

Irrigation Game Practitioner's Manual



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Rationale for Irrigation Game

Common pool resources, such as irrigation water, are difficult to manage given that they are shared. Distribution of the water resource among users requires coordination. Irrigation systems add an extra layer of complexity in coordination because not only is the resource shared, but the irrigation canals and distribution system must be collectively maintained.

Though for long-term sustainability the resource and the irrigation infrastructure should be managed collectively, individuals receive more benefit as “free-riders.” The least effort, most beneficial situation for a selfish, rational individual is the case in which everyone cooperates and contributes to collective maintenance except for that individual. However, if multiple users in the system pursue this decision pathway, the sustainability of the resource diminishes and the entire system is put under threat.

This game highlights the dilemma between decision-making that contributes to individual or collective benefit and the consequences that ensue (i.e. how the resource, irrigation water, is affected). It explicitly highlights how individual choices impact outcomes for the entire community of resource users.

This manual is intended to provide step-by-step instructions for those who would like to facilitate this game; an interventional learning tool to be used in contexts where the shared resource or resource users are at risk of experiencing diminishing quality or quantity of a resource due to collective management challenges.

Why play a game?

Traditionally, field games have been used as experimental tools to understand human behavior. However, recently, games have shown promise as tools for learning among participants. Games are powerful learning tools because they simulate change over time and thus give participants the opportunity to experience what is in reality a long-term change over a span of a few hours. There are multiple reports of anecdotal evidence that suggest that games focused on resource management strategies are used as reference points for determining management decisions in reality.

However, the game itself is, perhaps, less important than the discussions that follow. Important for facilitators to understand is that these games are not meant to teach people what to do, but meant to stimulate conversation about issues at the community level.

This irrigation game is one in which players make individual management choices regarding the maintenance of irrigation infrastructure and water withdrawal, but they experience the impact of uncoordinated decision-making because each individual decision impacts the state of the resource. Thus far, this game has been used in China, Colombia, Cyprus, Kenya, Kyrgyzstan, Pakistan, and Thailand.

Using this Manual

This manual is for NGOs, trainers who are involved in community groundwater projects, and government employees who work with communities.

This manual includes:

1. **A game kit checklist:** provides a brief description and visuals of each item that needs to be gathered to play the game
2. **The Game Roles:** facilitator and Record Keeper
3. **Preparation for the Game:** instructions for preparing facilitators and communities
4. **Instructions for Play:** step-by-step instructions for how to play the game
5. **Game variations**
6. **Suggestions for a post-game discussion**
7. **Printable Materials Appendix**

Materials Needed

Irrigation Game Posters: Table of available water quantity AND graphic of player location with respect to the canal/water source

Supplies to hang up the posters: tape, string, etc.

An erasable marker or indicator arrow: used to designate how much water is available on the available water quantity poster during each round



Table of available water quantity	
Total units invested in the public fund by all 5 players	Water available
0-10	0
11-15	5
16-20	20
21-25	40
26-30	60
31-35	75
36-40	85
41-45	95
46-50	100

Player calculation sheet				
Player no:		Time:		
Capital letter:		Place:		
		Date:		
Round	My Decisions			
	A	B	C	D
	Contribution	Amount of water extracted	Amount kept = 10-A	Earnings: B+C
Practice 1				
Practice 2				
Practice 3				
1				
2				
3				
4				

Player Calculation/Decision Sheets: should have enough spaces for 10 years plus the additional three

50 Tokens: Participants receive 10 each round

Character Cards: Players draw these randomly at the start of the game to determine where they are located-upstream or downstream

A	B	C	D	E
---	---	---	---	---

Pens/Pencils and extra paper



Decision Monitor Card

Monitor calculation sheet monitor:		Extraction player no.										
												Time:
Place:		1	2	3	4	5						
Date:												
Round	Contribution decisions					Total Fund	Water available	Extraction decisions				
	1	2	3	4	5			1	2	3	4	5
Pract 1												
Pract 2												
Pract 3												
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

