GLORIA Education Workshop Madagascar

Global Learning Opportunities for Regional Indian Ocean Adaptation

Adina Paytan
University of California, Santa Cruz

Sponsored by GULLS
Global Learning for Local Solutions
(The Belmont Education Efforts)

IH-SM and mr hp - Madagascar

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

Thought Swap

Describe an experience (in or out of school) where you felt like you really learned something. What was it about the experience that helped you learn?

Décrivez une expérience (à l'école ou en-dehors) pendant laquelle vous pensez avoir vraiment appris quelque chose. Quel aspect de cette expérience vous a aidé à apprendre?

Thought Swap

Describe a moment when you thought you were at your best teaching – or you saw someone else doing it. What was especially effective about it?

Décrivez un moment où vous pensiez être (ou avez vu quelque'un être) particulièrement efficace en tant qu'enseignant. Quels étaient les points forts?

Thought Swap

What do you think your students should learn about the ocean and about climate?

Why is that important?

Selon vous, que devraient apprendre vos étudiants sur l'océan et le climat? En quoi est-ce important?

Teaching & Learning Ocean Sciences

Workshop Goals

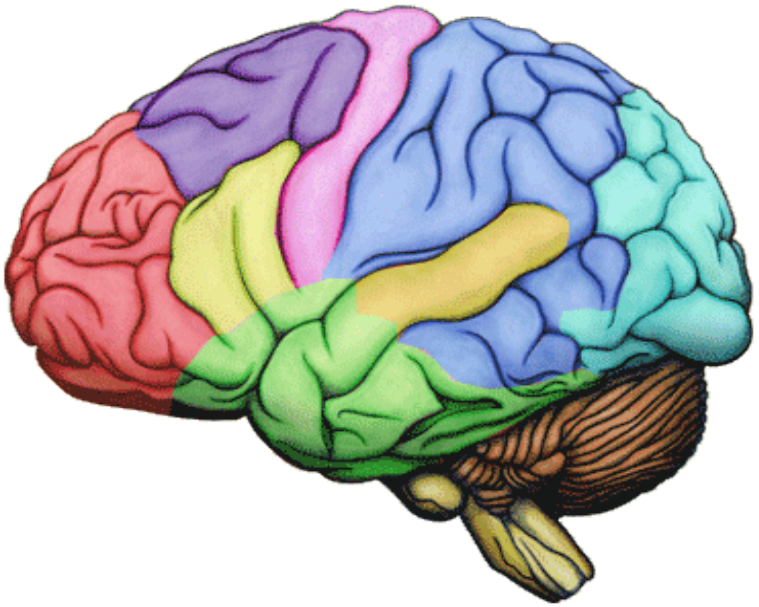
- Provide experiences with research-based teaching & learning strategies and hands-on activities that scientists and educators can use when communicating ocean and climate science to diverse audiences (public, K–12 students, university students, other scientists).
- Discuss ocean literacy needs

How Learning Happens

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

Quick Write

- How do you think learning happens?
  - What are your ideas about what facilitates and supports learning?



Foundational Ideas on Learning

- Learning is ***an active process*** to construct understanding.
- Learning ***builds on prior knowledge***.
- Learning occurs ***in a complex social environment*** and is a social activity.
- Learning should be ***situated in an authentic context***.
- Learning is affected by ***motivation and cognitive engagement***.

Sand Activity

I know

I want to find out

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

mr hp

UNIVERSITY OF CALIFORNIA SANTA CRUZ SLUG

INSTITUT HALIEUTIQUE ET DES SCIENCES MARINES
IHSM
UNIVERSITE DE TOULARA

NSF

Sand Activity

What is sand? What is it made of?
How big are the grains?
Where does it come from?
What colors? What shape?
What can it tell us about the beach?

How are the samples similar?
How are they different?

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

Sand Activity

Make a sand slide

Draw a picture of your sand
Write about your sand

Get together with another person compare and share.

Why is sand important for people?

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

Some Concepts about Sand (Grades 2-3)

- Sand grains can be made of animals, plants, rocks, minerals
- Sand grains come in many different shapes, sizes, colors
- Differences between sand grains can be clues about where they came from and how they got to the beach

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

Think Pair Share:

