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The River Basin Game Manual
A water dialogue tool

RIPARWIN Project
Raising Irrigation Productivity And Releasing Water for Intersectoral Needs

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MANUAL FOR THE RIVER BASIN GAME

Introduction

This manual describes how to arrange, budget for, deliver and monitor the River Basin Game, which is a tool for promoting dialogue over water resources. The river basin game is a physical representation of a sub-catchment (or small river basin) with a gradient to show upstream-downstream flow of water. Upstream abstractors/users of water tend to be favoured over downstream abstractors and users of water. This difference often gives rise to inequality in water access for rural people – which can result in conflict. In addition, the game is applied via role-playing to conduct research and to facilitate local decision-making.

As seen from the photos (Figures 1 through to 4), the game is a large board placed on a slope with a 'catchment' at the top end and a 'wetland' at the bottom end (see also Appendix E). The river flows between these two, and has on it several intakes into irrigation systems of varying sizes. Some of the irrigation systems are advantaged by being at the top of the river, while others are tailend systems. It is assumed that the flows are principally generated at the most upstream section of the catchment and virtually none or very little from the rest of the catchment. The river 'flows' when a large number of glass marbles are released down the river. The marbles are like water. Participants put small sticks (like weirs) across the river to capture these marbles and scoop them into the irrigation systems where they sit in small holes - thereby meeting the water requirement of that particular plot of rice or irrigation activity. The pictures (Figures 1 and 2) show the very large sticks that allow capture of the marbles very easily - these represent the upgraded and modernised intakes. By the end of the game, participants have a good understanding of what is going on, what needs to be targeted and what solutions might be considered. It must be stated that the game becomes highly animated.

The second day is to follow up on lessons learnt from the game played the previous day, and to bring together various institutions to assist in improving equity of supply. Both days need good planning to be successful.

Role-playing games and public involvement in decision-making

It is widely acknowledged that public decision-making, consultation and participation in watershed management is seen as good practice (WWF, 2001; Chave, 2001). Such participatory practices help “to define problems, set priorities, select technologies and policies, and monitor and evaluate impacts and in doing so is expected to improve performance” (Johnson et al, 2001). The value of these deliberative processes (that aim to solicit public debate) over other forms of decision-making is argued by Collentine et al 2001: “If the primary reason for including citizens in the process is to legitimize allocation decisions, then models for participation which increase legitimacy, such as deliberative democracy with its emphasis on public debate as an important part of the deliberation process, should be preferred over models such as surveys, which reduce the scope for participation to either single values (contingent valuation) or acceptance/rejection modes of participation”.

Role-playing is a well-known tool in participatory rural appraisal, community empowerment and facilitation of natural resource management (Forester, 1999). Furthermore, role-playing is also seen as a legitimate tool for qualitative social research (Bloor, 2001; Mikkelsen, 1995; Nichols, 1991; Pratt and Loizos, 1992) though it does need to be carefully managed and encapsulated within formal validation, feedback and follow-up activities. Recognising these positive and cautious dimensions of role-playing and gaming as a part of generating greater exposure to deliberative inclusionary decision-making, we believe a physical-based board game has some benefit in such processes.

Figure 1. Detail of the top part of the river basin game, showing main channel, abstraction points, intake design, farms and fields, marbles used to depict water and holes in fields to depict irrigation need.

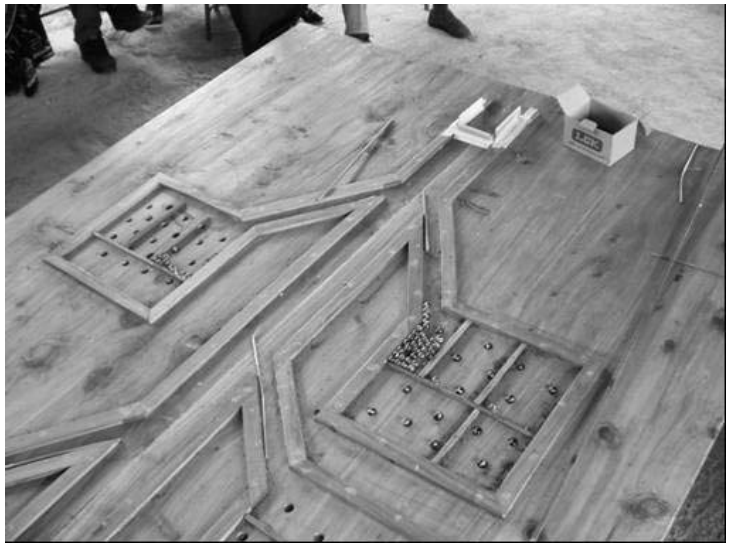


Figure 2. Day 1. Participants playing the river basin game by choosing water abstraction strategies

Figure 3. Day 1. Participants contemplate current inequitable division of water

Figure 4. Day 2. Participants discussing new resolutions to manage and share water

In what type of environment is the game best played?

The authors feel that the game is best suited to smaller catchments (50-500 km^2) where surface water is shared between numerous users aligned upstream-downstream in sequential access to the available water. A groundwater version of the game has not yet been developed. Users of water are small and large irrigation systems, domestic users, environmental 'users' (wetlands, fisheries, livestock), industry and electricity generation. If the catchment is too large, the system becomes too complex. In such cases, the basin needs to be sub-divided.

Who plays the Game?

