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RIVER CITIZEN OVERVIEW

Welcome teachers to this exciting study known as "River Citizen"! This program aims to teach students about the Chicago River and its watershed* through independent discovery and on the scientific method. The program is designed to allow students to establish a personal connection to the Chicago River and its watershed, and in turn have the desire to take individual action to help. Students will learn to appreciate nature and the environment as a whole and at the end of the program will become a designated "River Citizen".

The program is designed so that students are the investigators while the teachers are the facilitators. The students are referred to as the "Chicago River Study Team". The teacher is referred to as the "Team Leader" to emphasize the teachers role in the team process. The students should really feel like this is THEIR project. It is up to them to analyze the facts, form hypotheses, collect data, analyze data, make decisions and take action.

The program, which is divided into six stages, is a scientific investigation guided by the scientific method. At each stage, students work individually and in teams to further their understanding of the history, ecology and hydrology of the Chicago River and its watershed. Along the way, students come to appreciate the Chicago River and its watershed and build a personal connection to them. This connection serves to further inspire their work. At each stage there are specific objectives that the students must meet. It is suggested that the included lessons and activities be completed to fulfill the objectives. However, if the teacher has a favorite activity that would help students meet the stated objectives or would like to add in extra things, he/she should feel free to do so. An assessment piece follows each lesson. As part of the program, classrooms will track their collective positive impact on the Chicago River and its watershed by listing all the activities the students (and teacher) have done to improve the health of the river and watershed.

 $_{\checkmark}$ $_{\checkmark}$ The teacher manual contains all the background information, resources and lessons needed to complete the program. References used in producing sections in the curriculum are cited after that section. Students are required to have a notebook dedicated to River Citizen. Student pages found in this manual, called Investigator pages, can be photocopied and taped into the students, notebooks. Every new section and lesson (called "Explorations") will be introduced to the students by the River Citizen Videotape. Teachers should play the introductions at the beginning \checkmark \checkmark of each section and each exploration for the students.

Have a wonderful experience!!

* A watershed is the area of land that surrounds a body of water which drains into that body of water.

Section SIX:

GAN DO IT! TAKING AGTION for the Chicago River and its Watershed

Overview and Purpose

Students often don't believe that their positive actions can make a difference in helping the environment. This section aims to inspire students so that they realize that actions they take really can help and allows them to actually try to bring this actions to fruition.

Objectives

- Students will understand that their positive actions can make a difference.
- Students will be able to analyze how they and others contribute to environmental problems and recommend ways that they can help lessen the problems faced by the Chicago River and its watershed.

The Program

Play the introduction to Section 6 on the River Citizen Videotape.

Tell the students that often scientists can feel discouraged and overwhelmed by the environmental problems that they investigate. Explain that discovering what other scientists have done can be inspirational. Explain to the students that scientists usually look for ways to use their data to solve problems. Tell the Team that now they will be looking back and using all the research and data that they have collected to come up with actions that they could take to help reduce the problems facing the Chicago River and its watershed. Should they choose to accept the mission, they will then make a commitment to make changes to the way they or their family does things in order to help the Chicago River and its watershed.



Overview

This exploration will give students a sense of being a part of a large movement by being introduced to various celebrities' conservation efforts. Adolescents are very interested in the world of celebrities and what they are doing.

Materials

 Copied and cut out celebrity cards (found on the following page)

Procedure

- Play the Introduction to Exploration 14 on the River Citizen Videotape.
- Ask the students if they know of any people who work hard to save the environment. Tell them they might be surprised to learn who cares about the environment. Pass out cards to select students. Have students read their cards to the class. The class will have to write down whom they believe is described in their data notebooks and then take turns guessing.

