**\*\*Park Name**

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| --- |
| [Everglades National Park](http://www.nps.gov/ever/index.htm)  |

**\*\*Lesson Plan Title (255 characters maximum)**

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| “Sea Level Rise” Climate Change: 4-6 Grade |

**\*\*Essential Question and Quick Lesson Description**

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| --- |
| 1. Show what happens to sea level when ice-sheets melt.
2. Show what happens to sea level when icebergs melt.
3. Connect sea level changes in Miami to ice-sheets melting.
4. Explain that sea level changes are caused by melting/freezing of ice sheets in Antarctica/Greenland.
5. Show that communities in Florida will be affected by sea level rise.
6. Realize that South Florida has been under water many times in the geologic past.
7. Discuss ways communities can mitigate/adapt to sea level rise.
 |

**\*\*Lesson Grade Level: (Check One of the following)**

Fourth-Sixth Grade

**\*\*Lesson Subject: (Check As Many as Apply)**

Science

**Feature Image for Lesson**

**This will be shown next to your lesson on the Education Portal. Provide filename and location below.**

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| <http://www.nps.gov/common/uploads/teachers/assets/images/akr/park/ever/BF3A0F7D-1DD8-B71C-07753E447A3ADB38/BF3A0F7D-1DD8-B71C-07753E447A3ADB38.jpg> |

**Alt Text for Feature Image**

**If the image does not display, what description do you want to appear in its place?**

|  |
| --- |
| See how sea level rise is being caused by melting ice-sheets. |

**\*\*Common Core Standards:**

**Want more information about Common Core? Go to** [**http://www.corestandards.org/**](http:///h)

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| --- |
| **Grade Level:** 4-6th **Subject Area:** Science**Common Core Standards:** RI.2.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text. RI.2.9 Compare and contrast the most important points presented by two texts on the same topic. W.2.7  Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). SL.2.2 Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.  |

**\*\*State Standards:**

|  |
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| **State:** FL **Subject :** Science **Grade Level:** 4-6 **State Standards:**Next Generation Florida Sunshine State StandardsSC.5.L.14.2 SC.5.L.15.1 SS.5.C.2.4 SS.5.C.2.5LA.5.5.2.2 |

**Additional Standards(s) (255 characters maximum): Does this lesson meet additional standards?**

**e.g. Next Generation Science Standards, National Council for Social Studies Standards, Advanced Placement (AP) Courses, International Baccalaureate (IB) Courses, Next Generation Science Standards**

|  |
| --- |
| Next Generation Science: 2-ESS1-1. Make observations from media to construct an evidence-based account that Earth events can occur quickly or slowly. 2-ESS2.A – Wind and water can change the shape of the land  |

**Thinking Skills (Check As Many as Apply)**

The thinking skills listed below are based on Bloom’s Taxonomy. Consider your lesson procedure and activities. Then check off the thinking skills that students will experience through your lesson.

X **Knowledge** – Recalling or recognizing information ideas, and principles

X **Comprehension** – Understand the main idea of material heard, viewed, or read. Interpret or

summarize the ideas in own words.

X **Application** – Apply an abstract idea in a concrete situation to solve a problem or relate it to a

prior experience.

\_\_\_ **Analysis** – Break down a concept or idea into parts and show the relationships among the parts.

X **Creation** – Bring together parts (elements, compounds) of knowledge to form a whole and build

relationships for NEW situations.

\_\_\_ **Evaluation** – Make informed judgments about the value of ideas or materials. Use standards and

criteria to support opinions and views.

**Complete Lesson File**

**Is there a downloadable file (or PDF) for this lesson plan? If yes, provide filename and location:**

**Be sure your PDF or other file meets universal accessibility requirements, most PDFs do not.**

|  |
| --- |
| <http://www.nps.gov/ever/forteachers/upload/whathappensin.pdf> |

**Lesson Duration**

 **Time to complete this lesson plan in minutes (25 characters maximum)**

|  |
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| 60 minutes |

**\*\*Background Information for Teacher**

**What important content, contextual, or practical information and background knowledge does the teacher need to successfully implement this lesson?**

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| Our "Climate Change" unit is broken into three lesson plans, each taking 60 to 90 minutes to complete, and targeted mainly at fifth and sixth grade students. A class needn't complete every lesson in the unit, though some lessons do refer to one another and are better done in sequence. However, each lesson comes with its own set of objectives and resourcesIce floating in the ocean, which then melts, does not raise sea level. However, ice sitting on land, which then melts and flows into the ocean, does raise sea level. This activity is designed to show the difference between melting icebergs and melting ice sheets. Students will build replicas of Florida and then simulate melting icebergs and melting ice sheets. Students will observe the difference in sea level rise by measuring the distance the water level has risen in the iceberg container and then measuring the distance water has risen in the ice sheet container.  |