There are four ways of playing the Game:

1. With students and researchers of water management to self-teach about common property management of water
2. With local resource users of water to facilitate local decision-making regarding the allocation of water. This requires a facilitator who is also knowledgeable about water. This type of game also allows outside researchers to observe what the game reveals in terms of current problems and proposed solutions.
3. With higher-level decision-makers to encourage an appreciation of the issues facing local users, and of the beneficial and negative outcomes that formal decision-making might have on water management and availability.
4. With both higher-level institutions and local resource users to generate a comprehensive picture of how mutual collaboration, flexibility and support is required to manage water at the sub-catchment level.

Decisions about who to invite should be carefully made, and the advice in this manual tailored accordingly. In addition, invitees can be divided into players and observers. Appendix A gives as advice some "golden rules" for playing the Game.

Background to the game

The game was originally devised by Bruce Lankford in 2000 at the University of East Anglia to teach undergraduate students the principles of common property resource management as applied to surface water. The game shows that some water-claiming strategies result in certain members of the community gaining while excluding others.

In 2002 and 2003, the game was tested with farmers and stakeholders under the project RIPARWIN (Raising Irrigation Productivity and Releasing Water for Intersectoral Needs). RIPARWIN is funded under KAR, DFID and is joint-managed by the Soil-Water Management Research Group, the Overseas Development Group (University of East Anglia) and the International Water Management Institute through its Africa Regional Office, South Africa. In these tests, the game was successfully applied to generate dialogue about water in the upper part of the Great Ruaha River Basin, also known as the Usangu Plains.

Recently, at the 2003 Conference on Water and Conflict at Montpellier, the game was presented as a paper. This generated further interest, and was felt by some of the audience to be applicable to their situation, including for example, mountain rivers in Peru used by a series of irrigation intakes. *(See Lankford, B.A. and Sokile, C. 2003. Reflections on the river basin game: Role-playing facilitation of surface water allocation in contested environments. Paper presented at the ICID 20th European Regional Conference, Montpellier, France, 17-19 September 2003).*

Overview of the Programme

Each game is played over two days. The format for the version in Usangu is particular to the types of problems found here.

Day 1. River basin game and video "Talking about Usangu" (a stakeholder "talking heads" type documentary). Finish late afternoon. (Optional Evening of day 1: Social event).

Day 2. Detailed follow up asking "How can we use the video and river basin game and what means are there to save and share water?" "What means are there to support local users?" "What role do higher level institutions have?" "What new institutions and agreements are required?" The participants (users or higher level institutions) finish about 1 to 2 hours after lunch – but can go on longer, if necessary. Later in the afternoon, there should be a feedback session between players and observers and the managers of the Game to discuss the outcomes of the two days, and to draw up lessons and conclusions.

Questions

In planning it is important to consider some key questions:

1. What are we trying to achieve? To demonstrate role-playing can benefit understanding of top-tail inequities of water supply and that solutions lie with communities, particularly if given support by formal institutions willing to respond to their needs.
2. How many participants and observers? If choosing water users – say 10 from upstream, 10 from middle and 10 lower end, but no people who are rainfed farmers, they must be users of surface water be it domestic, livestock or for irrigation. Rainfed farmers are not able to release water!
3. Who to invite as players or observers? (e.g. RBWO, RBMSIIP, Pangani basin SRMP representative, zonal irrigation officer, Ministry of Agriculture and Food Security representatives, SHARI?, Mbarali district irrigation officer).
4. What preparation is required? What back-up is required? What follow-up is required?

This manual helps answer some of these questions. Appendix A (Golden rules) should also be referred to.

Budgeting

This budget assumes a two-day workshop and about 50 participants. In effect this is a whole day, requiring arrival of participants, refreshments, lunch, evening and social event.

The cost components are as follows:

1. Two lunches for 30 players, plus 20 other observers = 50 persons.
2. Supper for same number end of first day.
3. Breakfast for same number for second day.
4. Summary Food = 4 meals.
5. Residential fee paid to host.
6. DSA and Per diem for farmers and other invited participants.
7. Invited observers per diem.
8. Transport, collection and delivery of farmers and invited personalities.
9. Stationery and other sundry costs.

Dates and preparation

- Set dates to allow mid-week playing of the game. Allow 2-4 months for invitations to go out and follow up with additional emails/letters.
- Invitations to go out (see Appendix B for example letter).
- Suggest to allow 50% extra invitations as not all invitees will come.
- Farmer and water user groups to be identified from target area.
- Inform hosts – arrange accommodation and venue.
- Who would be good observers to invite? Basin Water Office, Ministries of Water and Livestock and of Agriculture and Food Security, District Irrigation officer, Zonal irrigation officer, and others?
- Make plans, if necessary, for videoing this - the game might be one means of generating requests from local communities for river basin authorities to provide conflict resolution and re-engineering of intakes.
- You will need on-going analysis of the day. For example, it might be a good idea to get two researchers to keep notes of points made by farmers but which do not get aired in the discussion.
- Make up an evaluation form (See Appendix C for an example).

The River Basin Game – Day 1

Below is the basic format, but this is open to suggestion and evolution. (The times are indicative since the whole session takes about 3-4 hours and should be allowed to evolve according to discussions and clarifications). There are five phases of the game on day 1 after introduction:

- Introduction to the two days
- Phase 1. Introduction and demonstration to the game
- Phase 2. Individual action to acquire water
- Phase 3. Individual action to acquire money (livelihood)
- Phase 4. Community action to allocate water more fairly and to priorities
- Phase 5. Initial discussion, lessons, feedback, future action, assistance and summary (main discussion is left until Day 2).