I played in a group called the Ocean Symphony, which was a collection of celebrities that played bad, humorous music on purpose in order to spread the environmental message to keep the oceans clean. I was born in Santa Monica California in 1969, and am an actor that starred in the movie "Shallow Hal" and "School of Rock". I also have my own band called "Tenacious D". Who am I?-Jack Black

I have given 1.5 million dollars to Cambodia in order to protect a large forest and to educate the people there about conservation. I am an actress that is best known for my role as a "Tomb Raider". Who am I?-Angelina Jolie

I was given the 2002 Global Environmental Citizen Award because of my work in trying to conserve biodiversity. I am an older actor who has starred in many movies. I am best known for my roles as "Indiana Jones" and Han Solo from "Star Wars". I also starred in "Six Days, Seven Nights". Who am I? - Harrison Ford I love to speak to young people about the causes and affects of water pollution. I am a young female actress that has starred in "Rat Race" and "The Butterfly Effect." Who am I?-Amy Smart

I often talk to young people about the importance of conserving energy. I make Public Service Announcements encouraging them to care for the environment. I provided the voice of Princess Fiona in Shrek and am one of "Charlie's Angels". Who am I?-Cameron Diaz

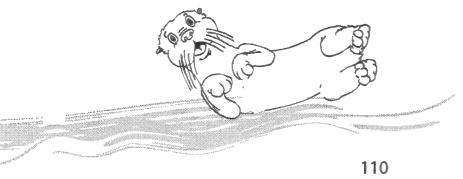
I love all animals, especially reptiles! My mission in life is to help conserve animals and their habitats and to educate people about these issues. I have my own TV show and have recently made a movie. People call me a "Crocodile Hunter" but I don't really hunt them. Who am I?-Steve Irwin, "The Crocodile Hunter".





Play the introduction to Exploration 15 on the River Citizen Videotape.

A collection of touching stories that show the wonderful things that kids have done to help the environment can be found at www.actionfornature.com then "amazing stories". Either print these out and pass them out to the students or have the students read them on the computer. Ask them to choose one that they found to be particularly interesting and have them write an essay, poem or story about why it inspired them. Make sure that they include an explanation of what the young environmentalists did. BE SURE TO LET THE STUDENTS KNOW THAT THESE AE ALL TRUE STORIES!!



Expoloration 16: Everything Adds Up: How much water could we save?

Overview

Students, and the teacher, will analyze how much water they use and how much water they can save. The take home message is that individuals have to take action, even if it seems small, to affect change. When everyone takes action, the results are anything but small.

State Standards

- 1.C.3a: Use information to form, explain and support questions and predictions.
- **7.A.3b:** Apply the concepts and attributes of length, capacity, weight/mass, perimeter, volume, time, temperature and angle measurements in practical situations.
- 8.D.3b: Propose and solve problems using proportions, formulas and linear functions.
- **11.A.3d**: Collect and record data accurately using consistent measuring and recording techniques and media.
- 11.A.3d: Explain the results of unexpected results in a data set.
- 11.A.3f: Interpret and represent results of analysis to produce findings.
- 11.A.3g: Report and display the process and results of a scientific investigation
- **13.B.3d:** Analyze the interaction of resource acquisition, technological development, and ecosystem impact.
- **13.B.3f:** Apply classroom-developed criteria to determine the effects of policies on local science and technology issues.
- 17.B.3b: Explain how changes in components of an ecosystem affect the system overall.

Materials

- River Citizen Videotape.
- Copies of "Investigator Page-How Much Water Do I Use?" (1 per student)
- Copies of "Investigator Page-Water Conservation Discussion Questions" (1 per student)
- A gallon bucket
- Student data notebooks

Background Information

Most people do not believe that what they do on a daily basis can make a big difference when it comes to the health of the environment.

You probably think, "if I throw away one can instead of recycling, it doesn't make a big difference....Who cares?" Lets take a look at our water usage to get a sense of whether what one person does matters.

Americans use a large amount of water each day, and though water in general is abundant, water available for our use is limited. Most water is in the oceans or locked up in glaciers and living organisms so we cannot use it. There is very little water available for our use, which is why it is important to keep it clean and not use so much on a daily basis so that there is enough for everyone. In addition, using gallons of water each day requires treatment plants to clean larger amounts of water. During a storm, people using high amounts of water in the Chicago area contribute to the already large amounts of rainwater entering combined sewer and storm water pipes. When there is too much water going to the treatment plant, it is shifted to the Deep Tunnel to be stored. However, the Deep Tunnel project is not complete and thus cannot handle all of the water present during big storms. In addition, even the Deep Tunnels sometimes fill up to the brim and cannot hold all of the water from runoff. As a result, treatment plants back up and dump untreated water into the Chicago River. When the river begins to flood, the locks must be opened to let out the water into Lake Michigan.