**\*\*Important Vocabulary and Terms with Definitions:**

**What terms and academic language will students have to know to participate in the lesson? Lessons typically include 5 to 15 terms and definitions.**

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| --- |
| 1. Sea level: the level of the sea's surface
2. Antarctica: a continent around the South Pole, situated mainly within the Antarctic Circle and almost entirely covered by ice sheets.
3. Greenland: a large island that lies to the northeast of North America, mostly within the Arctic Circle
4. Ice sheet: a permanent layer of ice covering an extensive tract of land, esp. a polar region.
5. Ice berg: a large floating mass of ice detached from a glacier or ice sheet and carried out to sea.
 |

**\*\*Lesson Preparation: What preparation does the teacher need to do before the lesson? What supplies or materials should be gathered?**

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| The teacher should review the “Climate Change” unit and gather the materials needed to complete the activity as outlined in the “What happens in Antarctica/Greenland doesn’t stay in Antarctica/Greenland.” |

**\*\*Lesson Hook or Preview: What activity, video, song, or other experience could get the students excited about the lesson and thinking about the topic? Is there a way to make the lesson important to their lives or link the lesson content to what they already know?**

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| Have students find the Arctic ice caps (not a land mass), Greenland and Antarctica (both are big landmasses covered in ice) and Florida on the globe. Explain the differences between Arctic icebergs, and Antarctica/Greenland ice-sheets. Explain that Antarctica is a continent covered with ice-sheets, and the Arctic ice caps are ice floating in the ocean. In places, Antarctica is covered by tens of thousands of feet of ice. Let them compare the size of Antarctica with the USA. Talk about icebergs being in the water, and ice sheets being on land. Also talk about how South Florida’s sea level has fluctuated throughout geologic history.  |

**\*\*Procedure: List the instructions the teacher should follow as Step One, Step Two, Step Three, etc.**

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| 1. Divide the students into two groups. Group #1 = effects on Florida of icebergs melting. Group #2 = effects on Florida of ice sheets melting. Give each group a large plastic container, an upside-down plastic bowl, plastic toys, playdoh, gravel. (Having a hole pre-punched into the plastic bowls allows them to stay in the water better.)
2. Tell each group that they are going to find out how environments are connected to each other through climate change.
3. Each group attaches one upside down bowl to the bottom of their large shallow container – this one upside-down bowl is “Florida”.
4. Group #2 then attaches a second upside down salad bowls to the bottom of their shallow container. This second bowl is “Antarctica”.
5. Pour equal amounts of water into containers #1 and #2 – this represents the world’s ocean. Pour the water so that it stops about 1⁄2 inch from the top of the upside salad-bowls.
6. Add the ice for group #1 to container #1 only. The water level will rise a bit with the addition of ice: try to have the final water-level no more than 1⁄4 inch from top of the bowl. All this will depend on the amount of ice you’re using and the size of the large shallow container.
7. Have students on both groups mark this water level/sea level with a dry erase marker on the side of their “Florida” upside-down salad bowl.
8. Using the materials provided, have each groups create their own Florida landscapes on top of their upside-down salad bowl. (Houses, animals, cities, farms, roads, etc). Make a city is on the edge (coastline) of their bowl.
9. For group #2 only place their block of ice on top of their second upside-down bowl. This represents all the ice sheets on top of land masses like Antarctica or Greenland.
10. Wait for the icebergs and ice sheets to melt. (Go do another activity and come back) Or place a heat lamp acting as the sun over the Icebergs in #1and Ice Sheets in #2 until the ice has melted.
11. Look at the water level marks in both containers. Is the water level now higher, lower, or the same? –“Sea level” will not have changed in group #1. This is because ice-cubes already displaced the ocean water and as the icebergs melted, no more water was added to the oceans.
12. “Sea level” will be higher in group #2. This is because the melting ice-sheets on land added extra water to the oceans. What happened to their cities as the water rose in group #2?
13. Have students in the Ice Sheet in #2 group mark and measure the new water line, so they can determine how much the water had risen.
14. Compare and contrast the effect of melting icebergs and melting ice sheets. (Note: if the teacher saw the ice cubes in group #1 displace the initial water level by one inch while setting up the activity, then the ice sheets melting should have flooded Florida in group #2 by one inch too). The students’ harbors, beaches, resorts, Miami, etc. should be underwater. Water already in the ocean no matter what form (solid, liquid) has the same amount of displacement. However, melting ice on land will add more water to the ocean.
15. Icebergs melting won’t raise sea level, but melting ice-sheets on land will raise sea level. Reiterate that climate change will not flood Florida overnight, but in geologic history there has been a pattern of total flooding in South Florida. We already are having higher flooding tides in South Beach.
 |

