



Climate Change and Impact: Module Materials

TEKS Alignment

(4) **Geography.** The student understands the patterns and characteristics of major landforms, climates, and ecosystems of Earth and the interrelated processes that produce them. The student is expected to:

(A) explain how elevation, latitude, wind systems, ocean currents, position on a continent, and mountain barriers influence temperature, precipitation, and distribution of climate regions;

(C) explain the influence of climate on the distribution of biomes in different regions.

(8) **Geography.** The student understands how people, places, and environments are connected and interdependent. The student is expected to:

(A) compare ways that humans depend on, adapt to, and modify the physical environment, including the influences of culture and technology;

(B) describe the interaction between humans and the physical environment and analyze the consequences of extreme weather and other natural disasters such as El Niño, floods, tsunamis, and volcanoes;

(20) **Science, technology, and society.** The student understands how current technology affects human interaction. The student is expected to:

(B) examine the economic, environmental, and social effects of technology such as medical advancements or changing trade patterns on societies at different levels of development.

Key Vocabulary

- Global warming
- Greenhouse Effect
- Greenhouse Gases
- Tsunami
- Monsoon

Module Introduction

Climate change is a very real issue which is becoming increasingly important in the modern world. Record heat waves, storm seasons, droughts, and massive flooding across the globe only hint at what the future holds as the world's temperatures climb steadily. It is becoming clear that certain areas of the world will fare better than others as the temperatures climb. Wealthier countries have the resources to mitigate climate change – wealthier people merely turn down the dial on their A/C and complain about their higher electric bills. But, the poor and the poorer countries of the world will bear the full burden of global warming – even though they have had little to do with its cause.

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Unlike many parts of the world which will become much drier, Southeast Asia will be dealing with a much wetter world. Many of Southeast Asia's major cities lie on land low enough to become inundated with a rise in sea levels of only 2 meters – well below the 4 meter projections if temperatures rise as they are projected to. As a result, even the more well off nations in the region face losing their entire industrial base as their major industrial centers sink under the rising waters. Countries such as Laos and Burma, which rely heavily upon agriculture, will find their crops drowning or prone to molds, mildews and other water induced blights. And all of the countries will face increases in diseases which are affected by water – malaria, dysentery, and others will cause huge losses in life and resources.

Most of the resources below look at climate change from a global perspective. It is important for students to understand that the excess water Southeast Asia will experience is coming from somewhere – other regions will be drying out. The American Association of Geographers presents two case studies focusing on this region and Climate Change. In addition, there are numerous resources available from The World Bank which are worth looking into. The case study draws upon the World Bank's research into climate change and presents a look at the world – 4°C warmer. The lesson plan for this module focuses upon specific changes Southeast Asia will face as temperatures climb and provides students with an opportunity to practice reading strategies using a short article provided by Radio Free Asia.

Video Presentations

- Global Warming Video Clip
 - http://stream.its.txstate.edu/users/tage/Global_Warming_Env.mov
- Climate Change and Stratification of Wealth - Miguel de Oliver
 - http://stream.its.txstate.edu/users/tage/MO_Climate_Change.mov
- World Bank President: Southeast Asian Economy Vulnerable to Climate Change – 1 minute overview of the effects climate change will have on Southeast Asia
 - http://www.youtube.com/watch?v=LlICa_hHfJo

Case Study

4°C of Change Power Point – An examination of the World Bank's "Turn down the heat" program.

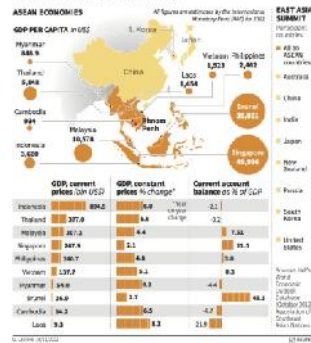
Information compiled from:

http://climatechange.worldbank.org/sites/default/files/Turn_Down_the_heat_Why_a_4_degree_centrigrade_warmer_world_must_be_avoided.pdf

Readings and Visual Resources

2012 East Asia Summit

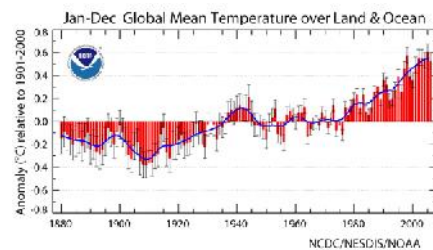
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2012 East Asia Summit – ASEAN Economies

- <http://blog.thomsonreuters.com/index.php/2012-east-asia-summit-graphic-of-the-day/>

This graphic illustrates the varying levels of development in Southeast Asia. Since climate change is affected by industrialization, it is helpful to see which countries in Southeast Asia might be contributing more to climate change than the others. In addition, since countries at lower levels of development have the most difficulty mitigating the effects of climate change, this graphic also helps illustrate which countries might be most at risk.