Procedure

- Play the introduction to Exploration 16 on the River Citizen Videotape.
- Most students do not understand the concept of wasting water when they learn that water is
 a cycle. If students are not familiar with the water cycle, review it using the proper terms of
 precipitation, evaporation, infiltration, and transpiration. This activity aims to show students that
 small individual activities coupled with the activities of others can grow to make large impacts.
- Explain that water can not be created or destroyed in nature. Water moves in a cycle from place to place. Explain that only about 1% of the earth's water is available for human use as the rest is salt water, locked up in glaciers, and trapped in living organisms. This is one of the reasons that it is very important not to pollute the available water that we have, because we aren't able to get any more.
- Pass out the "Investigator Page-How Much Water Do I Use" data sheet found on page 114.
 Go over the forms for calculating their water usage. Have students return to school the next day or week with their calculations. You, the teacher, should also perform your own calculations.
- ENCOURAGE STUDENTS TO HAVE A FAMILY MEMBER HELP THEM WITH THIS ACTIVITY.

Reflection and Assessment:

When the students come back with their data pasted into their data notebook, have them figure out how much water they could save as a class. Share with them the following conservation options:

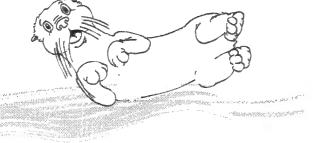
- Shortening shower time
- Turning off water when not necessary
- Installing low flow shower head (a low flow showerhead uses about 2 gallons a minute and many cost under \$10)

Have students decide which they could do and then recalculate their usage. Do this by having them adjust the amount of time that they used the water. Then as a class, calculate how much the class would save over a year? How about if everyone in the US did what they did? To have students better comprehend how much water this is have them calculate how many Olympic sized swimming pools (253, 125 gallons) that would fill up. Pass out the "Investigator Page- Water Conservation Discussion Questions found on page 116 for this purpose.

Reflection

Answering the discussion questions serve as a reflection. The following rubric might help you to assess the reflection.

A work	B work	C work	D work
Student answered each question very thoroughly and thoughtfully. (3 points)	Student answered each question thoroughly and thoughtfully.(2.5 points)	Student answered each question adequately.(2.25 points)	Student did not answer each question.(2 points)
Student exhibited excellent research skills in finding population numbers for equations. (2 points)	Student exhibited good research skills in finding population numbers for equations.(1.5 points)	Student exhibited average research skills in finding population numbers for equations.(1.25 points)	Student exhibited poor research skills in finding population numbers for equations.(1 point)





In the shower:

Obtain a gallon bucket and hold it right up to the showerhead so that no water leaks out. Have someone help you put the water on at the volume that you would normally take a shower. Time how long it takes the gallon bucket fill up with water. Record that number in your notebook.

Take a shower for the amount of time you usually do. Time how long the shower takes from the moment you turn the water on to the moment you turn it off.

Calculate how many gallons of water you use during your shower by using the following proportion:

1 gallon x gallons (your timed minutes to fill up the bucket) = (your timed minutes during your shower)

While brushing my teeth:

Obtain a gallon bucket and place it in the bathroom sink. Put the water on at the volume that you would normally use to brush your teeth. Time how long it takes for the gallon bucket to fill up with water. Record that number in your notebook.

Brush your teeth for the amount of time you usually do so. Time it from the moment you put the tooth brush in your mouth until the time you take it out and put it away.

