). Self-management (C3.2). Problem-solving (C3.3).</p>	
<p>Science for the workplace</p> <p><i>The nature of work and the skills work requires, change rapidly. New skills in the workplace are in demand all the time; at the same time some skills are becoming obsolete. Employers argue that communication, teamwork, problem solving, initiative and enterprise, planning and organising, self-management, and learning and technology skills are as important as professional, paraprofessional and technical skills. Students should explore and develop an awareness of science as it operates in common or local workplaces.</i></p>	<p>Resources, energy and sustainability</p> <p><i>Solutions to humanity's energy and resource challenges are likely to come from the application of science and technology. Students should develop an awareness of the consequences of using resources by considering their short-term and long-term impacts as well as their sustainability.</i></p>		<p>Environments</p> <p><i>Environments can be defined by their geology and ecology, their size, or whether they are natural or human-made. Students should understand that the management of environments relies on understanding their individual components, inherent interrelationships, and the impact of the human species on them. As part of, and determining factors in, the environment, human interactions with the Earth have a profound effect on present and future generations. Science can inform these complex global problems.</i></p>	