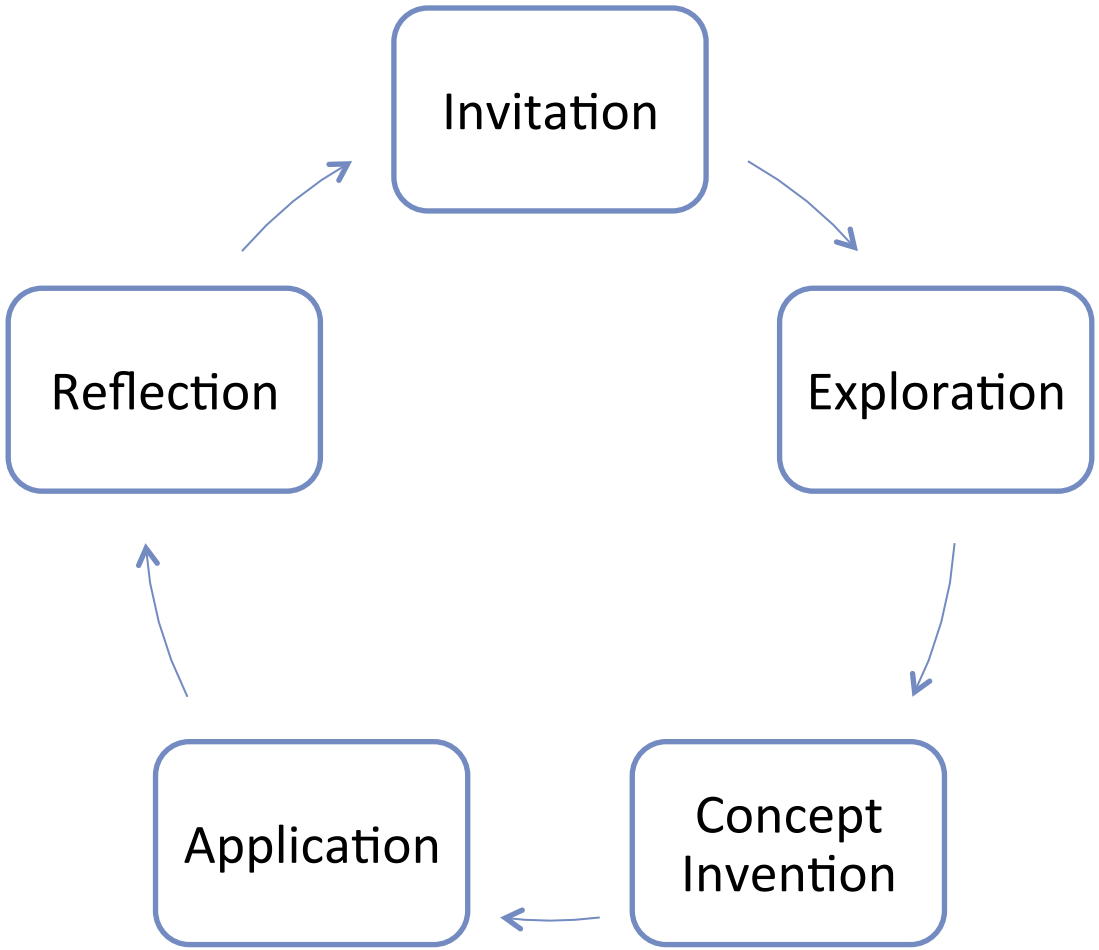
Sand Activity Reflection

- What did the teacher have you do (how did you engage in the activity) & how did that help you learn the content?
- What foundations of learning were we doing in this activity?

How can experiences be designed to support learning?

- Focus on the learning goals.

The Learning Cycle



THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

The Learning Cycle
limitations of only one phase

- Many educators focus on the area of the Learning Cycle with which they are most comfortable
- Focusing solely on one phase of the cycle may mean neglecting or rushing other important phases of the cycle

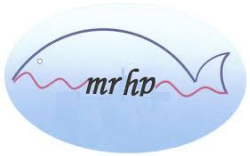
The Learning Cycle as a *flexible* tool

- Successful lessons do not have to include every stage of the cycle
- May be cycles within cycles in 1 activity
- Sometimes learners will have explored amply before coming to class or engaging in an outreach activity, & will be prepared to begin at the Concept Invention phase