Calculate how many gallons of water you use if you leave the water on while brushing your teeth by using the following proportion:

1 gallon x gallons (your timed minutes to fill up the gallon bucket) = (your timed minutes while brushing)

While doing the dishes:

Obtain a gallon bucket and place it in the kitchen sink. Put on the water at the volume that you usually rinse the dishes when washing them. Time how long it takes for the bucket to fill up with water. Record that number in your notebook

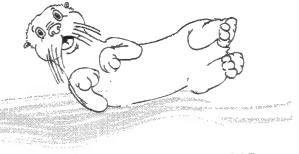
Wash the dishes that your family used from the latest meal. If you have a dishwasher, wash the ones that are left which can't be placed in the dishwasher or won't fit. Time how long it takes you to wash the dishes. Calculate how many gallons of water you use if you leave the water on the entire time while washing the dishes by using the following proportion:

<u>1 gallon</u> <u>x gallons</u> (your timed minutes to fill up the bucket) = (your timed minutes while washing dishes)

What does that add up to?

Fill in the following chart to show the data you have collected:

Activity	Gallons of Water Used
Taking a shower	
Leaving water running while brushing	
Leaving water running while washing dishes	
TOTAL GALLONS USED	



1) If every member of the Chicago River Study Team used this much water each day, how many gallons of water per day does the Team use?
2) If everyone in your town used that much water each day, how many gallons of water per day does your town use? (Find the population of your town in an atlas or on the web)
3) If everyone in the US used that much water each day, how many gallons of water per day does the US use? (Find the population of the US in an atlas or on the web).

4) How many gallons of water could you save if you reduced your shower by 3 minutes? By 5 minutes? How about as a Team? How about as a state and country?
5) How many gallons of water could you save if you shut off the water while you brushed your teeth? How about as a Team? How about as a state and country?
6) Why is water conservation important?

Exploration 17: Taking Individual Action For the Chicago River and Its Watershed.

Overview

This lesson provides students with the opportunity to use all that they have learned and all the data they have gathered to come up with plans of action to help improve the Chicago River and its watershed. Students will be exercising their problem solving and their teamwork skills.

State Standards

- 1.C.3a: Use information to form, explain and support questions and predictions.
- **3.A.3:** Write compositions that contain complete sentences and effective paragraphs using English conventions.
- **3.B.3a:** Produce documents that convey a clear understanding and interpretation of ideas and information and display focus, organization, elaboration and coherence.
- **4.B.3a:** Deliver planned oral presentations, using language and vocabulary appropriate to the purpose, message and audience: provide details and supporting information that clarify main ideas and use visual aids and contemporary technology as support.
- 11.A.3f: Interpret and represent results of analysis to produce findings.
- 11.A.3g: Report and display the process and results of a scientific investigation
- **12.B.3a:** Identify and classify biotic and abiotic factors in an environment that affect population density, habitat, and placement of organisms in an energy pyramid.
- **13.B.3d:** Analyze the interaction of resource acquisition, technological development, and ecosystem impact.
- **13.B.3f:** Apply classroom-developed criteria to determine the effects of policies on local science and technology issues.
- 17.B.3b: Explain how changes in components of an ecosystem affect the system overall.

Materials

- River Citizen Videotape
- Butcher paper
- Markers
- A shoe box
- Copies of "Investigator Page-Chicago River/Watershed Plan of Action" found on page 123.
 (2 per group)

Procedure

- Before class: Take a large piece of butcher paper and title it "How We Have Helped the Chicago River and its Watershed." Hang it next to the "Problems, Tests and Solutions" board already in the classroom. Then create an "accomplishment box" using a shoe box. Cut a slit into the lid of the box and decorate it.
- Play the introduction to Exploration 18 on the River Citizen Videotape.
- Divide students into the groups that they were in during the case studies.
- Hand out two "Plans of Action forms" per group.
- Have each group come up with two "plans of action" to help reverse the problem that they had investigated. The "plan of action" is something that they could actually do (nothing like "design a huge vacuum that can suck out only pollution in the River).
- Have the groups of students fill out the "plan of action" forms.
- When all groups are finished have each group present their "Plans of actions" to the whole class and tape them under "solutions" on the Chicago River Problems, Tests and Solutions Board as possible solutions to the problems.
- Allow the class to discuss the actions that have been proposed and if anyone would like to add
 any more as possibilities, they can feel free to do so. (Allow this process to spill over into another
 day if necessary.)
- Encourage the Team to perform one or more of the suggested actions. For each action that an individual does have them write what they did and place it into the "Accomplishment Box". Students can choose to write their names down or remain anonymous. Teachers should also submit items to the Accomplishment Box. This can serve as an inspiration for the students.
- At the end of class each day (or at the end of the week), the teacher will take the accomplishments and write them on the "How We Have Helped the Chicago River and its Watershed" board. Students should be aware that it is very hard to change a particular habit and that they shouldn't feel discouraged if they fail to do something one day.
- This will be continued throughout the remainder of the semester or the year, even as the teacher is covering other topics. It will remain in the background. At the end of the semester or year, the accomplishments will be totaled and benefits to the river and watershed discussed.