Table 1 gives the key phases and what each is trying to show.

Introduction to the two days

This pre-game session is to welcome everyone, and to allow late comers to settle down. Round the table introductions are conducted here. The facilitator can also outline some main rules – that each and everyone should participate.

Farmers appreciated being 'contextualised' within global water problems regarding intersectoral allocation, water productivity, conflict management, the increasing water needs of many sectors and distinguishing between needs and wants so that we can ask 'how do we meet the needs of the poorest in the sub-catchment?' This introduction reminded participants that to poor tailenders a small amount of water has very great value to their livelihoods, whereas to a top-ender rich in water, giving up that small amount of water will probably not make a difference or even be noticeable. We refer to other donor, district and NGO projects that have tackled water in the area and introduced a map of the whole basin to locate the Mkoji subcatchment, asking participants to locate and name users such as; domestic, cattle, rice, non-rice, wetlands, fisheries, wildlife, the Great Ruaha National Park, tourists, and the electricity generating Mtera/Kidatu reservoirs. Although a formal map was first provided, the facilitator then encouraged hand-drawing of a map so that all could refer to it. Since the board game was not an accurate representation, there were many features (canals, intakes, drains) that were added to a map.

Table 1. Demonstrating real water sharing situations by playing the river basin game

What is being shown	How	What happens
Phase 1 Simple introduction scenarios		
No intakes	No rods are sticking into the river	Water goes down to the bottom
Few intakes	One or two sticks are installed (can be modern or traditional)	Some water is captured by rice systems, much water flows to the wetland
Many intakes	All sticks are put in	All water is captured, little water (few marbles) end up in the downstream wetland
Dry year or dry season	Few marbles are used	Water tends to be used in upstream plots, with little water going downstream
Wet year or wet season	Many marbles are used	Water meets everyone's needs
Change of traditional to improved modern intakes	Change in design from small sticks that partially stick into river to large sticks that block whole river	More water is captured by modern intakes – less water flows downstream and inequity increases.
Phase 2. Individual person and individual intake strategies – the search for water		
Upstream/downstream inequity of supply	Using modern intakes	More water into top intakes
Excess water use	Too many marbles per plot	Each plot has more marbles than holes for the marbles showing that upstream farmers tend to take more water than they need
Phase 3. Individual person and individual intake strategies – the search for money - livelihoods		
Livelihood searches	Farmers move upstream	Farmers rent land higher up or take jobs where water is or move out and do other jobs
Insufficient water	Too few marbles per plot, or no marbles per plot	Farmers are left with no water, out-migrate, walk further for domestic water, start a business, rent land, sell labour, etc.
Swapping places	Tail-ender and top-ends switch place	Encourages people to see another viewpoint about access to water.
Phase 4. Community person and whole-river sharing strategies		
Agreeing sharing of water between intakes	Adjust intakes to let water through to downstream intakes	Water is shared amongst the different intakes, and so each farm gets some water
Agreeing sharing of water between fields	Share out marbles so that each plot gets correct number	One marble per hole – and equal between plots so that each plot might be minus one marble

PHASE 1. Introduction to the river basin game. This lasts about one hour. All times are approximate – time must be allowed for good understanding.

This phase is to show how the game works. Basic rules and agreements (listening, asking questions) of the game are explained. The participants were informed what they would see, that they would conduct a 'round' and that the facilitator would explain what they had seen. Although it was important to let the game have a natural flow, it was necessary to steer the game to achieve certain results. Discussion was allowed between water users before each round so they 'got into the game' – at which point the facilitator should not to dominate proceedings.

- 0-15 minutes, **welcome session**. Aim of the day. Aim of the game. Rules and agreements for being part of the team. (E.g. Listening, asking questions etc)
- 15-25 minutes, Explanation and demonstration of flow of glass marbles down the river in four basic situations; without any intakes, with many intakes, with high flow (wet year) and with low flow (dry year). Each demonstration of one flow is called a 'round'.

- 25-30 minutes, - Dividing participants into groups and initial play of a simple scenario using sticks that represent traditional intakes (ie those that let water pass by).
- 30-35 minutes - Second play using a change of intakes upstream to modern intakes, these are larger sticks that capture all or most of the marbles.
- 35-45 minutes Discussion. Who is happy? Who got water? Who is short of water? Why? Who obtained lots of water, perhaps too much for their needs?
- 45 - 55 minutes. Recap. Summary of what happened. Ratio of land to water – the fact that there is more land than water. Variability in rainfall and riverflow (wet years and dry years, wet and dry seasons). The desire for rice and water. The growth of irrigation over last 20 years. The difficulties of supplying the Ihefu wetland.

PHASE 2. Individual action – the search for water.
This phase demonstrates that individuals acting alone search for water and can sometimes acquire more water than they need leading to lower efficiency of water use and tailenders getting no water.

- 0-10 minutes. Introduction to this phase of the game. Explain the objective: That *each individual* needs to seek a solution to their water shortage. This means no or very little community action. What needs to happen? What do people do?
- 10-15 minutes. Farmers think about their options prior to the release of the new season's flow of marbles. Asking the question – how can I get water?
- 20-35 minutes. Various rounds are played so that farmers can situate themselves most advantageously to get water, and think about solutions that meet their individual needs.

PHASE 3. Individual action and coping surrounding water shortages – the search for income/livelihoods.
This phase demonstrates that individuals acting alone search for water-based livelihoods or alternative cope by developing other coping strategies.

