Experiment Protocol for

WLE Activity on

Exploring transitioning options for sustainable management of common property resources for enhancing eco-system services - comparative watershed studies from East Africa and South Asia

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Note: Text written in *italics* are instructions given directly to the players. Normal text are instructions for the facilitators only.

Experiment Place

Experiments are carried out in coordination with Panchayat and the Watershed committee. Public places will be used such as meeting places, temple areas or schools. We chose a quiet place with little disturbance

Choosing experiment participants

Main target group of the experiment are managers of the watershed. As such we will invite in particular watershed committee members, members of the Panchayat, teachers, and religious leaders. Special attention will be paid to have a least three women in the group. There should be not more than one person per household participating. Overall ten people participate in each session. We have to pay attention to include different sub-groups of the village.

An alternative setup is to let ten farmers play the game together who in real life manage/use one check dam together.

Materials

Before you start make sure that the following materials are at hand:

- Some computer device
- USB stick
- 4 laminated pay-off tables as posters
- 4 laminated results table
- 20 laminated decision cards No. 1

- 20 laminated decision cards No. 2
- 200.000 PLAY Rupees
- 4 dices
- 20 pens
- Flipchart and/or flipchart paper
- 6 non-permanent markers
- 3 cloths for cleaning the decision cards
- 10.000 real Rupees in small bills
- Receipt book or printouts

Registration of Participants

Please note down the names of all participants and assign player numbers to them. Use the Excel-Form provided to the facilitator for this documentation. Save the file repeatedly on the computer and a USB stick.

General instruction to the participants

In your village various watershed interventions have been implemented such as building of check dams, digging of contour trenches or making field bunding. In our meetings so far people mentioned that the watershed project helped the community a lot and that you experience a wide range of benefits thanks to them. At the same time you mentioned that some of the benefits are dissipating. Some of the trenches and dams are filled with silt and overgrow with grass and bushes. As a result you experience that the benefits in terms of groundwater recharge, surface water availability, and flood and soil erosion control become less and less. This is the main topic of this game!

But how to deal with this situation? We are aware that this is a difficult situation and we want to play a little game with you to jointly explore this challenge and to develop ideas for ensuring the continuous functioning of the watershed infrastructure.

You can win in this game between Rs 75 and almost Rs 400. First of all every person who participates gets a fixed amount of Rs 75. How much you win on top of this depends on how you play as well as how the other participants play. The money you can win is not our private money but comes from the International community via ICRISAT. The team represented here is working for ICRISAT. ICRISAT is an international institute conducting agricultural research which will help farmers all over the world to improve their living conditions (distribute information material on ICRISAT).

Whatever information we collect during this game will be treated absolutely confidential. Only aggregated anonymous analyses will be made available to different stakeholders at a later stage. We will come back by 2017 to share our scientific results with you. But the main purpose of the exercise is to encourage discussion within the community and we hope that in this way it will be beneficial for you immediately. We will not bring any grants and will not start a project here. The benefits you hopefully will get from us are the new ideas. At the same time, our study is likely to help the watershed department to better implement and manage watershed projects.

We will explain the game step by step. You should listen to the instructions very carefully and ask questions at any point. We will conduct short quizzes to see if you understand the game. You can only participate in the game when you fully understand it. The game will be played in

different rounds and we discuss in-between in clearly dedicated time slots. The whole workshop will take approximately five hours.

We will introduce different rules during our explanations. If we observe somebody not following the rules we will first explain the rules again. If anybody repeatedly break rules we have to exclude her/him from the game and no payments will be made to this person.

A check dam as public good

The game is all about maintaining check dams in the upstream area of your village. The dams support the recharge of open wells downstream of it. It affects an area of up to four kilometer downstream though the benefits decrease the further away from the dam people are having their wells and fields.

In our game we assume a dam of approximately 25,000 m^3. A dam with this capacity will allow you to pump approximately 1.5 lakhs m^3 water per annum for agricultural purposes. Even without the dam some water is recharging and available. Still, we assume that thanks to the dam at least 50,000 m^3 more water is available for the farmers around the dam. With a moderate economic water productivity this means that the village has at least Rs 1.75 lakhs annual additional agricultural income thanks to the dam.

