





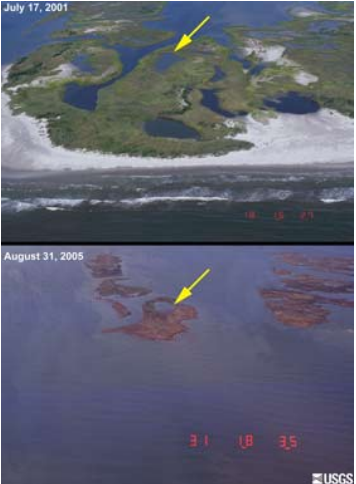



Stormy weather

Global warming is already evident on some Pacific islands. Sea water is bubbling out of the soil on the Island of Funafuti, Tuvalu and New Zealand. There are evacuation plans for some Micronesian islands. How are islands currently and into the future going to be impacted by global warming?

| STRATEGY | Suggested Ideas: |
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| ANALYSIS | <ul style="list-style-type: none"> ▪ Examine current case studies and assess weather changes that are already happening to your own island using local information and your own sets of records and observations. ▪ The issue of sea level rise is important to the entire world, as its population is increasingly moving toward the coast (about 60% or 3.6 billion) of the world's population lives within 60 kilometres of the coast (UNESCO, 1998). Low lying populated areas, such as cities built on deltas are the most vulnerable to rising sea levels. Read about Hurricane Katrina and the damage caused to coastal towns. Analyse the location of the human population on your island; graph the locations against the land elevation. Approximately what percentage of your island's population lives within 60 kilometres of the coast and below approximately 300 metres above sea level? ▪ How has housing and building construction on your island been influenced by weather conditions? Design and build a model home or office building that could withstand stormy weather. Investigate current designs of such buildings to assist your thinking. ▪ Prepare an online poster that shows clothing that people typically wear on your island. Draw conclusions as to what influences the style of clothing and describe the possible impact of the island's weather conditions on this choice. Compare your poster with that completed by students on other islands. |
| SYNTHESIS | <ul style="list-style-type: none"> ▪ View the webcam of weather on the Antarctic bases at: http://www.aad.gov.au/asset/webcams/default.asp and at Santa Monica Bay www.livinginthepalisades.com/baycam/ Set up a webcam during a storm on your island or to view interesting clouds or other weather phenomena. Synthesise your shots and add a commentary to your video. ▪ Research shipwrecks around your island. Develop an overall profile for these shipwrecks. What was the main cause of the wrecks? Are your findings similar to the findings of students on other islands? ▪ Read the article found at: http://www.cr.nps.gov/nr/travel/flshipwrecks/whypreserve.htm . Note that many shipwrecks provide a habitat for marine life, in addition to the historical value they possess. Discuss the importance of shipwreck preservation and the sanctuaries that they provide for many species. http://sanctuaries.noaa.gov/maritime/aboutmhp.html ▪ Explore shipwreck databases of other islands: For example, the Channel Islands http://channelislands.noaa.gov/shipwreck/cinms1.html . Be a detective and find some connecting links between the nature of the wrecks around your island and those near other islands.  |
| PARADOX | <ul style="list-style-type: none"> ▪ People want to live on islands but islands can have some of the worst weather conditions possible. Do you believe this statement to be accurate? Find global examples which may support or not support the statement. ▪ Show the weather contrasts on your island through a photographic comparative study.  |
| ANALOGY | <ul style="list-style-type: none"> ▪ List the metaphors for your island's weather. Compare your list with that of students from other islands around the world. Detail what have you learned about your island and other islands from this comparison. |
| DISCREPANCY | <ul style="list-style-type: none"> ▪ Research the weather conditions of selected global islands in any one day. How are their weather conditions different to yours on that particular day? Can you explain any differences? http://www.wunderground.com/global/IS_ST_Index.html. Connect, via the internet or telephone, with other students to conduct a synchronous weather program that shares weather conditions on your different islands. |

