

Groundwater game tutorial

Introduction

This is a simplified version of a game that is used in rural India and beyond to help farmers improve their use of groundwater extraction. Information of this game as an intervention tool can be found at <https://gamesforsustainability.org/practitioners/#groundwater-game>.

This version is intended to use in the classroom to expose students to issues like groundwater problems and collective action problems. One can use it in a more formal way where students write up their decisions on a form, or more playful by students revealing their choice with one of the crop cards and getting coins they earned (and thus no need for students to write up anything). You can use Figures 1 and 2 in your instructions.

Before using it in class it is useful to test out the mechanics with some volunteers. We have used the game in graduate and undergraduate classes at university, and as outreach in middle and high schools. If you have questions comments, send them to Marco.Janssen@asu.edu.

Groundwater Game

Instructions to read to the students

We do an exercise today which is like activities done with farmers in India. This is an activity for you to learn about groundwater problems. In case there is something you do not understand during the instructions, raise your hand.

The types of crops that you choose to plant affect how much groundwater is used and how much money you make. Some crops, like cotton, require more water to grow than a crop like wheat. But cotton also has a high price and is more profitable than wheat.

So, if everyone grows cotton, then the groundwater levels are likely to fall more than if everyone grows wheat.

We are going to play an activity that looks at how people make these decisions about what crops to plant. This is not a test, there is no right or wrong choice. You will be playing through several years of planting crops in a short period of time. This activity is very simple, and it doesn't include all the things that farmers usually deal with in the fields. We are focusing on how you decide between planting one or two different kinds of crops. One requires a little amount of water to grow, and it gives you a small amount of money. We will call that Crop A. The other crop requires more water to grow but gives you more money. We will call that Crop B.



Figure 1. Crop A/B Comparison

During this activity, you are asked not to speak unless we ask you to do so.

This activity is intended to recreate the situation in which people must make decisions about using water to grow crops. You have been organized into a group of 5 individuals. You will play a number of years, which have one pretend growing season, when all your water comes from groundwater. For this activity you should pretend that you all have the same amount of land.

At the beginning of the activity, there are 50 units of groundwater available for your group to grow crops. Every year, you will have to make a decision, which of the two crops to plant: Crop A or Crop B. Crop A costs one unit of water and gives two units of income. Crop B costs three units of water and gives five units of income. At the beginning of each year, the groundwater supply recharges by 5 units of water.

So, if everyone plants crop A, 5 units of water will be used, leaving 45 units of water. At the beginning of the next round, the groundwater will recharge with 5 units of water, so there will once again there will be 50 units of water available for the group.

If everyone plants crop B, 15 units of water will be used, leaving 35 units of water. At the beginning of the next round, the groundwater will recharge with 5 units of water, so there will be 40 units of water available.