Building one of these dams costs approximately two lakhs Rupees. The dam in our game has been build 5 years ago and starts to get problems. The wall gets cracks and there is a lot of filling due to siltation. Now the dam requires every year maintenance investment in terms of materials, labor, and hiring machinery. The additional water to be harvested from the dam depends on the amount invested in maintenance. The relationship between the income from the dam and the investment in the dam maintenance can be seen in Table 1. Up to a level of Rs 20,000 the maintenance

Table 1: Relationship between maintenance and agricultural income in game (based on Janssen et al. 2011

A) Maintenance investment of group in Rupees	B) Income from additional water in Rupees	C) Income of players in PLAY Rupees = B) / 10 players
Less than 20000	0	0
20000	2000	200
21000	4000	400
22000	9000	900
23000	13000	1300
24000	18000	1800
25000	26000	2600
26000	35000	3500
27000	44000	4400
28000	57000	5700
29000	74000	7400
30000	88000	8800
31000	101000	10100
32000	114000	11400
33000	127000	12700
34000	136000	13600
35000	144000	14400
36000	151000	15100
37000	158000	15800
38000	162000	16200
39000	162000	16200
40000	162000	16200
41000	166000	16600
42000	166000	16600
43000	166000	16600
44000	166000	16600
45000	171000	17100
46000	171000	17100
47000	171000	17100
48000	171000	17100
49000	171000	17100
50000	175000	17500

has no effect yet. The income increases steeply for moderate investments and less steeply for high investments. These calculations are made on the basis of evaluations and experiences from different watershed projects.

We have gathered ten people today to play our game. In the game, each player has 1 acre[1] of land which they need to irrigate in order to grow high value crops. All players are growing the same crops. In the game each of you can make individual contributions to maintaining the dam. These individual contributions come together in a group pool. Depending on how much all of you invested you get benefits as a group (see Table 1 column A & B). The group income is then equally divided by the ten players (see Table 1 column C).

As you can see in Table 1, the group and eventually everybody can increase its/her income by working together. At the same time, you can maximize your income if everybody pays the maximum amount but you yourself do not.

In the first phase of the game each player has to make one decision. At the time of making the decision each player acts independently without consulting anyone else. Players are not allowed to talk to each other or say anything in public during the first (baseline) *rounds. To ensure that you can make decisions independently, players in the same group are to be seated in such a way that no one is able to see other player´s decision.*

During the explanations the people still sit normally side by side facing the facilitators. Only once the real game starts they will turn and slightly disperse.

We will in every game round give each of you 5,000 PLAY Rupees. You will need this money to invest in the game or just to save it. At the end we will exchange 1,000 PLAY Rupees for one real Indian Rupee.

Please hand over the decision cards!

Player sheet: Dam maintenance Decision Card

Player No.: _____   Round No.:_____

You are given 5,000 PLAY Rupees. Please indicate how much of it you want to contribute to the maintenance of the check dam (any number between 0 and 5,000)! Any amount you do not invest will be kept in your game account.

I invest: _____ PLAY Rupees

Your income in this round (including the one left in your private account) has been:
_____PLAY Rupees

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1   1 acre = 0.405hectare

Now you have to decide how much of your 5,000 PLAY Rupees (the endowment) *you want to invest in the maintenance of the check dam. The money you invest will be put into the group account and depending on how much the group collected you will get your share on the basis of Table 1. Any amount you do not invest remains in your personal account and nobody can touch it.*

Now every player writes the amount she/he want to invest in a discrete way on the piece of paper (decision card) *provided to you* (see Player sheet below)*. You will be asked to hand over this paper to the facilitator after you have made your decision.*

All individuals make their decision simultaneously and independently without consulting other members of the group. This is how the game is played. But before we start the real game please answer the following questions!

