



*Boosting Effectiveness in
Water Operators' Partnerships*

A role-playing game for practising
stakeholder collaboration
in Water Safety Plans

Trainer's guidance manual

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This game was tested at UNESCO-IHE in November 2016 by Urban Water and Sanitation MSc course participants AA2016/2018: Amuthalingam Anparasi Sivabalan, Kem Davie Bartholomew, Claribel Jahzeel Buenaño Vargas, Ana Clara Da Rosa Santos, Mohamed Eltayeb Mohamed Elkhider, Madhuvi Kisoen, John Nii Ahumah Leonard Koppoe, Alejandro Medina Aristizabal, Miranda Mpetta, Edmond Mutugi Mugambi, Beverly Farai Nyakutsikwa, Giannina Pinotti Alonso, Michael Nii Aryee Quaye, Arjun Sharma, Nitesh Purna Shrestha, Suzette Autherine Smith, Puji Supriyatin, and María Clara Vanegas Camero. It was also tested in April 2017 by Water Management and Governance MSc course participants AA2016/2018: Leslie Ford, Imelda Kavuu, Abdi Muleta, Biar Biar, Hilmer Bosch, Julius Maxi Omuut, Momodou Sankareh, and Isaac Barnes.

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1. Context and objective

1.1 Active learning

Active learning techniques are increasingly being encouraged in teaching, as research shows overwhelming evidence that ‘students learn best when they engage with course material and actively participate in their learning’¹. Role-playing games have the potential to be especially efficient when the desired performance objective of the training involves problem solving. In a role play, participants are requested to take on an active role (e.g. a given stakeholder involved in water management) during the simulation of an activity that involves interacting and making decisions.

1.2 Goal

The goal of this game is for participants to experience the importance of stakeholder engagement in Water Safety Plans (WSPs), and particularly in the decision-making process when investing in rehabilitation and maintenance of a drinking water supply system from catchment to consumers. Participants will experience how this process can be influenced by information exchange between stakeholders and how this will eventually lead to higher awareness when assembling the WSP team.

1.3 Target audience

The game can be used in WSP training or during educational activities for water safety and WSP at graduate and post-graduate level.

2. Summary

2.1 Approach

This role-playing game is intended to illustrate the importance of stakeholder communication and cooperation when making decisions to address public health protection in relation to drinking water safety. This objective is achieved by giving participants the opportunity to experiment with decision making in teams during two consecutive rounds. A ‘fragmented’ approach, where institutions are segregated and stakeholders’ communication is limited, is experimented with during the first round of the game by the participants. The ‘integrated’ approach is experimented with through the second round, where communication is intensified between stakeholders, eventually leading to a different outcome for the decision-making processes.

2.2 Outcome

The outcome of both rounds will be evaluated in terms of water quality risk improvement, highlighting how stakeholder engagement and cooperation in the WSP decision-making process could lead to improved water quality through more efficient investment planning. A plenary discussion will be facilitated by the trainer at the end of the game based on the participants’ experience in both rounds.

2.3 Duration

The role-playing game is designed to last for a total of about 4 hours; however, there are options to play shorter or longer versions of this game, which are outlined in Section 7.

¹ The Florida State University 2010. Instruction at FSU. A Guide to Teaching and Learning Practices. The Florida State University Academic & Professional Program Services. 6th edition.

2.4 Materials

Materials needed for this game include:

- Trainer's guidance manual (this document)
- Participant's guidance manual
- Printed material for participants (in the annexes to this document)
- Flipchart or blackboard

The detailed list and quantity of materials and printouts needed are included in **Annex 1**.

3. Flow of the game

3.1 Forming the teams

Divide the participants into groups of 7 and ask each group to take their place at one of the round tables, as shown in Figure 1.

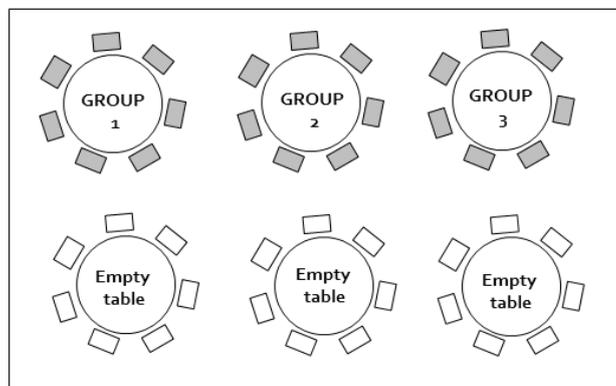


Figure 1. Room layout (example with 21 participants)

Each participant will represent one stakeholder from the following list:

1. Catchment authority (CA)
2. Farmers' association (FA)
3. Industry (I)
4. Water supply company (WC)
5. Local government (municipality) (LG)
6. Ministry of Public Health (MH)
7. Consumers (Co)

If the number of participants is not a multiple of 7, there will be more than one person representing the same stakeholder within one group. For example, if there are 13 persons, there will be only one group with six stakeholders represented by two persons and one stakeholder represented by one person; if there are 15 persons, there will be two groups and one of the group will have one stakeholder represented by two persons.

NOTE: One trainer can supervise up to 2 groups, but the ideal configuration is to have one trainer per group.

Participants divide themselves into groups and then each group can briefly discuss which stakeholder will be represented by each group member.

Recommendation for assigning roles: if one person works for the Ministry of Public Health, he/she should take any role except that. The reason is that then all the players will be at the same level and participants can gain a better understanding of the other roles.

When participants have selected their roles, distribute the 'role tags' (**Annex 2**) to identify which stakeholder they represent and 'stockholder cards' (**Annex 3**) containing the description of the role and specific interest of the stakeholder they are representing.

The game consists of two rounds. Before starting the game, each participant is instructed to read the case description.

4. Case description

The city of BE, which has a population of 100,000, is located on the shore of the river WOP that serves as the main water supply source for the city's population.

The city is located in a large catchment, downstream from rural areas where most of the economic activities are now based on agriculture. Agricultural activities in the catchment have in fact significantly intensified over the past 20 years, moving from small-scale subsistence agriculture to larger-scale, commercial agriculture, with a major increase in the use of pesticides. An industrial sector has also recently developed in the urban-rural fringe around BE, including an important chemical manufacturing plant.

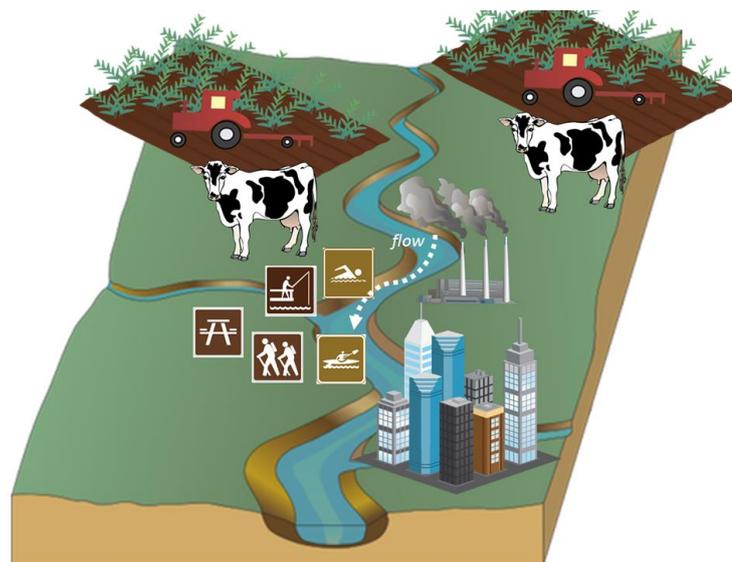


Figure 2. City of BE on the shore of the river WOP, showing key activities in the catchment

While BE used to benefit from a relatively clean source of surface water which could be used to meet the population's needs following a simple treatment (conventional treatment followed by chlorination), the quality of the river water has been drastically degrading over the past decade, and the water supply company is now struggling to supply drinking water that meets basic water quality standards, as recommended by the Ministry of Public Health. Customer satisfaction has been decreasing due to a number of boil-water advisories being issued over the past few years. In this context, it has been difficult for the water supply company to consider raising drinking water tariffs in order to support large investment in the water treatment and supply infrastructure.