- 0-10 minutes. Optionally, in the second part of this phase, fake paper money can be handed out so that participants could rent or buy plots, hire labour, etc. This worked very well. But it can also work with no fake money (and it is recommended that on first trial no money is used). Now farmers ask the question – how can I get an income? Pause while users think about what they will do. Remember, by the end of the play of marbles, they must have an answer about how to get money, even if they do not get any marbles.
- 10-15 minutes. Allow one game to be played so that users are able see that they might or might not get marbles.
- 15-20 minutes. Now repeat the game, but this time ask all the top-enders to become tail-enders and vice-versa. This is to demonstrate to both groups what it is like to get or not get water. This helps top-enders sympathise with tailenders.
- 20-0 minutes. Recap. Summary of individual actions taken to secure a livelihood. Livelihood lessons in water management – that water can bring benefits indirectly. Ask the farmers if they see some of the same things happening along their river.

PHASE 4. Third hour. Collective action and coping surrounding water shortages.
This phase demonstrates that individuals and communities can decide to use water more wisely to ensure that peoples needs are met, and that water is re-allocated to priority needs downstream leading to higher efficiency of water use and greater benefits all round. This includes meeting environmental, domestic and livestock needs downstream.

- 0-10 minutes. Introduction to this phase of the game. Objective: That each community and river community needs to find better solutions to sharing water. What needs to happen? What do people do? What bye-laws are needed? How can water be shared more fairly. (Please ensure that a discussion occurs first about this – see next stage)
- 10-20 minutes. Farmers *collectively* discuss their options prior to the release of the new season's flow of marbles. This means that all the farmers around the table discuss a group solution to the division of water.
- 20-35 minutes. Various rounds are played so that communities are able to optimise allocation of water between different irrigation systems and users and therefore allocate water over the whole river basin. Each round is used to fine tune the allocation of water so that it is fairly shared out in accordance with needs.
- 35-45 minutes. Recap. Quick summary of what happened. The collective or group approach compared to the individual approach.

PHASE 5. Final session. Group discussion.

- 0-5 minutes. Introduction to final session. Objective: that farmers must discuss lessons learnt, how they will apply any lessons, whether and why this has been useful, what assistance do they require. The farmer groups must appoint someone, a secretary, to report on their discussions.
- 5-10 minutes. Farmers break out groups. Suggest about three groups in total.
- 10-35 minutes. Farmers discuss the game, of lessons learnt, of needs, of institutional support required. The secretary makes notes.
- 35-55 minutes. Reporting back by farmer group secretaries.
- 55-75 minutes. This is followed up by final conclusion and discussion. Ensure that a list is made of main points, lessons learnt, solutions that seem appropriate.
- 75-85 minutes. Formal evaluation of the day. Voting by farmers of their feedback on how the day has been. This is need for project justification of the game and monitoring of success.

River Basin Game DAY 2
The objective of this day is to go into more detail about resolutions and agreements needed to begin implementing new ways of managing water. It is important that the organisers decide what they want out of this day. For example, two options exist, first to provide time for water users or decision-makers to discuss how they might save water whilst insuring productivity (e.g. technical solutions), or how to bring about new ways of managing water and supporting local users (e.g. institutional and legal ways). There are 4 main sessions for each, as shown in Table 2. Although a format for emphasising either technical or institutional agreements is given, the organisers are welcome to use these as examples for establishing their own format for Day 2. For example under the legal and institutional discussion, the advantages and disadvantages of formal water rights and fees are discussed and debated as a way of exploring them to recommend changes. Whatever the discussion, we remind organisers that the purpose(s(of day 2 must be made clear by putting up a clear statement of intent.

The day finishes with final summary statements and an evaluation exercise. After the participants have departed, either immediately or the next day the organisers should hold a meeting (post-evaluation) to discuss follow-up.

Table 2. Options for breaking down Day 2 discussions

For Water Users/decision makers – technical discussions	**For Water Users/decision makers – institutional and legal discussions (with rights and fees as an example)**
Session 1 is to summarise the previous day, its outcomes and intentions, plus then to introduce this day. The aim being to bring all users together to discuss what means can be agreed to share water whilst maintaining productivity – e.g. crop choice, planting schedules etc. [15-30 mins]	**Session 1** is to summarise the previous day, its outcomes and intentions, plus then to introduce this day. The aim being to bring all users together to discuss what means can be agreed to implement new agreements, bye-laws and if necessary institutions. This will be done by a debate on the pro's and con's of water fees and rights [15-25 mins]
Session 2 is to allow the users to completely brainstorm all the different methods they think work to maintain income while saving water. What have they seen while growing rice? What practices save water but do not harm rice growing? During this session outside experts should add to the methods (see Appendix D on means to save water used for the larger water users in Usangu in meetings in 2000). [1-2 hours]	**Session 2** is to divide the group into two sub-groups. Each sub-group will then either support the motion for water rights and fees, or alternatively will argue that the current format for rights and fees are failing water management and having a negative effect on local peoples access to water. Start by asking from the group who supports which motion – this will then allow each sub-group to be made from people who sincerely believe that motion. Allow each sub-group time and space to discuss their case, appointing a time-keeper, spokesperson and secretary [1-1.5 hours]
Session 3 is to prioritise these methods by a system of voting. [30 mins]	**Session 3** is to hear both points of view expressed as a debate (with both cases being argued by spokesperson) [40 mins]
Session 4 is to draw up agreements by farmers that they can try these methods? What other institutions need to be involved? What do the formal institutions need to do? How can we increase exposure to other farmers? [1 hour]	**Session 4** is to review what has been said, perhaps to agree the plus points of both methods, and to agree on a way forward. What does the workshop recommend? What other institutions need to be involved? What do the formal institutions need to do? [1 hour]

Workshop evaluation stage

The next stage is for observers and organisers only and is to collect feedback and draw lessons from the workshop – how did the two days work? What outcomes should the financier/sponsor (e.g. DFID) know about? Appendix C gives an example of evaluation form used.