**\*\*Assessment: How can teachers tell that each individual student has met the objective? How will teachers see if each student knows the answer to the essential questions or has mastered the skills? Below, include below a brief description of how to use the assessment. Later in this template you are provided with the opportunity to upload a digital copy of the assessment for teachers to print and use.**

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| Comprehension questions will reinforce the activity and see how much information students have retained and can use to critically think about solutions to the proposed problem. |

**Lesson Materials: Any worksheets, photos, primary source, scientific data, maps, graphic organizers, or PowerPoint ‘s should be described and attached using the template below. Please create additional materials boxes if necessary.**

**Material #1**

**Title (255 characters maximum):**

|  |
| --- |
| Florida’s ancient coastlines |

**Summary (how does the material function in the lesson?):**

|  |
| --- |
| Displays the development of the Florida coastline from 36 million years ago to today. |

**Downloadable file of this material in original format if possible, such as Microsoft word or PowerPoint (Provide filename and location)**

|  |
| --- |
| <http://www.nps.gov/ever/forteachers/upload/Florida-paleo-geography-maps-4.pdf> |

**Material #2**

**Title (255 characters maximum):**

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| Icebergs vs. Ice sheets |

**Summary (how does the material function in the lesson?):**

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| Shows students the difference between the two, making it easier for them to identify the effects of each one on sea levels. |

**Downloadable file of this material in original format if possible, such as Microsoft word or PowerPoint (Provide filename and location)**

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| <http://www.nps.gov/ever/forteachers/upload/Icebergs-vs-ice-sheets-2.pdf> |

**Material #3**

**Title (255 characters maximum):**

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| World map |

**Summary (how does the material function in the lesson?):**

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| Shows the global position of Greenland and Antarctica in relation to Florida to help students understand that what happens in these places on opposite poles of the Earth has world wide consequences. |

**Downloadable file of this material in original format if possible, such as Microsoft word or PowerPoint (Provide filename and location)**

|  |
| --- |
| <http://www.nps.gov/ever/forteachers/upload/world-map-2.pdf> |

**Assessment Materials**

**How can teachers tell that each individual student has met the objective? How will teachers see if each student knows the answer to the essential questions or has mastered the skills? Attach below the assessment and, if applicable, a rubric or answer key.**

**Assessment**

**Title (255 characters maximum):**

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| --- |
| Evaluation questions |

**Summary (how does the material function in the lesson?):**

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| The material will be used at the end of the lesson to assess student understanding see if the instructional objectives were met. |

**Downloadable file of this material in original format if possible, such as Microsoft word or PowerPoint (Provide filename and location)**

|  |
| --- |
| * Does what happens in Antarctica stay in Antarctica? Why or Why not?
* Why did this happen? Why didn’t the icebergs melting cause a higher sea level?
* In what other locations is ice melting on land (glaciers)?
* What would happen to you if you lived/hunted on the arctic now that it’s melting? (You lose your habitat – polar bears/Inuit cultures).
* What’s more of a problem: melting Arctic icebergs, or melting ice-sheets on Antarctica/Greenland?
* Can you find other places in the map where rising sea level will flood the coastline (Bangladesh, Venice, the Maldives, Tuvalu, Kiribati, other Pacific Islands)
* Will this happen overnight, or over your lifetime?
* What can you do to plan/mitigate/adapt for this?
* What’s causing ice-sheets to melt?
* If sea level has risen in Florida before, what is different about it this time? (Millions of people live here now. Billions of dollars of property and investments are based on the assumption that sea level is always the same).
 |

**Assessment Rubric or Answer Key**

**Title (255 characters maximum):**

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| --- |
| N/A |

**Summary (how does the material function in the lesson?):**

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**Downloadable file of this material in original format if possible, such as Microsoft word or PowerPoint (Provide filename and location)**

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**Supports for Struggling Learners**

**If a learner is struggling to understand the objective, essential question, or skills presented in the lesson, what can be done to help this learner? Is there a lower reading level version of text? Is there a more image heavy or simplified version of content? Can supportive devices be provided such as calculators?**

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| N/A |

**Extensions for Excelling Learners**

**If a learner is really excelling at the objective and skills presented in the lesson, what can be done to continue to challenge this learner? Can the student create a product or learn more in depth about the content?**

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| N/A |

**Additional Resources**

**Please list websites, references, or other materials for further research by interested students that is not already provided within the lesson.**

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| <http://www.epa.gov/climatechange/kids/impacts/effects/coastal.html><http://www.nature.nps.gov/climatechange/docs/SFCN_CC.pdf><http://www.nasa.gov/topics/earth/features/greenland-melt.html> |

**Related Lessons or Educational Materials**

**Is this lesson connected to other lessons within a unit? Is this lesson related to a field trip guide or activity? If so, list the website address or titled of these other materials below.**

|  |
| --- |
| <http://www.nps.gov/ever/forteachers/climatechangeforkids.htm> |