ADAPTIVE PLANNING FOR SUSTAINABLE WASH

a cross-cultural research

by Niki Versteeg

Adaptive planning for Sustainable WASH

This research contributes to a sustainable WASH sector. It recommends that WASH programmes should be planned in an adaptive way whereby essential features of adaptive planning approaches should be performed by different stakeholders, when working in environments where incentives are on benefits and not on robustness.

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Simavi

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‘ I may not have gone where I intended to go, but I think I have ended up where I intended to be.’

[Douglas Adams – The Hitchhikers guide to the Galaxy, 1981]

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I have always been intrigued by interaction between different cultures. This brought me to Jordan where I was introduced to development aid and found it remarkable to see how many organisations from all over the world - with totally different strategies – tried to contribute to the lives of refugees. I found it hard to understand that this could lead to long-term improvements for the refugees and as well as for the country itself. My interest started to grow about how international donor organizations operate. With this research I hope to make WASH development aid a bit more future proof.

I would like to thank my graduation committee, Prof. dr. Bartel van de Walle, Dr. ir. Leon Hermans and Dr. ir. Maurits Ertsen who provided guidance during my research process. Especially to Leon Hermans who dedicated a lot of his time to my research. I always walked out of our meeting motivated to continue researching and actually started all the meeting motivated to tell what I experienced and discovered too. I value the way you guided this research journey, that for sure contributed to the fact that I experienced the last couple of months as joyful.

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Niki Versteeg

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ABBREVIATIONS

ADB	Asian Development Bank
ATP	Adaptation tipping point
DMA	District metering areas
DPHE	Department of Public Health Engineering
GDP	Gross Domestic Product
JICA	Japan International Cooperation Agency
KCC	Khulna City Corporation
KDA	Khulna Development Authority
Khulna WASA	Khulna Water and Sewage Authority
KWSP	Khulna' Water Supply Project
LGD	Local Government Division
LGED	Local Government Engineering Department
NGO	Non-governmental organization
NRW	non-revenue water
PME	Planning Monitoring Evaluation
ToC	Theory of Change
UN	United Nations
WASH	Water Sanitation and Hygiene

EXECUTIVE SUMMARY

This research emerged from the need to improve the Netherlands' contribution to international water and sanitation service delivery. Over the previous two decades these serviced were not found to be sufficient sustainable according to the Dutch Ministry of Foreign Affairs (2013). This problem has led to the water, sanitation and hygiene (WASH) programmes having less impact than envisaged in terms of improved health. Sequentially, planning approaches of development aid organisations were brought to attention because these approaches visualize how services and infrastructure are able to keep functioning after construction of rehabilitation (Ministry of Foreign Affairs, 2016). This thesis researches how development aid organisations can contribute to sustainable WASH services by looking to the strategic planning process.

Development aid organisations face a challenging paradox. On the one hand, they set themselves ambitious poverty-reduction objectives which unavoidably come with uncertainty; on the other hand, development organisations are often pressured by Results-Based approaches to claim that their interventions can be achieved with minimum risk of failure. Although development organisations are aware that changing future conditions are expected to have significant implications for their WASH interventions and will be accompanied by uncertainty, they do not have a systematic step in their strategic planning approach to systematically cope with future uncertain conditions. According to different scholars, *adaptive* planning approaches can be used to design sustainable plans under uncertainty (Haasnoot, Kwakkel, Walker, & ter Maat, 2013; Hermans, Haasnoot, ter Maat, & Kwakkel, 2017; Kwakkel, Walker, & Marchau, 2010; Marchau, Walker, & van Duin, 2008; Ranger et al., 2010; Walker, Haasnoot, & Kwakkel, 2013).

In this research an adaptive planning approach is designed to contribute to long-term sustainable WASH services. It is a systematic step-wise pro-active approach where planners need to think beforehand of ways a plan might fail and design adaptation actions to guard against such failure. An adaptive planning approach has been adapted for sustainable WASH services and consist of three systematic steps:(1) defining the impact and critical assumptions of the WASH programme, (2) defining relevant uncertainties by using contextual scenarios, and (3) defining adaptation actions and the timing of the actions.

The content and the applicability of the adaptive planning approach for long-term sustainable WASH has been examined during this research in the context of Bangladesh. To examine the approach a single case study is used. In this research multiple research methods have been applied to improve the reliability and validity of the findings, but also to capture different perspectives on this topic. First by means of an adaptive planning workshop in the Netherlands with WASH experts from the Dutch NGO Simavi and sequential by means of a field-research in Bangladesh, including interviews with local project stakeholders and field-trips.

Khulna' Water Supply Project (KWSP) in Khulna, Bangladesh, is used as case study to examine the steps of the designed adaptive planning approach for long-term sustainable WASH. This project is a collaboration between the Asian Development Bank, Japan International Cooperation Agency, the government of Bangladesh and Khulna Water and Sewage Authority. The project aims to contribute to *expanded and reliable access to potable water in Khulna city.*

It can be concluded that WASH experts in the Netherlands and the project stakeholders in Bangladesh reacted differently on the three systematic steps of the adaptive planning approach for sustainable WASH. The indirectly involved project stakeholders - WASH experts - found it easy to question project assumptions and to identify critical assumptions for the project failure but could not propose specific adaptation actions. The directly involved project stakeholder - local project stakeholders in Bangladesh - found it more difficult to criticize and reassess project assumptions, but they defined feasible adaptation actions.

It appeared that disputable content of the critical assumptions caused project failure and the adaptation actions, therefore, seemed to be corrective actions; to account for the assumptions that have clearly lost validity. The

actions became reactive actions instead of proactive actions. The actions need to be implemented immediately because the thresholds beyond which the current plan fails to meet their objectives is already reached.

It can be argued that 'misrepresentation' of critical assumptions of the project created hazard to all sequential steps of the adaptive planning approach for long-term sustainable WASH services. In a sector where most project incentives are on benefits, the main problem in major infrastructure developments is pervasive misinformation about the costs, benefits, and risks involved (Flyvbjerg, 2007). Different scholars conducted research on problems and their causes in policy and planning for large-infrastructure projects (Flyvbjerg, 2007; Lovallo & Kahneman, 2003; Treasury, 2003). Strategic misrepresentation can be considered as incentive for the disputable content of the critical assumptions. Competition between projects and authorities creates political and organizational pressures that in its turn create an incentive structure that makes it rational for project promoters to emphasize benefits and deemphasize costs and failure. A project that looks highly beneficial on paper is more likely to get loan than one that does not (Flyvbjerg, 2007).

Purposely defining scenarios of success and gloss over the potential for failure, conflicts with the pro-active adaptive planning approach to define adaptation actions at the begin of the project. Therefore, it is questionable whether all systematic steps of the approach serve the interest of all project stakeholders. This makes that the adaptive planning approach, as it is designed now, does not contribute to long-term sustainable WASH services in environments where project incentives are on benefits and not on robustness.

Based on the findings of this research, it can be recommended that different components of the adaptive planning approach for long-term sustainable WASH services should be practices by different involved parties:

- Independent (not directly involved) WASH experts have to identify and review critical assumptions for project impacts
- Direct involved project stakeholders, via scenarios, have to identify adaptation actions
- An analyst or planning expert has to facilitate these steps and prepare the necessary inputs

The above recommendation is formulated for long-term sustainable WASH services but can be a recommendation for other sectors as well; sectors where directly involved project stakeholders are not willing and/or capable to independently identify and review critical assumptions for project impacts but are willing to plan their projects in an adaptive way.

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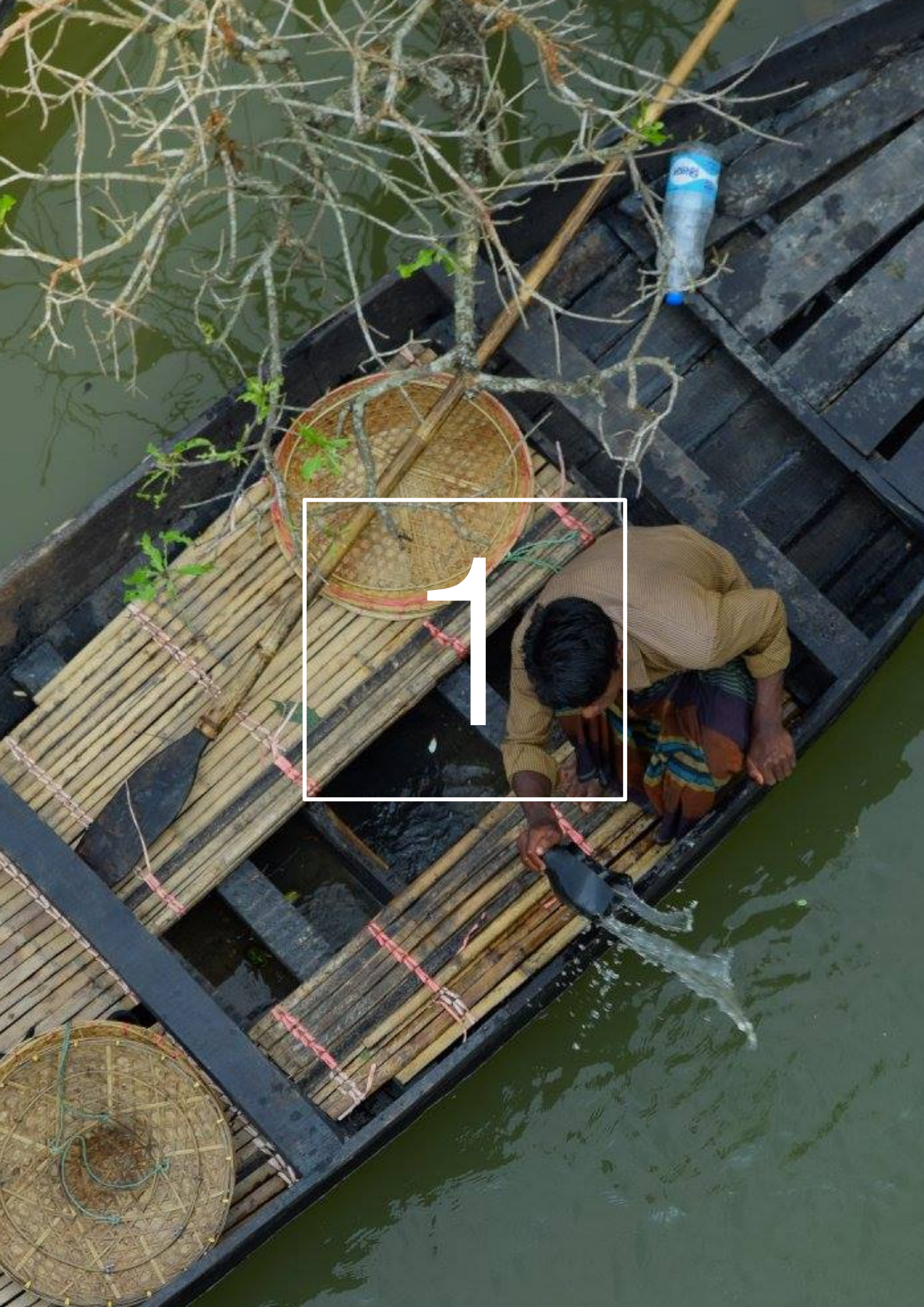
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INTRODUCTION

Chapter 1

This chapter is structured around six paragraphs. Together they will provide an introduction to this research. This chapters starts with a paragraph on the context of the research and continues with substantiated theory, the research challenge, the research objectives, the methodology. It ends with a reading guide to assist the reader to understand the organizational structure of this thesis.