Reflection and Assessment

The student "Plans of Action" creation and presentation will act as an assessment. The following rubric may be used to assess the action plans.

A work	B work	C work	D work
Group has an action plan to help with each problem. (Plans must be possible to perform in order to count!)(3 points)	Group has an action plan to help with each problem.(3 points)	Group is missing an action plan for one of the problems.(2.5 points)	Group is missing an action plan for 2 of the problems.(2 points)
All action plans are very well thought out and creative.(4 points)	All action plans are well thought out and creative.(3 points)	Action plans are somewhat well thought out and creative.(2.5 points)	Action plans are not well thought out nor creative.(2 points)
Action plans follow an excellent pattern of a conclusion/solution to a scientific problem.(3 points)	Action plans follow a pattern of a conclusion/ solution to a scientific problem.(2 points)	Action plans vaguely follow a pattern of a conclusion/solution to a scientific problem.(2.5 points)	Action plans do not follow a pattern of a conclusion/solution to a scientific problem.(2 points)





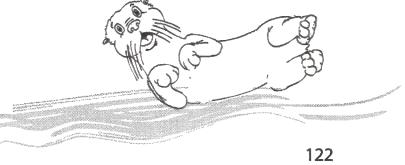
Thinking of action plans to help solve the nine problems with the Chicago River and its watershed that the students have focused on in this program can be difficult. Students are using critical thinking skills and are required to really understand the connection between cause and effect. It is very important that students come up with their own actions, but the following offers some suggestions that might help the teacher guide the students along. Be sure that the students realize that these actions really do help!

Examples of Actions that can help solve the nine problems investigated in the River Citizen Program

Problem	Solutions
Loss of biodiversity and habitat	Participate in a restoration workday on a Saturday morning.* Encourage your parents to plant native species in the garden.
Toxins in the water and sediment from point source pollution	•Take a walk along a section of the river and look for unusual substances in the water. Inform Friends if you see any •Inform yourself and others about what the Clean Water Act states about point source pollution.
Toxins in the water from non-point source pollution	•Find out when a household hazardous waste pick up is in your town or one close to you. Take old cleaners, paint and insecticides to the drop off site •Use non-toxic alternatives to household chemicals •Pick up litter when you see it.
Excess nutrients which cause eutrophication and oxygen depletion	•Find out if your laundry soap has phosphate in it. If so, encourage your parents to buy one without phosphate •Pick up your dog's waste immediately.
Excess fecal coliform bacteria due to Combined Sewer Overflows	•Turn off the water when you brush your teeth so you reduce water entering the sewer pipe. •Next time you use a backyard hose, be sure the excess water goes into the grass and is soaked up instead of going into the street and into the storm sewer.

Problem	Solutions
Excess erosion	 Encourage your parents to plant native plants in their gardens to reduce runoff. Volunteer to help plant along a streambank.*
Presence of dams	•Find out where the dams on the river are.§Find out why the dams were placed in the river in the first place.
Lack of public access.	•Tell someone about the places you can go to see the river. (Like where your field trip was) •Find places in which the river is blocked. Write to your town mayor about why you believe that it is important for people to reach the river.
Lack of public awareness and action	•Talk to parents about river/watershed issues.§ Talk to younger students about river/watershed issues.