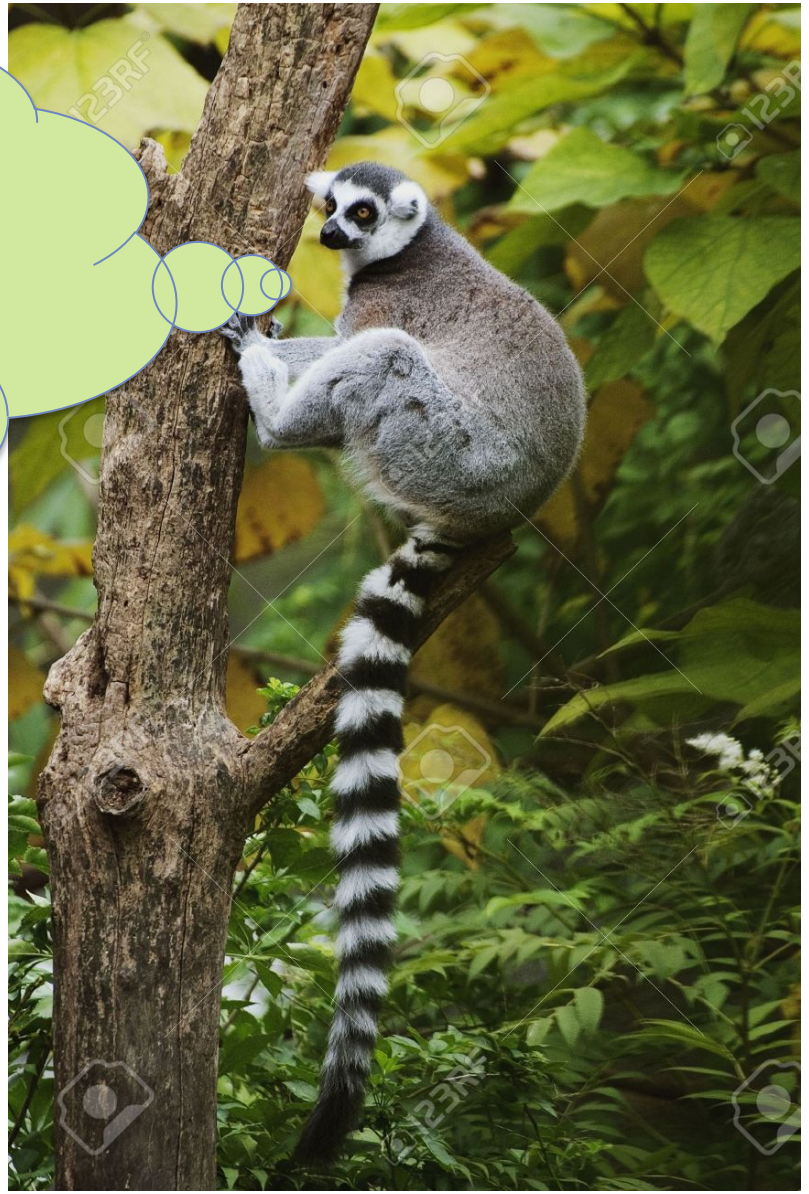

TIME FOR A BREAK

Designing Learning Experiences

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY



Where does most of the mass of a tree come from?



Minute paper

What do you think?
What do you think your students will say?

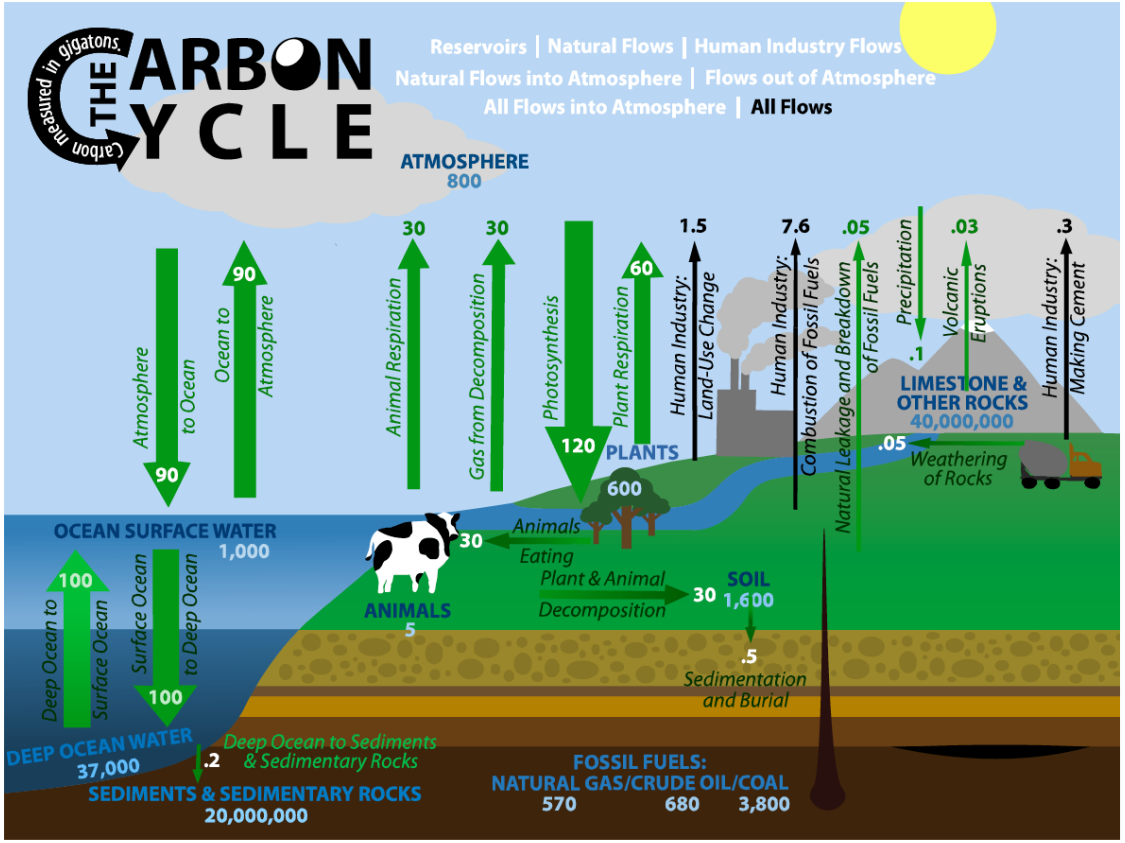
THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