1.1 Context of the research

Investing in building a strong WASH sector to meet the UN Sustainable Development Goals 6.1 & 6.2 is a priority of the Dutch Government (Global Citizens, 2015). In 2013 the Dutch Policy and Operations Evaluation Department of Foreign Affairs conducted a policy review of the Netherlands' contribution to improving drinking water and sanitation over the previous two decades, identifying lessons learned and making several important recommendations (Ministry of Foreign Affairs, 2013). Its main findings were that water and sanitation service delivery was not sufficiently sustainable. This problem has led to the water, sanitation and hygiene (WASH) programmes having less impact than envisaged in terms of improved health. After publication of this review, efforts in the area of sustainability were stepped up (Ministry of Foreign Affairs, 2016).

All Dutch official development aid investment in water supply and sanitation will carry a 15-year sustainability clause, requiring services and infrastructure to function for up to 15 years after construction or rehabilitation. Sequentially, planning approaches of development aid organisations were brought to the attention because these approaches visualize how services and infrastructure are able to meet the 15-year sustainable clause (Ministry of Foreign Affairs, 2016). This thesis researches how development aid organisations can contribute to sustainable WASH services by looking to the strategic planning process. To obtain deeper understanding of this topic, this research focuses on one Dutch non-governmental development organization, Simavi.

Simavi is a Dutch non-governmental development organisation, who strives for; a world in which good health is accessible to all, since good health is the first step towards building a better existence and creating a way out of poverty. They aim to provide full coverage with sustainable WASH services for all the areas they work in. These sustainable WASH services contribute to the impact Simavi strives for (Simavi, 2017c). Their programme strategies aim to achieve successful impact by carrying out activities that produce certain output for specific stakeholders. For example, Simavi facilitate community meeting to map current water governance structures; engage local government partners to ensure they fulfil their roles and responsibilities; organize advocacy activities with policymakers at different levels; and train school management committees and health centre staff members on operation and maintenance of WASH facilities. It is when stakeholders utilize the outputs and experience a benefit (outcome) as a result. These outcomes may contribute together with other development interventions (Spreckley, 2009) to Simavi' aimed impact.

1.2 Theory

Earl, Carden, and Smutylo (2001) argue that the 'impact' of a programme is nested as the last stage of the results-chain. This implicates that the impact of a programme is associated with the future. Sequential to this, they argue that the more successful the programme, as it moves towards the impact stage, the more influence is supplanted by local stakeholders. It is here, where developments organisations' control is low. The results-chain in combination with the level of control is illustrated in figure 1.

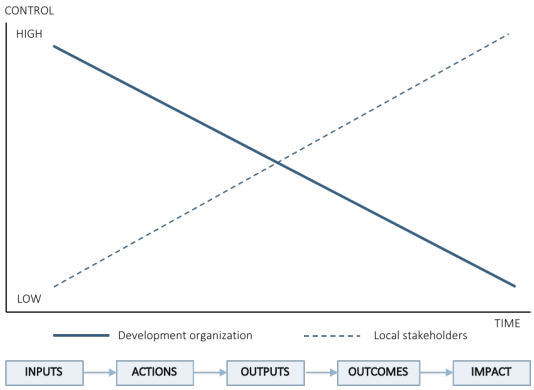

Figure 1: Relative control towards impact (Earl et al., 2001)

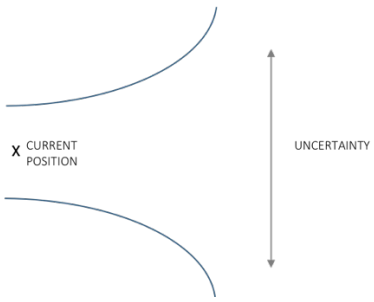

Figure 2: 'Trumpet of uncertainty'(Rosenhead & Mingers, 2001)

Thus, organisations' control decreases overtime. Alongside it can also be argued that uncertainty increases when considering events in the future. Rosenhead and Mingers (2001) present this by the 'trumpet of uncertainty' opening out into a wide bell (figure 2). Therefore, one must be aware that striving for impact will be accompanied by uncertainty. Many of these uncertainties are beyond the direct control of development organizations. Such decision making problems are now frequently labelled as decision making under uncertainty (Lempert, 2003; Volkery & Ribeiro, 2009; Walker, Marchau, & Swanson, 2010).

Development organisations, like Simavi, face a challenging paradox. On the one hand, they set themselves ambitious poverty-reduction objectives which unavoidably come with uncertainty; on the other hand, development organisations are often pressured by results-based approaches to claim that their interventions can be achieved with minimum risk of failure. This is what the policy review of the Netherlands' contribution to improving drinking water and sanitation argues as well (Ministry of Foreign Affairs, 2013). Therefore, development organisations have to be able to protect their plan from failure to meet high-level sustainable objectives, while they face uncertainty and have a limited span of control.

According to Haasnoot, Middelkoop, Van Beek, and Van Deursen (2011), *sustainability* has often been summarized as meeting economic, environmental, and social objectives now and in the future. They argue that given the uncertain changing conditions many development organizations are facing nowadays, a sustainable plan is not only one that is able to achieve objectives related to society, economy, and environment, but a sustainable plan should also be *robust*, meaning that it performs satisfactory under a wide variety of future, and *adaptive*, meaning that it can be adapted to changing future conditions. According to Walker, Haasnoot, & Kwakkel (2013) *adaptive* planning approaches can be used to design sustainable plans under uncertainty.

1.3 Research challenge

The policy review of the Ministry of Foreign Affairs (2013) did not only elaborate on the past WASH interventions but expresses also their thoughts about changing future conditions which are expected to have significant implications for WASH interventions such as population growth, urbanization and changing consumption patterns, environmental degradation and climate change, financial sustainability and migration. Other than that development organisations take economic, environmental, and social objectives into consideration, they should implement plans that can be adapted to changing future conditions. Therefore, there will be researched how an adaptive way of planning would be applicable to development aid organisations in order to cope with future uncertain conditions to contribute to sustainable WASH services. For this, the research will first elaborate on the Results-Based planning approach, as currently used in development aid (Menon, Karl, & Wignaraja, 2009), then

aims to complement this approach by designing an adaptive way of planning and as last examine this adaptive planning approach by means of triangulation approach. Insights of the Dutch NGO Simavi will be used to consider the operational side of development aid.

1.4 Research objectives

This thesis researches if an adaptive planning approach, which will be designed, can contribute to better planning for long-term sustainable WASH services and researches how the approach can be complementary to the strategic planning approach of development organisations. This leads to the following research question that needs to be answered:

How can an adaptive planning approach conducted by development organisations contribute to long-term sustainable WASH services?

In order to answer this question, the research question is divided in five sub-questions:

1. How do development organisations strategically plan their programmes to reach project impacts?
2. How can an adaptive way of planning complement current strategic planning approaches of development organisations?
3. How do development organisations interpret the systematic steps of the adaptive planning approach for long-term sustainable WASH services?
4. How do local stakeholders interpret the systematic steps of the adaptive planning approach for long-term sustainable WASH services?
5. How does an adaptive planning approach for sustainable WASH contribute to long-term sustainable WASH services?

1.5 Methodology

This section describes the methodology that is used in this thesis to research the objectives. This research consists of three sequential components; diagnosis & design, intensive research and synthesis. In the diagnosis & design phase of this research sub-question 1 and 2 will be answered, whereas in the intensive research phase sub-question 3 and 4 will be answered. In the last phase of this research, the synthesis phase, sub-question 5 will be answered.

1.5.1 Diagnosis & design

In the first phase of the research a diagnosis of the current planning approach of the Dutch NGO Simavi is made to discover where this research can contribute best to support their high level objective; contributing to long-term sustainable WASH services. This is done by first analysing the initiation phase of Simavi' programmes by means of a desk research and by questioning five employees of Simavi. Sequential, a literature study is conducted to obtain understanding of how adaptive planning approaches could contribute to long-term sustainable WASH services. Several existing adaptive planning approaches (Haasnoot et al., 2013; Hermans et al., 2017; Kwakkel et al., 2010; Marchau et al., 2008; Ranger et al., 2010; Walker et al., 2013), originating from Assumption-Based approaches are researched. Scenarios planning literature is studied (Börjeson, Höjer, Dreborg, Ekvall, & Finnveden, 2006; Enserink et al., 2010; Maier et al., 2016) to explore ways to consider future plausible states of the world. Hereafter a systematic step-wise pro-active adaptive planning approach is designed. As part of this approach, the scenario logic approach of Schwartz (1996) will be used, where a nxn matrix will be designed by placing key uncertain driving forces on the different axes of a scenario space. The driving forces will be defined by follow the methodology of Lindgren and Bandhold (2003) and Enserink et al. (2010).

1.5.2 Intensive research

In this phase the adaptive planning approach for long-term sustainable WASH will be examined by means of a case study. The aim is to examine the content of the approach and the applicability of the approach in local context. The core of the research strategy is a single case study. A case study enables the possibility to research a phenomenon in its context, providing a richer result than for example a self-contained interview (Yin, 2014). A case study is an ideal method to do so according to Baarda, De Goede, and Teunissen (2013), and will therefore by applied in this study. To be able to make the findings from the case study more reliable, the triangulation approach will be used (Yin, 1994). First by means of an adaptive planning workshop in the Netherlands with WASH experts from the Dutch NGO Simavi and sequential by means of a field-research in Bangladesh, including interviews with local project stakeholders and field-trips.

Case study

Although Simavi' planning approach is replicable -to a certain extent- in the countries they work in, all their WASH interventions are unique and context specific. In order to research if the approach can contribute to Simavi' strategic planning it is necessary to examine the approach in a specific context. For practical reasons, there was decided to examine the adaptive planning approach in the context of Bangladesh. Similar, research to the applicability of adaptive planning approaches is not unique although the application of the approach in the specific context of development aid and WASH services in Bangladesh is. Alongside, the case represents a critical test to the existing theory about adaptive planning approaches.