Irrigation Game Roles

FACILITATOR	RECORD KEEPER
SKILLS NEEDED	
<ul style="list-style-type: none"> - Respect everyone – women, children, different castes, religions, etc. - Include all players (give everyone a voice, chance to speak) - Facilitate instead of lecture 	
INDIVIDUAL SKILLS	
<ul style="list-style-type: none"> - Knowledge of factors influencing irrigation - Listen to community members and Respond appropriately - Encourage participation and discussion, avoid lecturing 	<ul style="list-style-type: none"> - Legible handwriting - Record keeping
RESPONSIBILITIES	
PREPARATION	
<ul style="list-style-type: none"> - Work with local staff and the village institution to set a date and time to play the games - Prepare the Game Kit, ensure all pieces are present -Lead practice game sessions prior to playing with a community 	<ul style="list-style-type: none"> - Distribute tokens, be in charge of irrigation water availability during the game using the monitor card, take notes during discussion - Consider the best locations for everyone to see the game and props
GAME PLAY	
<ul style="list-style-type: none"> - Lead introductions - Explain how to play the game and answer questions - Move the total water marker as the record keeper announces total water investment -Announce the starting water level after players make investments -Ask questions as needed to facilitate group discussion - Decide when to change rounds - prompt players to talk in discussion 	<ul style="list-style-type: none"> - Record the decisions for each player by marking the decision monitor card - Announce how much water is available after players make investment decisions - Enforce the rules - keep decision making time and talking to 1 minute - Take notes of anything new or interesting players say or do during the game if it supports your project
DEBRIEF	
<ul style="list-style-type: none"> - Introduce the debrief - Facilitate players explaining the game - Guide the community discussion to link the game with real life 	<ul style="list-style-type: none"> - Take notes of what the community is saying when useful to the project - Support the Facilitator by providing alternative explanations to the community to improve understanding

Preparation and Play

Pre-Game Day Preparation

1. **Practice the game:** Practice the protocol a number of times with volunteers. You need to get used to the logistics of the instructions, paperwork and calculating the payments. You may also adjust the protocols better fit your local conditions.

2. **Community Preparation:**

- ❖ Coordinate with the village and/or field staff to select a good date and time of day for the game(s) and debrief when most people can attend.
- ❖ Determine how many games will be played and where they will be played (site selection)
- ❖ Find participants! Best to consult with village leaders or field staff to determine how best to reach out to community members
- ❖ Gather all of the needed materials

TIP!

When you start using experimental games, use them initially with communities with whom you have a good relationship and where there are no serious conflicts within the community.

TIP!

When choosing a game site, ask yourself the following questions:

- Distance from village?
- Will everyone feel welcome?
- How many people can sit in the area? Is it big enough?
- Is there space to hang up the posters?
- Time of day:
In the evening, will there be enough light? A lantern or more central location to the village may be best
In the morning or early day, find a spot that will remain shaded, especially when it is hot



Game Day

1. Welcome Everyone!

- ❖ Introduce yourself and the topic of the game

Good day. My name is _____ and I work with _____ (name of organization) in _____ (location). We came here to play the irrigation game.

- ❖ Ask the participants about themselves.

What is your name? What do you do? Where do they live (upstream or downstream)?

- ❖ If possible, personalize the game for the group

Where does your irrigation water come from? i.e. name of the body of water, type of infrastructure

2. Explain How to Play

1. In this game you are a farmer that uses irrigation water. As you can see here [point to diagram of upstream and downstream], people are located at different points along an irrigation canal and each person makes an individual choice to decide how much water to use and how much time/resources to contribute to maintaining the irrigation canal/system.

2. Now, each of you will select a character card to determine where you live along the canal.





3. The game is played in rounds. At the beginning of each round you will receive 10 tokens that you can spend. In each round you will make two decisions that you will record on your decision card. First, you decide how many tokens you will contribute to the public fund that maintains the irrigation canals. The sum of the contributions will affect the amount of water units available to be shared among the five players. Second, in sequential order according to the character cards, you will each decide how much water to take from the irrigation canal for your personal use.

4. You can see how the first decision you all take affects the total available water [point to print out of Table of available water quantity]. The sum of your individual investments determines how much water is available each round. You will write down your decision on your decision sheet. Then, the record keeper will write down each of your individual contributions [on the decision monitor card] and tell the group how much water is available. In the case when there is no available water, the tokens you have remaining will be the amount of tokens you receive. So, if you invest only two tokens into the maintenance of the canal, you will have 8 guaranteed tokens.



5. After the available water is calculated, you will get back your decision sheets. Starting with character A, each individual will decide how much water they will take [note: everyone has the same amount of land to irrigate]. They will write down on their decision card and then inform the record keeper of how much water they wish to withdraw, the record keeper subtracts this amount from the total available water and shows it to the next person (B) until individuals have made a decision.

6. Then, the next round begins. Are there any questions?

7. We will begin by playing a few practice rounds. Then the game will be played for 10 rounds.

TIP!

Remind players that:

- All decisions should be made individually and privately
- They may have heard others in the community talk about the game but those comments don't necessarily apply to this exercise.
- They should inform you if they have difficulty reading or writing and, if so, one of the monitors will assist them.

TIP!

It is likely that community members may come and go as the game is played. Some will see the game being played and want to join. Others may have something to do and need to leave. The game is flexible and seeks to include as many community members as possible. They are free to come and go as they would like.