BEnet, the water company responsible for water supply (i.e. managing the water treatment plant and distribution) in the city of BE, has received in-depth training on WSPs as a management framework to help safeguard public health in drinking water services. Following this training, a WSP team has been formed within the water supply company, and a WSP has been elaborated, involving the identification of hazards in the water supply system from catchment to tap. One representative from the Ministry of Public Health is also part of the WSP team. An outreach campaign promoting the efforts of the water company and its sense of responsibility towards public health protection for the citizens of BE has enabled the community to be involved to a (limited) extent.

To reduce public health risks to the consumer from some of the key identified hazards, some considerable investment is required in the system. In order to prioritize these investments, BEnet is leading the development of an action plan; yet, given the nature of the interventions identified as requiring priority investments, a range of stakeholders will need to cooperate in the decision-making process.

A development agency has recently committed to allocate a total budget of 3M BE\$ over a 10-year period for improving water supply infrastructures in the city of BE in order to better safeguard public health. The fund is donated to (and administrated by) the local government. The water company BEnet will invest 1M BE\$ over the same period to improve the quality of its services.

5. Round 1

- a. Instruct each stakeholder to read the description of his/her role that is written on the 'stakeholder card' to the rest of the group.
- b. Based on the links between the stakeholders presented in **Table 1**, ask the stakeholders to use an A3 paper located in the centre of the round table to draw the configuration of links. Remind participants that stakeholders will only be allowed to exchange information with the stakeholders they are linked to.

Table 1. Stakeholders' interconnections and influence factors in decision-making

Stakeholder	Links	Influence factor
Catchment authority (CA)	Weak relationship with farmers' association about land use and agricultural practices; Weak relationship with industry about types of chemicals discharged in plant's effluent; Weak (informative) relationship with city government as downstream user in the catchment	1/10
Farmers' association (FA)	Weak relationship with catchment authority	1/10
Chemical manufacturing plant (I)	Weak relationship with catchment authority	2/10
Local government (municipality - LG)	Weak relationship with catchment authority	6/10
Water supply company BEnet (WC)	Relationship with customers based on billing, customer complaints and satisfaction surveys; Weak relationship with Ministry of Public Health which provides guidance on drinking water quality	5/10
Ministry of Public Health (MH)	Weak relationship with water supply company	3/10
Consumers (Co)	Necessary relationship with water supply company	2/10

- c. Walk around the room to help each group separate into 2 sub-sets of stakeholders based on the networks drawn: one sub-set includes the local government (sub-group A) and one sub-set includes the water supply company (sub-group B). For this first round, consumers are part of the sub-set led by the water supply company (sub-group B). A potential room layout is shown in Figure 3.
- d. Remind participants that communication between the two sub-groups is forbidden during this first round.

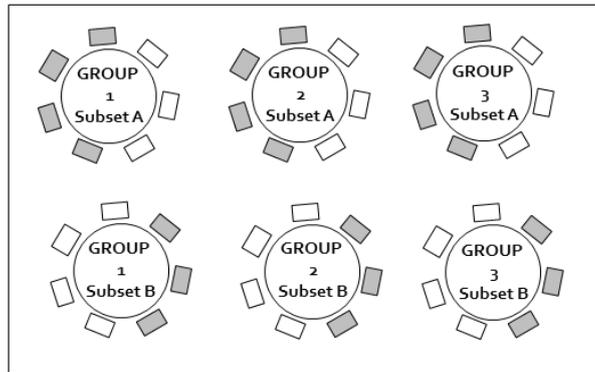


Figure 3. Room layout (Round 1)

- e. At the beginning of Round 1, verify that 2 stakeholders at the table have money (**Annex 4**): the water supply company owns a 1M BE\$ budget and the local government a 3M BE\$ budget. Within each sub-group, stakeholders have to discuss how to invest the money they have available over a period of 10 years, using the documents provided to their own sub-group. Discussion within sub-group B (led by the water utility) will lead to an investment proposal for rehabilitation of the water supply system based on a WSP, which will be presented to the local government at the end of Round 1 for approval. Meanwhile, discussion within sub-group A (led by the local government) will lead to a preliminary plan, which will need to be presented to the donor (played by the trainer at this point of the game only) as well as to the water supply company's sub-group.
- f. For this first round, ask each stakeholder to take note of their 'influence factor' indicated in **Table 1**, which will determine their (financial) influence on decisions made during this round.
- g. Instruct each sub-group to follow the instructions in sections 5.1 (sub-group A) and 5.2 (sub-group B) in the participant's guidance manual.

5.1 Instructions for sub-group A [led by the local government, 3M BE\$ budget]

- This sub-group of stakeholders is led by the local government and is provided with the map and description of the water supply system included in **Figure 4**.
- The local government also holds a record of a variety of issues that have been raised over the past few years of the government's mandate around water supply and water management (and the estimated funding required to address the issue at the time that it was raised), as shown in **Table 2** (printable A3 chart in **Annex 5**), with the majority of these issues remaining unaddressed to date.
- The local government administrates the funds, but discussion is guided based on consultation with other stakeholders within the sub-group.

- Each stakeholder within the sub-group can influence investments of an amount corresponding to a fraction of the total budget managed by the local government, based on the respective weight of each stakeholder, as follows: amount of investment influenced by $X = (\text{influence factor}) * (\text{total budget sub-group A})$. Each stakeholder should calculate the amount of money they can influence for this round. See **Table 1** for the influence or weight of each stakeholder.
- Stakeholders (e.g. the farmers' association or industry) should negotiate with the government to invest in addressing issues that impact or concern them most.
- Based on internal discussion, the sub-group proposes interventions that can help address the identified key issues. They cannot decide to address some issues only partially, but they have to raise the whole amount indicated as the required funding.
- At the end of the round, the sub-group summarizes the investment decisions made by filling in the requested information in **Table 3**.