Sketch an image of the Bay ecosystem
Label all the C reservoirs & C flows in the system

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

Carbon Cycle Investigation Stations

- 3 stations; 10 min each
- Work in teams
- Follow the instructions
- Clean up the Station for the next group
- Reflect on the experience



THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

Reflect on Learning Experience: as you engage with the stations…

- How are you engaging with the materials at each station to learn the content?
- What is one piece of science content you are taking away?
- What questions about the content arise for you as you engage in the activities?

Record your questions.

Activity Debrief

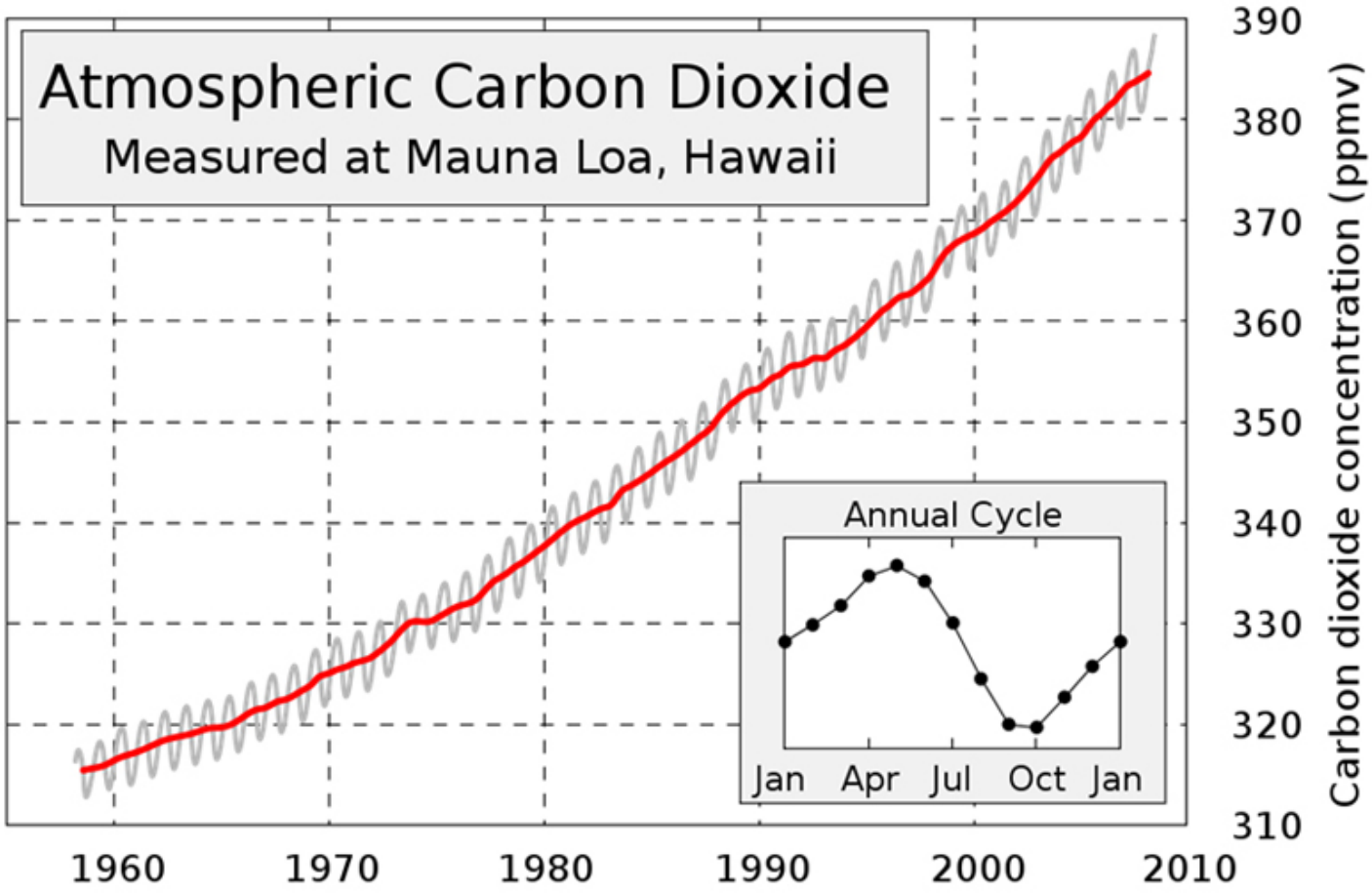
Design of the stations

- What was common across all the tasks?
- How did they differ?
- What did you learn from each?
- What was the goal of each station?