The Khulna' Water Supply Project (KWSP) in Khulna, Bangladesh, will be used as case study to examine the steps of the designed adaptive planning approach for sustainable WASH services. This project is a collaboration between the Asian Development Bank, Japan International Cooperation Agency, the Government of Bangladesh and Khulna Water and Sewage Authority. The project aims to contribute to *expanded and reliable access to potable water in Khulna city.* There has been decided to choose for this project because it aligns with the content of the MSc Construction Management and Engineering. Whereas the scope of the master is the management of complex project, including large-scale infrastructure projects. Also, this project gave the opportunity to conduct preparatory desk research from a distance because there is sufficient project information accessible online. The examination of the content of the approach and the applicability of in the approach in local context will be useful for Simavi because the outcomes of this thesis focus on the adaptive planning approach for long-term sustainable WASH, and may complement strategic planning approaches of development organisations.

Triangulation approach

The adaptive planning approach for long-term sustainable WASH is examined twice, as part of the triangulation approach (Yin, 1994). First by means of an adaptive planning workshop in the Netherlands with WASH experts from Simavi and sequential by means of a field-research, including interviews and field-trips in Bangladesh.

A workshop is organized to examine and validate the newly designed adaptive planning approach for sustainable WASH. A workshop is a suitable method to validate the approach since all the participants are free to speak, to bring forward the things that are deemed to be important or significant (Bryman, 2012). The workshop design followed the three systematic steps of the designed adaptive planning approach. The adaptive planning workshop has been organized at the head office of Simavi on Wednesday December 20th 2017.

Sequential, a field-research in Bangladesh was conducted to again examine the content of the approach and to research the applicability of in the approach in Bangladesh. Semi-structured interviews with representatives of six organisations in Dhaka and Khulna were conducted. These organisations have a direct relationship with the project (e.g. loan provider, executive organization) or these are organisation (e.g. municipality) which decision making will affect the project.

Although the design of the activity in the Netherlands differs from the design of the activity in Bangladesh, the examined content of the two activities was the same. The three steps of the designed adaptive planning approach

were systematically followed during both activities. The aim is to study the results deriving from each step, and as the content of the steps was the same during the workshop and the interviews, the results can be compared.

As the results deriving from each step were considered as most important, a suitable activity design to allow this was chosen. Within Simavi a workshop as suitable method as chosen because this method is used more often and therefore convenient to use.

Research was not only conducted in the Netherlands but in a cross-cultural setting, therefore cultural sensitivity was taken to account. The author of this research questioned if all local stakeholders would be free to speak during a workshop in Bangladesh. Due to the harsh relationship between the local stakeholders and a power distance dimensions in the culture of Bangladesh (Hofstede, 1980), there was chosen to examine the three steps of the approach by means of interviews. In this case, the author of this research assumed that the interviewees would talk more freely and that this resulted in more vulnerable results than when the approach was examined in a workshop-form.

Other than interviews, households in the peri-urban village Matumdanga were questioned to understand their drinking water situation and to obtain an understanding of change in water supplier after city expansion of Khulna. Also, two visits were organized to two water supply treatments plants.

1.5.3 Synthesis

After the intensive research phase the results and observations from the adaptive planning workshop and the field-research were compared and evaluated. To explain results, some additional literature was studied. The systematic steps of the adaptive planning approach for sustainable WASH were reviewed even as the applicability of the approach in local context. Sequential, there is concluded if the designed approach can contribute to better planning for long-term sustainable WASH services.

1.6 Reading guide

The structure of the thesis follows the structure of the sub-questions.

In the second chapter of the thesis the sub-question: *how do development organisations strategically plan their programmes to reach project impacts?* will be answered. This chapter elaborates first on Results-Based planning approaches, often used by development organisations and then analyses the current planning approach of the Dutch NGO Simavi to discover where this research can contribute best.

In the third chapter the sub-question: *how can an adaptive way of planning complement current strategic planning approaches of development organisations?* will be answered. Literature on adaptive planning approaches will be reviewed where after a pro-active adaptive planning approach for sustainable WASH will be designed.

The fourth chapter of the thesis will not answer one of the sub-question but functions as the introduction of the case study to examine the adaptive planning approach. In this chapter the local context of the case study will be studied where after Khulna' Water Supply Project will be introduced.

The sub-question: *how do development organisations interpret the systematic steps of the adaptive planning approach for long-term sustainable WASH services?* will be answered in the fifth chapter. The structure of this chapter follows the three systematic steps of the adaptive planning approach.

The same structure applies to chapter six. This chapter will answer the sub-question: *how do local stakeholders interpret the systematic steps of the adaptive planning approach for long-term sustainable WASH services?*

In chapter seven, the results and observations of the workshop and field-research will be compared and evaluated. In this chapter the question: *how does an adaptive planning approach for sustainable WASH contribute to long-term sustainable WASH services?* will be answered.

Chapter eight will provide conclusions and recommendations towards this research. The main research question: *how can an adaptive planning approach conducted by development organisations contribute to long-term sustainable WASH services?* will be answered.

This thesis ends with the reflection chapter. An additional elaboration on the conclusions of this research will be given. It also describes the limitations of this research and provides a reflection on cross-cultural research.


2

STRATEGIC PLANNING PROCESSES

Chapter 2

This chapter will look at strategic planning processes of development organisations and answers the question: how do development organisations strategically plan their programmes to reach project impacts? Results-Based approaches are widely used by many multilateral development organisations, bilateral development agencies and public administrations throughout the world (Menon et al., 2009). Simavi is more and more working from a Results-Based planning, monitoring and evaluation approach. This chapter will first elaborate on the general consensus of Results-Based approaches and thereafter on Simavi' planning approach. The initiation phase of Simavi' programmes will be analysed to gain understanding of their planning approach for long-term sustainable WASH services. Input for this chapter is obtained by questioning five employees of Simavi who are working in the WASH field and by analysing different WASH reports.

2.1 Results-Based development aid

According to the United Nations Development Programme (2009), good planning, combined with effective monitoring and evaluation, can play a major role in enhancing the effectiveness of development programmes and projects. Good planning helps to focus on the results that are desired, while monitoring and evaluation helps to learn from the past successes and challenges and inform decision making so that current and future initiatives are better able to improve people' lives.

Results-Based management can be defined as 'a broad management strategy aimed at achieving improved performance and demonstrable results' (United Nations Evaluation Group, 2007) and as said before, has been adopted by many multilateral development organisations, bilateral development agencies and public administrations throughout the world (United Nations Development Programme, 2009). The UN Sustainable Development Goals are among the most ambitious of global initiates to adopt a Results-Based approach towards poverty reduction and improvement in living standards. According to UNHABITAT (n.d.), achieving the Sustainable Development Goals require a strong Results-Based approach to the planning and implementation of development initiatives, including a strong monitoring and evaluation system (UNHABITAT, n.d.). The Ministry of Foreign Affairs of the Netherlands embraced the Results-Based approach as well. In 2017 they published a paper as one of a series of case studies that describes approaches to Results-Based management of Dutch aid. The purpose of the case study project was to identify and document approaches, key themes, current challenges and good practices in Results-Based management (Ministry of Foreign Affairs, 2017).

Not every Results-Based approach consists of the exact same steps but it all includes the same thinking. The overall consensus is that a Results-Based approach shifts from focusing on the inputs and activities to focusing on the outputs, outcomes impact and the need for sustainable benefits. Results are the changes occurring as an effect of a development intervention and imply that a change of behaviour by individuals, groups of people, organisations, governmental bodies or society has taken place (Spreckley, 2009).

Planning in a Results-Based approach is the process of identifying the goals or objectives to be achieved; formulating the strategies to achieve them; organizing or creating the means required; and establishing performance measurement frameworks, as well as determining the resources required. Planning lays the basis for implementation, monitoring, reporting and evaluation processes, and directs all steps in their proper sequence. A basic principle of Results-Based planning is to start with the desired change (impact and outcomes) and then identify the outputs, activities and inputs required to achieve them. This implies a thorough analysis of the problem that needs to be solved, the changes that are desired and the activities and inputs that are necessary to achieve them (UNHABITAT, n.d.).

Simavi is not unique in using a Results-Based approach to contribute to sustainable WASH services. The fact that there is no detailed overarching interpretation of the planning step (as well as the monitoring and evaluation steps) makes it interesting and necessary to look more closely to Simavi' interpretation of the planning step. This understanding is desirable to understand how and if uncertainty is addressed in Simavi' *planning* approach.

2.2 Planning in a Results-Based approach

Simavi is part of the WASH Alliance International (WAI). This is a collaboration between various Dutch not-for-profit organisations internationally active in the water, sanitation and hygiene (WASH) sector. The WAI aims to provide full coverage with sustainable WASH services for all the areas they work (WASH Alliance International, 2016). The planning step in the Results-Based approach is enclosed in the initiation phase of Simavi's programmes. Monitoring and evaluation practices are enclosed in the sequential implementation phase of the project. Although, the basis for implementation, monitoring, reporting and evaluation processes are formulated in the planning step. This paragraph describes the *planning* step within their initiation phase. Five interrelated steps are part of this step and will be discussed separately. Simavi is actively involved in each five steps in the initiation phase (Simavi, 2017a)

Step 1: Context analysis and stakeholder analysis

The purpose of the context analysis is to ensure that everyone working in the programme has a similar understanding of the context the programme will operate in and reach agreement on the goal of the programme. The problems and opportunities related to the topic (e.g. a lack of sustainable WASH) will be identified. This includes the identification of socio-economic, political-institutional, and environmental factors which are likely to have an effect on the success of the programme, and on which the programme can have an effect. This is important because the stakeholders need to know what is going on in their intervention area. The problems and opportunities are mapped, and the causes are identified. This will help in the next step, when thinking about the 'pathways of change'. This step is also to identify and map all the stakeholders who are relevant for achieving sustainable and inclusive WASH service in the intervention area, to see which stakeholders need to be taken along and which stakeholders there is to be dealt with.

Step 2: Theory of Change with causal assumptions

When the context and goal of the programme are known, it is time to think about *how* this goal will be reached within the programme. In the past two decades the Logical Framework is mainly used as the basis for the programme design for Dutch development aid. At present the Theory of Change (ToC) is used as a replacement because it elaborated in more detail in the *how* question. Therefore, the second step is to construct the Theory of Change with causal assumptions. Mostly, the Theory of Change is developed during a workshop with (local) stakeholders. The Theory of Change is a presentation of the 'pathways of change' that lead towards the goal of the programme: what need to change first in order to reach the final change in the end. The purpose is to base activities on an understanding of the actors, problems and opportunities of the specific country. This step is to think about and understand what changes need to be made - and so what needs to be done- to achieve sustainable WASH (Simavi, 2017c).

The Theory of Change focuses in particular on mapping out or 'filling in' what has been described as the "missing middle" between what a programme does - its activities or interventions - and how these lead to desired goals being achieved (figure 3).

