More than Mud; Exploring lake sediments in your own backyard
Lesson 2
Sediment Core Acquisition

Title: Let's Get Muddy – Collecting pond or lake sediment

Completion Time:
- This activity will take about 1 period. (Depending on site location)

Grade Level:
- Middle School and up

Overview:
This activity may be adapted to many different curricula. (In my Earth Science classes I have used this successfully as part of an initial introduction and measurements unit. Others have used it in environmental and life science classes.)

This activity is a necessary prerequisite for all other sediment activities. Depending on the proximity of a pond/lake or other water source to your school, this may be done with students on campus, with a small group of students after school or on a weekend, or sediments may be collected by the teacher and brought into class for later activities.

While not a formal lesson, what follows may be used for logistical assistance in the process of core collection. Students will take coring equipment to a local pond or lake to collect sediment samples for later analysis. Time spent outside may be effectively used collecting data for other activities later in the year and or collaborations with other classes/subjects.

Objectives:
Primary objective -Students will take coring equipment to a local pond or lake to collect sediment samples for later analysis.
Secondary objectives - Other measurement equipment such as IR thermometers may be used to make temperature measurements and observations of objects with varying albedo. Water quality measurements such as water turbidity, pH, dissolved O_2, and observation of macro-invertebrates may also be conducted.

Materials:
Notebook, journal, clipboard, pencil, still or video camera for process documentation

Coring tool

PVC TMart Coring tool – core barrel, cutting bit, handle, deep water extension, toothbrush (for cleaning threads) channel-lock/tongue and groove pliers or pipe wrench, core liners, end caps

Wildco – core barrel, cutting bit, top with handles, extension handles, toothbrush (for cleaning threads) core liners, core catchers, caps

Digital camera
Tape measure
Pliers/wrench,
Knife and other small tools
Marking pen (sharpie) for labeling samples.
Boots/waders

(In cold climates, winter coring has been suggested, Ice cutting tools would be required if coring from a frozen pond surface.)

Other :
GPS (or GPS app on smart phone)
IR surface thermometer or conventional thermometer
Secchi disk

Lesson Preparation:
Depending on class size and patience of students, it is HIGHLY recommended to scout coring locations prior to taking students into the field. Numerous problems may be encountered. The two coring tools suggested have limited functionality in sand or gravely sediments.

Procedure:
As noted earlier, much of this lesson is site specific. My school has a storm water sediment detention pond; (approximately 0.7 Acre) this pond is slightly more than 200 meters from the classroom which minimizes the time necessary for this activity.

Carry equipment to coring location, assemble coring device, and extract sediment cores.
Students encouraged to document the coring process photographically and in journal/notebook.
Using GPS, students should document site location. Other observations of water may include: clarity, secchi depth, temperature, water depth at coring location, and percent core recovery.

When transporting sediment cores back to classroom/laboratory, keep core tube in an upright position and avoid shaking to disturb soft sediments.

Resources:
Using PVC Coring tool
http://www.youtube.com/watch?v=vYPSqHWntew
Using Wildco Coring tool
http://www.youtube.com/watch?v=c4rF1_tuGD0

Extension:
This lesson is completed during a measurement and introduction unit. Among other activities students carry hand-held IR surface thermometers as the class walks to the pond. Students are tasked with measuring (and recording) surface temperatures of many different objects. Later in a meteorology unit, as albedo is discussed, these measurements will be discussed.

Teachers are encouraged to seek cross-curricular opportunities for this type of outing. Teaching teams may be able to work collaboratively where English students may complete a nature/creative writing assignment, various math, or art assignments should also be pursued.

Assessment:
No specific assessment is given for this lesson

Credits:
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Standards:
The list below includes some of the NGSS standards likely to apply to lessons from these activities

Middle school

MS-ESS2-2.	**Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales**
MS-ESS3-3.	**Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.***

HS-ESS2-2.	**Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems**
HS-ESS2-5.	**Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.**
HS-ESS3-5.	**Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.**