Affordances & limitations of the Design of each Station

- How did the stations differ in what you were able to do & talk about?

Carbon Cycle Discussion



Carbon Cycle Discussion

Carbon Moves between reservoirs, but the total amount of carbon on Earth does not change.

Human industry moves carbon out of fossil fuel and limestone reservoirs and into the atmosphere.

Strategies for Learning & Teaching

- Hands on, manipulation of the model
- Listening to & talking with peers
- Thinking on your own
- Reading about the explanation
- Listening & talking with the instructor in the whole group
- Overhearing other peers
- Discussing and testing out ideas that agree or disagree with your own understanding
- Asking new questions
- Explaining your ideas to peers or instructor
- Accessing and making connections to prior knowledge & experiences
- Multi-faceted experiences - provided more than one opportunity to learn, different approaches were used
- Developing and refining models
- Creating a desire or will to learn about something

Synthesis of Discussion

- People construct understanding of complex ideas over a long period of time.
- Learners don't acquire concepts simply by having someone tell them the content, or even by doing hands-on activities.
- Learners must encounter multiple learning experiences that encourage them to
  - question their assumptions;
  - engage in discussion about their ideas;
  - make connections to and build on their prior knowledge; and
  - apply their new understandings in different contexts.


TIME FOR A BREAK

Teaching the Greenhouse Effect

Draw a diagram depicting your understanding of the greenhouse effect.

Label the parts of your diagram.

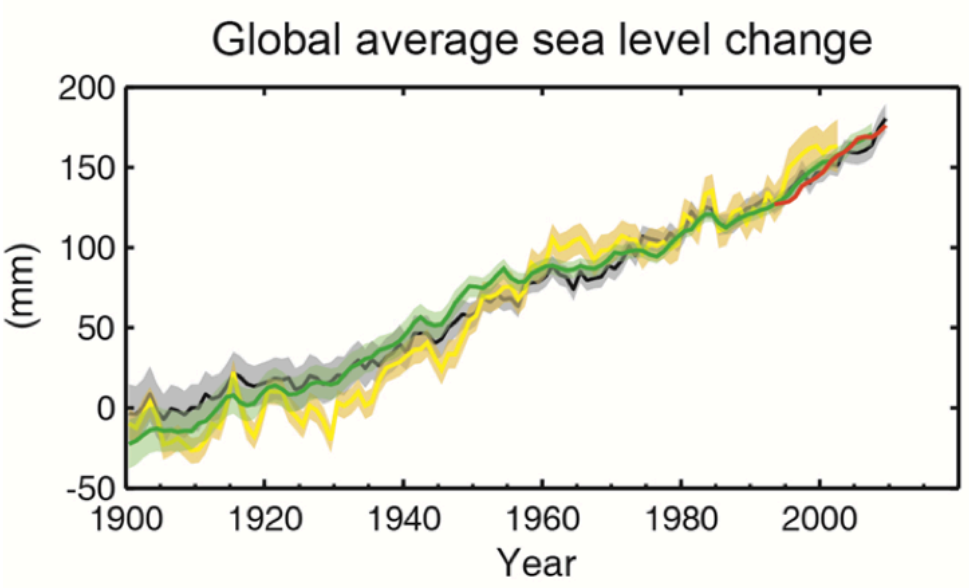
Record any questions you have about the greenhouse effect.

