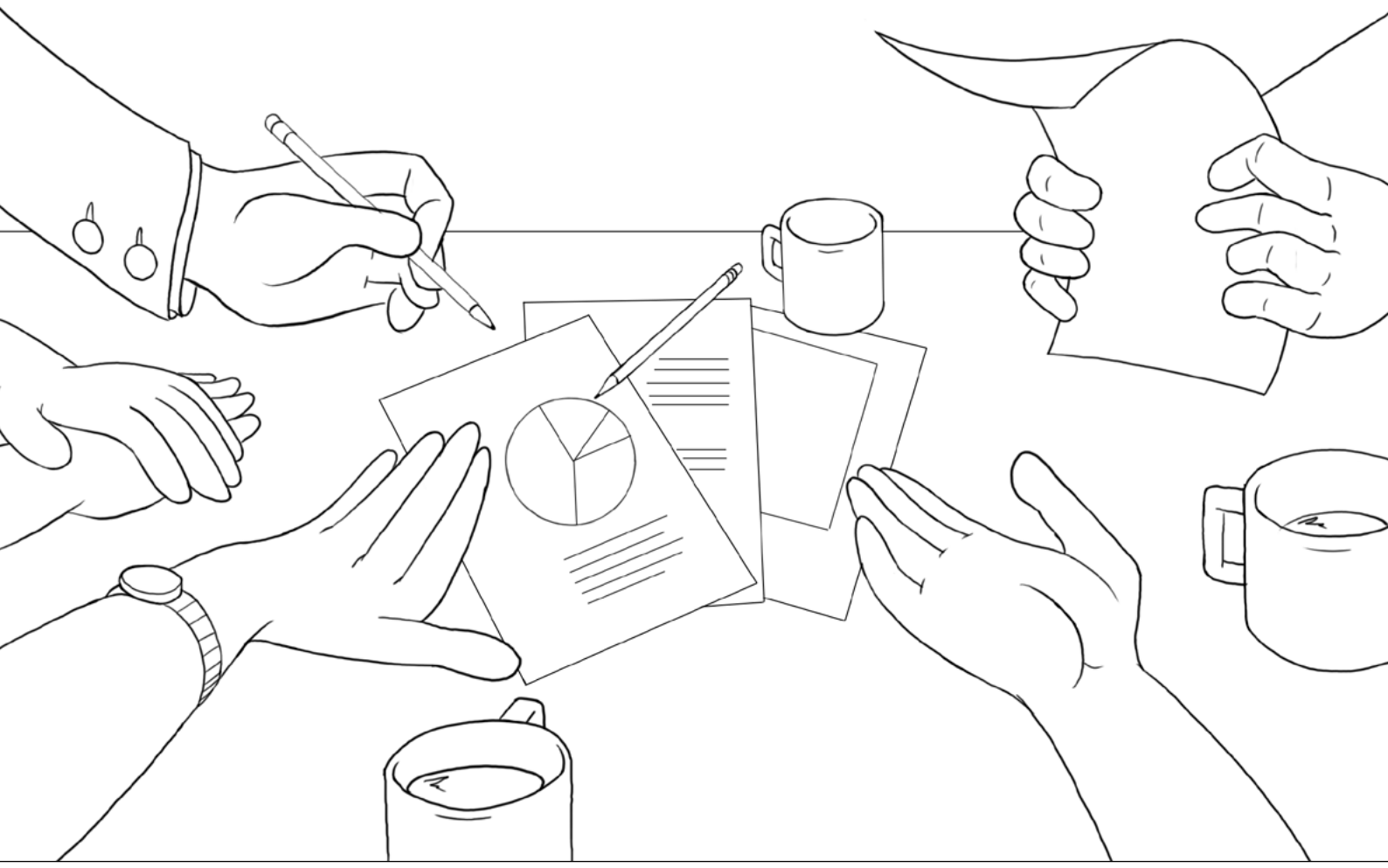
BEWOP

TOOL SERIES

Stakeholder Collaboration in Water Safety Plans

OPERATIONAL TOOL | ROLE-PLAY GAME

USER'S MANUAL



GWOPA Global Water Operators' Partnerships Alliance

UN HABITAT FOR A BETTER URBAN FUTURE

UNESCO IHE DELFT

A joint initiative of GWOPA/ UN-Habitat and IHE Delft Institute for Water Education

Ministry of Foreign Affairs of the Netherlands

Cooperación Española

Funded by the Dutch Ministry of Foreign Affairs and the Spanish Agency for International Development Cooperation

Principal Authors
Giuliana Ferrero, g.ferrero@un-ihe.org
Françoise Bichai, fbichai@polymtl.ca

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 Mpeta, Edmond Mutugi Mugambi, Berverly 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 Kavu, Abdi Muleta, Biar Biar, Hilmer Bosch, Julius Maxi Omuut, Momodou Sankareh, and Isaac Barnes.