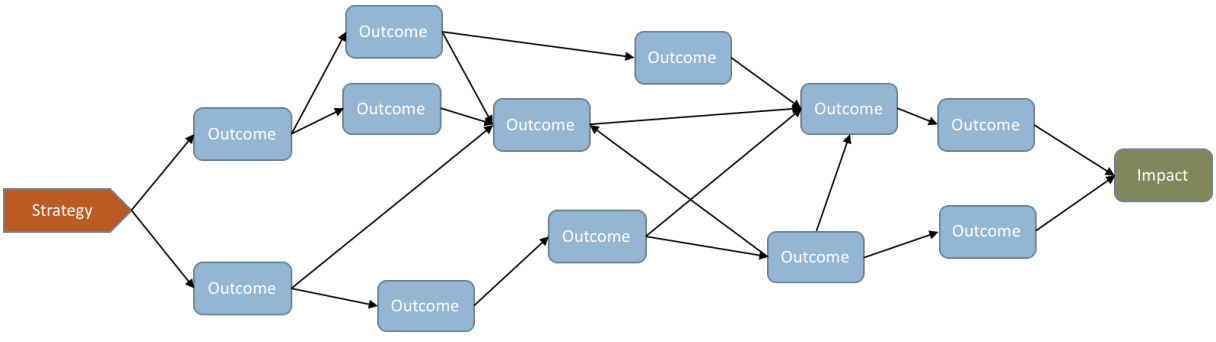

Figure 3: Conceptual representation of Theory of Change

Simavi defines this relationship by formulation casual assumptions. Casual assumptions in the Theory of Change are the variables or factors that need to be in place for results to be achieved (United Nations Development Group, 2011). Assumptions stem from and represent values, beliefs, norms and ideological perspectives that inform out interpretation and understanding of reality, and our expectations of what will happen. Assumptions are personal, but can also be part of collective convictions of a specific group having a similar social, cultural, political background or history (Van Es, Guijt, & Vogel, 2015). According to Simavi this leads to better planning, as activities are linked to a detailed understanding of how change actually happens. It also leads to better evaluation, as it is possible to measure progress towards the achievement of longer-term goals that goes beyond the identification of program outputs such as impact (Van Es et al., 2015).

The Theory of Change is used as a results-orientated approach for analysing the complex systems in which the organization and its partners operate, and for defining actions that are likely to influence those system in a positive way. So basically, a Theory of Change articulates the casual assumptions about the process through which change will occur, and specifies the ways in which all of the required early and intermediate outcomes related to achieving a desired long-term change (impact) will be brought about and documented as they occur (Netherlands Organisation for Scientific Research, n.d.).

Step 3: Planning Monitoring & Evaluation Framework

The next step is to decide which of intermediate changes will be monitored during the programme, to keep track on the 'pathway' towards the end goal. These changes - called intermediate outcomes- will be included in the monitoring. For each outcome this provides clarity on, the indicators which will be used and their definition, the choice of means of verification, sources of information, methods, tools and process of monitoring, and the responsibilities and the frequency of measures. In this step a plan is formulated for monitoring. Monitoring practices starts in the implementation phase of the programme. In this step a plan for regular reflection on the 'pathways of change' will be given, with the aim to make use of monitoring findings (Simavi, 2017b).

Step 4: Baseline study

For the outcomes that will be monitored, a zero-value need to be known. This value will be used during and at the end of the programme to compare results and define the change that happened during the programme. The baseline study also functions to be able to set realistic targets, together with stakeholders.

Step 5: Programme strategy

Based on the context analysis, the Theory of Change and the baseline findings, a country programme strategy can be drafted. This includes activities, budgets, targets and partners and is preferably been done during a workshop with partners.

This is the end of the planning step within the Results-Based approach of Simavi, hereafter the programme continues with the implementation phase in which the monitoring and evaluation steps will play an important role. During the implementation phase, the agreed intermediate and long-term outcomes will be monitored to see what has changed. Regular there will be looked back at the Theory of Change to answer the question: Where are we in the 'pathway'? Did change happen as expected? Do we have new knowledge about certain linkages? This will be all done to be able to achieve the long-term outcome and impact of the programme (Simavi, 2017b).

2.3 Dealing with uncertainty in Results-Based Planning

Within the second step of the initiation phase, Theory of Change with casual assumptions, risks will be identified as well. Mitigation actions will be defined to reduce the likely adverse effects of the risks when it occurs. According to the PMBOK Guide, 'risk is an uncertain event or condition that, if occurs, has a positive or negative effect on one or more project objective such as scope, schedule, cost, and quality'. In other words, risk is an unplanned event and if it occurs it may affect the outcomes in the Theory of Change. The known risks are identified during the risk assessment in the second step of the initiation phase. Although risk is often seen as synonym for

uncertainty, it is not. Risk can be controlled if proper measures are taken to control it. On the other hand, uncertainty is beyond the control of an organisation, as the future is uncertain. Also, to risks events a probability can be assign, while with uncertainties this cannot (PMBOK, 2004)

Whereas a risk assessment is included in the Results-Based planning approach of Simavi, identification of future uncertainties is not included in their Results-Based planning approach.

2.4 Conclusion

In this chapter the concept of Results-Based management is addressed. Hereafter the initiation phase of Simavi programmes has been analysed to gain understanding of how development organisations strategically plan their programmes to reach project impacts. Simavi is actively involved in the initiation phase of their programmes. Together with the local programme stakeholders they define, within five steps, the outputs, outcomes, project impacts, causal assumptions and actions. It appears that Simavi does not have a systematic step in their strategic planning approach to cope with future uncertainty. Although, uncertain conditions as population growth, urbanization and changing consumption patterns, environmental degradation and climate change, finance and migration, in their interventions areas are expected to have significant implications for WASH interventions (Ministry of Foreign Affairs, 2016). Ignoring uncertain conditions of these variables during the programme could provide a potential condition for project failure (e.g. delay, extra expenses, deviation from the planning) (Shahriari, Sauce, Buhe, & Boileau, 2015). The sequential chapter will research if a systematic way of approaching uncertainty can contribute to better planning for long-term sustainable WASH services.


3

ADAPTIVE PLANNING PROCESS

Chapter 3

This chapter looks in more detail to planning approaches that are adaptable in order to cope with future change and avoidable uncertainty. According to Walker et al. (2013) *adaptive* planning approaches can be used to design sustainable plans under uncertainty. This chapter provides an overview of one family of approaches to adaptive planning, those that have their roots in Assumption-Based Planning. All approaches represent uncertainties with sets of multiple plausible futures states of the world (Walker et al., 2013). This chapter ends with a systematic step-wise pro-active approach where planners need to think beforehand of ways a plan might fail and design adaptation actions to guard against such failure. This step-wise approach aims to contribute to better long-term planning for sustainable WASH. In this chapter the following question will be researched: How can an adaptive way of planning complement current strategic planning approaches of development organisations?

3.1 Uncertainty, knowledge & change

To start with, it is good to be aware of the difference between uncertainty and change. Uncertainty is not the same a change. Some changes can be predicted quite precisely. According to Rosenhead and Mingers (2001) 'it is only unpredictable change, whether due to ongoing turbulence or to structural discontinuities rendering previous experience unreliable, which falls under the heading of 'uncertainty''. Uncertainty is significant for a programme if the range of variation of the imperfectly known future is perceived to be large, if there is considerable sensitivity to the occurrence of the unpredicted, and if the cost of reversing a commitment once made is high (Rosenhead & Mingers, 2001). If these three factors occur in combination a wide possible variance in outcomes can be produced and uncertainty's invisible occurrence needs to be acknowledged and allowed for. Moreover, many of these uncertainties are beyond the direct control of the programme team. Such decision-making problems are now frequently labelled as decision making under uncertainty (Lempert, 2003; Volkery & Ribeiro, 2009; Walker et al., 2010). The future is unavoidably a mixture of the known and the unknowable.

3.2 Adaptive approaches for designing sustainable plans

A variety of different approaches for guarding plans under uncertainty have been developed (Walker et al., 2013). This paragraph briefly introduces Assumption-Based Planning, and then provide an overview of several adaptive planning approaches; Adaptive Policymaking, Adaptation Pathways and Dynamic Adaptive Policy Pathways. These approaches are directly related to the principles underlying Assumption-Based Planning. Note that the 'pathways to change' as considered in chapter 2 are different from the 'adaptation pathways' mentioned in this chapter. Whereas the 'pathways to change' illustrate what need to change first in order to reach the final change in the end (paragraph 2.2), the 'adaptation pathways' represent alternative routes to get to the same desired point in the future (Haasnoot et al., 2013).

3.2.1 Assumption-Based Planning

Assumption-Based Planning (ABP) was developed as a reaction to shortcomings of the scenario planning approach. Scenario planning approaches identify high plausible future world and find a plan that performs sufficient in that world. Assumption-Based Planning starts differently. It begins by assuming that there is a proposed plan, or that there is a plan already in operation. It then tries to guard the plan from failing. This is done by examining each of the underlying assumptions and then consider what would happen to the plan if the assumptions failed to be true. Assumption-Based Planning is development as tool to improve the adaptability and robustness of existing plans (Dewar, Builder, Hix, & Levin, 1993).

Assumption-Based Planning identifies 'load-bearing' assumptions and assumptions that are most *vulnerable* to being overturned by future events. The 'load-bearing' assumptions are the assumptions upon which the success of the plan most heavily rest. The assumptions that are 'load-bearing' and vulnerable can be defined as critical assumptions, they are most likely to produce surprises during the planning process. Defining signposts, shaping actions, and hedging actions can help to deal with these potential surprises. Walker et al. (2013) describes *signposts* as 'an event or threshold that, if detected, signifies that a vulnerable assumption is being broken or is dangerously weak, and that some actions should be taken', *shaping action* as 'an action that is intended to help

protect an uncertain assumption, to control the future as much as possible' and a *hedging action* as 'a action that prepares for the possibility that an assumption will fail, despite the shaping action'. Figure 4 illustrates the steps in Assumption-Based Planning.

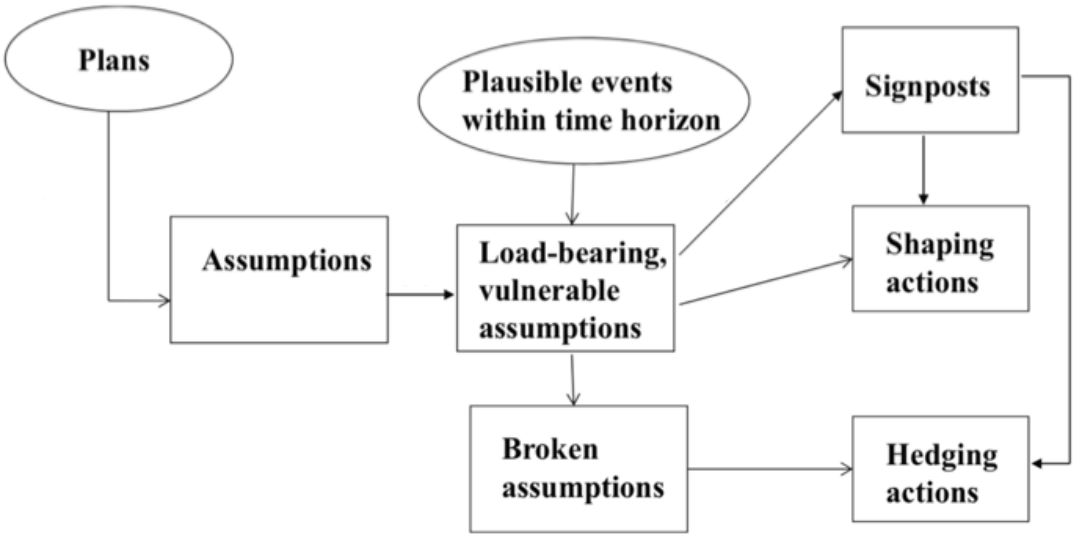

Figure 4: The steps in assumption-based planning (Walker et al., 2013)

3.2.2 Adaptive Policymaking

Adaptive Policymaking is a generic structured approach for designing dynamic robust plans (Kwakkel et al., 2010; Marchau et al., 2008; Ranger et al., 2010) and is rooted in Assumption-Based Planning (Dewar et al., 1993). Kwakkel et al. (2010) defined five steps in the design phase of the Adaptive Policymaking process (figure 5). These will be shortly summarized.