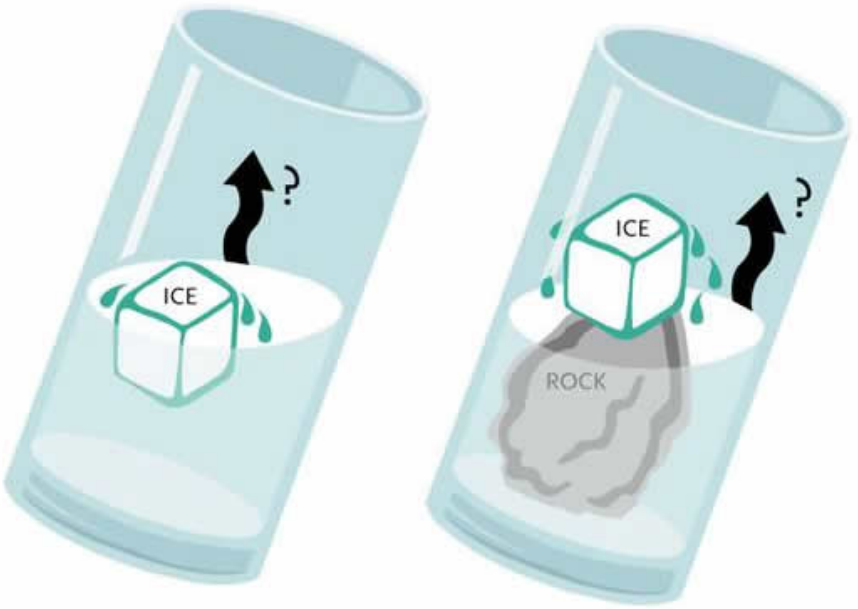
Simulation

https://phet.colorado.edu/en/simulation/legacy/greenhouse

THE LAWRENCE HALL OF SCIENCE
UNIVERSITY OF CALIFORNIA, BERKELEY

What does the public know and understand about sea level rise and climate change?

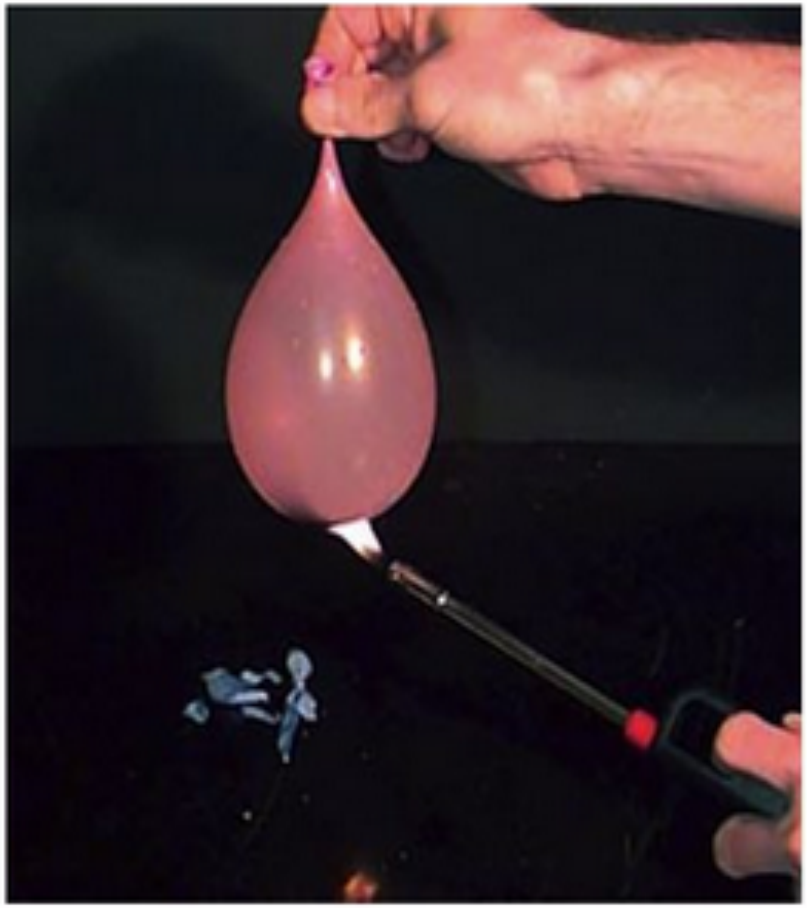




- What is it?
- What causes it?
- Who is affected?