Post-evaluation stage

At this stage, the organisers should be clear about what new agreements were discussed in meaningful ways that will then need following up on. In other words, how can institutional and cross-compliance issues be sustained by stakeholders and the facilitators of the game? (Cross-compliance is about mutual support – meaning interventions from one or more party being implemented when building on implementation of previous agreements by other parties.) Various questions should be set here:

- What real steps were agreed by game participants?
- What schedule did the organisers/other participants agree to?

- What ways can successful implementation of this schedule be monitored?
- What should the facilitator/participants do to keep to the schedule?
- How can success be monitored?
- What happens if one or more parties is very slow in responding to agreements established by the game?
- How can a series of mutual-agreements be negotiated and implemented? (For example "our catchment users agrees to release downstream water during the dry season if the fees are waived or cut by 50% by the RBWO).

Conclusions

We have conducted a preliminary appraisal of the game, which had the following attributes: Players benefited from having two days and a highly structured and organised schedule to explore in detail various issues: In a relatively safe and sociable environment, the game demonstrated various dimensions of irrigation, water-based livelihoods and river basin management at the local level: The game elicited many suggestions regarding solutions and revealed to users that they held the key to managing water rather than relying on external agents and solutions (although timely suggestions from attendant technical experts were well received by participants): The workshop enabled support organisations to observe various representations of conflicts and solutions, allowing them to work with rather than against local ideas: The two days provided material for researchers triangulating results derived from other methodologies so that survey, subject and participant biases could be carefully addressed. In summary, we feel that the game represents a very real tool to assist in conflict mediation (and possibly conflict resolution) through local dialogue about water distribution and sharing. Finally, it is worth noting (echoing thoughts from the Montpellier Conference on Water and Conflict) that such tools are part of a wider process and should not be relied upon in isolation. Indeed, if deployed alone or without sufficient follow-up, such exercises can stir up expectations and issues resulting in a more problematic situation than existed previously.

Notable disadvantages included not being able to include more than about 35 players, though by allowing local user observers the total exposure might be increased to 50-60. Thus, without replicating the board, or playing more frequently, widespread displays of the game will be limited. There may be problems if the game is played in more sophisticated catchments were pipe networks reticulate water, where groundwater is the major source, or where water quality is an important issue. There will also be limitations if users are brought together from different parts of very large basins since the community-based resolutions that this game attempts to generate are unlikely to be institutionally sustainable given the distances involved.

Although a longer-term evaluation of the game has not been possible due to lack of elapsed time, the authors are optimistic that this workshop design can be taken forward as one conflict-mediation approach in the region. There is interest from key support groups and in addition, the game will be reviewed as a part of curriculum overhaul for irrigation diplomas, and we believe it can be a part of a Dialogue Initiative with IWMI, WWF and the Ministries of Water and Livestock and of Agriculture and Food Security in Tanzania (some ministry staff have requested future invitations). Moving on from early 'trials', we will be inviting representation by other water users in the catchment and from those institutions obliged to assist water users in the area (e.g. Ward Leaders, District Council, Zonal Irrigation Office and the River Basin sub-offices). These invitees are arguably part of the structures and factors that foster long-term sustainability of the agreements made by farmers, although the lack of external support was explored by the farmers ("its up to us", as one game participant said).

APPENDIX A: Golden rules for the river basin game

Before playing – trial games

1. The facilitator must go through the five phases of the first day before the participants arrive. It is surprising how easy it is to forget key issues, and the facilitator must look comfortable with the game.
2. Remember to play the game so you can get the fundi to fix any problems before the participants arrive.

Before playing – who should be there?

1. Main facilitator – especially one who is familiar with institutional/social issues, and who has helped design the day and chosen the participants.
2. At least one or two technical assistants, those who know about water management.
3. Good note keepers, if not the above assistants. Plus video operator.
4. About 30-35 water users from different parts of the sub-catchment; farmers, top-enders, tail-enders, domestic users, pastoralists, fisherpeople. (More can be used as observers, but 35 is about the maximum number that can play). Some of these might be local leaders.
5. Stakeholder players or observers – with a particular emphasis on those who might be responsible for assisting water users; irrigation training specialists, staff and officers from MAFS, Zonal Irrigation Office, MOWL, District staff.

Before playing – introduction

1. Aims of the water project, global water management, intersectoral allocation, raising productivity, conflict management, increasing needs of many sectors, distinguishing between needs and wants – how do we meet needs not wants. How do we meet the needs of the poorest in the sub-catchment?
2. Please remind participants that to poor tailenders (domestic user, cattle keeper or small rice farmer) a small amount of water has very great value to their livelihoods, whereas to a top-ender rich in water, giving up that small amount of water will probably not make a difference or even be noticeable.
3. Specific aims of river basin game – to show how we might improve subcatchment management of water in the chosen subcatchment. To learn from this day to promote the game if desired in other sub-catchments and other regions.
4. (Refer to other projects that have worked in the area: SMUWC, RIPARWIN, RBMSIIP – and their aims).
5. Refer to the map of the region, locate the relevant subcatchment and other catchments, and downstream users.
6. Refer (or ask them to name) to many users in the basin (e.g. domestic, cattle, rice, non-rice, wetlands, fisheries, wildlife, Great Ruaha National Park, tourists, electricity Mtera Kidatu).
7. Suggest that a map of the river catchment is made at some point – so that you can refer to it. Remember the game is not an accurate representation and there may be many features (canals, intakes, drains) that you wish to put on a map.