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| <p>ATTRIBUTE LISTING</p> |  | <ul style="list-style-type: none"> ▪ What significant storms / weather patterns have been apparent in your area for the past 12 months? Collect newspaper and magazine clippings that describe significant weather events. Share and compare this information with students on other islands. Find out the impact of such weather on various aspects of your own and other students' lives. ▪ While the sea levels have risen more than 120 metres since the last ice age, the oceans have been fairly constant for the past 6,000 years. Recently the world sea levels have begun rising again at a rate of 3 millimetres per year, which translates into 1 metre per 100 years. Sea Level is rising and is expected to accelerate over the next 100 years (USGCRP, 2001). Although scientists are not in total agreement on the rate of rise or acceleration, the fact that it is rising is unquestionable. List the possible impact of sea level rise on your island. Show your findings in a report and draw some conclusions as to what might need to be put in place to prevent disastrous impact. <p>Find out what actions are being considered for your island regarding sea level rise. Invite an expert to your school to discuss the issues. Set up an online forum where these issues can be discussed by students on islands around the world.</p> |
| <p>EXAMPLES OF CHANGE</p> | <ul style="list-style-type: none"> ▪ Interview members of your family to see whether they can see any changes in the weather patterns on your island over a period of time. Discuss your findings. Are any changes reflected in similar findings from other islands around the world? If so, which ones? ▪ Design an experiment to show the relationship between climate change and rising sea levels. Use the following site as a guide: http://www.combatclimatechange.ie/index.asp?locID=31&docID=-1, where the activity shows how long term increases in the earth's temperature from use of fossil fuels, could force some coastal communities to abandon their homes forever. ▪ Explore ways in which weather was recorded hundreds of years ago. ▪ Measure the tide differences on your coast. Compare the differences and their impact. | |
| <p>PROVOCATIVE QUESTION</p> | <ul style="list-style-type: none"> ▪ Are some island developments disasters waiting to happen? To illustrate your response to the question, collect island images, such as this one of South Padre Island in the Gulf of Mexico, where any sea level rise or storm could have disastrous consequences, |  |
| <p>EXAMPLES OF HABIT</p> | <ul style="list-style-type: none"> ▪ How do islanders anticipate and prepare for bad weather? For example, in the Caribbean, islanders open the front and back door of their homes so that hurricanes pass through. Provide additional examples. | |
| <p>SKILLS OF SEARCH</p> |  | <ul style="list-style-type: none"> ▪ A powerful hurricane or storm can devastate a coastline, destroying barrier islands, eroding beaches and flooding freshwater marshes. Use NASA's climate change models to understand how such storms are likely to increase in intensity during this century. http://www.nasa.gov/vision/earth/everydaylife/climate_class.html Research some of the major storms that have affected your island. Share this information with others through newspaper clippings, photographs and written reports. ▪ Identify the natural disasters that might impact on islands? Identify islands around the world where natural disasters have regularly occurred and see whether there is a pattern of what disasters are most likely to occur on particular islands. Use satellite images to view the human and environmental impact of these disasters on the islands at: http://rst.gsfc.nasa.gov/Sect3/Sect3_6.html Create a series of political cartoons to convey such impact. |

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| <p>TOLERANCE FOR AMBIGUITY</p> | <ul style="list-style-type: none"> It is possible that entire nation states will cease to exist once their islands become uninhabitable. This will create the new phenomenon of 'environmental refugees'. How should the rest of the world accommodate them? Will it result in cultural extinction? Discuss these statements and reach some conclusions. What if your local beach and coastline disappeared due to rising sea levels? Do a 'before' and 'after' painting or create a digital image that shows the impact to the area. |  |
| <p>INTUITIVE EXPRESSION</p> | <ul style="list-style-type: none"> Explore the ways in which some animals can predict bad weather. How could people use this trait? Convey your ideas in a creative way. Imagine that you are a news reporter, arriving at Unawatuna, Sri Lanka, on December 27th 2004, (the day after the tsunami). Record what you see, interview local residents and collate a photo essay. http://news.bbc.co.uk/1/hi/south_asia/4125581.stm http://www.who.int/features/tsunami/sri_lanka/en/ | |
| <p>ADJUSTMENT TO DEVELOPMENT</p> |  <ul style="list-style-type: none"> Hurricane Katrina destroyed large areas of wetlands and barrier islands off the US Gulf Coast in 2005. Review 'before and after' photographs Undertake research about Hurricane Katrina and its immediate and ongoing impact on the local islands and the delta areas and the people who lived there. http://news.nationalgeographic.com/news/2005/09/0902_050902_katrina_coverage_2.html The 26 December 2004 Indian Ocean tsunami, generated by the most powerful earthquake in decades, is believed to have killed more than 150,000 people and made millions homeless, making it perhaps the <u>most destructive tsunami</u> in history. Undertake research about the tsunami and its effects. http://news.nationalgeographic.com/news/2004/12/1228_041228_tsunami.html IndyMedia stated in a December 27, 2006 news article: http://melbourne.indymedia.org/news/2006/12/134906.php, that: 'Rising seas attributed to human induced global warming have submerged Lohachara island, once the home to 10,000 people. Uninhabited Suparibhanga has also vanished, while the inhabited island of Ghoramara has lost two thirds of its area to the rising seas in the Bay of Bengal.' People from Lohachara island and the disappearing Ghoramara island have fled to Sagar, which has also lost 7,500 hectares of land to the sea. Up to a dozen islands, home to 70,000 people, are immediately threatened by the rising seas inundating homes and livelihoods. In Bangladesh, 17 million people live less than one metre (three feet) above sea level. Rising sea levels and submergence of habitat also pose a threat to the area's 400 Bengal tigers.' <p>Do people in your family know about this disaster? Brainstorm some possible solutions to these events. What could be some global solutions to this issue? Create a list and invite others to discuss the issues and the possible solutions.</p> | |
| <p>STUDY CREATIVE PROCESS</p> | <ul style="list-style-type: none"> Find and describe the innovative ways in which islands around the world have dealt with climate change 20 years into the future. Include in your research the breakwaters built in the Cook Islands and ways in which individuals can reduce global warming. http://www.environmentaldefense.org/documents/392_20%20Simple%20Steps.htm Select what you consider to be the best solutions and justify your selections. Could any of these solutions be used in populated low elevation areas on your island? List the positive actions that your island community may be doing to slow the rate of climate change. Invite the people involved in these actions to talk to your class. How might you be able to contribute to and maximise the outcome of these positive actions? Research what is happening in the city of Venice to counteract the issue of ever rising tides. |  |
| <p>CREATIVE LISTENING SKILLS</p> | <ul style="list-style-type: none"> Record the sounds of stormy weather on your island. Use instruments to create a symphony of a storm on your island, Share your symphony with others. | |
| <p>EVALUATIVE</p> | <ul style="list-style-type: none"> Have you ever walked from a sandy beach into the water? Is it always sandy or does the | |

