

Climate change

Impact on natural disasters in Qld

Preparation

This lesson will inform students of the changes to natural disasters in Queensland that are expected to occur with the changes in climatic patterns predicted over the next century.

- ▶ Provide students with a print out, or PDF from the Federal Environment department on the expected consequences of Climate Change on Natural Disasters within Queensland
<http://www.climatechange.gov.au/climate-change/climate-science/climate-change-impacts/queensland>
- ▶ Give students sufficient time to read the

article, either within class time or as a homework task

- ▶ Ask students to make notes of the key findings of the article. Suggested reading time: 15 minutes.
- ▶ Provide students with the following questions to review whilst reading the article. Suggested time for answering questions: 15 minutes
- ▶ Following reading the article conduct an in class discussion to go over students responses to the questions. Suggested time for in class discussion: 15minutes

Quiz questions and answers

Q1: What are the changes to the coastal zone that have been experienced over the last 15 years in comparison the sea levels from the 20th century? How is this expected to affect Queensland's coastal zone into the future?

Answer

- ▶ Sea levels in the 20th century rose by 1.7mm per year.
- ▶ Within the last 15 years this has changed to 3.2mm per year.
- ▶ This will lead to a 1.1m change in sea levels over the next century.
- ▶ This will affect the coastal zone by inundating between 48,300 and 67,700 residential buildings and 4700km of road; 570km of railways and 1440 commercial buildings worth \$12.9 billion, \$2.3 billion and \$15 billion respectively.

Q2: How is Climate change likely to influence the frequency, strength and location of tropical cyclones in Queensland over the coming century?

Answer

- ▶ There is expected to be a reduction in the total number of cyclones, but a higher proportion of severe tropical cyclones of category 3 and above.
- ▶ Cyclones are also expected to be able to form and decay 100km south of current limits by 2100.

Q3: How is climate change expected to change rainfall patterns and events in the next century? What kinds of natural disasters will these changes affect?

Answer

- ▶ Overall rainfall for most of the state is expected to decline however the amount of extreme rainfall events will increase.

- ▶ Reductions in rainfall will likely increase drought events and bushfires.
- ▶ Increases in extreme rainfall events will increase flooding events for Queensland

Q4: How will Climate Change affect human health in Queensland?

Answer

- ▶ Increases in days above 35degrees Celsius are expected to lead to heat related deaths.
- ▶ The projected change in temperature related deaths by 2070 in Queensland is 4131.

Q5: With the knowledge you now have about how climate change will affect natural disasters over the coming century, how will natural disasters affect the natural environment?

Answer

- ▶ Increases in atmospheric CO2 will increase ocean acidification.
- ▶ Sea surface temperature increases will increase coral bleaching events.
- ▶ Increases in sea surface temperatures will result in 34-65% of coral reefs being above the critical limit for bleaching.
- ▶ Temperature increases will cause cloud and highland rainforests to become reduced in area, and more fragmented.
- ▶ Australian tropical rainforest vertebrates are likely to all become extinct with a 2degree Celsius change in average temperatures.

Q6: How will the effects on the natural environments affect communities living in disaster prone areas?

Answer:

- ▶ Great Barrier Reef Tourism will be severely affected which employees 58000 people and is worth \$5.4billion.

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- ▶ Australian tropical rainforest vertebrates are likely to all become extinct with a 2degree Celsius change in average temperatures.

Q6: How will the effects on the natural environments affect communities living in disaster prone areas?

Answer:

- ▶ Great Barrier Reef Tourism will be severely affected which employees 58000 people and is worth \$5.4billion.
- ▶ Agriculture will also be affected with a 33.5% decline in beef production, and 17% decline in sugar production by 2050.

Q7: As a class discuss ways in which you think Australia can reduce the risk of climate change to Australia and ways in which Queenslanders could adapt to the predicted changes climate

change will cause to natural disasters.

Source

Australian Government Department of the Environment, Climate Change, Climate Change impacts in Queensland. Available via: <http://www.climatechange.gov.au/climate-change/climate-science/climate-change-impacts/queensland>

- ▶ Agriculture will also be affected with a 33.5% decline in beef production, and 17% decline in sugar production by 2050.