3. Communication Rounds

Explain that: Until now, you played the game without talking. You played like this was your land. Without discussing anyone's else decision, you grew crops. But that is probably not happening in real life, neighbors can see what water you are putting on your field. You share your decisions with other farmers by considering everyone else's decisions, and then you make your own.

In the first game, you did not share your decisions with others. This round, you can. No problem.

So now all 5 of you can sit together and discuss what are good strategies for investment and water extraction. You have 1 minute to decide how much to invest so everyone can share their voice and from that, make a common decision.

Play for 10 more rounds with the new rule!



4. Other Variations of the Game

- One might introduce a variation in which different users have different incomes. Instead of receiving 10 tokens each round by every player, some players may receive 8 tokens, while others receive 12 tokens at the start of each round. One should keep the average tokens of the five players equal to 10 tokens. This variation might demonstrate that those with greater financial resources have more power to influence the system.
- Rainfall variability, changing the water availability each round, could be added into the game. In such a version, there could be an added decision about which crop to grow. Certain crops might require less water but also be less profitable for farmers. The decision then is whether it is better to choose profit stability with a

less lucrative crop or maximize profit through crop choice knowing that in a year with little rainfall, the crop may not produce at all.

- In areas where irrigation reservoirs are replenished primarily through rainwater infiltration, farmers could be given another crop choice. Rather than choosing between a more profitable crop and a less profitable crop, the farmers might choose to plant a cover crop that, though not profitable, increases infiltration and water availability for the subsequent planting season.
- A variation for play that does not require literacy: Each participant is given 10 tokens. The record keeper has two bags: one in which the participants drop coins to contribute to the maintenance of the system and the other for participants to withdraw units of water. After participants contribute to the maintenance fund, the record keeper adjusts the water bag accordingly to match the number of available water units. In this way one the players do not write down their decisions.

Post-Game Discussion

For the discussion, invite a broader sample of the community, beyond those who participated in the game. There are different ways to organize the post-game discussion. Below are some suggestions:

- **Trend Line Analysis:** In a discussion with the community a history for the last 30 years or so is created. Make it visual and do not ask just *what* changes have occurred but *why* certain changes occurred.

Irrigation TREND LINE EXERCISE

SUPPLIES		WHY??? The trend line exercise is a
ON THE GROUND (under a tree, on a mat...)	ON FLOOR (house, school, local	

- Large sheet of paper with a straight line across the page
- Markers

- hall...)
- Chalk

method to have the community discuss the history of their irrigation water resource. The questions help illustrate how changes in farming and in the community have influenced water availability. This helps to tangibly link the game with their real life experience.

ROLES

FACILITATOR

- Guide the exercise by questions
- Write the community's simple responses on the paper (number of canals, users per canal, crops, etc.)

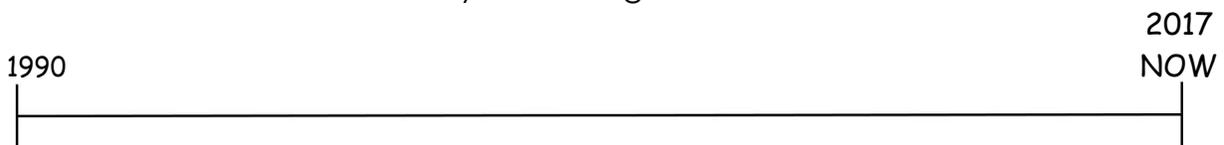
NOTE TAKER

(Optional)
 explanations to why changes occurred. This learning document can help understand the community situation

When mobilizing the community, request elders who have a good knowledge of the village's history.

Let's discuss your real life situation. We will go back over the past 30 years.

Point to the Trend line on the sheet of paper. Write "30 years" on the left end of the line. Write "Now" or "Today" on the right end of the line.



Ask the community for 3-5 key milestones in the community's history that highlight major events over the past 30 years. This helps with memory recall throughout the game. For example:

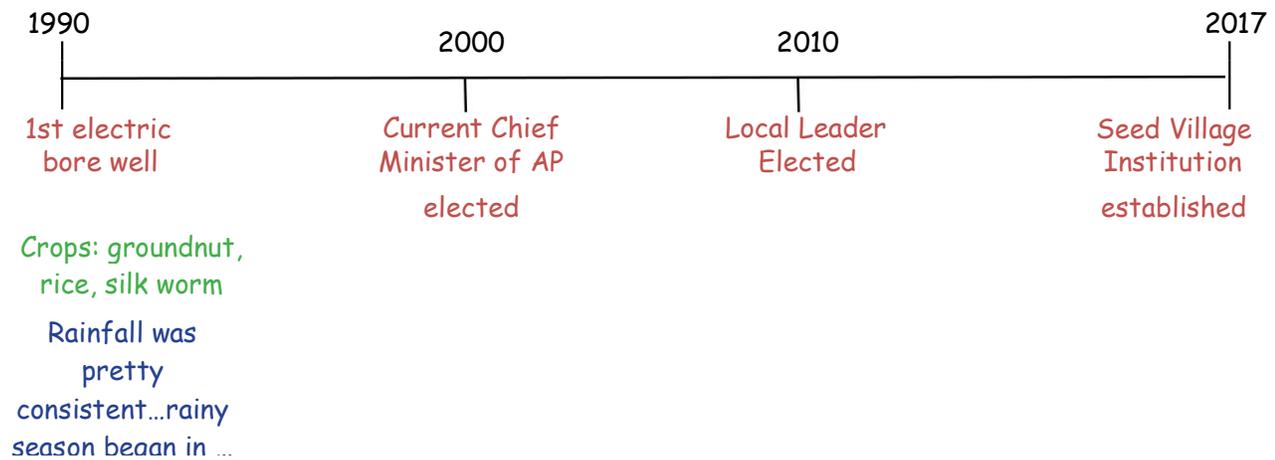
- When was the school built?
- When was the village electrified?



Ask a series of questions and write the response on the trend line. Start with the 1st electric bore well in 1990, ~30 years ago:

-How was rainfall?

-What crops were you primarily cultivating?



Go to the next milestone, 2000, ~20 years ago. Ask the set of 3 questions again. If there was any changes from the previous points, ask: **Why?**

<p>Canals Why did you make new canals? Why didn't you invest in them?</p>	<p>Crops Why did you shift the crops you were cultivating?</p>	<p>Water Why was there a lack of water? Why is there a lack of water now?</p>
--	---	--

- Another element for the debriefing is to ask the participants in the game to explain to others what the game was like and how it was played. What were some choices you made in the game and what were the consequences? Was the game realistic, why or why not? What did you learn? Was the game useful? Discuss the trend line....does that which was learned support or go against the current trend of the resources?
- If available, present any site-specific data that you have regarding their resource
- Finally, ask: What could be done to change/improve resource dynamics/trends here?

Contribute to the Game's Evolution!

Though this manual provides a game protocol, we encourage users to use this as a starting point. Many of the variations listed in this manual have been developed so that the game better fits their specific contexts and we encourage all users to do the same!

Please contribute to building and evolving this resource!
Connect with us via the contact page on our website or by Facebook to share reflections and thoughts from your experience implementing the game and to share any variations that you create. We can add this information to and credit your work in the manual.

Facebook Group: [Games for Sustainability](#)

Website: www.gamesforsustainability.org

Materials Appendix

Player calculation sheet				
Player no:		Time:		
Capital letter:		Place:		
		Date:		
Round	My Decisions			
	A	B	C	D
	Contribution	Amount of water extracted	Amount kept = 10-A	Earnings: B+C
Practice 1				
Practice 2				
Practice 3				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Player calculation sheet				
Player no:		Time:		
Capital letter:		Place:		
		Date:		
Round	My Decisions			
	A	B	C	D
	Contribution	Amount of water extracted	Amount kept = 10-A	Earnings: B+C
Practice 1				
Practice 2				
Practice 3				
1				
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4				
5				
6				
7				
8				
9				
10				

Player calculation sheet				
Player no:		Time:		
Capital letter:		Place:		
		Date:		
Round	My Decisions			
	A	B	C	D
	Contribution	Amount of water extracted	Amount kept = 10-A	Earnings: B+C
Practice 1				
Practice 2				
Practice 3				
1				
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7				
8				
9				
10				

Player calculation sheet				
Player no:		Time:		
Capital letter:		Place:		
		Date:		
Round	My Decisions			
	A	B	C	D
	Contribution	Amount of water extracted	Amount kept = 10-A	Earnings: B+C
Practice 1				
Practice 2				
Practice 3				
1				
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9				
10				

Player calculation sheet				
Player no:		Time:		
Capital letter:		Place:		
		Date:		
Round	My Decisions			
	A	B	C	D
	Contribution	Amount of water extracted	Amount kept = 10-A	Earnings: B+C
Practice 1				
Practice 2				
Practice 3				
1				
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9				
10				

Player calculation sheet				
Player no:		Time:		
Capital letter:		Place:		
		Date:		
Round	My Decisions			
	A	B	C	D
	Contribution	Amount of water extracted	Amount kept = 10-A	Earnings: B+C
Practice 1				
Practice 2				
Practice 3				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Monitor calculation sheet monitor:													
		Extraction player no.											
Time:													
Place:		1	2	3	4	5							
Date:													
Round	Contribution decisions					Total Fund	Water available	Extraction decisions					
	1	2	3	4	5			1	2	3	4	5	
Pract 1													
Pract 2													
Pract 3													
1													
2													
3													
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10													