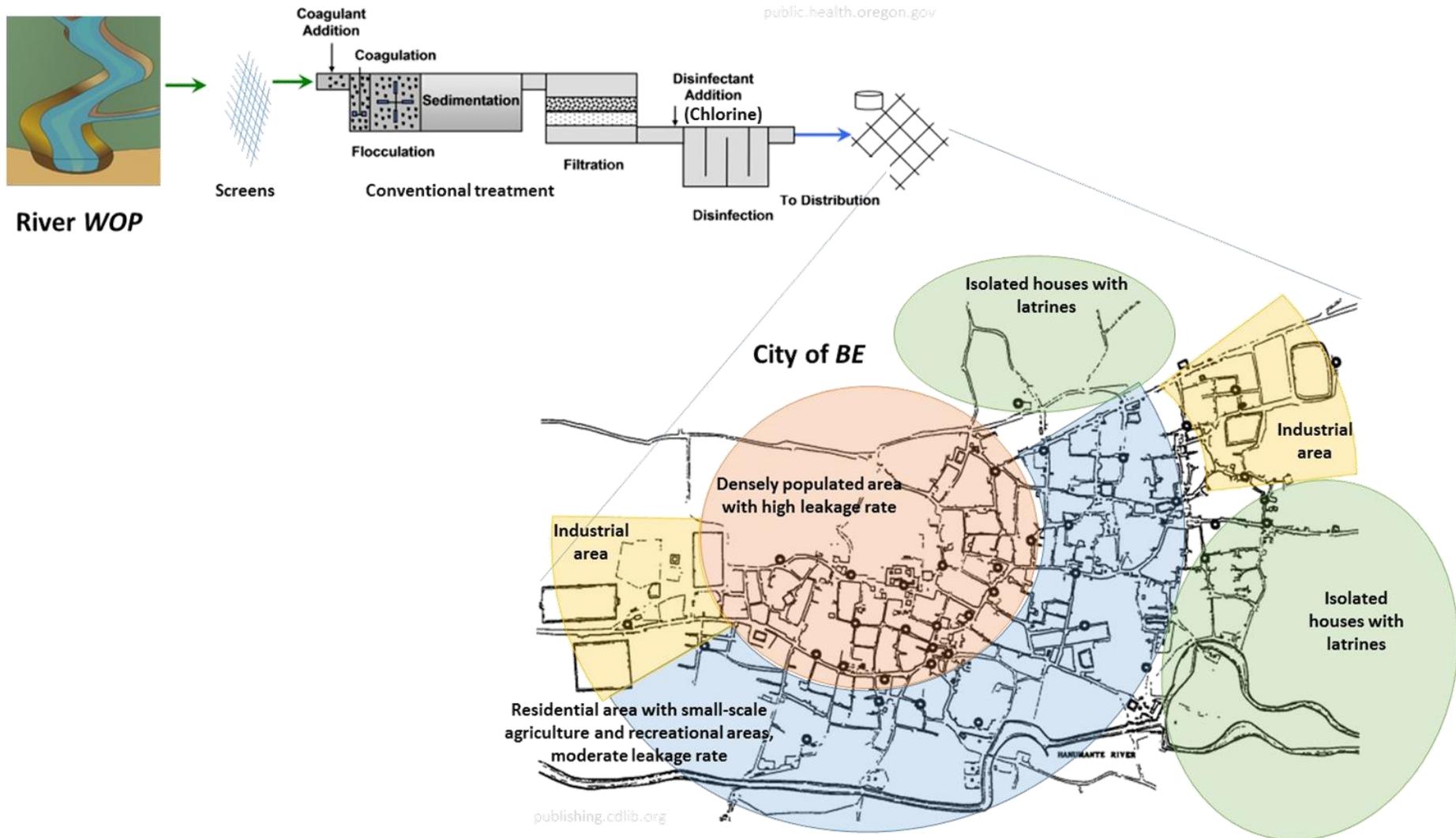


Figure 4. Description of the water supply system managed by BEnet: the water treatment plant and distribution system

Table 2. Local government’s record of issues in water supply/water management raised over the past 5 years (sub-group A, Round 1)

	Water supply/management issue	Estimated funding required (BE\$)
1.	Uncontrolled use of pesticide in commercial agriculture in the catchment	1M
2.	Uncontrolled use of manure and fertilizer in commercial agriculture in the catchment	1M
3.	Poor operation and malfunctioning of the WTP leading to prolonged boil-water advisories in residential sector	2M
4.	Aging water distribution system in the town centre, degrading infrastructure, low repair/replacement rate of pipes	3M
5.	Low coverage of centralized wastewater collection services in new developments	3M
6.	Low enforcement of industrial wastewater discharge regulations	2M
7.	Lack of metering for industrial uses of water from the municipal supply system	2M
8.	Degradation of water quality in the river WOP due to wastewater discharge	3M
9.	Competition between town water use and agricultural irrigation use during the dry season	2M

Table 3. Summary of investment decisions made by sub-group A (Round 1)

Investment decision	Amount allocated (BE\$)	Stakeholders involved in implementation
Total (investment)		

Notes:

- a. Investment decisions: Specify which issue is being addressed and how (what measure is being implemented).
- b. Stakeholders involved: Specify which stakeholders would be involved in implementing the corrective investment.

5.2 Instructions for sub-group B [led by the water supply company, 1M BE\$ budget]

- This sub-group of stakeholders is led by the water supply company and has access to the WSP documents as a basis for decision-making on investments. The sub-group examines the table of high-risk hazards and potential control measures that have been identified based on the WSP, as shown in **Table 4** (*Note: sub-group A does not have access to the information in **Table 4***). Sub-group B can also use the map (**Figure 4**, page 10 of this manual and page 8 in the participant's manual).
- Participants decide on an amount of money to invest in different control measures over the next 10 years. Teams must make decisions based on an internal discussion where each stakeholder can influence investments of an amount corresponding to a fraction of the total budget managed by the sub-group, based on the respective influence factor of each stakeholder, as follows: Amount of investment influenced by X = (influence factor) * (total budget sub-group B). Each stakeholder should calculate the amount of money they can influence for this round. The local government distributes the money (BE\$) among stakeholders according to the amounts calculated. See **Table 1** for the influence factor of each stakeholder.
- *Note:* in Round 1, some of the control actions listed in the WSP table are not feasible, as they require collaboration with stakeholders outside this sub-group.
- At the end of the round, the sub-group summarizes the investment decisions made by filling in the requested information in all 4 columns of **Table 5**.

Table 4. High-risk hazards and possible control actions identified through the WSP

	Hazards	Likelihood	Consequence (severity)	Risk (high and very high)	Control action	Investment (BE\$)	Risk after implementing the control action	Stakeholders involved/ remarks
1	Pesticides from agricultural uses	4	3	12	1.A – Improved farmers’ practices involving a reduced use of pesticides	0.8M	9	<i>*Requires close collaboration with farmers and coordination through the catchment authority</i>
					1.B – Investment in advanced treatment systems at the drinking water treatment plant	2M	3	
					1.C – Improved treatment at the drinking water treatment plant through punctual dosing of powdered activated carbon during and after intense rainfall events	1.2M	6	<i>*Requires close collaboration with catchment authority for accurate and timely information on rainfall events</i>
2	Solvent from industrial effluents	4	4	16	2.A – Closing of the chemical manufacturing plant	2.8M	0	<i>*Involves job losses for several residents of BE</i>
					2.B – Enforcement of industrial effluent quality regulations	1.2M	4	<i>*Probably requires industries to collaborate to treat effluents before discharging to the river, coordination through catchment authority</i>
3	Failure of chlorine disinfection process at the drinking water treatment plant	3	5	15	3.A – Upgrade of chlorination with equipment redundancy	0.8M	5	
					3.B – Dual power source	0.4M	10	
					3.C – Alarm in place and recommendation issued to boil water	0.4M	15	<i>*Involves poor service quality for several residents of BE, requires coordination through local government and Ministry of Public Health for dissemination of recommendations and community outreach</i>

4	Uncovered clear water storage tank with potential contamination from bird defecation	4	5	20	4.A – Closing of water storage tank	0.8M	0	
					4.B – Addition of chlorine dosing pump at the outlet of storage tank	0.4M	10	
5	Leaks in distribution system with potential microbial contamination	3	5	15	5.A – Implementation of a major leak repair programme across the city	4M	0	<i>*Requires coordination with the local government for planning of repair works</i>
					5.B – Prioritization of leak repair based on in-depth investigation of higher risk locations	2M	5	<i>*Requires coordination with the local government for planning of repair works</i>
					5.C – Increased chlorine residue in distribution system with additional dosing points	0.8M	10	<i>*Involves potential loss of service quality in terms of taste/customer preferences</i>
					5.D – Permanent recommendation to boil water in all potentially affected sectors of the city	0.4M	15	<i>*Involves poor service quality for most residents of BE, requires coordination through local government and Ministry of Public Health for dissemination of recommendations and community outreach</i>

Notes:

- a. Important: In Round 1, some of the control actions listed in the WSP table are not feasible, as they require collaboration with stakeholders outside this sub-group. This means that in Round 1 participants can only select the control actions that do NOT require coordination.
- b. In both rounds: It is not possible to partially invest in one control action from this table (control actions that are only partially funded are considered not to be implemented/not effective).

