One for All

Introduction:

Renewable resources are natural resources that replenish themselves, such as trees or fish. Human can use renewable resources again and again if we manage them properly. But if we don't give these resources an opportunity to reproduce, we can exhaust them quickly, especially as our demand grows. The tragedy of the commons theory asserts that individuals acting in their own best interest may deplete a shared resource at the expense of the interest of the whole group. When we manage shared resources, it is important that we use them cooperatively and sustainably rather than exploiting them for short-term gain. In the following activity, students play a game where cooperative decisions must be made if all participants are to benefit.

Materials:

Chips or tokens (such as poker chips), about 200 chips
Candies or other reward
Music

Procedure:

1. Count out 30 chips.
2. Seat 10 students in a circle.
3. In the center of the circle, place the pile of 30 chips.
4. Read the following rules carefully to the students. Allow time for questions and answers to make sure students understand the rules of the game thoroughly.

Rules

- You may not talk to anyone during the game or communicate with hand or facial gestures.
- The chips belong to all of you, to the group.
- Music will be played, and while it is playing, each of you may take chips out of the pool of chips in the center.
- You may not put chips back into the pool once you have taken them out.
- As soon as the music stops, you must stop taking chips out of the pool. At that time, I will double the number of chips left in the pool, and then continue the game.

Concept:

Sustaining our natural resources requires conservation and the cooperative use of those resources.

Objectives:

Students will be able to:
- Identify a strategy that would produce a sustainable use of resources in a simulation game.
- Draw parallels between the chips used in the game and renewable resources upon which people depend.
- Draw parallels between the actions of participants in the game and the actions of people or governments in real-world situations.

Subjects:

Biology, Ecology, Environmental Science, Social Studies, Geography

Skills:

Finding cooperative strategies

Method:

In a simulation, students desiring to draw renewable resources from a common pool determine short-term consumption strategies that will preserve a long-term supply of the resource.

- At the end of each round, players who get 10 chips may trade them in for a piece of candy. If you have less than 10, you will not get candy.
- There will never be more chips in the pool than there were at the start of the game. This is the maximum number of chips the pool can hold.

5. Start the music and watch what happens. Typically, the players take all of the chips in the first round, completely emptying the pool. If this happens, point out that, as it's impossible to double zero, the game is over. Ask the students if they'd like to try again. Each student must return all his or her chips to the pool. Start the music and the game again. If the players leave chips in the pool at the end of the first round, double the number of chips (not to exceed 30), and continue playing. If any player accumulates 10 chips, they can trade it for a candy.
6. If after three rounds, your students are still emptying the pool of chips, change one rule - allow them to talk. Most likely, some of the students have realized that some chips must be left in the pool in order for the resource to be sustained. Let the group work out a strategy to use moving forward with the game.
7. After the students have applied their strategy in two or three more rounds, ask three additional students to join the circle of players, and continue the game. After another two rounds, ask three more students to join the circle. (You should now have 16 players in the circle.)
8. As the game continues and you see that students are starting to work towards the same goal, you may stop the game and start discussion. You may want to have enough candy on hand so that all of the students get a piece for a job well done.

Notes to the leader:

DO NOT explain the significance of the chips before playing the game. The rules are the only instruction the players get.

When doubling the chips in the pool, remember there can "never be more chips in the pool than there are at the start of the game, this is the maximum number of chips the pool can hold." A useful analogy is to think of the chips in the pool as fish in a pond. A pond only has enough room and food to support a certain number of fish. That number is the pool's carrying capacity. The pool in this game has a "carrying capacity" of 30 chips.

As mentioned in the procedure, it is very likely that the first time students attempt to play the game, they will deplete the pool of its chips. In fact, they may continue to fully deplete the pool until they are allowed to verbally strategize.

Groups come up with various strategies to equitably acquire chips and ultimately get candy. The two most common scenarios are: 1) Each student takes one chip per round. As a result, they remove 10 chips each round and the game can continue. 2) The students take turns taking 10 chips. During one round, a single student takes 10 chips and trades it in for candy. During the next round, a different student takes 10 chips and so on.

Do not be surprised if halfway through the game – when the group has a strategy for removing chips and things seem to be going smoothly – a single student decides to break from the group plan and, in one round, remove all the chips. This is a great opportunity for discussion! For example, consider a group of countries that have agreed to a specific policy. Would one country ever decide to break from the group and go its own self-serving way?

Discussion Questions:

1. What do the chips represent?

   Renewable resources, such as fish or trees. (Coal, gasoline, oil, iron, aluminum are examples of nonrenewable resources, and therefore are not applicable in this exercise.)

2. Can we draw any parallels between the way the players treated the chips and the way individuals, and society as a whole, uses or overuses renewable resources?

   DEFORESTATION: cutting trees down without planting replacements or at a rate at which newly planted trees are not given time to grow to maturity before they, too, are harvested; or cutting down old-growth or tropical rainforests which can never be replaced. OVERFISHING: taking so many fish that not enough are left to reproduce and replenish the stocks for the next year. OVERFARMING: depleting the soil of nutrients without giving it time to regenerate. POLLUTION: producing carbon dioxide and other forms of pollution far out paces the time it takes to naturally replinish clean air and water.

3. Imagine that each of you playing the game represents a different country. What are some resources that nations might have in common? Is it realistic for nations to share these resources cooperatively?

   Oceans, air, fish, coral reefs, rivers, etc.

4. How many chips did each player take out of the pool in the different game variations? How many candies (or other rewards) did this generate? How did each game variation make you feel about other members of the group?

5. Why do you think more players were added in the middle of the game? What do they represent?

   The additional players represent an increasing population. Because the amount of resources stayed the same, participants needed to cooperation more in order to benefit from equitable distribution.

6. How did talking about the game make you play differently? Did discussing strategies change your attitudes or the way you played the game? Why did some players take as many chips as they could while other players left some behind? How did this make you feel?

7. Have you experienced a similar situation at home, with friends, in your community? (It may help to provide an analogy, such as several people in the house competing for hot water in the morning.) How, in the long run, can the whole group benefit when individuals refrain from taking too much? What sort of attitude do we need to have as individuals to achieve the goal of the greatest benefit for all?

This activity was adapted from "Something for Everyone," found in Teaching Population: Hands-on Activities, Population Connection, 2008., which was adapted by permission from an activity developed by Kurt and Ursula Frischknecht and Karen Zimbelman in Thinking Globally and Acting Locally: Environmental Education Teaching Activities by Lori D. Mann and William B. Stapp, ERIC/SMEAC, 1982.