The first step is setting the stage; the present conditions of a system are analysed and the objectives for future development are specified. Second, assembling a basic plan; the way in which the objectives are to be achieved is specified by assembling a basic plan. In step three, increasing the robustness of the basic plan, the basic plan is made more robust through four types of actions; mitigating actions; hedging actions; seizing actions and shaping actions. Even with these actions the plan' performance and the moment to implement the actions need to be monitored. This is the fourth step and is called; setting up the monitoring system. In the last step, preparing the trigger responses, the four different types of actions are specified. The actions can be triggered by a signpost. Signposts specify information that should be tracked in order to determine whether the plan is meeting the conditions for its success. In addition, critical values of signpost variables beyond which additional actions should be implemented (triggers), are specified. These are, defensive actions, corrective actions, capitalizing actions and a reassessment of the plan. Signpost information related to the triggers is collected, and actions are started, altered, stopped, or expanded in response to this information. The implementation of other actions is suspended until a trigger event occurs (Haasnoot et al., 2013).

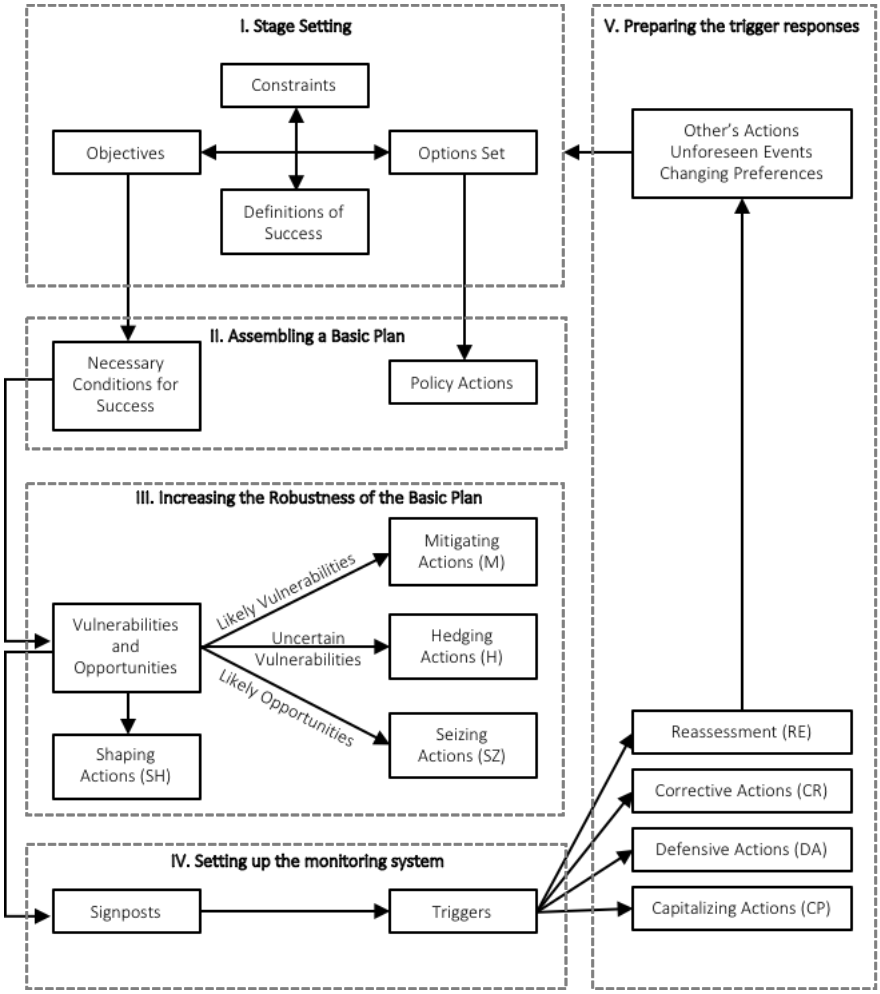

Figure 5: Five steps in the design phase of the Adaptive Policymaking process (Kwakkel et al., 2010)

3.2.3 Adaptation Pathways

Also, Adaptation Pathway approaches support long-term planning under uncertainty. It combines the work on Adaptive Policymaking with the work on Adaptation Tipping Points (Haasnoot et al., 2013; Hermans et al., 2017). Adaptation tipping points (ATP's) are of great importance to adaptation pathways. Kwadijk et al. (2010) argues that ATP's indicate the critical values at which the current plan fails to meet the objectives. The dynamics of future developments determine the point in time at which adaptation tipping points are reached. With different future scenarios the time within which adaptation decisions might be expected can be estimated (Hermans et al., 2017). When a tipping point is reached addition adaptation actions need to be implemented. This approach enables pathways to emerge. An adaptation tree can be designed that present a sequence of possible adaptation actions after a tipping point is reached (Haasnoot et al., 2013). This approach is studied for a case of the Delta Programme in the Netherlands. This programme incorporated adaptation pathways in its planning approach, called adaptive delta management (Hermans et al., 2017).

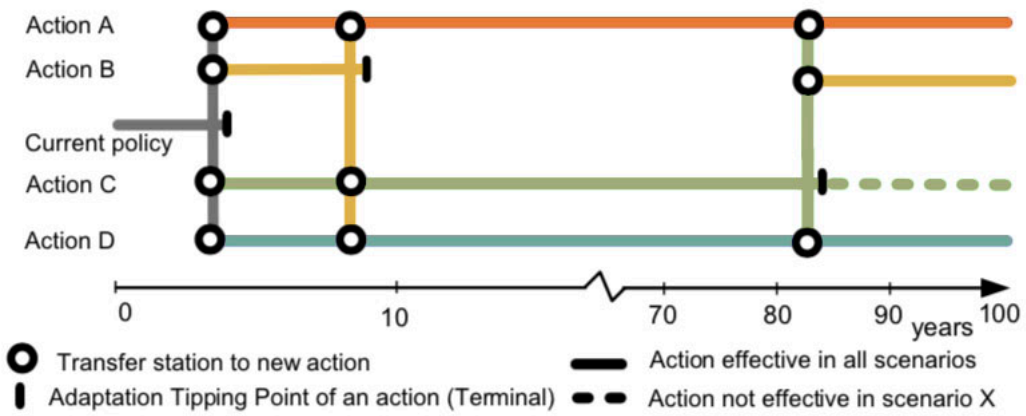

Figure 6: Conceptual example of Adaptive Pathways (Haasnoot et al., 2013)

Haasnoot et al. (2013) explain the concept of adaptation pathways with the following conceptual example (figure 6). In de illustration, objectives - intermediate outcomes - begin to be missed after four years. When you are following the grey line of the current plan, there are at a certain point four options. When choosing Action A and D should the objectives for the next 100 years will be achieved in all scenarios. If the programme team choses option B, a new adaptive tipping point is reached within about five years. A shift to one of the other three actions will then be needed to achieve the objectives. When the programme team chose Action C, a shift to action A, B, or D is needed in the case of scenario X (follow the solid green lines). In all other scenarios, the objectives will be reached for the next 100 years (the dashed green line). Due to unacceptable performance of some actions in a selection of scenarios, some routes are not always available (dashed lines). The programme team may have a preference for certain pathways, since costs and benefits may differ (Haasnoot et al., 2013).

3.2.4 Dynamic Adaptive Policy Pathways

This approach built upon the concept of Adaptive Policymaking and Adaptation Pathways. This combination results in ideas of thinking beforehand of ways a plan might fail and designing adaptation actions to guard against such failures, the use of scenarios to present relevant uncertainties and their development. Dynamic Adaptive Policy Pathways also incorporate pathways to describe sequences of actions, and a monitoring system with related actions to keep the plan on the track of a preferred pathway (Haasnoot et al., 2013).

3.3 Scenario planning

The use of future scenarios representing a variety of relevant uncertainties and their development over time, is a recurring component in adaptive planning approaches. Through careful shaped scenarios, a large amount of uncertainty can be reduced to a handful of plausible alternative future states of the world that together contain the most relevant uncertainty dimensions (Lindgren & Bandhold, 2003). Maier et al. (2016) clearly describes methods of identifying multiple plausible futures. In line with Lindgren and Bandhold (2003), he also argues that arguably the most common approach to the identifications of multiple plausible futures, or 'state if the world' as they are referred to by Herman, Reed, Zeff, and Characklis (2015), is the use of scenarios.

There are different definition of scenarios and scenario planning made by different thinkers:

- 'An internally consistent view of what the future might turn out to be' (Porter, 1985).
- 'A tool for ordering one's perceptions about alternative future environments in which one's decision might be played out right' (Schwartz, 1991).
- 'That part of strategic planning which relates to the tools and technologies for managing the uncertainties of the future' (Ringland & Schwartz, 1998).
- 'A disciplined method for imaging possible futures in which organizational decisions may be played out' (Schoemaker, 1995).

These definitions evince that a scenario is not a forecast, in the sense of a description of an unsurprising projection of the present, a probable future. Neither is it a vision, that is, a desired future (Lindgren & Bandhold, 2003) (figure 9). Börjeson et al. (2006) categorized scenarios based on the type of questions they are trying to answer (figure 7).