Jan-Dec Global Mean Temperature over Land & Ocean

- http://www.wunderground.com/resources/climate/fifth_war_mest_year.asp

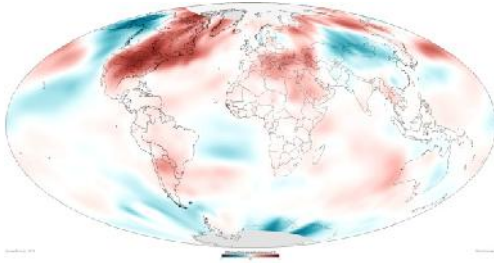
This graphic illustrates how global mean temperatures have changed over the last century.



Ten Signs of a Warming World

- <http://cpo.noaa.gov/warmingworld/>

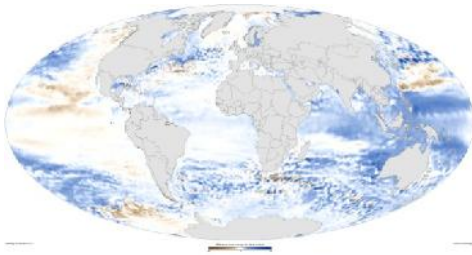
This website produced by NOAA explains the 10 signs that Global Warming is affecting our planet. The site explains each sign in detail and provides a variety of graphs, charts, graphics and videos to support their instruction. In addition, there is a downloadable poster, a downloadable interactive presentation and links to lesson plans appropriate for multiple grade levels over each topic.



Global Surface Temperatures, 2012

- <http://www.climate.gov/news-features/understanding-climate/2012-state-climate-earths-surface-temperature>

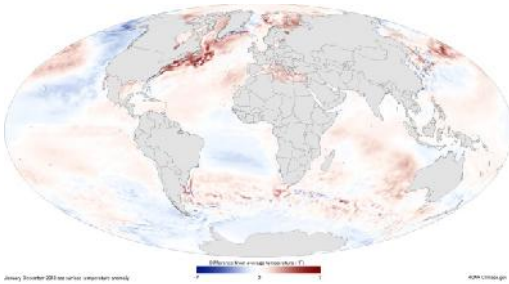
This map shows the difference from average temperatures in 2012. While many areas are much warmer than normal, others are cooler than normal; illustrating that global warming isn't affecting every place in the same way. Southeast Asia shows slightly higher temperatures than normal.



Global Sea Levels

- <http://www.climate.gov/news-features/understanding-climate/2012-state-climate-global-sea-level>

This map shows the difference from average sea levels in 2012. Sea levels near Southeast Asia are clearly rising, while others are falling.



Sea Surface Temperatures

- <http://www.climate.gov/news-features/understanding-climate/2012-state-climate-sea-surface-temperature>

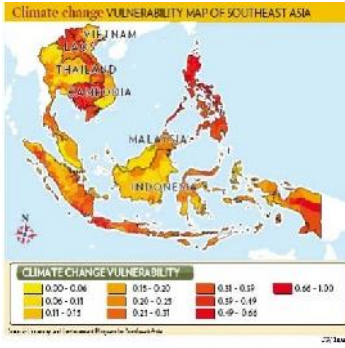
This map illustrates the difference from average sea temperatures in 2012.



Climate Change Vulnerability Index 2011

- <http://thescientistgardener.blogspot.com/2010/11/climate-change-and-importance-of.html>

The blue areas in the poster indicate regions that are most environmentally, socially and politically vulnerable to the predicted changes.



Climate Change: Vulnerability Map of Southeast Asia

- <http://ki-media.blogspot.com/2009/05/map-pinpoints-se-asian-vulnerability-to.html>

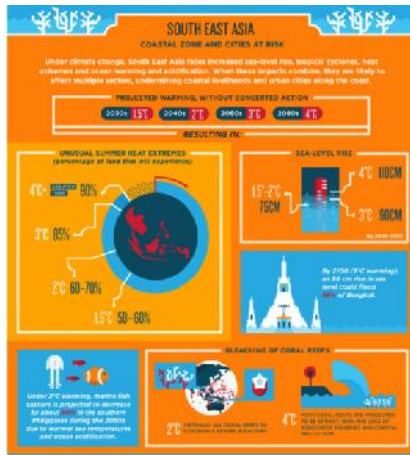
Environment Program for Southeast Asia (EEPSEA), which is administered by the International Development Research Centre of Canada, produced this map showing vulnerability to climate change in Southeast Asia.



