

WORKING WITH WATERSHEDS



TEACHER GUIDE

LAUNCH



PLANNING

Here's a suggested schedule for this kit! The activities should be completed in order, but you can choose when the lessons take place over time.

ACTIVITY INFORMATION	SECTION (S)	TIME REQUIRED	DAY/ LESSON
ACTIVITY 1: INSIGHTFUL STORY Begin to investigate human influence on natural systems with a series of news reports. Total time: 45 min	<input type="checkbox"/> Beach Visits	45 minutes	Day 1
ACTIVITY 2: WHAT'S IN THE WATER? Experiment to determine what organism caused the illness in the last activity. Total time: 2 h 45 min	<input type="checkbox"/> Growing Green	90 minutes	Day 2
	<input type="checkbox"/> Blue-Green Bacteria	30 minutes	Day 3
	<input type="checkbox"/> Blue-Green Bacteria (Under a Microscope)	45 minutes	Day 4
ACTIVITY 3: CYANOBACTERIA AND ME Discover which human behaviors led to CHAB.	<input type="checkbox"/> Impact		

Full schedule available with purchase

Question 4: What is another way that human infrastructure can cause harm to human health?

Answer: Answers will vary.

How to Help:

- This question doesn't have a specific answer but is intended to get students thinking beyond CHAB to other ways that anthropogenic changes negatively impact human health.
- Some possible student responses could include bodily injury from lifting large pieces of building material, air pollution causing lung damage, or water pollution seeping into our drinking water.
- There is some potential to relate social studies or history content students are learning to this response.

DATA AND DECISIONS

Anthropogenic impacts on biodiversity can make drastic impacts on the earth. Your student will draw conclusions about how human impact changes the environment through data collection and evaluation, in this activity.

LEARNING GOALS:

- ✓ I can evaluate and revise technological solutions to reduce human impact on natural resources and ecosystems.
- ✓ I can use computational tools to represent relationships among Earth's systems and to show the effects of human activity on those systems.

MATH TIME!

Pre-human Cycle

Question 1: Use your spreadsheet to log the data from this figure into the following categories. Columns A and B should include Earth "spheres," Columns C and D should include reservoirs, and Columns E and F should include flux. Use spreadsheet functions to perform calculations within the appropriate cells.

Answer: Student spreadsheets should look similar to this:

	A	B	C	D	E	F
1	Earth "sphere"		Reservoir		Flux	
2	Atmosphere	1	Atmosphere	1	From biota	200
3	Biosphere	2600	Ocean	92000	From soil	200
4	Geosphere	840120000	Soil	120000	From river (approximation)	2.5
5	Hydrosphere	92000	Sediment	840000000	Burial (approximation)	2.5
6			Biota	2600	Soluble (approximation)	1.5
7					Total (approximation)	406.5

How to Help:

- Approximations are the mean for the range provided in the figure.
- Spreadsheet functions students should be using include sum and addition.
- Students may need help to recognize that "dissolved" in the figure equates to "atmosphere."
- If students are struggling, have them log data for each reservoir first and then use spreadsheet functions to calculate Earth "sphere" data.

4 activity

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CONTENT

- In this reading section, your student will be given possible solutions to return the phosphorus cycle to a pre-human version, at least to a closer version.
- Some of the solutions provided may align with student suggestions in the previous section's last question. If so, encourage them to think about the similarities between their suggestion and what is provided. If not, you can encourage them to think about how the solutions provided may be more or less beneficial than their suggestion.

MAKING A DIFFERENCE

While we cannot take back our actions, we can make positive choices for the future. Encourage your student to remember that each person makes a difference, but the impact can be greater if changes are made as a community.

LEARNING GOALS:

- ✓ I can evaluate and revise technological solutions to reduce human impact on natural resources and ecosystems.

MY WATERSHED, MY SOLUTION

CONTENT

- This section has your student determine the watershed they live in and develop a solution to reduce the impacts humans have on it.
- While students are encouraged to have their solution be related to cHAB, they can choose another anthropogenic issue related to their watershed.
- There is an extension called "Pledge Campaign" in Activity 6 that has your student take their solution one step further and set up a pledge campaign where they encourage members of their community to pledge to partake in the solution they have developed. This extension fits well between this section and the next one.

MULTIPLE AGES AND ABILITIES:

If you have several students working through this kit, you can use this section as an opportunity to encourage your students to collaborate or to diversify ideas.

Collaboration is an important life and science skill. Scientists rarely, if ever, work alone. This is because they rely on one another to vet ideas, find inaccuracies and areas of confusion, and help them relay their ideas and findings to the public.

Having your students work as a team to come up with a solution to reduce the anthropogenic impacts on our ecosystems related to cHAB can encourage them to think and work like scientists, in a collaborative group. If you choose this, it is advised that you develop higher expectations for the group than you would a single student working alone.

Do your students already work well together, but often come up with similar ideas? Instead of having your students work as a team, have each student come up with their own solution. You can monitor students to ensure that each student is coming up with a different solution than the rest. This will allow you and your students to see a diverse set of possible solutions to compact anthropogenic impacts on the earth.

If you notice that your students are all coming up with the same or similar solutions, you can have each student choose a watershed they are not currently living in, or choose an issue other than cHAB to create a solution for.



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