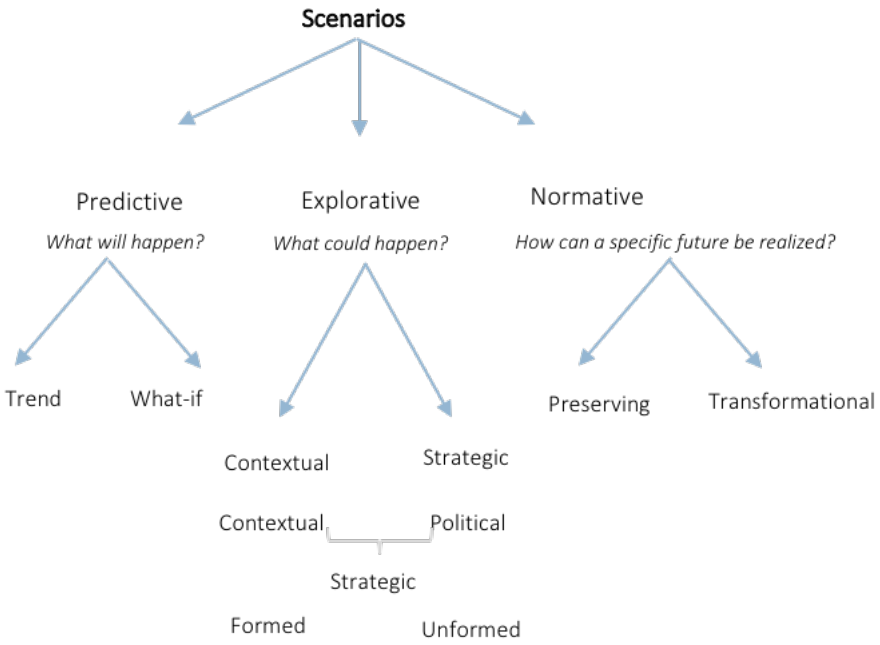

Figure 7: Scenario classification (Börjeson et al., 2006)

Predictive scenarios can be used to answer the question 'what will happen?'. This can be realised using either 'trend' or 'what-if' scenarios. 'Trend' scenarios assume current conditions will continue, building from a historical trend and allowing for impact of known policies. These scenarios are often used or adapted into a most likely scenario. Alternatively, 'what-if' scenarios, which consider the future based on what will happen of a specific even occurs are another form of predictive scenario.

Explorative or exploratory scenarios can be used to answer the question 'what could happen?'. Exploratory scenarios have similarities with 'what-if' scenarios but consider longer time-frames and multiple perspectives. Börjeson et al. (2006) categorize exploratory scenarios based on the influence of interested parties: *external* exploratory scenarios (contextual) are characterized by the development of external factors beyond the control of the interested parties, while *strategic* scenarios consider what could happen if the interested parties act in a particular way. Consequently, the former does not consider policy options, while the latter do.

Enserink et al. (2010) distinguish explorative scenarios somehow different. Scenarios either can be about the *context* of the problem, or about *policies* for problem solving, or a combination of both (strategic). *Policy* scenarios describe possible developments of the problem or system itself, where the problem owner or policymaker can influence the choices that give direction to the development. *Contextual* scenarios provide images of possible future environments of the policy or programme to be taken into account. They are mainly used to make statements about the robustness of possible policies. These scenarios focus on the environment or context of the problem that cannot be influenced by the policymaker, but that can significantly influence the results of a policy. *Strategic* scenarios deal with images of the whole, they combine policies and contextual developments. Strategic scenarios are used to clarify strategic choices between kinds of developments or policies by providing insight into the expected effects.

Maier et al. (2016) propose a categorization of exploratory scenarios based on whether they are *framed* or *unframed* during their development. The development of framed scenarios is constrained by the consideration of particular driving forces or outcomes. While this provides guidance for their development, it also limits the breadth of the plausible futures that can be explored. How to frame them, either on uncertain drivers or outcomes of interest, should be based on problem context. For more applied policy assessment, framing on outcomes may provide a more effective scenario development process. However, if the exploration and understanding of future uncertainty is of more significance, framing based on drivers or the use of unframed scenarios can provide a better platform for identifying multiple plausible futures. A well-known framework for the development of framed scenarios is the scenario logic approach (Schwartz, 1996), where typically a 2x2 matrix is produced by placing two key (uncertain) driving forces on the vertical and horizontal axes (Ramirez & Wilkinson, 2014; Van Asselt, 2012; van't Klooster & van Asselt, 2006). This allows each scenario to be clearly differentiated from others and hence more easily communicated and understood. In contrast to framed scenarios, unframed scenarios are completely open in the way they formulate the factors, actors, and sectors included in their development, as well as their directions for change, and therefore have a greater ability to identify a wider range of multiple plausible futures. They do not consider pre-determined drivers or outcomes of interest as the starting point, as is the case with framed scenarios (Maier et al., 2016).

The last distinction that Börjeson et al. (2006) categorized are Normative scenarios. The question 'how can a specific target be met?' can be answered with normative scenarios. They have clear starting points in the future about conditions or objectives to be met. Normative scenarios contain actions or steps that are required to achieve the desired objectives or future conditions. This can be useful for comparing possible actions or steps for achieving the future conditions (Parker, Srinivasan, Lempert, & Berry, 2015). The focus of preservative scenarios is on how the desired target can be achieved as efficiently as possible, while the focus of transformative scenarios is on what changes have to be made to enable that the target can be met.

Although predictive, explorative, and normative scenarios all consider the future, they are not equally suited to identifying multiple plausible futures. Explorative scenarios are well suited to identifying multiple plausible futures, as they offer rich descriptions of the future and look to incorporate qualitative and quantitative assumptions for alternate world views (Rounsevell & Metzger, 2010). These assumptions can involve diverse ideas and opinions. Different techniques can be used for their development, although they commonly revolve around aspects encapsulated by changes to societal, technological, environmental, economic and political (STEEP) factors (Bradfield, Wright, Burt, Cairns, & Van Der Heijden, 2005; Rounsevell & Metzger, 2010).

3.4 Toward adaptive planning approach for sustainable WASH

In order to cope with future uncertain conditions in the WASH sector, adaptive approaches for strategic planning have been researched to be able to design an adaptive planning approach for long term sustainable WASH services. This paragraph will first elaborate on the design criteria and then introduces the three systematic steps of the designed adaptive planning approach for sustainable WASH services.

Design criteria

After analysing the existing adaptive planning approaches (Haasnoot et al., 2013; Hermans et al., 2017; Kwakkel et al., 2010; Marchau et al., 2008; Ranger et al., 2010; Walker et al., 2013), the proposed approach should enhance the following components; un understanding of when a programme successful is and when it fails, understanding of the underlying critical assumptions as a link to project success, understanding of uncertainty and what exactly can be uncertain in the long-term future, a tool to help picture the long-term future, understanding of what needs to be done when uncertainty occurs and when this needs to be done. An adaptive planning approach for sustainable WASH is designed as a proactive step-wise approach where the planners need to think beforehand of ways a plan might fail and design adaptation actions to guard against such failure. It assumes that there is a proposed plan, or a plan in operation that will be examined. The proposed adaptive planning approach for sustainable WASH exists of three steps that following the recurring components of adaptive planning approaches and are not included yet in Simavi' planning approach.

Step 1: Impact & critical assumptions

The first step, labelled as *impact & critical* assumptions, considers the long-term goals and impact of the development programme and the critical assumptions. It is important to obtain an understanding about how the long-term goals and impact are assumed to be reached. In the past decennia a Logical Framework was often used to illustrate the change in results-chain for development aid. A more recent approach for development aid is the Theory of Change. The Theory of Change articulates the casual assumptions about the process through which change will occur. But not all casual assumptions are critical. To cope with uncertainty is it crucial to define the critical assumptions, as they play a central role in project failure. It are the critical assumptions upon which the success of the plan most heavily rest and the assumptions that are most *v*ulnerable to being overturned by future events. Adaptive planning tries to guard the plan by examining each of the underlying critical assumptions and see what would happen to the plan if that critical assumption was not to be true.

Step 2: Contextual scenarios & uncertainty

The second step, labelled as *contextual scenarios & uncertainty*, of this adaptive approach for sustainable planning starts to examine the critical assumptions of the programme. In order to assess the vulnerability of the critical assumptions towards future events, an understanding of plausible future events is needed. This can be obtained through contextual scenarios. Contextual scenarios are mainly used to make statements about the robustness of the programme plan. These scenarios focus on the environment or context of the problem (e.g. lack of sustainable WASH) that cannot be influenced by the programme team, but that can significantly influence the results of a programme. The scenario logic approach, where a 2x2 matrix is produced by placing two key driving forces on the vertical and horizontal axes, will be used in this step. The contextual scenario represents a variety of relevant uncertainties and their development over time. These uncertainty dimensions are important to considered as they influence failure of the programme. Defining uncertainty for WASH interventions areas, through scenarios, is something that has not done before by Simavi.

Step 3: Adaptation actions & timing

As a third step, labelled as *adaptation actions & timing*, adaptation actions will be defined to cope with uncertainty and to handle vulnerable critical assumptions. The timing of these adaptation actions depends on adaptive tipping points, thresholds beyond which the current plan fails to meet their objectives. Therefore, information is needed that should be tracked in order to determine whether the plan is meeting the conditions for its success and gives a sign when adaptation is needed (signpost). In addition, critical values of signpost variables beyond which additional actions should be implemented (triggers), are specified. When all tree steps are conducted, several adaptation pathways can describe sequences of actions.

Assessing the adaptability of project plans for long-term sustainable WASH is a continues process that should not be approach once in the initiation phase of the programme, but repeatable throughout the programme horizon. Monitoring arrangements whether the plan is meeting the conditions for success and changes in plausible future

states of the world should be embedded in the monitoring framework of the programme. The frequency of monitoring should be aligned with other monitoring practices of the programme.

3.5 Conclusion

This chapter considered several adaptive planning approaches with their roots in Assumption-Based Planning. It introduced a systematic step-wise pro-active approach in which planners need to think beforehand of ways a plan might fail and design adaptation actions to guard against such failure. The adaptive planning approach for sustainable WASH consists of three steps, (1) defining the impact and critical assumptions of the programme, (2) defining relevant uncertainties by using contextual scenarios, and (3) defining adaptation actions and the timing of the actions. The approach aims to contribute to better long-term planning for sustainable WASH. With the objective that the programme plan can function over a long future horizon - and therefore is able to contribute to sustainable WASH - because the risk of project failure is less because the plan can be continuously adaptive to future uncertain conditions.


KROMCO
4

KHULNA' WATER SUPLLY PROJECT

Chapter 4

In this chapter the case study will be introduced, which will be used in the sequential chapters to examine the designed adaptive planning approach on its contribution to long-term sustainable WASH services. The chapter starts with an introduction to the current water supply situation in Khulna city in Bangladesh. Hereafter the institutional structure of the urban water supply services in Khulna will be explained. As third Khulna as a dynamic environment will be studied, looking to past trends of growth influenced by the topography and communication route. The fifth paragraph will elaborate on *Khulna' Water Supply Project,* hereafter called the project. Different project components are discussed as well as the roles of different stakeholders.