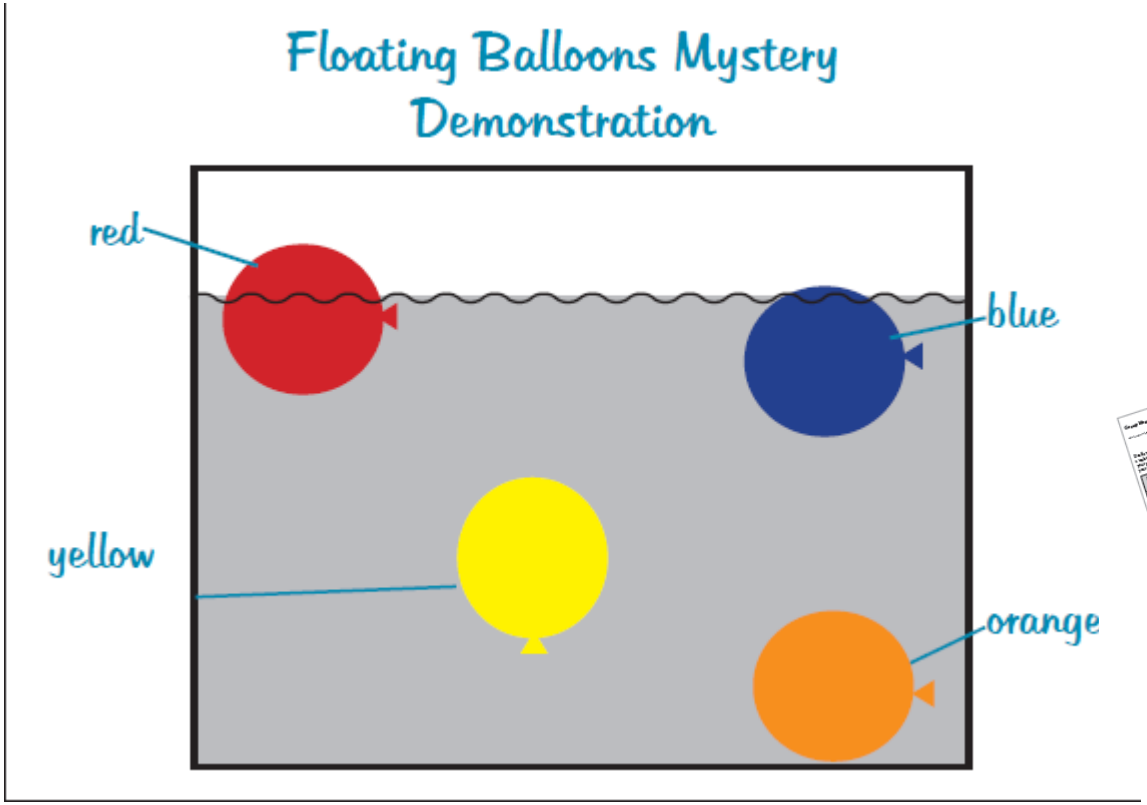
Heat Capacity of Water and Air

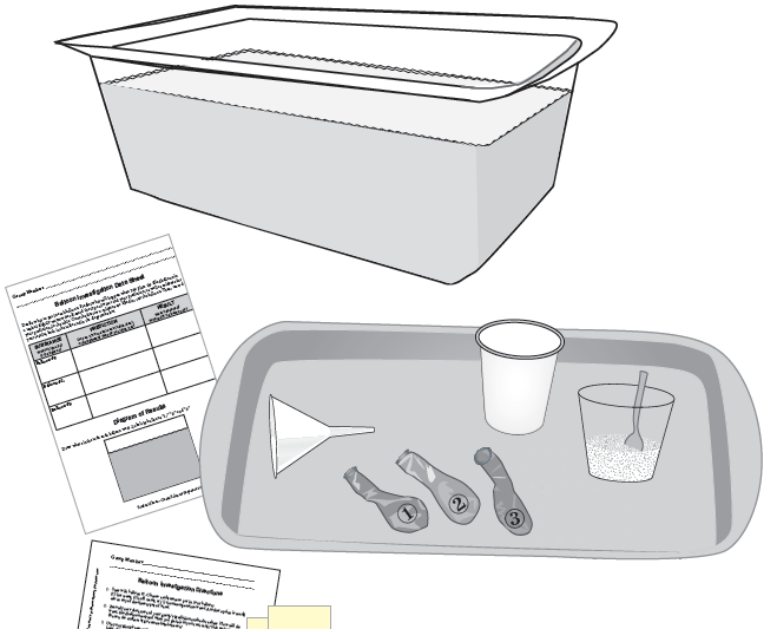
Air-filled balloon

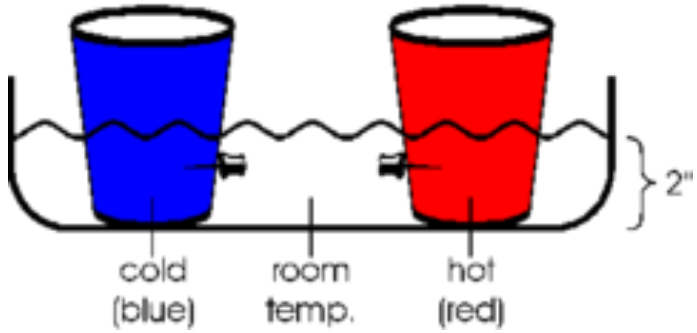


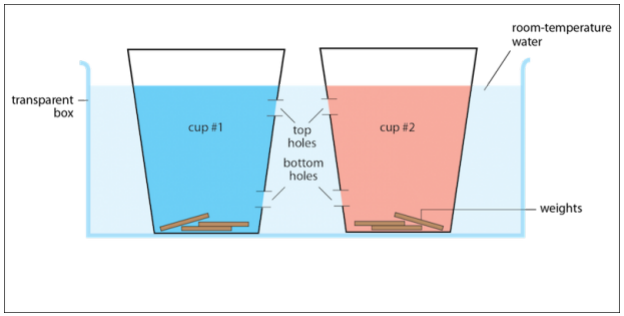
Water-filled balloon

Ocean currents and climate change?