5.3 Wrap-up Round 1

- Invite sub-group A to present their expectations in terms of investment plan, based on their internal discussion, to sub-group B (and to the trainer) and to explain how their decisions were made. Then, ask sub-group B to present its investment plan to the local government and explains its choices. Sub-groups A and B compare their plans and discuss.
- If the investment decisions in both plans differ, the local government will reject the water company's proposal, and the donor will reject the plan of the local government. The team must then play the second round to develop a better plan.
- Collect all the money from both teams before starting Round 2.

Guiding questions:

- ✚ Was it easy for sub group-A to agree on an investment plan? If not, what would have improved the process?
- ✚ What were the difficulties faced by sub-group A in developing their investment plan?
- ✚ Was it simple for the sub-groups to reach a consensus? Which were the biggest hurdles in the discussion?
- ✚ How did the group overcome the issues encountered during this round?
- ✚ What do participants think will be the way forward?

6. Round 2

Now the sub-groups A and B sit at the same table and will play Round 2 as one group.

At the beginning of Round 2, distribute money (BE\$ bills) to the teams: 3M BE\$ to the local government and 1M BE\$ to the water supply company. The spending of the total budget (4M BE\$ in total) during Round 2 should be guided by an investment plan based on the prioritization of risks and control measures as informed by the WSP.

- Explain to participants that they should develop a different stakeholders' configuration within each group with the goal of improving the decision-making process. This new configuration is based on a whole-group discussion about how all the stakeholders are linked and influenced by one another and how they perceive that information held by different stakeholders should be exchanged with other stakeholders to improve the outcome in this round. The team re-assigns the links among the stakeholders by drawing lines on an A3 paper placed in the centre of the round table, and fills in the 'Links' column of **Table 6**, as they progress in their discussion.
- The teams decide on the influence factor of each stakeholder up to a total of 20 influence points (x/20). This requires the team to question the influence factor that was attributed to each stakeholder in the previous round. What are the consequences and limitations of such a weight distribution, and how can it be reconsidered and improved in order to increase the benefits of coordinated decision-making on water supply?
- Participants indicate the revised configuration of stakeholders (links and influence factors) by filling in the missing information in **Table 6**.

Table 6. Stakeholders’ interconnections and influence in decision-making for Round 2

Stakeholder	Links	Influence factor	Amount influenced
Catchment authority (CA)			
Farmers’ association (FA)			
Chemical manufacturing plant (I)			
Local government (municipality - LG)			
Water supply company <i>BEnet</i> (WC)			
Ministry of Public Health (MH)			
Consumers (Co)			
		Total = 20	4M BE\$

- d. The total budget is 4M BE\$, with the local government holding an initial budget of 3M BE\$ donated by a development agency, and the water supply company holding an initial budget of 1M BE\$.
- e. The team examines the table of high-risk hazards and potential control measures that have been identified based on the WSP (**Table 4**) and the map (**Figure 4**) and description of the water supply system.
- f. Participants decide on the amount of money to invest in different control measures over the next 10 years. Teams must make decisions based on an internal discussion where each stakeholder can influence investments of an amount corresponding to a fraction of the total budget (4M BE\$), based on the respective influence factor of each stakeholder, as follows: Amount of investment influenced by X = (influence factor) * (total budget). Each stakeholder should calculate the amount of money they can influence for this round. These respective amounts can be written down in **Table 6**. The local government and water supply company distribute the money (BE\$) among the stakeholders according to the amounts calculated.
- g. Teams can use a chart representing the possible control actions and the respective amounts illustrate investment decisions (**Figure 5** and printable A3 format in **Annex 7**); stakeholders can place the BE\$ on the pie chart while discussing. If a given option (control action) requires collaboration from specific stakeholders, these stakeholders must agree to support at least part of the investment required to implement that control action.

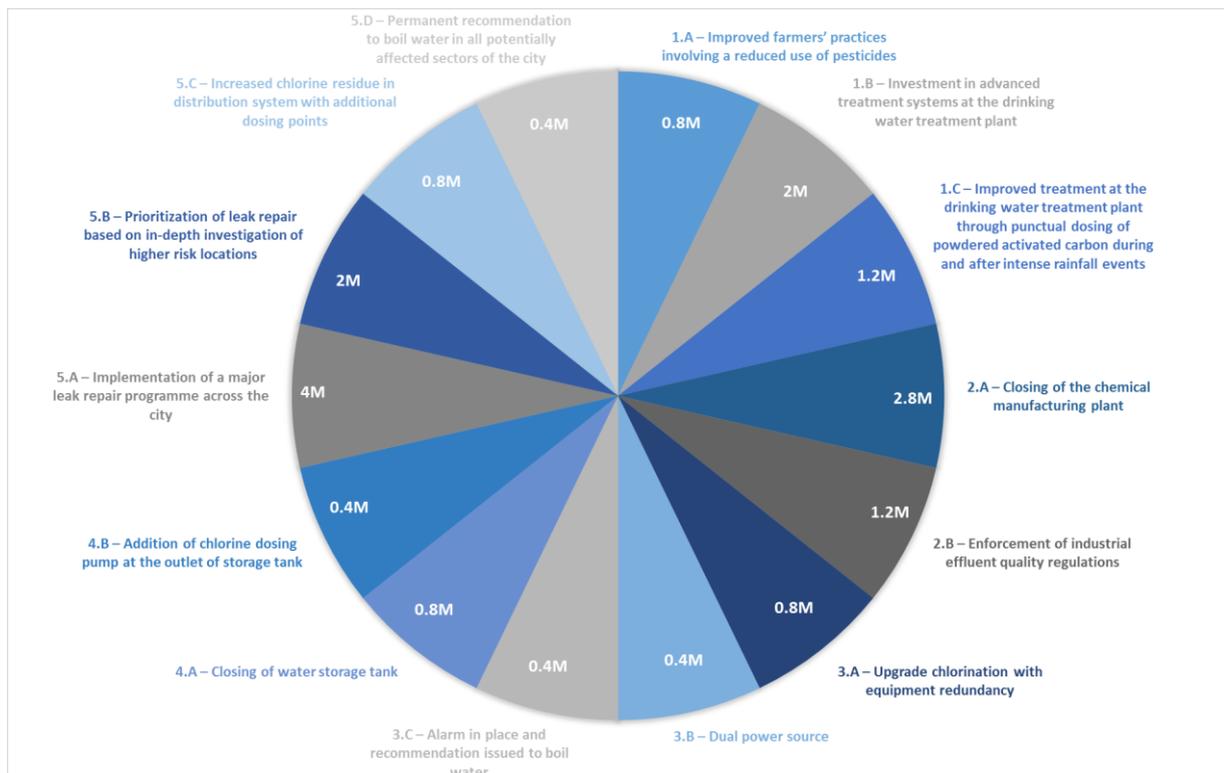


Figure 5. Chart to illustrate investment decisions made by a team (Round 2)

- h. At the end of the round, the team summarizes the investment decisions made by filling in the requested information in all 4 columns of **Table 7**.

Table 7. Summary of investment decisions made by each team (Round 2)

Investment decision	Amount allocated (BE\$)	Stakeholders involved in implementation	Risk reduction
Total (investment, risk reduction)			

OPTIONAL: the next steps can be applied when playing in a large group with several teams, and if a total period of 5-6 hours is available for playing the game (see Section 7).

- i. When the teams are discussing the investment to be carried out in Round 2, the trainer goes around all the teams distributing ‘unexpected event cards’ (**Table 8** and a printable version in **Annex 8**). This can be done randomly by rolling a dice and attributing numbers from 1 to 6 to the event cards as in **Table 8**.