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Curriculum links

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| 11 | Geography; Natural hazards and ecological hazards | ACHGE012: Geographical Knowledge and Understanding; Overview of natural and ecological hazards | An overview of the nature of natural hazards (atmospheric, hydrological, and geomorphic) and ecological hazards |
| 11 | Geography; Natural hazards and ecological hazards | ACHGE013: Geographical Knowledge and Understanding; Overview of natural and ecological hazards | The concept of risk as applied to natural and ecological hazards |
| 11 | Geography; Natural hazards and ecological hazards | ACHGE014: Geographical Knowledge and Understanding; Overview of natural and ecological hazards | The temporal and spatial distribution, randomness, magnitude, frequency and scale of spatial impact of natural and ecological hazards at a global scale |
| 11 | Geography; Natural hazards and ecological hazards | ACHGE015: Geographical Knowledge and Understanding; Overview of natural and ecological hazard | The role of spatial technologies in the study of natural and ecological hazards |
| 11 | Geography; Natural hazards and ecological hazards | ACHGE022: Geographical Knowledge and Understanding; Depth and study of an ecological hazard | The nature and causes of the selected hazard and how the activities of people can intensify its impacts |
| 11 | Geography; Natural hazards and ecological hazards | ACHGE023: Geographical Knowledge and Understanding; Depth and study of an ecological hazard | The magnitude, frequency, duration, temporal spacing and effects of the hazard |
| 11 | Geography; Natural hazards and ecological hazards | ACHGE024: Geographical Knowledge and Understanding; Depth and study of an ecological hazard | The diffusion and resulting spatial distribution of the hazard, and how an understanding of biophysical and human processes can be used to explain its spread |
| 11 | Geography; Natural hazards and ecological hazards | ACHGE025: Geographical Knowledge and Understanding; Depth and study of an ecological hazard | The physical and human factors that explain why some places are more vulnerable than others |
| 11-12 | Earth & Environmental Science | ACSES102: Science understanding; the cause and impact of earth hazards | Human activities, including land clearing, can contribute to the frequency, magnitude and intensity of some natural hazards (eg draught, flood, bushfire, landslides) at local and regional scales |

Classroom activity

Classroom resources provided by Cairns Regional Council



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| 11-12 | Earth & Environmental Science | ACSES106: Science understanding; the cause and impact of earth hazards | Climate change affects the biosphere, atmosphere, geosphere and hydrosphere; climate change has been linked to changes in species distribution, crop productivity, sea level, rainfall patterns, surface temperature and extent of ice sheets |
| 11-12 | Earth & Environmental Science | ACSES108: Science understanding; the cause and impact of global changes | Climate change models (eg general circulation models, models of El Niño and La Niña) describe the behaviour and interactions of the oceans, atmosphere; these models are developed through the analysis of past and current climate data, with the aim of predicting the response of global climate changes in the contributing components (eg changes in global ice cover and atmospheric composition) |
| 12 | Earth & Environmental Science | ACSES094: Science as a Human Endeavour; Natural hazards and ecological hazards | People can use scientific knowledge to inform the monitoring, assessment and evaluation of risk |
| 12 | Earth & Environmental Science | ACSES097: Science as a Human Endeavour; The changing earth - the cause and impact of earth hazards | Scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability |
| 12 | Earth & Environmental Science | ACSES098: Science Understanding; The changing earth - the cause and impact of Earth Hazards | Earth hazards result from the interactions of Earth systems and can threaten life, health, property, or the environment; their occurrence may not be prevented but their effect can be mitigated |
| 12 | Earth & Environmental Science | ACSES100: Science Understanding; The cause and impact of Earth Hazards | Monitoring and analysis of data, including earthquake location and frequency data and ground motion monitoring, allows the mapping of potentially hazardous zones, and contributes to the future prediction of the location and probability of repeat occurrences of hazardous Earth events, including volcanic eruptions, earthquakes and tsunamis |
| 12 | Earth & Environmental science | ACSES101: Science Understanding; The cause and impact of Earth Hazards | Major weather systems generate cyclones, flood events and droughts; the occurrence of these events affects other Earth processes and interactions (for example, habitat destruction, ecosystem regeneration) |
| 12 | Earth & Environmental science | ACSES102: Science Understanding: The cause and impact of Earth Hazards | Human activities, including land clearing, can contribute to the frequency, magnitude and intensity of some natural hazards (for example, drought, flood, bushfire, landslides) at local and regional scales |

Impact of climate change

- ▶ Read the article from the Federal Environment department on the expected consequences of Climate Change on Natural Disasters within Queensland
<http://www.climatechange.gov.au/climate-change/climate-science/climate-change-impacts/queensland>
Make notes on key points of the article
- ▶ Read the questions below and provide answers in the space provided following completion of the article
- ▶ Participate in the class discussion by sharing and comparing your answers to the questions with your classmates.

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Q3: How is climate change expected to change rainfall patterns and events in the next century? What kinds of natural disasters will these changes affect?

Q4: How will climate change affect human health in Queensland?

Q5: With the knowledge you now have about how climate change will affect natural disasters over the coming century, how will natural disasters affect the natural environment?

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Q7: As a class discuss ways in which you think Australia can reduce the risk of climate change to Australia and ways in which Queenslanders could adapt to the predicted changes climate change will cause to natural disasters.