In case there is an illiterate person in the group one assistant will help him in a discrete way to fill the form.

Test questions (to be answered in the group):

Question 1: *If a group invests a total of 45,000, which income would the group get?*

A: 44,000   B: 162,000   C: 171,000   D: 185,000

Question 2: *If four participants invest 5,000 each and the six other participants invest 2,500 PLAY Rupees each, which income would the group get?*

A: 0   B: 101,000   C: 144,000   D: 166,000

Question 3: *If three participants invest 2000 PLAY Rupees each, five participants invest 3000 PLAY Rupees each, and two participants invest 4500 PLAY Rupees each, how much income does each players get?*

A: 8,800   B: 14,400   C: 17,500   D: 144,000

The actual game

After all participants understood the game well we make one test round. If during the test round it becomes apparent that additional information are needed than we will explain these aspects again. Otherwise we play the game with them and record all decisions.

Before every round, prepare the decision cards by writing for every player and every round the player number and the round number!

Now please turn around and sit in a way that no one is able to see other player´s decision. We now start the game.

Please hand over the decision cards.

Please all of you make your decisions without consulting other members of the group.

After all group members have made their decision we will calculate the income which the group receives in this game round. Record in the Excel table the contribution of every player and the income she/he received. The excel table will help you to calculate the earnings of each player. Write the earnings of each player on the decision card and give the cards back in a way that

other players cannot see them. *Now that you made this experience we want to see how you decide now. Let us play the game for 5 rounds in order to see whether something is changing.*

Repeat the procedure 5 times!

Discussions

After every game phase we will discuss with the players.

Ask the following questions:

- *What do you think about the game?*
- *What do you learn for your real life?*
- *Are people in real life jointly maintaining old dams or trenches?*
- *How do you think could the rules of the game be changed in order to achieve a better result?*

Record answers as summary!

As a variation of the game, village members who are observers can participate in the discussion. If this is the case please note this down in your discussion report.

Communication and social information Treatment

As a first treatment we introduce communication and social information. This is important as our game is supposed to initiate the learning effect within the group. This effect is strongest if people can discuss their experiences in the game.

Now you play the same game for another 5 rounds but from now on, at the end of each round we will inform you about how much each player contributed and earned. We use this poster for this purpose.

Show the empty Record Poster!

In addition, once you have received the decision cards, you can now discuss amongst each other. To keep the exercise short you have for every round a maximum of five minutes of discussion. In case you finish earlier you can just give us your decision cards.

It is very important to note down the content of the discussion. It can be summarized but should include all arguments, agreements, complaints, and praises. In addition please use a tally sheet which is part of the excel table where you mark for every player how often she/he made statements of the following kinds:

- Proposing rule
- Stating agreement to rule
- Stating rejection of rule
- Praise
- Blame/complaint
- Proposing punishment
- Proposing reward
- Statement unconnected to the game

From now on you do not have to write the earning of each round on the decision card anymore.

Record Poster:

Round	Player 1		Player 2		Player 3		Player 4		Player 5		Player 6		Player 7		Player 8		Player 9		Player 10		Total	
	Investment/payment	Earning (group income & private account)	Investment/payment	Earning (group income & private account)	Investment/payment	Earning (group income & private account)	Investment/payment	Earning (group income & private account)	Investment/payment	Earning (group income & private account)	Investment/payment	Earning (group income & private account)	Investment/payment	Earning (group income & private account)	Investment/payment	Earning (group income & private account)	Investment/payment	Earning (group income & private account)	Investment/payment	Earning (group income & private account)	Group investment/payment	Group earning
6																						
7																						
8																						
9																						
10																						
11																						
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13																						
14																						
15																						
16																						
17																						
18																						
19																						
20																						

Before every round prepare the decision cards by writing for every player and every round the player number and the round number! Please hand over the decision cards.

Please all of you make your decisions.

After all group members have made their decision we will calculate the income which the group receives in this game round. Record in the Excel table the contribution of every player and the income she/he received. The excel table will help you to calculate the earnings of each player. Write the earnings of each player on the decision card and give the cards back.