Table 8. Unexpected event cards

	Unexpected event card
1	The farmers are going on strike to protest at the low market price for their products. Cooperation with the farmers is prevented during the development of the investment plan.
2	Extreme rainfall events have caused major flood damage in the city. The local government has agreed with the funding agency that 1M BE\$ from the initial allocated budget for water supply interventions (3M BE\$) will be re-allocated to flood control and rehabilitation of damaged infrastructure.
3	International guidelines on drinking water quality have recently been updated; accordingly, the Ministry of Public Health requires your investment plan to comply with more severe water quality standards, requiring an overall risk reduction of 50 points. If this is not possible with the money available, the stakeholders involved will need to negotiate on who will apply for a loan in order to finance the additional control actions required.
4	Poor influent quality and operational problems at the treatment plant have caused half of the filtration units to become completely clogged. The water utility has to spend 0.4M BE\$ on upgrades and maintenance costs for the filtration units, which is withdrawn from the 1M BE\$ budget that can be spent on investment decisions guided by the WSP.
5	A severe drought period is hitting the country this summer, which is causing increased degradation of the water quality in waterways, including the river WOP. This impacts the quality of the supplied water, and your team starts with a +5 total risk score. In this context, priority is imposed at country level on the enforcement of industrial effluent quality regulations, and the State government will sponsor up to a third of the associated cost of this enforcement. Meanwhile, the State government has also imposed restrictions on commercial and domestic water use. The reduction in water demand is causing a decrease in revenue for the water company, which decides to reduce its contribution to the investment plan by 20%.
6	A large sewage pipe in the town centre is severely leaking, causing increased risks of contamination in the drinking water supply network in that area where leakage rate is high. This requires a large sector in the city centre to be put on boil-water recommendation, at an extra cost of 0.4 BE\$, while priority has to be given to leak repairs in the distribution system.

At the end of the round, the team summarizes the investment decisions made by filling in the requested information in all 4 columns of **Table 7**.

6.1 Final feedback session

The trainer should facilitate a final discussion, where each team presents the outcomes of Round 2, including justifications on linkages and influence of the stakeholders, and their investment decisions (control actions) selected with an associated impact on risk reduction and the stakeholders involved.

A comparison between the participants’ experience during rounds 1 and 2 is discussed, and feedback from the participants in the game and their experience is collected.

Guiding questions:

- ✚ What were the main differences that participants experienced between Round 1 compared with Round 2?
 - Was it challenging to define the connections between stakeholders in Round 2?
 - Was there consensus on the influence factor of each stakeholder? If not, why? And how did participants reach an agreement?

- ✚ What was the rationale behind the group's decisions on investment?

- ✚ Was there a heated discussion among the group members? If so, what were the triggers?

- ✚ Was everyone able to 'stick to' their role throughout the game or was there a tendency to choose the most reasonable option?

- ✚ Was there any group that decided not to invest the full budget of 4MBE\$? If so, why?

- ✚ If unexpected event cards were used, which were the outcomes of different groups? Which was the group that despite the unexpected event managed to get the highest risk reduction with the lowest investment?

- ✚ Which is the 'take home' message from playing this game?
 - Could participants appreciate the value of WSP while taking strategic decisions on investments?
 - Could participants relate the stakeholders' fragmentation experienced in the game to the situation in their own home country?
 - Would they recommend this game to fellow professionals in the water sector?

7. Practical guidance

The minimal number of participants to play this game is 7. As mentioned in Section 3, if the number of participants is greater than 7, but not a multiple of 7, there will be more than one person representing the same stakeholder within one group.

One trainer can supervise up to 2 groups, but the ideal configuration is to have one trainer per group.

The game could be linked to a specific ‘real case’ description, or can be based on the hypothetical case described in Section 4 of this document.

7.1 Timing

The different steps of the game in each round and their expected duration are indicated in **Table 9** below, with a total time planned of maximum 4 hours. The time can vary from group to group; this is an estimate of the maximum time needed to play the game.

Table 9. Steps and timing of the game

	Steps	Duration
Introduction	Introduction to the aim of the game	15 min
Round 1	Organization of the participants into teams	5 min
	Assessing the links between stakeholders	15 min
	Instructions for Round 1 by the trainer	5 min
	Examination of the case in teams	10 min
	Development of the investment plan	30 min
	Collection of outputs from the teams by the trainer	10 min
	Presentation of investment decisions by the teams (sub-groups)	15 min
	Total Round 1	90 min
Break	Transition to Round 2	15 min
Round 2	Instructions for Round 2 by the trainer	5 min
	Development of a new stakeholder configuration	20 min
	Development of the new (integrated) plan	30 min
	Collection of outputs from the teams by the trainer	10 min
	Presentation of investment decisions by the teams	15 min
	Total Round 2	80 min
Discussion	Feedback on both rounds	30 min
Total time		240 min

Depending on the context/training type, longer versions of this game can be played, e.g. by having participants themselves develop some additional control actions in the WSP table, and determining themselves who are the stakeholders involved for each of the control actions listed in the WSP table. These options are outlined below:

- Longer version (~5 hours): in order to make the game more challenging, different ‘unexpected event cards’ (**Annex 8**) can be distributed to each group during the second round of the game; these events will allow the diversification of scenarios and investment plans and ultimately will have an impact on the decision-making process.
- Longer version (~8 hours): in addition to using the ‘unexpected event cards’, the information provided in the high-risk table (Table 4) can be restricted as follows:

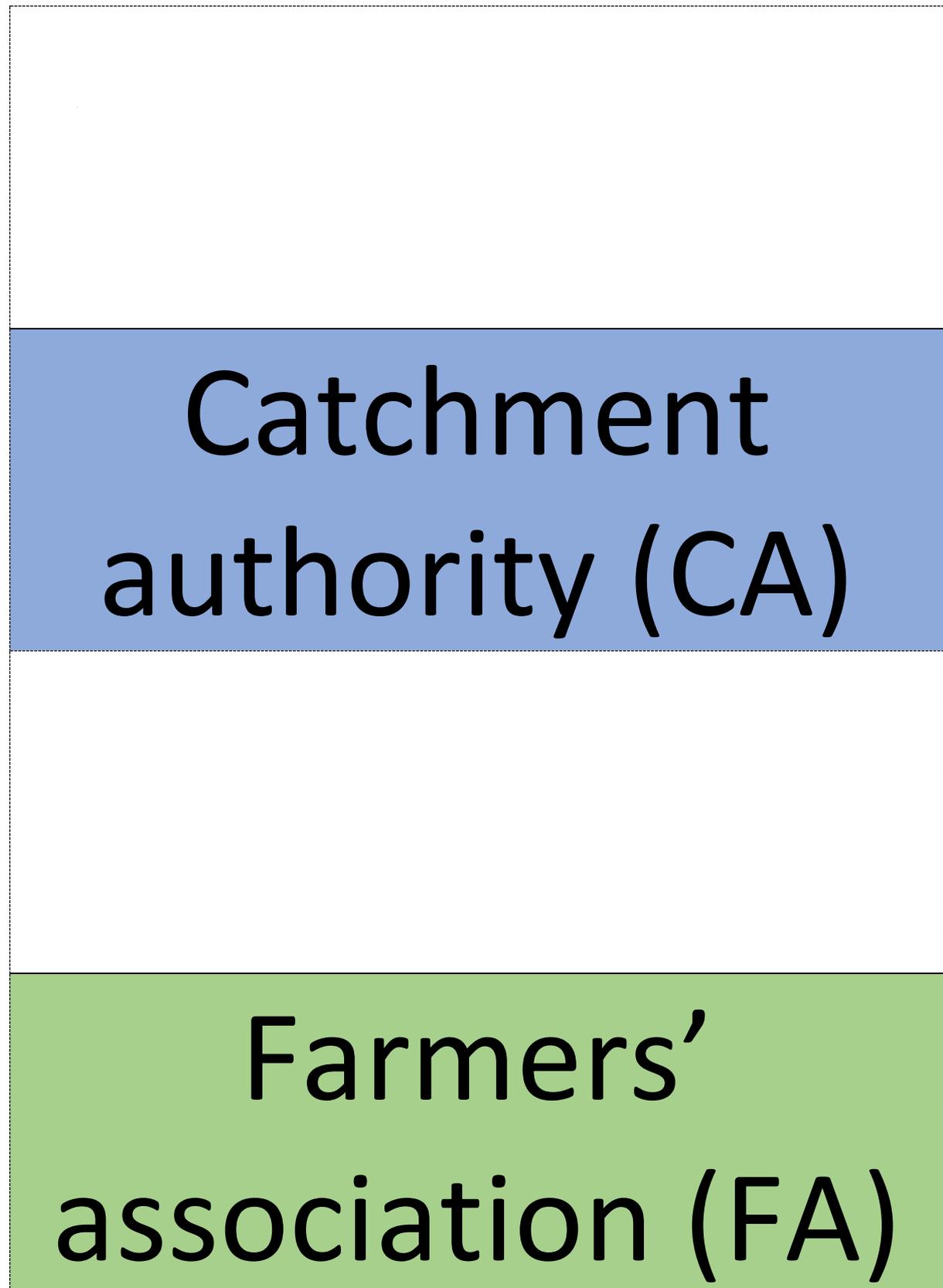
- a. High-risk hazards, their likelihood. Participants reason on their consequence, calculate the 'risk' and have to formulate control actions for each hazard. They also need to identify the stakeholders that are/should be involved in each control action. The trainer should then review the table(s) produced by the participants and complete the investment and water quality columns.
- b. In addition, participants could be asked to formulate 2 additional high-risk hazards in the table produced (using the material provided about the case), and complete the table for these hazards as well (likelihood, consequence, risk, control actions, and stakeholders' involvement).
- Shorter version (2-3 hours or less): If a shorter period of time is available to play the game, the following simplifications could be made:
 - a. Sub-groups A and B are formed within each team by the trainer at the beginning of Round 1;
 - b. A column is added at the right-hand side of Table 1 to specify at the outset the amount of money that each stakeholder can influence during the decision-making in each round;
 - c. A column is added at the right-hand side of Table 2 to rank the issues by political priority order in order to shorten the discussion by participants on which issue to address during Round 1 (sub-group A);
 - d. Additional restriction can be added in the instructions to sub-group A in Round 1 in order to force participants to fully fund each issue being addressed during the decision-making (e.g. no partial funding of issues, simplifying the investment plan).

8. Annexes

Annex 1. Detailed list of materials needed

Quantity needed	Item	Reference	Users	Round
1	Trainer's guidance manual	This document	Trainer	1, 2
1 per participant	Participant's guidance manual	Participant's guidance manual	Participants	1, 2
2 per team	A3 papers	-	Participants	1, 2
2 sets per team	Stakeholder role tags	Annex 2	Participants	1, 2
1 set per team	Stakeholder cards	Annex 3	Participants	1, 2
4 sheets per team	BE\$ bills	Annex 4	Participants	1, 2
1 per team	Local government's record of issues in water supply/water management raised over the past 5 years	Annex 5	Participants of sub-group A	1
1 per team	High-risk hazards and possible control actions identified through the WSP	Annex 6	Participants of sub-group B	1, 2
1 per team	Chart to illustrate investment decisions by each team	Annex 7	Participants	2
1 set	Unexpected event cards	Annex 8	Trainer	2

Annex 2. Stakeholder role tags for participants



Industry
(I)

Water supply
company (WC)

**Local
government (LG)**

**Min. of Public
Health (MH)**

Consumers (Co)

Annex 3. Stakeholder cards with roles and specific interests

Catchment authority (CA)

Role: Responsible for the integrated planning of ecosystem protection and coordination among users and polluters of water resources in the catchment.

Specific interest: Protection of environmental flows and water quality in the river WOP to sustain environmental health, recreation, and biodiversity.

Farmers' association (FA)

Role: The FA is an independent, non-governmental, membership-based rural organization. It can help farmers gain skills, access inputs, form enterprises, and also process and market their products more effectively to generate higher incomes. It can also assist its members purchase inputs and equipment, meet quality standards and manage the drying, storage, grading, cleaning, processing, packing, branding, collection and transportation of produce.

Specific interest: Access to reliable water source for irrigation during the dry season and maintain an economic relationship with the city as a market for its food stock all year round.

Industry (I)

Role: The industrial process plant manufactures chemicals on a large scale. The general objective is to create new material wealth via the chemical transformation and/or separation of materials. The plant uses specialized equipment, units, and technology in the manufacturing process. It is one of the major sources of new jobs in the city of BE.

Specific interest: Access to sufficient water resources and limiting the investment needed for complying with regulations on water discharge.

Local government (LG)

Role: Implementing national policy and strategy on environmental management. Environmental management policy is related to spatial planning and aimed at creating a healthy environment with clean air, water and soil by regulating emissions from road transport, industry and other sources. LG has both the legal and financial means to implement and enforce decisions and regulations. LG sets out the zoning guidelines for the location and expansion of residential, industrial and commercial areas within cities, towns and villages. LG is also responsible for enforcement of environmental regulations by large companies.

Specific interest: Maintain a good balance between the populations' health and support of economic activities in the area.

Water supply company BEnet (WC)

Role: Provide sufficient and safe drinking water to customers. BEnet treats surface water from the river WOP with a conventional treatment system followed by chlorination. Source water deterioration and an outdated infrastructure are making it difficult for BEnet to meet basic water quality standards. Customer satisfaction has been decreasing and it has been difficult for the water supply company to consider raising drinking water tariffs in order to support large investments in water treatment and supply infrastructure.

Specific interest: Customer satisfaction, financial sustainability and compliance with drinking water quality regulations.

Ministry of Public Health (MH)

Role: Advise the government, monitor the performance improvements in the health sector, support the planning and accountability functions of the health sector, regulate the sector and ensure legislative requirements are being met.

Specific interest: Protect public health by enforcing drinking water quality regulation.