4.1 Current water supply situation in Khulna city

Khulna, the third largest city in Bangladesh, is located in the south west area of the country (figure 8) and has a population of 1,5 million (Kulna City Corporation, 2014). Khulna city relies entirely on groundwater for its water source. Khulna Water and Sewage Authority's (Khulna WASA) deep tube wells yield 30,100 cubic meters per day, supplying water to the piped network. In addition, there are many privately built tube wells and hand- pumped tube wells of Khulna WASA that extract groundwater. The total extraction of groundwater is estimated at 119,100 m^3/day (table 1). The groundwater is declining by 2–3 meters annually in some areas in Khulna because of over extraction. The extraction should be limited to ensure the sustainability of the groundwater resource (Asian Development Bank, 2011).

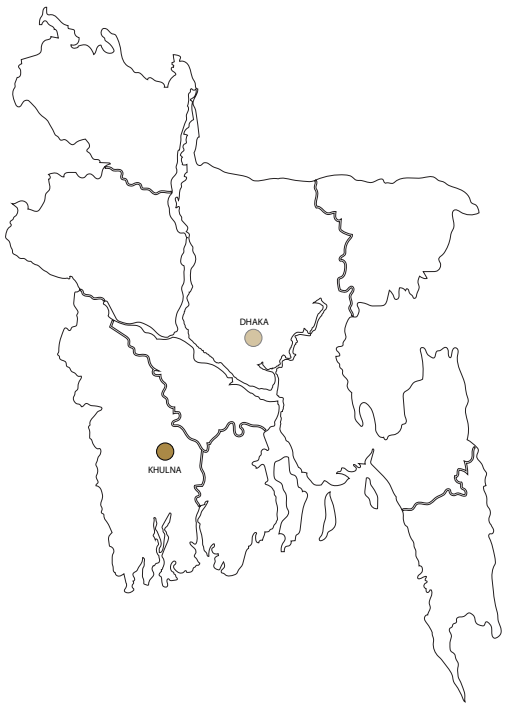

Figure 8: Khulna city with respect to Bangladesh

In 2008 only 23% of the population had access to piped water supply, and the rest resorted to alternative sources, such as shared public taps and tube wells built privately (table 2) (Asian Development Bank, 2011). The existing system was old and poorly maintained, resulted in substantial leakage and low quality of water. Households connected to the piped network enjoyed only intermittent water supply of 5.3 hours per day, and 74% of households found the supplied quantity insufficient. As for water quality, 59% of the surveyed households (the survey covers 3,000 households randomly selected in Khulna city) perceived the supplied water to be dirty and 55% rated the service standards *very poor* or *poor (*service standards were rated fair by 33% of the surveyed households and good by 11%) *(Asian Development Bank, 2008).* Many unconnected households relied on shared public taps and spend a daily average of 90 minutes fetching water, imposing a particular burden on women who tend to manage water for the whole family.

Water Source		Extraction per day
Ground water	KWASA's tube wells	30,100 m^3/d
	KWASA's hand pumps	39,300 m^3/d
	Private pumps	49,700 m^3/d
	Sub-total	119,100 m^3/d
Surface water		0 m^3/d
	Total	119,100 m^3/d

Table 1: Water Resource-wise Daily Water Consumption in Khulna city (Asian Development Bank, 2011)

Calculation of Served Population	Numbers	Remarks
KWASA's tube wells		
1) Registered connections	15,251	
2) Inactive connections	2,579	
3) Active connections	12,672	(1) – (2)
4) Consumer per each	13,5	
5) Served population	171,100	(3) x (4)
Street Hydrant		
6) Total Connections	503	
7) Inactive Connections	403	
8) Active Connections	100	(6) – (7)
9) Consumers per each	100	
10) Served Population	10,00	(8) x (9)
KWASA's hand pumps		
11) Number of deep hand pumps	3,748	
12) Number of Shallow Hand Pumps	5,538	
13) Consumers per each	30	
14) Served Population	278,600	((11) + (12)) x (13)
Private wells		
15) Number of private wells	13,733	
16) Consumers per each	30	
17) Served Population	412,000	(15) x (16)
18) Uncategorized population	85,300	
Total	957,000	

Table 2: Water Source-wise Population in Khulna (Asian Development Bank, 2011)

4.2 Institutional structure of the local government and urban water

Municipalities in urban areas have been rendering public health services since 1863 in Bangladesh. The Department of Public Health Engineering (DPHE) was created in 1935 as a sector agency to promote public health by ensuring the provision of safe drinking water and, since 1954, sanitation as well. After independence in 1971, the Government of Bangladesh first emphasized rehabilitation of damaged water supply and sanitation services and subsequently started installation of new facilities through the DPHE. Since then, the water and sanitation sector went through a phase of rapid development with increased participation from citizens. Water and Sewage Authorities (WASA's) were first established in Dhaka and Chittagong in 1963 to address the water supply and sanitation needs of large cities. The intention was to operate the organisations according to different laws from public law, which was viewed as not being sufficiently flexible to operate utilities under commercial practices. However, the organisations were managed by government appointed staff and functioned mainly under public rules and regulations and as such, the desired commercial efficiency did not materialize (The World Bank, 2014). The Government of Bangladesh established Khulna WASA in 2008. Khulna WASA is therefore the third water supply and sewerage authority established in the country. Khulna City Corporation was directly responsible for water supply service in Khulna city before the establishment of Khulna WASA (figure 9) (Asian Development Bank, 2017).

At the national level, the Local Government Division (LGD) of the Ministry of Local Government, Rural Development, and Cooperatives has overall responsibility for the water and sanitation sector. The DPHE and WASAs are under the administrative control of the LGD. DPHE is now responsible for the implementation of water supply and sanitation projects in the public sector in rural and urban areas outside the areas covered by the WASAs. In addition to the DPHE, the Local Government Engineering Department (LGED), also under the LGD, implements water and drainage projects in urban areas as part of urban infrastructure development projects. Coordination at the national level between the sector stakeholders such as government agencies, NGOs, development partners, and the private sector is performed by the National Forum for Water Supply and Sanitation, established in the LGD (The World Bank, 2014). As observed there are a lot of parties active in the water sector.

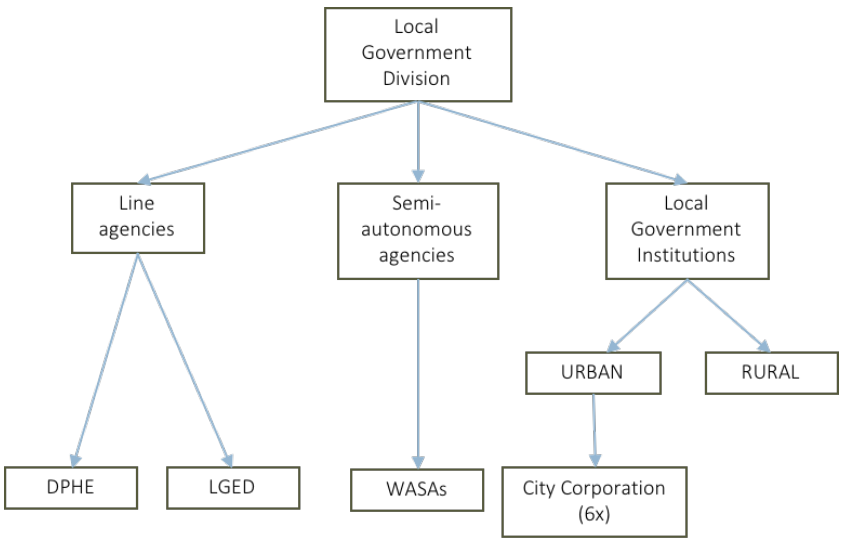

Figure 9: Organizational Structure under the Local Government Division (The World Bank, 2014)

4.3 Dynamic environment

Observations on the past trends of growth reveal that physical expansion of Khulna city was highly influenced by two main factors - topography and communication route. Natural environment has a profound impact on a city in shaping its physical setting and its pattern of growth. Khulna City is located in the southwest region of the country, which has been developed and influenced by the process of siltation from a network of rivers. Because of its location in a moribund delta and tidal environment, the city has specific characteristics on land, soil, climate, hydrology, rainfall and salinity. The land surface of Khulna city is not perfectly levelled and is characterized by six major geomorphic units. These are natural levees, floodplains, old meander complex, bar, tidal marsh and back swamps. Natural levees are well developed along the Bhairab-Rupsha banks (mostly on the west bank) and are occupied mainly by the present built-up area of the city. This part of the city is 4 m above the mean sea level. The low-lying areas extend mainly towards the fringe areas of the city characterized by swampy areas, currently used for agricultural purpose that are poorly drained and persistent water logging problems. The average altitude of this area is less than 2 m above mean sea level. Because of physiographic setting, Khulna has grown along the west bank of the river Bhairab in a linear pattern. Because of the non-availability of build able land on the west, the westward growth of the city has been restricted, making the city a narrow strip of urbanized land, 16 km in north-south and a maximum of 4 km in east-west (figure 10) (Rejaur Rahman, 2008).

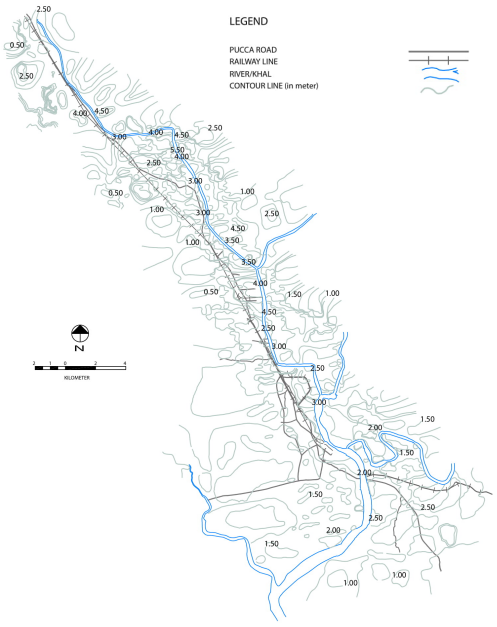

Figure 10: Topography of Khulna city

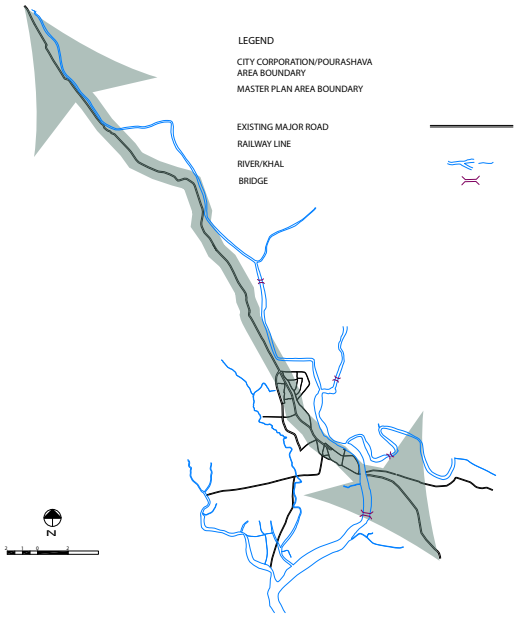

Figure 11: Transport route in Khulna city

The linear shape is also influenced by transport route, that is Khulna-Jessore highway (figure 11). Over the years, the settlements continued to extend on the levee along the river Bhairab-Rupsha. During early days rivers served as the key route of transport, which also became one of the key factors in location decisions. Later on, when road system was developed, particularly the Khulna-Jessore Road, also followed the higher topography along the river. The entire settlement pattern, was thus dictated by the land level and the transport route (Khulna Development Authority, 2002a). The physical expansion of Khulna City took place in several phases. The first growth came from the extension of railway line from Jessore to Khulna during the British period. In the second phase, division of India played a vital role in population growth through the increase of refugees. In the third phase, industrialization of Khulna in the 1960s played a remarkable role. During the post Liberation period, the population of Khulna city was

observed a tremendous growth (figure 12). This was mainly due to rural urban migration and natural increase of population. It can be observed that migration from other places to Khulna has been the main factor of population growth (Rejaur Rahman, 2008).