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| SITUATIONS | <p>structure of the sea floor change as you leave the shoreline? How does sea floor topography affect tsunami wave height? To respond to this question, undertake some research on 'topography' and 'tsunamis' and consider some hypotheses. Conduct an experiment that will assist you to respond to the question: www.oesd.noaa.gov/.../How%20Does%20Sea%20Floor%20Topography%20Affect%20Tsunami%20Wave%20Height.doc</p> |
| CREATIVE WRITING SKILLS | <div data-bbox="384 309 715 472" data-label="Image"> </div> <ul style="list-style-type: none"> ▪ Create a brochure or poster specifically for young people informing them of the threat to islands of global warming and how to act. ▪ Report on what changes we can make in our daily lives to reduce greenhouse emissions. <ul style="list-style-type: none"> ▪ Read the island climate change information sites, e.g. http://www.niwasience.co.nz/ncc/icu/2007-01/. Prepare a newspaper front-page, including headlines, photos and images to describe the impact of global warming on your island or islands in general. |
| CREATIVE READING SKILLS | <div data-bbox="427 611 1513 1041" data-label="Complex-Block" style="border: 1px solid black; padding: 5px;"> <h3 style="text-align: center;">Sinking Pacific States Slam U.S. over Sea Levels BY PAUL TAIT</h3> <p>SUVA Thursday August 15 (Reuters) - Pacific Island nations, most at risk of sinking beneath rising sea levels, chided the United States on Thursday for not signing the Kyoto Protocol and urged big aid donor Australia to do more to cut greenhouse gas emissions.</p> <p>Six island states met at the start of the annual Pacific Islands Forum and expressed their grave concern about climate change. The former leader of one of the islands, Tuvalu, predicted the Pacific would submerge his country in 50 years.</p> <p>The leaders of the Cook Islands, Kiribati, Nauru, Niue, the Marshall Islands and Tuvalu released a statement saying they "expressed profound disappointment at the decision of the U.S. to reject the Kyoto Protocol."</p> <p>The statement stopped short of also naming Australia, the region's biggest greenhouse emitter and one of its largest aid donors. Canberra is expected to give more than \$278.9 million in aid to the region in the next fiscal year. Australia also is not a signatory to the 1997 treaty on global warming that limits greenhouse gas emissions.</p> <p>"We are very sad," Tuvalu Prime Minister Saufatu Sopoanga told a news conference. "Australia is one of our traditional donors."</p> <p>"We were actually expecting they would do something concrete about... making a marked contribution to ensuring that industrialized countries respect and implement the Kyoto protocol," he said.</p> <p>Sopoanga's nation of about 11,000 people measures just 10 square miles. A string of nine coral atolls, Tuvalu is just 16 feet above sea level at its highest point.</p> <p>Tuvalu fears its last palm tree could sink under the Pacific within 50 years. (Continued/...)</p> <p style="font-size: small;">ARTICLE © 2002 REUTERS LIMITED. LESSON © 2002 WWW.ENGLISH-TO-GO.COM</p> </div> <ul style="list-style-type: none"> ▪ Read the article about a meeting of the leaders of the Pacific Island nations. Read more of the article at: http://www.english-to-go.com/English/samples/pacific_islands.pdf The big topic of discussion at the meeting was the Kyoto Protocol – an agreement on global warming that requires countries to limit their greenhouse emissions. Find out more about this protocol. Undertake a role play with a partner. One person will play the Australian prime minister and the other will play the Prime Minister of Tuvalu. Discuss the pros and cons of a ratification of the Kyoto protocol by all nations. Video the role play. Imagine you are the Prime Minister of Tuvalu, write to the Australian Prime Minister and explain why it is important that Australia approve of the Kyoto Protocol. ▪ Read: <ul style="list-style-type: none"> ○ the headlines and articles about Trinidad's rising seas at: http://pulseplanet.com/archive/Feb98/1564.html ○ the article 'Sea level rises and their consequences' at: http://news.nationalgeographic.com/news/2004/04/0420_040420_earthday_2.html ○ the article 'Sink or swim' at: http://www.geographyinthenews.rgs.org/news/article/?id=609 Synthesise the common features of each of your readings into a MindMap. Compare your map with those from students on other islands. Write the newspaper headlines and articles about rising sea levels for your island in the next 5 years; 10 years; 50 years; 100 years. Include in your front page article, the consequences for your island of global warming and rising sea levels. ▪ Read Jules Verne's book 'The Mysterious Island'. Make a list of the ways it is like the TV Series 'Lost' (American T.V. program) or other books about islands. ▪ In 2006, experts from around the world gathered under the auspices of the United Nations to promote systems to protect communities against a wide range of natural disasters. More than 300,000 victims have perished in disasters during 2005 and 2006, Read about government disaster strategies at: www.minivannews.com/news/news.php?id=1946. Design your own early warning system for natural disasters on your island or for other islands. <div data-bbox="1342 1688 1485 1832" data-label="Image"> </div> |