BEWOP

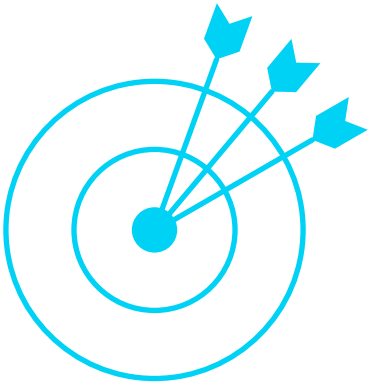
Water Operators' Partnerships are peer support arrangements between two or more water and sanitation operators, carried out on a not-for-profit basis with the objective of strengthening operator capacity.

The Boosting Effectiveness of Water Operators' Partnerships (BEWOP) initiative is producing a series of guidance materials, tools and games to help WOP partners expertly plan and implement WOP partnerships and effectively learn and share knowledge with one another.

Two types of products feature in the second phase of this BEWOP initiative. Process Tools support WOP participants prepare for, design, implement and follow through with their WOPs. Operational Tools support in the transfer of knowledge on specific operational topics relevant for water utilities.

Find out more

bewop.un-ihe.org | **BEWOP.org** | **#BEWOP**



Objectives

This tool aims to provide users with the opportunity to experience the importance of stakeholders' engagement in WSPs, particularly in the decision-making process when investing in rehabilitation and maintenance of a drinking water supply system.

The game can be used in WSP training or during an educational activity on water safety and WSP at graduate and post-graduate institutes.

How this tool works

1 Participants are organized into groups of 7. Each participant represents one stakeholder.

2 **Round 1:** Not all stakeholders in the groups are connected. The groups of 7 are divided into 2 sub-groups representing A) the local government and B) the water supply company. The sub-groups have to make decisions on an investment plan, but are lacking comprehensive information on the water supply system and communication between the sub-groups is forbidden.

3 **Round 2:** Sub-groups A and B re-join their main group of 7. Participants can decide on the type of stakeholder relations they have between one another and on the "weight" of each stakeholder in the decision-making process. The investment plan is based on the prioritization of risks contained in the WSP.

Contents

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.

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.

3. Flow of the game

3.1 Forming the teams

Participants are divided into groups of 7 and each group will take place at one of the round tables, as shown in **Figure 1**.

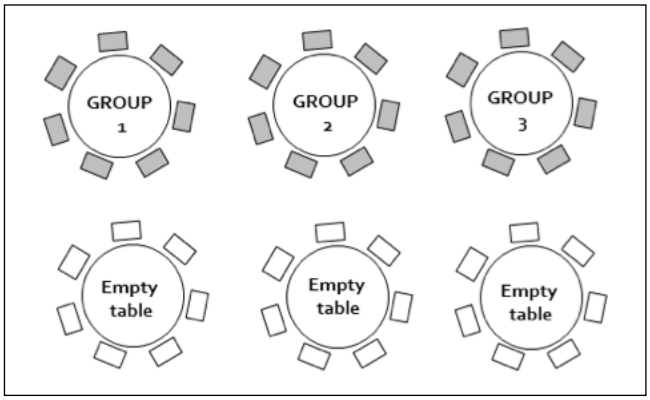


Figure 1. Room layout (example with 21 participants)

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.

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.

Each group will 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.

After selecting the roles, participants are given a 'role tag' to identify the stakeholder they represent and a 'stakeholder card' containing the description of their role and the specific interest of the stakeholder they are representing.

The game consists of two rounds. Before starting with the game, take 5–10 min to individually 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.