When playing

1. Prepare first, ensure you have traditional and modern intakes (former is thin, latter is larger sticks)
2. Go slowly
3. Explain what the participants will see, do it and then explain what they have seen.
4. Repeat if necessary.
5. Collect all marbles at the end of each round so that the game is ready to start anew, and that the results of the previous round do not confuse what happens in next.
6. Remember to drive the game to see the results you wish to see. In other words, think before each round what you want to see happen and then fine-tune it so you get the result you want. You are not just a facilitator, but also a teacher! Make a dry season a very small number of marbles, and a wet season very many marbles. Choose small intakes for traditional and large intakes for modern.
7. Summarise at the end of each phase, ensuring questions and answers.
8. Allow discussion between farmers before each round is played so they 'get into the game'. The facilitator should be careful of talking too much.
9. Allow this discussion to be relatively unstructured, (in other words, free-flowing), but listen to what is being said.

10. When something interesting is said, you may wish to tell the others, so that all can know of the interesting fact or thought.
11. Do not omit any stages – you need each building block to get everyone thinking about the same issue. Some stages look unnecessary but without them, you may lose your audience.
12. Explain that the model is just a model and not an exact representation of the sub-catchment that the users come from.

Technical aims – managing water better to share water.

1. We are trying to get users to express what ways they know to save water.
2. Remember, the users already know what is required to save water, and to share water more equitably between them and other users.
3. Always go from player comments – draw up lessons and agreements from what they are saying. Try not to impose too much, except by managing the game well.
4. So, first ask them to list all the ways that save water.
5. Then use Appendix B to perhaps suggest some more ways of saving water.
6. Now, once all the methods have been listed (on paper?) use group ranking methods to get the group to prioritise ways of saving water – ways that the whole group need to agree to, even if they might be difficult and require co-ordination or assistance from outside.
7. Now discuss this prioritised list of technical options to save water – in other words, validate this list back to them, giving them the option to change it again.

Institutional aims – ways of implementing technical means to save and share water

1. Above we listed the technical ways of saving water.
2. Now, what we are aiming at is to try to get them to agree that communal ways of managing water are more suitable, and this applies at the field level between neighbouring farmers, to the system level between farmers in a Water User Association, and to the sub-catchment level between irrigation systems.
3. So, we are aiming at asking them to consider how they might implement these technical ways of managing water better to share water.
4. Thus, our objective is for them to identify helpful and hindering institutions. In other words, what institutions they can turn to (or should turn to) to assist them in water saving and sharing, and what institutions do not help them (and that also they either ignore or tackle).
5. However, we are also asking them to consider ways of establishing new institutions if necessary – a sub-catchment management committee?
6. By asking observers from other institutions (e.g. RBWO, Mbarali District), we can try to get all parties to work together in more effective ways.

Getting the farmer's feedback on the game

1. Was the game too long, too short?
2. Was two days necessary?
3. What other improvements to the programme?
4. How might the wooden board game itself be improved? What would you like to see?
5. Were the instructions clear?
6. Did you need preparation before coming to the day?
7. Who else would the group like to see represented here? Are there more influential people in your village that should come? What other institutions are missing?

Follow-up - summarising and analysing the results of the game

1. Were all the users represented? Where all institutional observers represented?
2. What were the technical options listed? Were all options listed?
3. What were the group management and institutional ways agreed to implement these technical options? Were all the institutional ways and bye-laws listed and discussed that could be possibly done?

4. What main institutions do you need to help solve your problems? What institutions do not help you share water and solve your problems?
5. Suggest that the video of the discussions is played back to the participants?
6. What follow-up is needed? How can we monitor on-going support for these new agreements?

Final self-reflection

1. Did anything unexpected occur? What? Did this mean anything?
2. Did everyone get a chance to speak?
3. Could you, the facilitator improve the day? What would you change?
4. Did you forget anything?
5. Is there anything immediate that you need to see to?

Making adjustments to the game

1. Adjustments and improvements should always be considered and welcomed. The game must evolve.
2. Be careful of introducing improvements that do not represent what happens on the catchment – always think about what you are trying to improve.
3. Fix small frustrating issues after a trial play – if you allow these to continue your main playing of the game will be hampered by these faults.

APPENDIX B: Sample letter of invitation

SOKOINE UNIVERSITY OF AGRICULTURE
FACULTY OF AGRICULTURE
DEPARTMENT OF AGRICULTURAL ENGINEERING AND LAND PLANNING
SOIL –WATER MANAGEMENT RESEARCH PROGRAMME
P.0. Box 3003 MOROGORO – TANZANIA
TEL: 255 056 3847 or 255 056 604216 MOROGORO
Email: swmrg@suanet.ac.tz FAX: 255 056 3718

Our ref: **Your ref**: **Date:** 14th July, 2003

…….

……..

……..

……...

Dear Sir or Madam:

RE: INVITATION TO ATTEND RIVER BASIN GAME WORKSHOP

Kindly refer to the caption above.