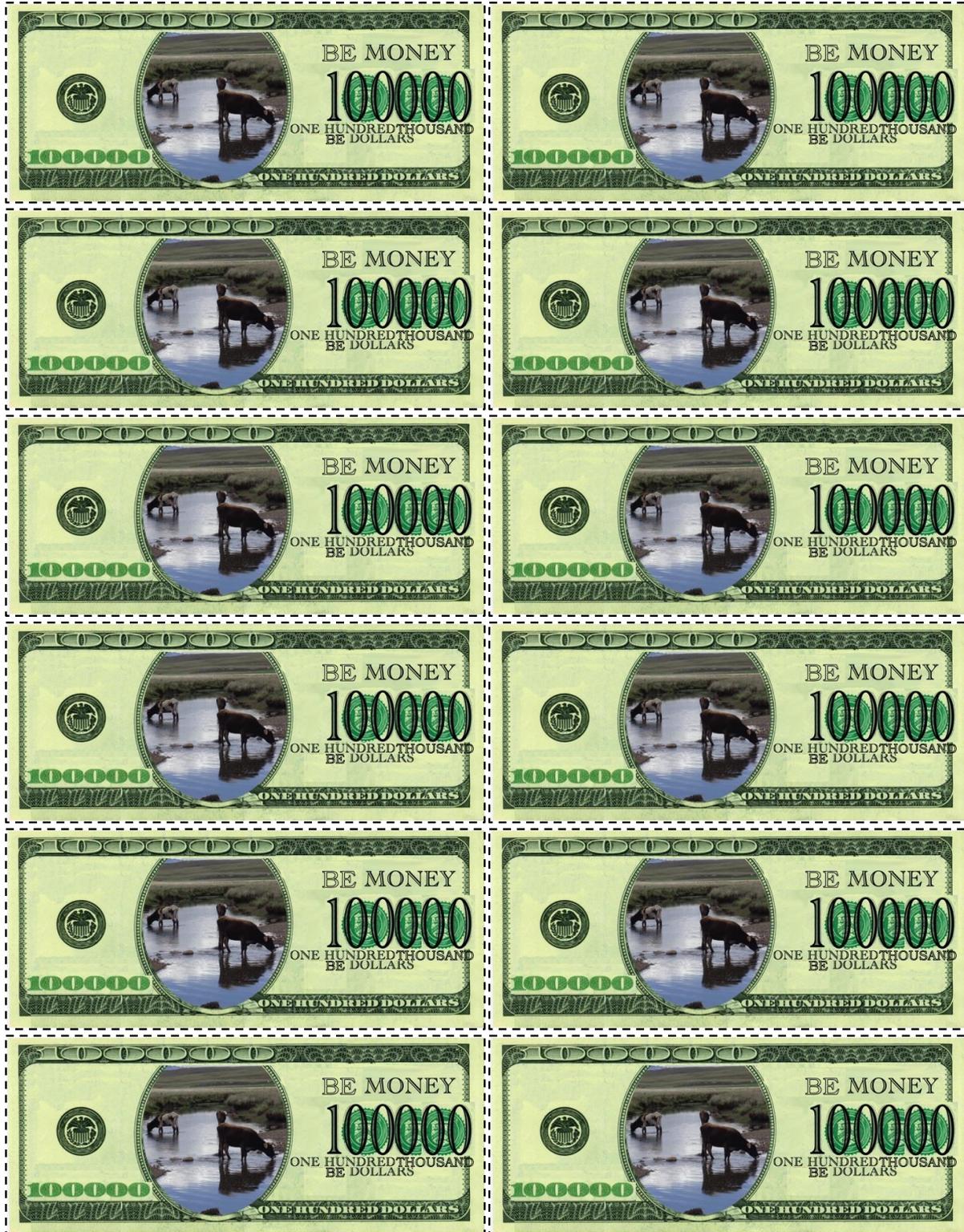
Consumers (Co)

Role: Purchase and use supplied drinking water. Customer satisfaction has been decreasing due to the number of recommendations to boil water being issued over the past few years. Consumers are objecting to the proposal of the water supply company to increase drinking water tariffs in order to support large investments in water treatment and supply infrastructure.

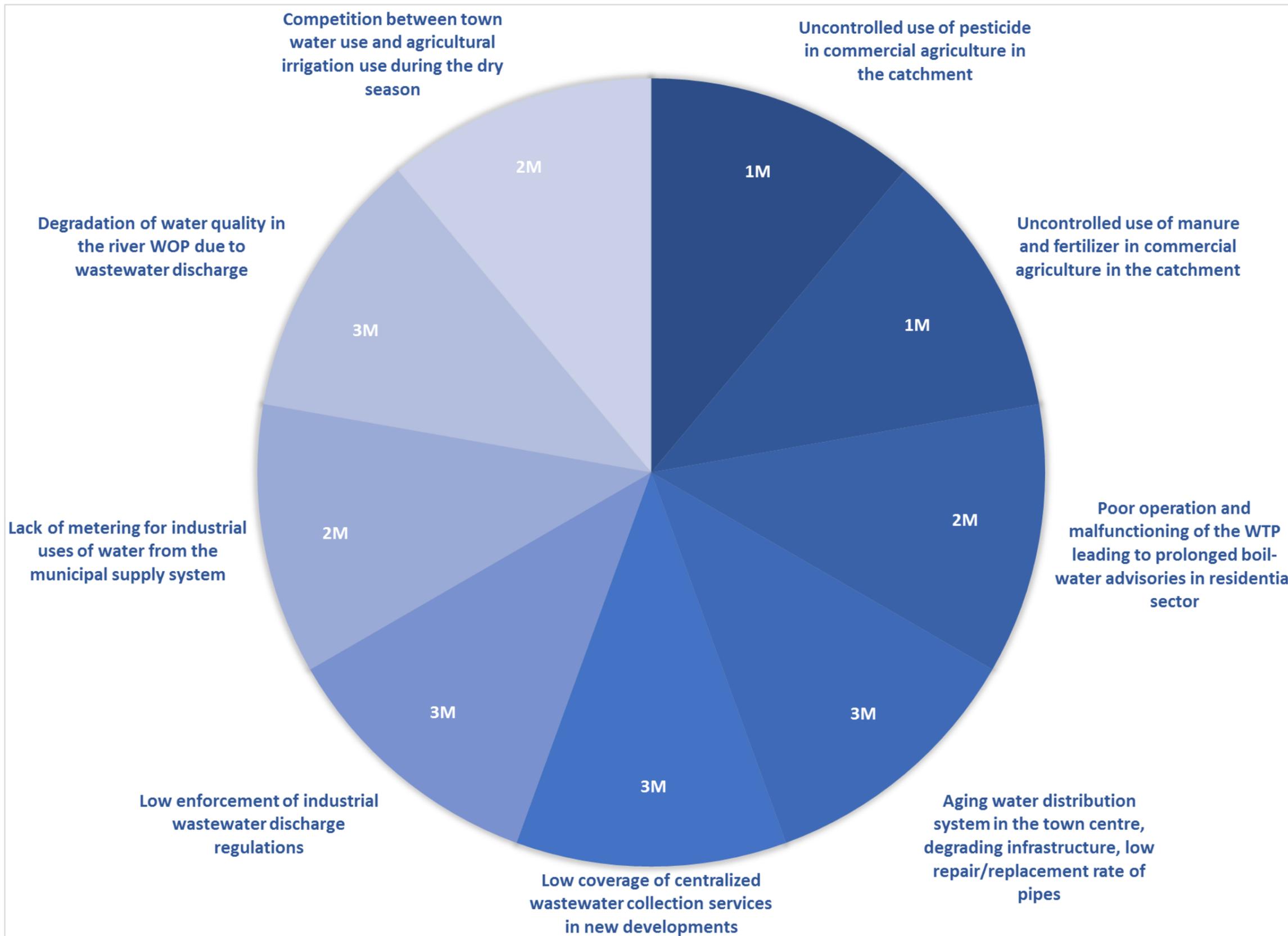
Specific interest: Access to safe and reliable water supply at the tap at an affordable price.

Annex 4. BE\$ bills

Note: 100,000 BE\$ bills; total 1.2M BE\$ per sheet: print 4 sheets per team for an entire game session and distribute according to the game instructions for each round.