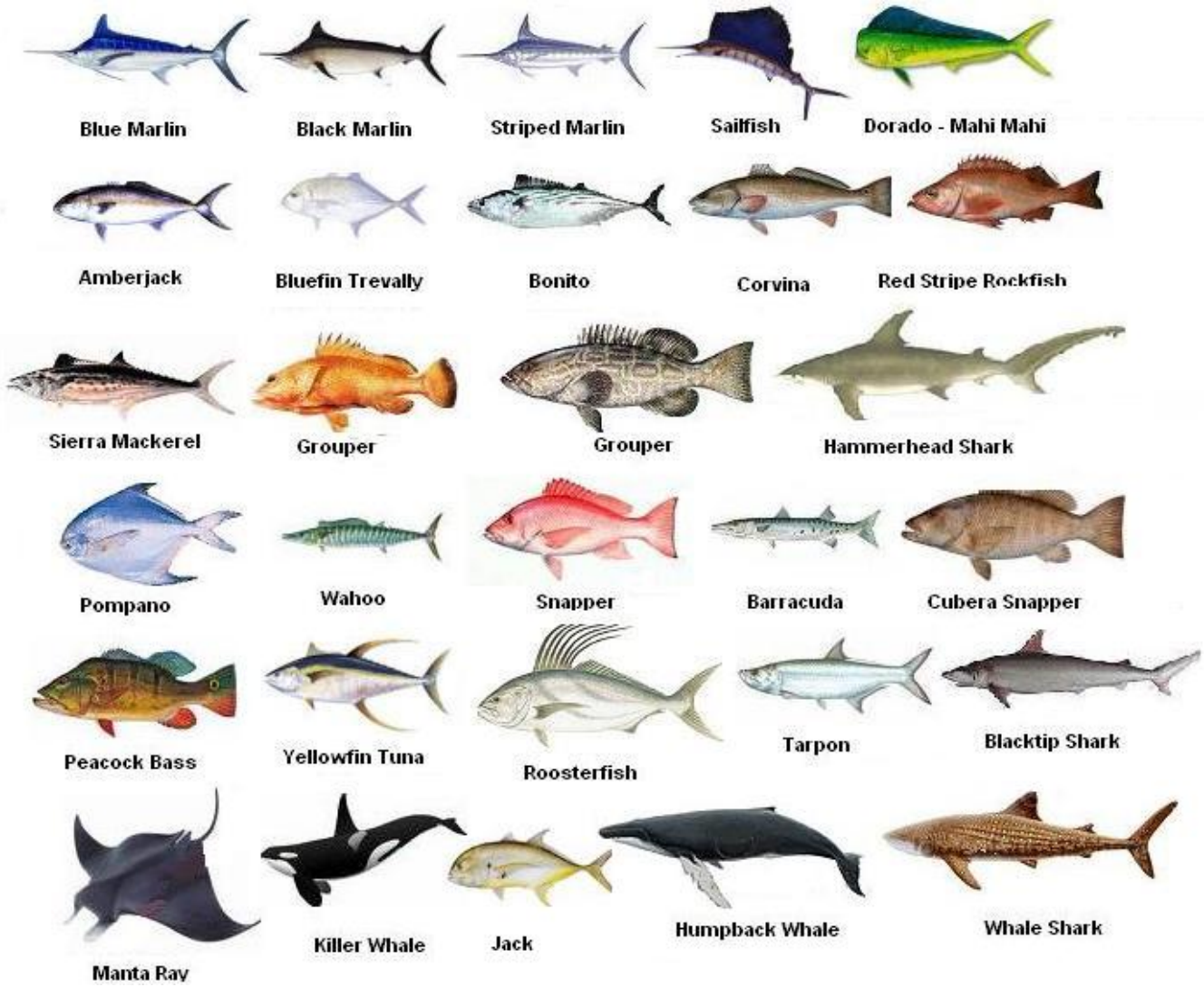




Ocean Acidification

It Takes All Kinds

Fish come in a great variety of forms, colors and shapes and these adaptations can be used to tell us about their habitat and lifestyle



It Takes All Kinds

1. Referring to the two focus science practices:
   - What did the teacher have you do & how did that help you learn the content?
2. What foundations of learning were we doing in this activity?
3. What phases of the learning cycle were included?

Workshop Reflections & Questions

- What is one thing you want to take away and try out?
- What are you still wondering about?
- What else would you like to tell us?

- http://mare.lawrencehallofscience.org/curriculum/ocean-science-sequence/oss68-overview/oss68-resources/unit1