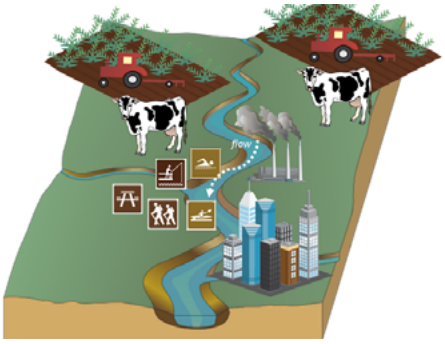


Figure 2. City of BE on the shore of the river WOP, showing key activities in the catchment

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. Each stakeholder reads the description of his/her role written on the 'stakeholder card' to the rest of the group.

b. Based on the links between stakeholders presented in **Table 1**, stakeholders have to use an A3 paper located in the centre of the round table to draw the configuration of links. Stakeholders will only be allowed to exchange information with 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 fg.armers' 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. Each group separates 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).

d. Communication between the two sub-groups is forbidden during this first round.

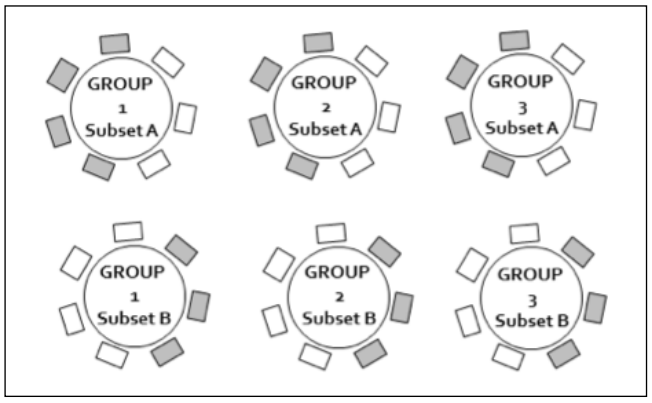


Figure 3. Room layout (Round 1)

e. At the beginning of Round 1, 2 stakeholders at the table have money: 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.

f. Each stakeholder is requested to take note of their 'influence factor' indicated in **Table 1**, which will determine their (financial) influence on decisions made during this round.

Each sub-group should follow the instructions in Section 5.1 (subgroup-A) or Section 5.2 (sub-group-B).

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**, 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 = (influence factor) * (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**.