Annex 5. Local government’s record of issues in water supply/water management raised over the past 5 years (sub-group A, Round 1) – [to be printed in A3 format](#)



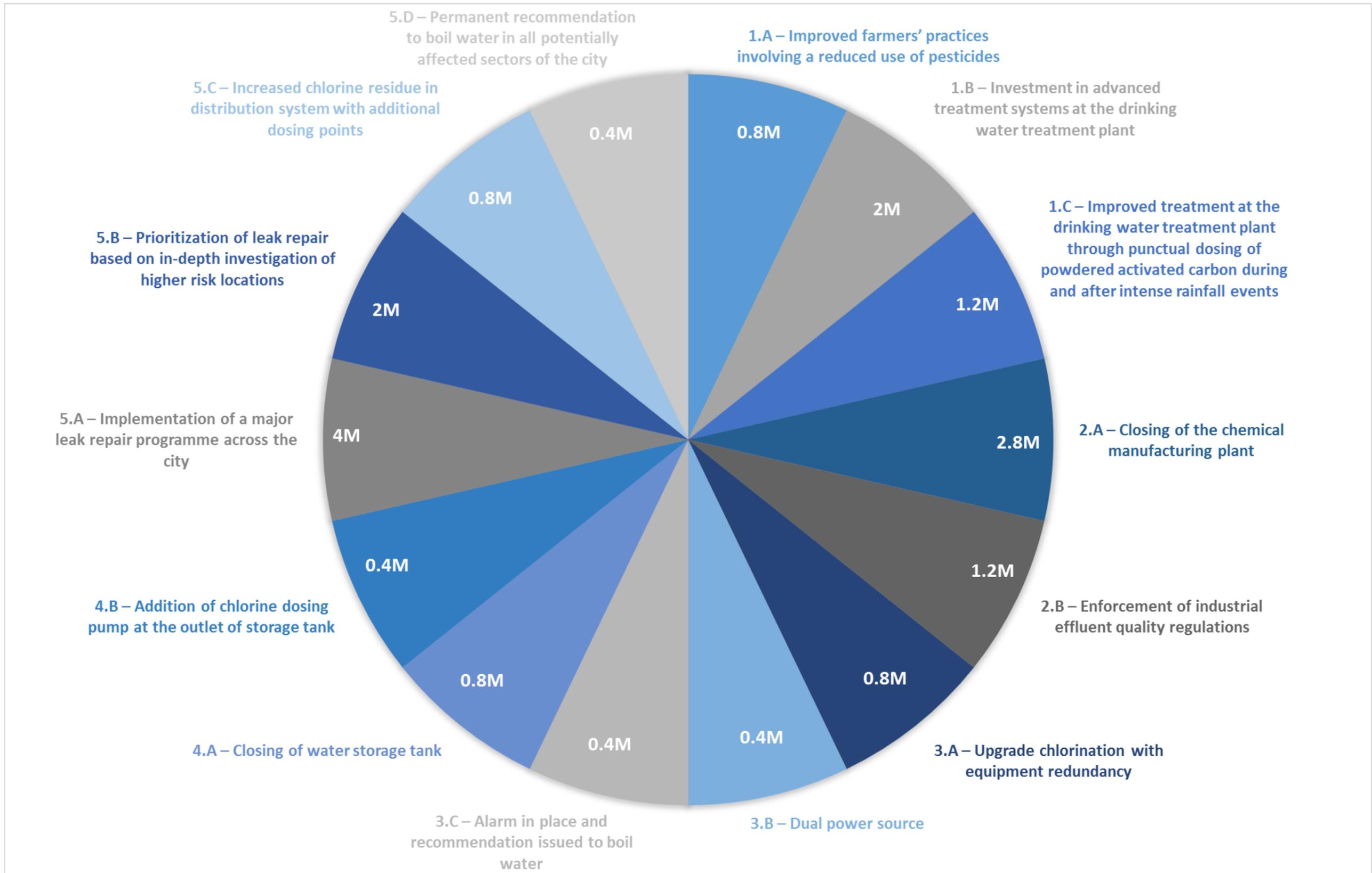
Annex 6. High-risk hazards and possible control actions identified through the WSP Table 5. – to be printed in A3 format

	Hazards	Likelihood	Consequence (severity)	Risk (high and very high)	Control action	Investment (BE\$)	Risk after implementing the control action	Stakeholders involved/ remarks
1	Pesticides from agricultural uses	4	3	12	1.A – Improved farmers’ practices involving a reduced use of pesticides	0.8M	9	<i>*Requires close collaboration with farmers and coordination throughout the catchment authority</i>
					1.B – Investment in advanced treatment systems at the drinking water treatment plant	2M	3	
					1.C – Improved treatment at the drinking water treatment plant through punctual dosing of powdered activated carbon during and after intense rainfall events	1.2M	6	<i>*Requires close collaboration with the catchment authority for accurate and timely information on rainfall events</i>
2	Solvent from industrial effluents	4	4	16	2.A – Closing of the chemical manufacturing plant	2.8M	0	<i>*Involves job losses for several residents of BE</i>
					2.B – Enforcement of industrial effluent quality regulation	1.2M	4	<i>*Probably requires industries to collaborate to treat effluents before discharging to the river, coordination through catchment authority</i>
3	Failure of chlorine disinfection process at the drinking water treatment plant	3	5	15	3.A – Upgrade of chlorination with equipment redundancy	0.8M	5	
					3.B – Dual power source	0.4M	10	
					3.C – Alarm in place and issue of recommendation to boil water	0.4M	15	<i>*Involves poor service quality for several residents of BE, requires coordination through local government and Ministry of Public Health for dissemination of recommendations and community outreach</i>
4	Uncovered clear water storage tank with potential contamination from bird defecation	4	5	20	4.A – Closing of water storage tank	0.8M	0	
					4.B – Addition of chlorine dosing pump at the outlet of storage tank	0.4M	10	
5	Leaks in distribution system with potential microbial contamination	3	5	15	5.A – Implementation of major leak repair programme across the city	4M	0	<i>*Requires coordination with the local government for planning of repair works</i>
					5.B – Prioritization of leak repairs based on in-depth investigation of higher risk locations	2M	5	<i>*Requires coordination with the local government for planning of repair works</i>
					5.C – Increased chlorine residual in distribution system with additional dosing points	0.8M	10	<i>*Involves potential loss of service quality in terms of taste/customer preferences</i>
					5.D – Permanent recommendation to boil water in all potentially affected sectors of the city	0.4M	15	<i>*Involves poor service quality for most residents of BE, requires coordination through local government and Ministry of Public Health for dissemination of recommendations and community outreach</i>

Notes:

- c. Important: In Round 1, some of the control actions listed in the WSP table are not feasible, as they require collaboration with stakeholders outside this sub-group. This means that, in Round 1, participants can only select the control actions that do NOT require coordination.
- d. In both rounds: It is not possible to partially invest in one control action from this table (control actions that are only partially funded are considered not to be implemented/not effective).

Annex 7. Chart to illustrate investment decisions by a team (Round 2) – to be printed in A3 format



Annex 8. Unexpected event cards

A large sewage pipe in the city centre is severely leaking, causing increased risk of contamination in the drinking water supply network in the area where the leakage rate is high.

This requires a large sector in the centre to be given a recommendation to boil water, at an extra cost of 0.4 BE\$, while priority has to be given to leak repairs in the distribution system.

Poor influent quality and operational problems at the treatment plant have caused half of the filtration units to become completely clogged.

The water utility has to spend 0.4M BE\$ on upgrades and maintenance costs of the filtration units, which is taken from the 1M BE\$ budget that can be spent on investment decisions guided by the WSP.

The farmers are going on strike to protest at the low market price of their products.

Cooperation with the farmers is prevented during the development of the investment plan.

Extreme rainfall events have caused major flood damage in the city.

The local government has agreed with the funding agency that 1M BE\$ from the initial allocated budget for water supply interventions (3M BE\$) will be re-allocated to flood control and rehabilitation of damaged infrastructure.

International guidelines on drinking water quality have recently been updated; accordingly, the Ministry of Public Health requires your investment plan to comply with stricter water quality standards, requiring an overall risk reduction of 50 points.

If this is not possible with the money available, the stakeholders involved will need to negotiate on who will apply for a loan in order to finance the additional control actions required.

A severe drought period is hitting the country this summer, which is causing increased degradation of the water quality in waterways, including the river WOP. This is impacting the quality of supplied water, and your team starts with a +5 total risk score. In this context, priority on the enforcement of industrial effluent quality regulation is imposed at the country level, and the State government will sponsor a third of the associated cost of this enforcement. Meanwhile, the State government has also imposed restrictions on commercial and domestic water use. The reduction in water demand causes a decrease in revenue for the water company, which decides to reduce its contribution to the investment plan by 20%.