Now that you made this experience we want to see how you decide now. Let us play the game for 5 rounds in order to see whether something is changing.

Repeat the procedure 5 times!

Optional Treatments

The following treatments are options to extend the game. If in the first discussions issues have been raised which fit to one of the treatments below, let the group play with the respective treatment. If this is not the case chose randomly one of the treatments below. Record whether a treatment was randomly selected or on the basis of the discussion.

In all treatments communication and social information (see Treatment 1) are introduced as we want to encourage discussion and affect real life behavior. It is important to document carefully the content of discussions!

Treatment 2: NREGA

As an additional rule you can now make use of the Mahatma Gandhi National Rural Employment Guarantee Act scheme. As all over India, the NREGA scheme is working in your village. Imagine that in the case of this game the Panchayat has decided to dedicate the NREGA to some work which does not give you much benefit. If NREGA was used to maintain the check dam this could save you and your fellow watershed farmers a significant amount of money. In order to convince the Panchayat to change their decision and indeed use the NREGA work for the dam you would have to go to meetings and discuss with them. During this time you cannot do other things and this means you lose income. Let us assume that if one person of you is attending the Panchayat meeting and advertising the watershed work this would result in investment equivalent to 2,500 PLAY Rupees into the dam maintenance. But in order to attend the Panchayat meeting you lose time and even money for instance for petrol. This time and petrol will be valued with 500 PLAY Rupees. This amount of 500 PLAY Rupees would be taken from your account but it would be equal to 2,500 PLAY Rupees invested in dam maintenance. Just for clarification, imagine now that each player in your group including yourself attended the Panchayat meeting. In this case each of you would pay only 500 PLAY Rupees but the dam would be maintained at the level of 25,000 play Rupees. Additional maintenance investments would have to be done by yourself as in the basic game.

Keep in mind, if NREGA is partly maintaining the dam you can achieve the maximum possible income by investing less of your own money into the dam.

On your new decision card you will now have two decisions to make:

Show new decision card!

Player sheet: Dam maintenance Decision Card

Player No.: _____   Round No.:_____

You are given 5,000 Rps PLAY MONEY. Please indicate whether you want to invest 500 of it to lobby the maintenance of the dam using NREGA!

□ yes   □ no

Please indicate how much you want to contribute to the maintenance of the check dam (any number between 0 and 5,000)! Any amount you do not invest will be kept in your game account.

I invest: _____

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a) *Are you investing 500 Play Rupees into advocating of NREGA to be used to maintain the dam?*
b) *How many Play Rupees are you investing yourself into the dam maintenance?*

Before every round prepare the decision cards by writing for every player and every round the player number and the round number! Please hand over the decision cards.

Please all of you make your decisions.

After all group members have made their decision we will calculate the income which the group receives in this game round. Record in the Excel table the contribution of every player and the income she/he received. The excel table will help you to calculate the earnings of each player. Write the earnings of each player on the decision card and give the cards back.

Now that you made this experience we want to see how you decide now. Let us play the game for 5 rounds in order to see whether something is changing.

Repeat the procedure 5 times!

Treatment 3: New development program

As an additional rule, it is of course also always possible that another development project is stepping in and maintaining the dam again. This is of course uncertain and we assume that there is a chance of one out of six that the government or an international donor would be doing the maintenance work. If the donor is maintaining the dam you get the whole income but do not have to pay. If the donor (e.g. the government) maintains the dam, the money you have invested is, however, gone. But equally, if you do not invest and the donor does not step in you have no benefits from the dam.

To simulate this situation we will throw a dice. One of you will do this. If the dice will show a 1 than another development project is maintaining your dam free of charge. If any other number but 1 is shown than nobody from outside is helping out. In this case the maintenance again solely depends on how much each of you is investing into the maintenance. You have to make your decision on how much to invest in the dam before we throw the dice.

Given this information we ask you again to decide how much you are willing to invest into the maintenance of the dam.