Coastal Regions in Southeast Asia Vulnerable to Climate Change

- http://www.nature.com/nclimate/journal/v2/n7/fig_tab/nclimate1463_F1.html

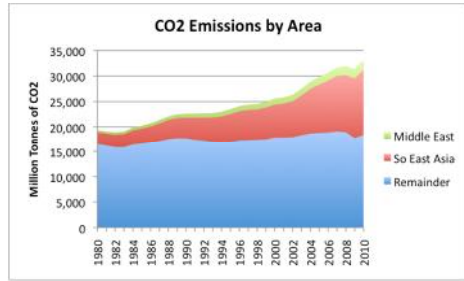
Map depicting coastal regions in Southeast Asia that are particularly vulnerable to climate change produced by Jones, H. et al. 2012.



World Bank Infographic

- <http://www.worldbank.org/en/news/feature/2013/06/19/Infographic-Climates-Change-in-Sub-Saharan-Africa-South-East-Asia>

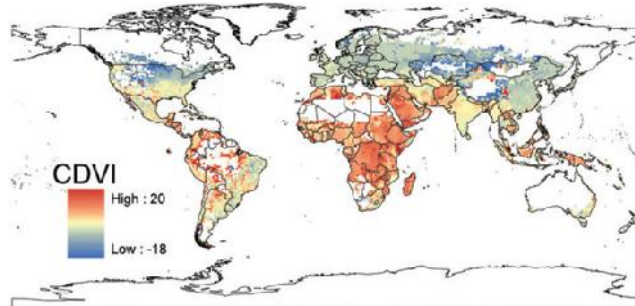
Depicts the effects rising temperatures will have on Southeast Asia.



CO2 Emissions by Area – Focusing upon Southeast Asia and the Middle East

- <http://www.financialsense.com/contributors/gail-tverberg/world-energy-consumption-since-1820-in-charts>

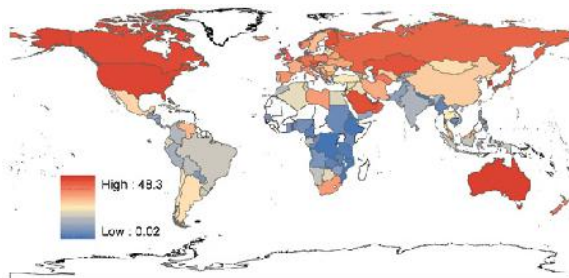
Climate Demography Vulnerability



Index

- <http://www.skepticalscience.com/Those-who-contribute-the-least-greenhouse-gases-will-be-most-impacted-by-climate-change.html>

This map illustrates a new way of looking at climate change. The index takes into consideration which world regions will be most impacted by climate change as well as the population growth for those regions in order to illustrate which regions will suffer the most as a result of climate change. Blue areas will be affected the least, while red areas will be affected the most.



National Average CO2 Emissions

- <http://www.skepticalscience.com/Those-who-contribute-the-least-greenhouse-gases-will-be-most-impacted-by-climate-change.html>

This map is used to compare with the map. The countries which will be affected the least by climate change are the countries which contribute to it the most.

Global Climate Change Case Study: How are Countries Adapting to Climate Change? - Singapore

- <http://cgge.aag.org/GlobalClimateChange1e/cs-2/index.html>

This case study investigates the causes and impacts of climate change, as well as the effectiveness of policies designed to mitigate climate changes caused by human activities. As the reading level might be challenging for high students, the case study is listed here as a background source for teachers. However, it might prove to be a good resource for an AP Human Geography course. The module is part of a collection of online modules designed for college courses by the AAG Center for Global Geographic Education.

Global Climate Change Case Study: Where are Rising Sea Levels Threatening Human and Natural Environments? – Southeast Asia

- <http://cgge.aag.org/GlobalClimateChange1e/cs-4/index.html>

This case study investigates the threats to Vietnam’s social and economic progress, as well as threats to its natural environment. As the reading level might be challenging for high students, the case study is listed here as a background source for teachers. However, it might prove to be a good resource for an AP Human Geography course. The module is part of a collection of online modules designed for college courses by the AAG Center for Global Geographic Education.

Lesson Plan

Climate Change in Southeast Asia Lesson Plan – Students will learn how people in Southeast Asia are or will be affected by rising sea levels caused by climate change and how climate change impacts will vary among countries at different levels of development.