The River Basin Game is a role-playing physical-based model that determines how downstream –upstream water use patterns happens, and propels solutions to water scarcity and conflicts through dialogue among various stakeholders. We have run this game twice now, and believe you will find it very rewarding and interesting.

The Raising Irrigation Productivity and Releasing Water for Intersectoral Needs (RIPARWIN) project under the Soil Water Management Research Programme based at Sokoine has organized a River Basin Game Workshop that will take place as explained hereunder;

Dates: 29th & 30st July 2003

Venue: MATI Igurusi- Mbeya*, some 50 Km east of Mbeya town along Dar/Iringa Road*
As a key stakeholder in water management in the Rufiji Basin, we would like to invite you in this particular workshop. We kindly request you to meet your own costs.
Confirm your participation through the above contacts or directly to the workshop coordinator via Tel. O744 645 142 or email: sokile@email.com.

Hope to see you in the workshop.
Yours truly,

Prof. Nuhu Hatibu
Team Leader SWMRG

APPENDIX C: Evaluation form

RIVER BASIN GAME WORKSHOP

EVALUATION SHEET

Dear participant,

We highly appreciate your participation in the River Basin Game (RBG) workshop.

We therefore kindly request you to honestly fill in this evaluation form. Your views will make us improve the workshop in future.

1. Is the RBG prototype representative enough for you to understand upstream-downstream water use relations??
    a. It highly representative
    b. It fairly representative
    c. It poorly representative
    d. It did not represent the relations
2. How did you find the different phases of the RBG in respect to the development of different water uses in a river basin with time?
    a. Its highly true
    b. Its fairly true
    c. Its poorly true
    d. Its not true at all
3. Do you think the RBG plays appropriate role in eliciting water users understanding and soliciting their views on individuals' strategy for access to water?
    a. Yes, if yes why?
    ---
    b. No, if no why?
    ---
    c. Indifferent, why?
    ---
4. What do you think would be done by individuals so as to make them use water equitably?

    ---
5. What do you think would be done by individuals so as to make them use water productively?

    ---
6. What water storage strategies you think would be done by individuals so as to mitigate the water scarcity?

    ---
7. Do you think the RBG plays appropriate role in eliciting water users understanding and soliciting their views on communities' strategy for access to water?
    a. Yes, if yes why?
    ---
    b. No, if no why?
    ---
    c. Indifferent, why?
    ---
8. What do you think would be done by communities so as to make them use water equitably?

    ---

9. What do you think would be done by communities so as to make them use water productively?

    ---
10. What water storage strategies you think would be done by communities so as to mitigate the water scarcity?

    ---
11. Consider the time allocated to each session; what would you say about the time if the game were to be played in the villages by local water users?

    ---

1. Any other comments concerning time allocated for each RBG session?

    ---

13 Do you think RBG can act as a tool for reducing water use conflicts through role-play?
    a. Yes, why?

    ---
    b. May be, why?

    ---
    c. Not at all, why?

    ---

14. What do you think we need to improve from the RBG?
    i. ---
    ---
    ii. ---
    ---
    iii. ---
    ---

15. Do have any other comment for RBG?
    i.---
    ii. ---
    iii.---

16. How did you find the facilitation of the RBG?
    a. Good
    b. Fair
    c. Poor

17. What would advice to be improved in facilitating the RBG?

Thank you very much.

APPENDIX D: "Thinking about water management in relation to the river basin game"

These questions are grouped together under headings, and are designed to help you begin thinking about water management in different ways.

Planning and calendars

When are the first rice seed beds/nurseries made?

When are the last rice fields harvested?

What is your main constraint? What affects the calendar (land, water, labour, seed, machinery, money)?

What are your bye-laws on dry season planting? What are your plans for future dry seasons?

Do you change your water management for a dry year, compared to a wet year? If so, how?

What are your rice varieties? How many days do they take to ripen/harvest?

Calendar & Time questions

When is your water right for?

What is the delay between first irrigation and transplanting?

How long does a field take to irrigate at the beginning of the season?

How long ***should*** a field take to irrigate at the beginning of the season?

Water scheduling, sharing and cycling questions

How do you tell if water is short for a crop? When is the crop stressed?

How do you decide when to start irrigating a field, and when to stop irrigating the field?

What depth of water do you allow?

Can you tell, or do you monitor, if one field gets more water than another?

Do you cycle water between fields?

How are flows shared between the fields? When do you decide to do this?

How long between cycles (meaning how long before water comes back to the same field, in days)?

Area questions

What is the **total** area that you farm?

Is this one continuous area, or many small plots in different places?

How does this farming pattern affect your water management?

What is the **rate** of area transplanted (answer in area in hectares per week or per 10 days or per month, or number of fields per week or per 10 days or per month). (What is the rate in September, October, November, December, January, February, March?)

What controls this rate of area transplanted (ie. what slows it down, or speeds it up?)

Water flow questions

What is your water right? What is your water right at different times of the year?

What instructions do you give regarding water/gate openings at the main intake?

What is the maximum flow you use? (cumecs, or l/sec)

What is the normal flow you use? (cumecs, or l/sec)

What is the minimum flow you use? (cumecs, or l/sec)

What is the flow for each field? (cumecs, or l/sec)

Do you ever close the main gate? Do you close it during heavy rains?

Water demand and supply questions

Is the water available enough for the area irrigated?

What creates the most water demand from your fields? (evaporation?, wetting up? field design? Seepage?)