Before every round prepare the decision cards by writing for every player and every round the player number and the round number! Please hand over the decision cards.

Please all of you make your decisions.

After all group members have made their decision we will calculate the income which the group receives in this game round. Record in the Excel table the contribution of every player and the income she/he received. The excel table will help you to calculate the earnings of each player. Write the earnings of each player on the decision card and give the cards back.

Now that you made this experience we want to see how you decide now. Let us play the game for 5 rounds in order to see whether something is changing.

Repeat the procedure 5 times!

Treatment 4: Path dependency
We add another slight modification to the game! The new rules take into account that a dam which has not been sufficiently maintained in the previous year requires more intensive maintenance in the following year.

If in the previous round the dam has been maintained at least at a group level of 45000 Play Rupees, your maintenance cost will decrease by 10000 Play Rupees in the following round. The following pay-off/income

Table 2: Relationship between maintenance and agricultural income in game (based on Janssen et al. 2011

A) Maintenance investment of group in Rupees	B) Income from additional water in Rupees	C) Income of players in PLAY Rupees = B) / 10 players
Less than 10.000	0	0
10000	2000	200
11000	4000	400
12000	9000	900
13000	13000	1300
14000	18000	1800
15000	26000	2600
16000	35000	3500
17000	44000	4400
18000	57000	5700
19000	74000	7400
20000	88000	8800
21000	101000	10100
22000	114000	11400
23000	127000	12700
24000	136000	13600
25000	144000	14400
26000	151000	15100
27000	158000	15800
28000	162000	16200
29000	162000	16200
30000	162000	16200
31000	166000	16600
32000	166000	16600
33000	166000	16600
34000	166000	16600
35000	171000	17100
36000	171000	17100
37000	171000	17100
38000	171000	17100
39000	171000	17100
more than 39000	175000	17500

table applies. So let this get clear. In the first round of this game phase you play with the Table 1 again as in the initial game. If in this first round of this game phase you invest less than 45,000 Play Rupees you continue playing with Table 1. If you invest, however, more than 45,000 Play rupees than you will have to pay less in the following rounds in order to achieve the same outcomes. The Table 2 will apply in this case. If you then manage to invest again at least 35,000 Play Rupees again you will continue playing with Table 2. If the investment is less than 35,000 Play Rupees you will have to go back to the Table 1.

Before every round prepare the decision cards by writing for every player and every round the player number and the round number! Please hand over the decision cards.

Please all of you make your decisions.

After all group members have made their decision we will calculate the income which the group receives in this game round. Record in the Excel table the contribution of every player and the income she/he received. The excel table (pay attention to use the table for the path dependency treatment) will help you to calculate the earnings of each player. Write the earnings of each player on the decision card and give the cards back.

Now that you made this experience we want to see how you decide now. Let us play the game for 5 rounds in order to see whether something is changing.

Repeat the procedure 5 times!

Treatment 5: Vote for exclusion
We add another slight modification to the game! Now you play with a new rule which takes into account that you can exclude people who are not contributing to the dam.

After every round the group can decide to exclude somebody from the dam which eventually would mean the person loses her/his benefits. We do not give you a rule when somebody can be excluded. Either you can decide on such a rule yourself or you use a simple majority vote to decide whether one player is to lose his share of the group income. The logic is that if a farmer is excluded from the dam he will not get any income from it. The other players get the same income as they had received if the one player had received his share. The share of the excluded fellow is lost for the whole group.

We take into account that it takes some effort to enforce the exclusion of somebody from the dam. Therefore, if any player gets excluded by the group, each of the other group members will have to pay 500 Play Rupees.

After every round, once the earnings and payments of all players have been announced, anybody from the group can propose to make a vote for the exclusion of one of the players.

Before every round prepare the decision cards by writing for every player and every round the player number and the round number! Please hand over the decision cards.

Please all of you make your decisions.

After all group members have made their decision we will calculate the income which the group receives in this game round. Record in the Excel table the contribution of every player and the

income she/he received. The excel table will help you to calculate the earnings of each player. Write the earnings of each player on the decision card and give the cards back.