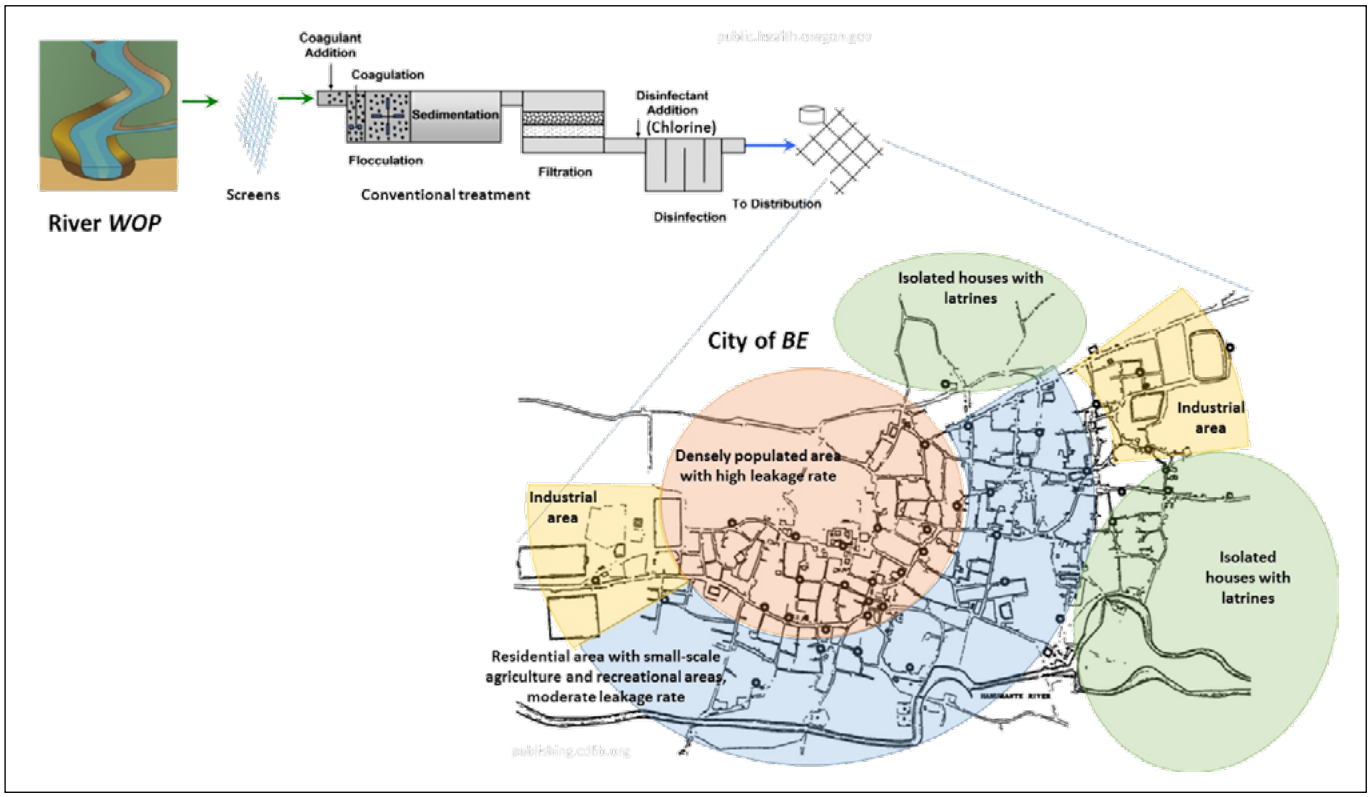


Figure 4. Description of the water supply system managed by BEnet: the water treatment plant and distribution system

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 by sub-group A (Round 1)

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

Notes:

Investment decisions: Specify which issue is being addressed and how (what measure is being implemented).

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 5).
- 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
1	Pesticides from agricultural uses	4	3	12	1.A – Improved farmers' practices involving a reduced use
					1.B – Investment in advanced treatment systems at the dri plant
					1.C – Improved treatment at the drinking water treatment dosing of powdered activated carbon during and after int
2	Solvent from industrial effluents	4	4	16	2.A – Closing of the chemical manufacturing plant
					2.B – Enforcement of industrial effluent quality regulations
3	Failure of chlorine disinfection process at the drinking water treatment plant	3	5	15	3.A – Upgrade of chlorination with equipment redundancy
					3.B – Dual power source
					3.C – Alarm in place and recommendation issued to boil w
4	Uncovered clear water storage tank with potential contamination from bird defecation	4	5	20	4.A – Closing of water storage tank
					4.B – Addition of chlorine dosing pump at the outlet of sto
5	Leaks in distribution system with potential microbial contamination	3	5	15	5.A – Implementation of a major leak repair programme a
					5.B – Prioritization of leak repair based on in-depth investi locations
					5.C – Increased chlorine residue in distribution system wit
					5.D – Permanent recommendation to boil water in all pote the city

	Investment (*BE$*)	Risk after implementing the control action	Stakeholders involved/ remarks
e of pesticides	0.8M	9	**Requires close collaboration with farmers and coordination through the catchment authority*
nking water treatment	2M	3	
plant through punctual tense rainfall events	1.2M	6	**Requires close collaboration with catchment authority for accurate and timely information on rainfall events*
	2.8M	0	**Involves job losses for several residents of BE*
s	1.2M	4	**Probably requires industries to collaborate to treat effluents before discharging to the river, coordination through catchment authority*
y	0.8M	5	
	0.4M	10	
water	0.4M	15	**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*
	0.8M	0	
orage tank	0.4M	10	
cross the city	4M	0	**Requires coordination with the local government for planning of repair works*
gation of higher risk	2M	5	**Requires coordination with the local government for planning of repair works*
h additional dosing points	0.8M	10	**Involves potential loss of service quality in terms of taste/customer preferences*
ntially affected sectors of	0.4M	15	**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*

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).

Table 5. Summary of investment decisions made by sub-group B (Round 1)

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

5.3 Wrap-up round 1

- At the end of Round 1, sub-group A presents to sub-group B and the trainer their expectations in terms of their investment plan, based on their internal discussion, and explains how decisions were made. Then, sub-group B presents 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.

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, money (*BE*$ bills) is distributed 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.

a. Participants 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.

b. 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?

c. 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 *BEnet* (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. This can be illustrated using a chart (given by the trainer) representing the possible control actions and respective amounts; 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.

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)			

Notes

Created under
BEWOP

Supporting the implementation of
SUSTAINABLE DEVELOPMENT GOALS

IMPLEMENTING THE NEW URBAN AGENDA

GWOPA Global Water Operators' Partnerships Alliance
UN HABITAT FOR A BETTER URBAN FUTURE
UNESCO IHE DELFT
Ministry of Foreign Affairs of the Netherlands
Cooperación Española