

Task	A research investigation involving the collection of secondary data
SAC weighting	30 %
Due date	Category 1 Term 3, Week 7, 2021 Category 2 Term 3, Week 9, 2021 Category 3 Term 4, Week 3, 2021

Environmental Science SAC 1

Unit 2

Area of Study 2: What makes pollution management so complex?

Outcome

In this area of study, students investigate three pollutants of national or global concern. They explain how pollutants move through, and affect, the atmosphere, biosphere, hydrosphere and lithosphere, and compare treatment and management options for each pollutant. Students also explore the limitations of the categorisation of pollution as air, water and soil pollution.

Students investigate a question for each of the three categories of pollution: air, water and soil.

Key Skills:

Key science skill VCE Environmental Science Units 1–4

Communicate and explain scientific ideas

- use appropriate environmental science terminology, representations and conventions, including standard abbreviations, graphing conventions and units of measurement
- discuss relevant environmental science information, ideas, concepts, theories and models and the connections between them
- identify and explain formal environmental science terminology about investigations and concepts
- use clear, coherent and concise expression
- acknowledge sources of information and use standard scientific referencing conventions

Instructions:

How do I structure my investigation?

Each of you will choose either a topic from the list provided or you can suggest a topic of personal interest that I will consider. Our research will be spread over the course of the unit following the following outline;

- ✓ Category 1: Air pollution – Weeks 5 – 6 Term 3
- ✓ Category 2: Water pollution – Weeks 7 – 8 Term 3
- ✓ Category 1: Soil pollution – Weeks 1 – 2 Term 4

In your research you should consider the following **key points**;

- ✓ the physical and chemical characteristics of the relevant pollutants
- ✓ how the pollutants (relevant to the specific questions selected) move through, and affect, the atmosphere, biosphere, hydrosphere and lithosphere
- ✓ their persistence, mobility, toxicity and likelihood of bioaccumulation sources of pollutants
- ✓ rate of dispersal of pollutants through different processes that transport pollutants
- ✓ treatment and management options for each pollutant

Where do I start?

It is important to first read a few articles on your topic before trying to address the research points mentioned above. Your finished work will be presented as a factual text with no more than a 1000 words so the content needs to be considered carefully. When presenting your research you should consider the following criteria:

- ✓ include a broad scope of relevant information that relates to the **key points**
- ✓ use various relevant graphs, tables and diagrams to complement the research
- ✓ present the research in a visually appealing, easy to follow structure so that key information can be readily located
- ✓ a range of sources should be cited in your bibliography

It will be crucial that you communicate with me throughout each week of this research by emailing your work to me for clarification, advice and suggestions. The more regular our correspondence the clearer your task will be. This should be done via my school email mkidd@lyss.vic.edu.au.

Category 1: Air pollution

Questions that may be explored in this investigation include:

- Can cities be smog free?
- What health hazards are associated with living indoors?
- Should technologies that produce carbon dioxide be banned?
- Can demolition and construction sites be managed sufficiently to control the effects of particulates?
- How can cities be designed to avoid the urban heat island effect?
- Should car-free days become compulsory?
- Are nanochemicals safe?
- How do endocrine disruptors work in the body, and how can they be avoided?
- What effect would elevated noise levels have on reproductive patterns of birds reliant on mating calls to find a mate?
- Is infrasound pollution?
- Should housing be built directly under aeroplane flight paths?
- Are some radioactive materials more dangerous than others?
- Is it only living things that are affected by radioactive pollution?
- Has the global response to the hole in the ozone layer made a difference over time?
- Why do chlorofluorocarbons present an environmental risk, and how were alternatives developed?

Category 2: Water pollution

Questions that may be explored in this investigation include:

- Should ocean oil spills be cleaned up or should reliance on natural processes for their dispersal and chemical degradation be the preferred course of action?
- How can acid mine drainage from waste rock storage at mine sites and the resultant surface and groundwater pollution be managed?
- What are the downstream consequences of disposal of medication into water systems?
- Should fish that bioaccumulate heavy metals be culled?
- Can the Great Barrier Reef be quarantined to alleviate coral bleaching?
- What issues are associated with storm water runoff?
- Should dioxins and other persistent organic pollutants be banned?
- What is the evidence for and against the impact of fracking on groundwater security?
- How are fish and wildlife populations that require water of a certain degree of purity, and within a narrow temperature range for survival, affected by agricultural run-off, the dumping of human and animal wastes into water supplies, or thermal pollution resulting from processes that change ambient water temperature?

- What dangers do underground oil tank leakages pose?
- Should all roads be paved to minimise erosion impacts on waterways?
- Can all contaminants be removed by reverse osmosis filters?
- Does it matter which detergents people use?

Category 3: Soil pollution

Questions that may be explored in this investigation include:

- Do pesticides kill more than pests?
- Is salination linked to desertification?
- Why does lead-acid battery recycling pose an environmental threat?
- What is the extent of pollution associated with large-scale farming?
- What are the salination risks associated with different types of crop irrigation methods?
- How are mining practices regulated to minimise environmental impacts?
- How do the chemical properties of biodegradable plastics differ from those of non-biodegradable plastics to enable more rapid environmental degradation?
- Do the heavy metal deposits in surface water systems left over from historic gold mining sites present a hazard?
- Should food 'take-away' containers be banned?
- What happens to rubbish buried in landfills?
- What makes materials biodegradable?
- How do the toxicities of different forms of mercury (elemental, organic and inorganic) compare?