Now that you made this experience we want to see how you decide now. Let us play the game for 5 rounds in order to see whether something is changing.

Repeat the procedure 5 times!

Treatment 6: Upstream – downstream effects

We add another slight modification to the game! Check dams usually do not provide the same benefits to every person. We assume that the people living close to the dam get more benefits from the dam. Therefore the four nearby players share equally half of the income and the six downstream players share equally the second half of the income. In accordance with Table 3/column B the group will receive income which is distributed amongst the players' game accounts.

From now on, six of you will be (randomly) selected to be downstream residents. Their income depending on the group contribution can be seen in the column D of Table 3. Four of you will be upstream residents. Their income you can see in the column D of Table 3. It is of course not very fair in the game that four players get more income. Therefore we let the luck decide who will be an upstream and who will be a downstream player in the game. Each of you will throw the dice and the four players who throw the highest number will be the upstream players with the higher income.

Let all players throw the dice in public. The four players with the highest numbers are announced to be the upstream players. If there are ties than let the players with the tie throw the dice again.

Before we start the new version of the game please let us ask again a few questions to check whether everybody understood the new rules.

Question 4: *If six players invest 5,000 each and the four other participants invest 0 PLAY Rupees each.*

   a) *Which income would each upstream player get?*

A: 0   B: 8,800   C: 11,000   D: 30,000

   b) *Which income would each downstream player get?*

A: 0   B: 7,333   C: 8,800   D: 13,500

   c) *In the same situation, one of the **upstream** players did not invest. How much did she earn in this turn including also the money which is left in her account?*

A: 5,000   B: 11,000   C: 16,000   D: 35,000

   d) *In the same situation, one of the **upstream** players did invest 5,000 Play Rupees. How much did she earn in this turn including also the money which is left in her account?*

A: 0   B: 11,000   C: 16,000   D: 30,000

Table 3: Relationship between maintenance and agricultural income in game with upstream and downstream farmers (based on Janssen et al. 2011)

A) Maintenance investment of group in Rupees	B) Income from additional water in Rupees	C) Income of players living close to the dam from additional water in Rupees = B) / 2 / 4 players	D) Income of players living further away downstream of the dam from additional water in Rupees = B) / 2 / 6 players
Less than 20000	0	0	0
20000	2000	250	167
21000	4000	500	333
22000	9000	1125	750
23000	13000	1625	1083
24000	18000	2250	1500
25000	26000	3250	2167
26000	35000	4375	2917
27000	44000	5500	3667
28000	57000	7125	4750
29000	74000	9250	6167
30000	88000	11000	7333
31000	101000	12625	8417
32000	114000	14250	9500
33000	127000	15875	10583
34000	136000	17000	11333
35000	144000	18000	12000
36000	151000	18875	12583
37000	158000	19750	13167
38000	162000	20250	13500
39000	162000	20250	13500
40000	162000	20250	13500
41000	166000	20750	13833
42000	166000	20750	13833
43000	166000	20750	13833
44000	166000	20750	13833
45000	171000	21375	14250
46000	171000	21375	14250
47000	171000	21375	14250
48000	171000	21375	14250
49000	171000	21375	14250
50000	175000	21875	14583

If the players answered the questions rightly, please start playing again. Before every round prepare the decision cards by writing for every player and every round the player number and the round number! Please hand over the decision cards.

Now that you understood this new rule, please let us start playing again. Please all of you make your decisions.

After all group members have made their decision we will calculate the income which the group receives in this game round. The two players living close to the dam (top or upstream players) share equally half of the income and the three downstream players living further away from the dam share equally the second half of the income. Record in the Excel table the contribution of every player and the income she/he received. The excel table will help you to calculate the earnings of each player. Write the earnings of each player on the decision card and give the cards back.

Now that you made this experience we want to see how you decide now. Let us play the game for 5 rounds in order to see whether something is changing.

Repeat the procedure 5 times!