VISUALISATION



- Revise a map of your island, your region or the world, if the sea levels rise by 10 metres, 50 metres or 100 metres in the future.
- Use Google image search to view a range of global images of sea level rises. Acknowledging copyright, print and arrange these images in a collage that depicts the impact of rising sea levels on islands in particular.
- View the video *Tuvalu: that sinking feeling*. Read the background notes and links and respond with your reactions on the online forum at:

http://www.pbs.org/frontlineworld/rough/2005/12/tuvalu_that_sin_1.html#

- Watch the movie 'The day after tomorrow'. There are powerful fictional images of the effect of global storms and climate change on the whole northern hemisphere and in particular the island of Manhattan. Retell the story using a storyboard, with the events involving you and your island. Develop a theme of islands, causes and effects and climate change throughout the story.
- Could the movie 'The day after tomorrow' become a reality? What is fact and fiction in this movie? Go to:

<http://www.dayaftertomorrowfacts.org/> to listen to Dr. Daniel Schrag, Professor of Geochemistry at Harvard University talk about global warming and what it could mean for our future. Also read the fact from fiction articles. Could abrupt climate change really occur like it did in the movie? Consider the information at:

<http://www.pewclimate.org/dayaftertomorrow.cfm> for your response to the question.



- View the movie 'An Inconvenient Truth'. <http://www.climatecrisis.net/>. What messages are in the film that are directly relevant to you and your island. Discuss the film with students from other islands around the world. Create a blog to discuss ongoing issues about climate change and your island.



STUDY OF PEOPLE



- A climate refugee is a person displaced by climate change. Disasters result from both incremental and rapid ecological change and disruption that include increased droughts, desertification, sea level rise, and the more frequent occurrence of extreme weather events such as hurricanes, cyclones, flooding and tornados. See: http://www.wikipedia.org/wiki/Climate_refugee and <http://www.science.org.au/sats2002/pearman.htm>

Discuss this issue with other islanders. Are there people on your island who are climate refugees? Find out the impact of climate refugees on an island.

Prepare a magazine article to highlight this issue.

- Read the BBC News article (Monday 24 January 2000, by Alex Kirby) that outlines a warning for the West of climate refugees. <http://news.bbc.co.uk/1/hi/sci/tech/613075.stm> and draw parallels with the effects that climate change is having / will have on islands. The Bangladeshi Ministry stated that if climate change causes sea levels to rise in line with scientific predictions, the country will have millions of homeless people. The Ministry predicted that in the future, 17.5% of Bangladesh's landmass could be lost beneath the waves. Approximately 20 million people will become ecological refugees. Where could such a huge population be relocated? Brainstorm the possibilities and share an overall plan with others.



- Undertake the webquest titled 'Tsunamis' to gain an understanding of their cause and effect on islands at: http://ww4.fsusd.k12.ca.us/education/eettWeb/Knight/Tsunami_WebQuest.htm
- Did island tribes use ancient lore to evade tsunamis? Find out more at http://news.nationalgeographic.com/news/2005/01/0125_050125_tsunami_island.html