What depth of water is required to create the standing water layer? What is the depth of water in your fields?

When do you think there is no demand for water on your farm? What months, or what dates?

When do you stop irrigating before harvesting? How many weeks before harvesting?

Canal water management

Is water delivered by field to field irrigation or by channels?

How do you manage water control in your canals? How do you adjust water flows?

How is flow switched (moved) from one canal to another canal?

In-field water management questions

Who manages the spreading of water inside the fields?

Is the depth of water variable inside the fields?

What do you think is the difference between smallholders and NAFCO water management?

Does the sunken field-edge canal inside the field increase water demand?

Which uses more water - dry seeding or transplanting?

Location questions

Where do you put your nurseries? Are they grouped together?

Which fields are transplanted and irrigated first?

Water efficiency questions (water losses)

Do you have irrigation (water) losses? Are your losses great or small?

Where are the losses mostly occurring - meaning from where are they arising? Who is causing them?

When do you think most of the losses are occurring?

What are the effects or results of these losses?

Are there causes of losses that you could correct and fix?

Are there times when your fields are using water but are not growing rice? Why is this so?

Is water returning to the rivers? What percent of water abstracted is returning to the rivers?

Who uses your excess water? How much land is irrigated using your runoff?

People making decisions

Who makes the decisions about water management? When? In what forum?

How are these decisions arrived at?

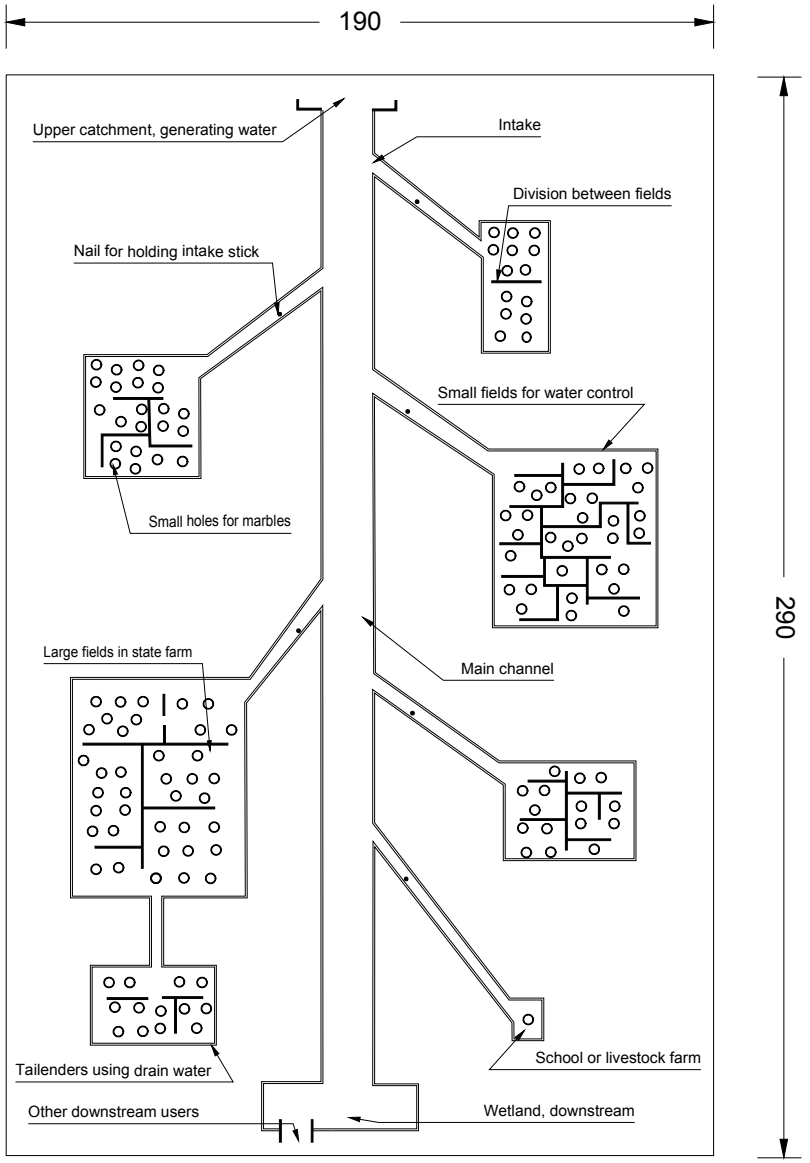
Saving water

How do you think you can save water? What are the main ways in which you can save water?

When is the best time to save water?

How much water can you save at different times of the cropping calendar (cumecs, litres/sec, or percentage, or days, or leaks)?

APPENDIX E: "Design of the River Basin Game" (Dimensions in centimetres and are approximate – see over for further details)



Construction details on the river basin game

1. All dimensions are approximate and should be decided with the carpenter.
2. The holes for the marbles should be big enough to accept marbles but not too large so it is difficult to get the marbles out.
3. The wooden board can be divided into four parts for ease of movement.
4. The slope should not be too steep – around 15 cm higher at one end than the other over 290-300 cm long. Separate legs can be built.
5. The fields are divided by small wooden sticks (batons).
6. The carpenter/fundi should make the game in stages so a careful eye can be kept on progress and so that mistakes are not made.
7. The wood should be varnished to make it hard-wearing.

Options = It is possible to introduce additional components such as a storage dam that can store wet season water for later release or even boreholes for villages.

Acknowledgments and Copyright

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