^{*}To find out about restoration workdays visit www.chicagoenvironment.org and look under volunteer opportunities.

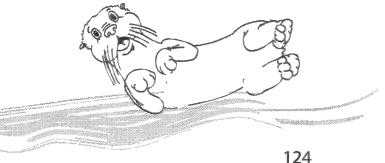


We propose an action plan to help reverse the problem ofChicago River and its watershed.	in the
The reason this problem occurs is	
Evidence of this problem includes	
Negative affects of this problem are	
Plan of Action (Include all of the steps needed to do this, and what it will accomplish)	

Action Instructions

- When the plans of actions are completed each scientist group will present them to the entire Team. Every action that a group has come up with will be written on the "Chicago River Problems, Tests and Solutions Board" under the "solution" column.
- Now that the Team has investigated the problems with the Chicago River and its watershed and come up with solutions to help repair these problems, it is time to do something about it! A scientist never just lets a great idea disappear!
- Whenever a Team member performs an action from the board under the "solutions" column, he/she may place it in the "Accomplishment Box". The action taken and the benefit to the river and watershed will be written down on a slip of paper, which will be taken out every day or week at the end of each Team meeting. The Team member's accomplishment will be written on the "How We Have Helped the Chicago River and its Watershed" board hanging up in the room. A Team member may write his/her name on the slip of paper or choose to remain anonymous. The Team's goal is to complete as many actions as possible to help the river and its watershed. The Accomplishment box will remain in the room for the rest of the semester or the year.

Remember, it is very difficult to change bad habits, so do not get discouraged if you fail to do something some days! You can do it!





Overview

It is highly encouraged that teachers share and celebrate their students' accomplishments as River Citizens. This gives students pride in their efforts

Materials

- River Citizen Videotape
- Copies of "Investigator Page-Final Reflection Instructions" (1 per student)
- Copies of "River Citizen Certificates" (1 per student)

Procedure

Play the introduction to Exploration 18 on the River Citizen Videotape.

Students should be designated as a "River Citizen" at the end of the program. Cut out and copy the certificate located on page 128 for this designation.

Additional ideas include:

SHARING

- Arrange an announcement at a school pep rally that talks about students' accomplishments in helping the Chicago River and its watershed.
- Announce students' action accomplishments over the PA each morning.
- Award the student who performed the most actions a "River Citizen of the Year Award"
- Have students' do a presentation or have a "river carnival" for younger students.
- Inform local newspapers about student efforts.

CELEBRATION

- Have a "River Citizen Party." Each student will bring a food that with a river or watershed theme. (ex. Gummy worms).
- Hold a "Chicago River and Watershed Day Carnival" where students will create games about the river and its watershed.

FINAL REFLECTION

Pass out the "Investigator Page-Final Reflection Instructions" found on page 127.

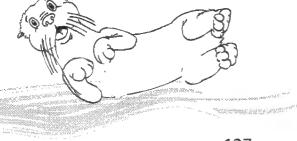
Have the students reflect on their experiences with the River Citizen Unit in its entirety. Students will think about the question "What does being a River Citizen Mean to Me and How Would I Encourage Others to Become One?" They will then create something illustrating how they feel and showing why someone else would be interested in becoming a River Citizen. Students should be very creative on this and can use any type of media. They can create art, cartoons, a commercial, poems, songs etc. to achieve this. This reflection will be presented to the class.





REFLECTION

You will think about the question "What Does Being a River Citizen Mean to Me and How Would I Encourage Others to Become One?" You will then create something illustrating how you feel and show why someone else would be interested in becoming a River Citizen. You should be very creative on this and can use any type of media. You can create art, cartoons, a commercial, poems, songs etc. to achieve this. This reflection will be presented to the class.



Friends of the Chicago River



the Chicago River and its watershed through my knowledge the Chicago River. I am charged with helping to protect part of a scientific study team dedicated to exploring Friends of the Chicago River. I have been a successful have been officially designated as a River Citizen by and actions.





Chicago River Study Team Leader