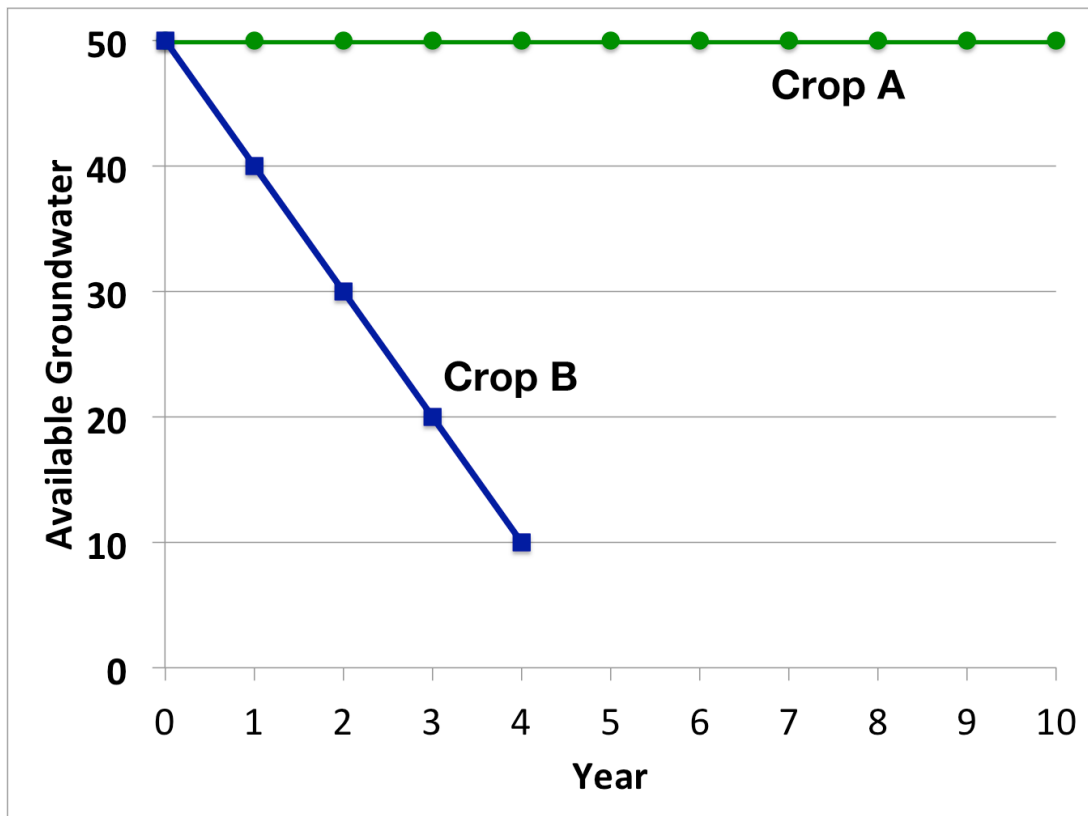


Figure 2. Comparison of Everyone Playing A vs Everyone Playing B (AAAAA vs BBBB)

If some people choose Crop A and others choose Crop B, then the amount of water that will be used will be between these two possibilities.

We will play the activity for a number of years. If the groundwater level drops below 15 units of water, the activity is ended due to insufficient water for the group.

When the activity is ended, we will begin a discussion period, where you can talk about the activity, and share any thoughts or observations you may have about your experience. After the discussion session, we will play the activity again, starting with a fresh groundwater supply of 50 units.

I will now describe how we will play the activity in detail.
[We provide two options]

[Option 1] We are handing each of you a piece of paper, your Decision Form [See Appendix]. Each year, you will choose which crop to plant by circling one of the two options in the “My Crop” column. Circle “A” if you want to plant crop A, or circle “B” if you want to plant crop B. We will come around to record which crop you want to plant, and we will write how much income you receive for your crops in your Income column.

[Option 2] Each of you has two cards. One with the image of wheat [Crop A] and one with the image of cotton [Crop B]. Make your choice and add the card upside down in front of you. Once everyone has made their choice, reveal your choice. Each of you will get the number of coins you have earned.

The instructor will have to prepare cards and have a bag of plastic coins or equivalent tokens representing money that can be used in games.

We will calculate how much water the group has used, and we will write the total amount of water available on the board. This is the end of the year.

The Instructor can use the Monitor Sheet to do the calculations. It would also be helpful to show the progress in a graph so the participants see the change of the groundwater over the years.

Do you have any questions about this? *[FACILITATOR: pause to resolve questions.]*

First, we will play two practice years that will not count toward the results of the groundwater levels. These practice rounds are just an opportunity for you to familiarize yourself with the activity.

After we have completed the practice years, you will have another opportunity to ask any questions you may have. After that, we will begin the actual activity.

It is recommended to play the game twice. First, without the players talking with each other. This often leads to the depletion of the groundwater resource. And a second time, where players can talk with each other. They still will make private decisions but could coordinate. This typically leads to more sustainable use of the groundwater.

Decision Sheet

Student:			
Group:			
	My Crop		My Income
Practice	A	B	
Practice	A	B	
1	A	B	
2	A	B	
3	A	B	
4	A	B	
5	A	B	
6	A	B	
7	A	B	
8	A	B	
9	A	B	
10	A	B	
11	A	B	
12	A	B	
13	A	B	

Monitor Sheet

Monitor Calculation Form												
Date:				Time:								
Round	Water Remain	Re-charge	Water Avail	Player Crops					Crop B	Crop A	Irrigation use	Water remain
				1	2	3	4	5				
Practice 1												
Practice 2												
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
			TOTALS:									