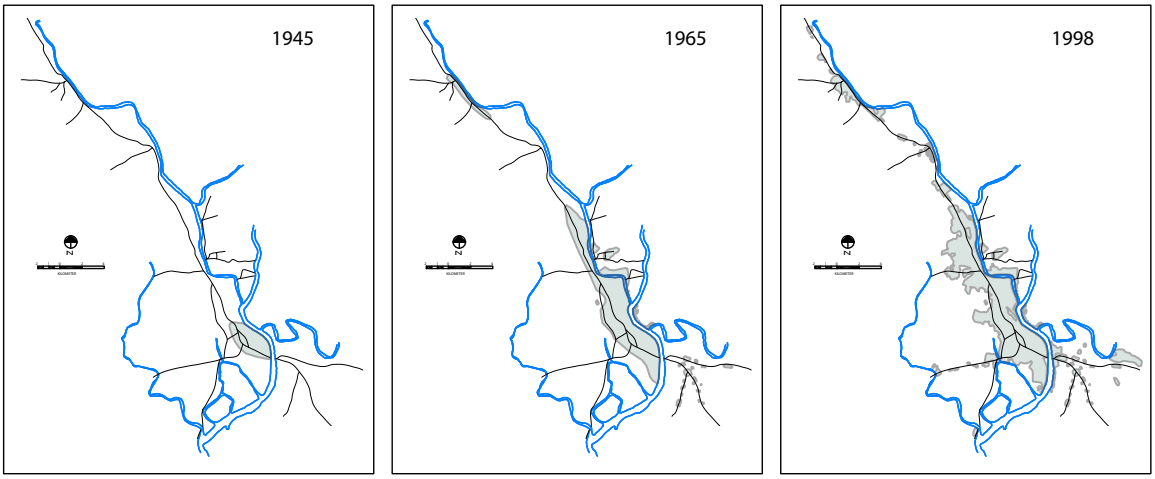

Figure 12: Spatial growth of Khulna

The present trend of urbanization and macro-economic characteristics in the country and the role of urban sector in the GDP suggest that the urban sector will play a dominant role in the national development. In particular construction of the Bangabandhu Jamuna Bridge, other bridges and the road network system throughout the country will boost the emergence and development of growth centres, peri-urban centres and strengthen the rural-urban continuum in the country. Such a situation will lead to further growth of cities, particularly the big ones, like Khulna. Thus, Khulna will have to be ready to accommodate increased population and provide required services to these additional people, including sufficient quality and quantity of drinking water (Khulna Development Authority, 2002b).

Khulna City Corporation (KCC) designed an Urban Strategy, Structure Plan, Master Plan and a Detailed Area Plan to cope with the further growth of Khulna city. Khulna City Corporation submitted a proposal to extend Khulna city' boundaries from 45 km^2 (figure 13) to 70 km^2 to the government of Bangladesh in 2004. In 2014 a revision of the plans has been made to increase Khulna city to 114 km^2 (figure 14) and is again handed to the government. Up till 2018, Khulna City Corporation is still waiting for approval.

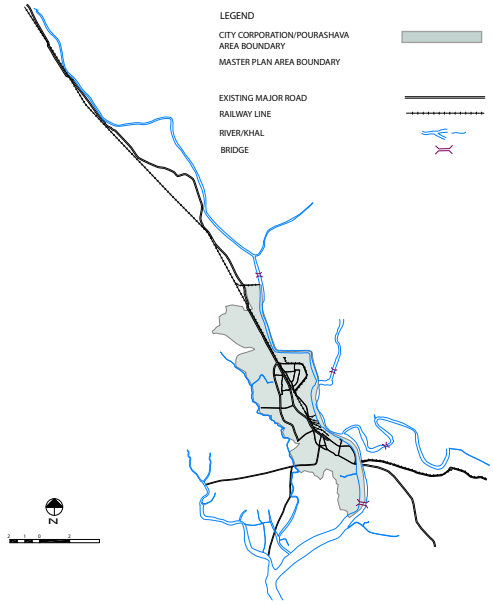

Figure 13: Khulna city boundaries

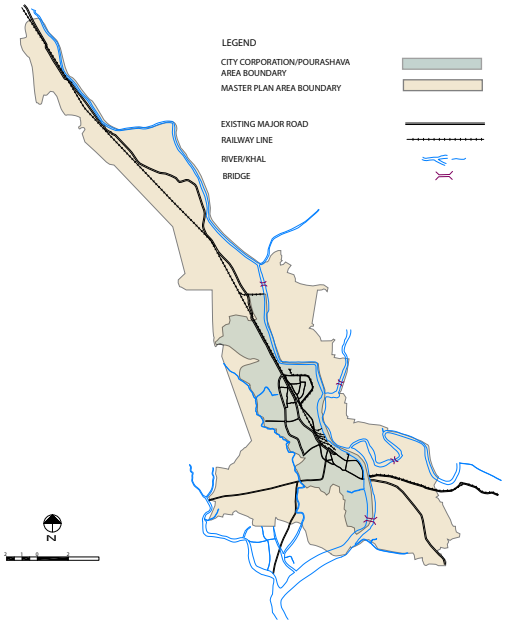

Figure 14: Expansion Khulna city

Khulna WASA have to provide required water services for the citizens of Khulna city now and in the future. Their supply area depends on the city expansion plans of Khulna City Corporation. For this, Khulna WASA need to know what the existing number of citizens is, and the expected number will be, so that they can design their installations appropriate. The prognoses of the population growth differ per organization. The prognoses of Khulna WASA and Khulna City Corporation shows different numbers, although they are taking into account the same city boundaries. Estimating future population for a specific period over a particular area is one of the most difficult tasks in Khulna for all organisations. A big problem in Khulna city is that there are no accurate numbers of the population.

Khulna WASA together with the Asian Development Bank made a prognosis of the population in 2009 and up to 2030. The prognosis is illustrated in the first row of table 3. This data from 2009 is still used today by Khulna WASA for their projects.

		2009	2010	2011	2015	2020	2021	2025	2030	2031
Khulna WASA	Total population	975,000	975,000		1,078,000	1,190,000		1,314,000	1,450,000	
KCC	Total population			1,042,535			1,410,618			1,908,569

Table 3: Current and Future population in Khulna according to Khulna WASA(Asian Development Bank, 2009)) & according to KCC (Khulna City Corporation, 2011)

Table 3 shows also the expected population growth of Khulna city according to KCC. KCC data derives from 2011 and these numbers are also still used by KCC. BBS Census population data have been used for the population projection for KCC. Following the annual growth rate for the study area available from the 2001 Population Census, the projection up to the year of 2031 with ten years interval has been made with the help of Compound Rate of Growth Method. To calculate the future population growth of the area, the following formula is used.

$P_n = P_o (1+ r)^n$

Where,

P_o = Population in the base year,

P_n = Population in the projected year,

n = number of intermediate years,

r = annual rate of growth.

As illustrated in table 3, the estimated population size in 2020 according to Khulna WASA is 1,190,000 citizens and the estimated population size in 2021 according to KCC is 1,410,618 citizens. Whereas the projected population in 2030 according to Khulna WASA is 1,450,000, the projected population in 2031 according to KCC is 1,908,659 citizens. KCC made an adjustment to the number of citizens in 2014 to 1,500,000 and is still using this amount as the number of citizens in Khulna city in 2018. This shows that there is no consensus about the number of citizens in Khulna city and that it is difficult to define the exact water demand for Khulna WASA.

4.4 Khulna Water Supply Project

To cope with the increasing water demand and the lacking qualitative and quantitative water supply service, Khulna Water Supply and Sewerage Authority decided in 2009 to start with the Khulna Water Supply Project to improve the existing water supply system with assistance from Japan International Cooperation Agency (JICA) and the Asian Development Bank (ADB). The time-scope of the project is till 2025, therefore the project team took into account the estimated amount of population in 2025.

Khulna Water Supply Project is co-financed by JICA and ADB and is being formulated as a project loan to be implemented over a 6-year period (2011 - 2017). Due to delays in the project, the load by JICA and ADB is extended till June 2018. The project will expand the access to water supply services by building a surface water treatment plant and extending the distribution network to supply drinking water to the whole city and aims to improve the quality of life for all residents and businesses in Khulna (Asian Development Bank, 2011).

The project will develop a surface water treatment plant with 110,000 m^3/day capacity to meet the growing demand until 2025 without increasing the groundwater abstraction and undermining its sustainability. Groundwater and surface water will be used conjunctively to ensure environmentally sustainable and economically efficient water resource management.

In 2009 baseline data was collected by the ADB in order to understand the situation in 2009. The estimated population of Khulna City in 2009 was 957,000 inhabitants. 82 litters per capita per day was defined as a sufficient amount of drinking water, creating a total domestic demand of 78,474,000 litters in Khulna city. The amount of non-domestic water demand added to the domestic water demand makes a total demand of 98,093,000 in Khulna city. Khulna WASA estimated the percentage of leakage after the water treatment plan at 18%. This makes the average day water requirement 119,625,000 litter per day. Including the seasonal peak factors of 1.15, the maximum day water requirement is 137,569,000. The existing supply capacity of Khulna WASA was designed in 2009 as 119,100,000 litters per day. This shows that the water supply system could not meet the water demand in Khulna city, and therefore addresses the importance of Khulna Water Supply Project (the project) according to Khulna WASA. These calculations are repeated till the end of the scope of the project in 2025 and 15 years after. At the end of the scope in 2025 the maximum day water requirement 230,692,000 litter in Khulna city. An additional supply of 110,000,000 litters per day is needed to serve all citizens of Khulna. This requires a water treatment plant to be installed with the capacity of 110.000.000 litters per day as well. Calculations on the water situation in 2030 were also made by Khulna WASA and the ADB, but due to loan restrictions the Khulna' Water Supply Project only takes the water treatment capacity of 2025 in consideration.

The project proposes a surface water supply system sourced from Mollarhat intake point on the Bank of Modhumati River in Bagerhat District. Approximately 33 kilometers from Khulna city. The raw water from Madhumati River will be stored into an impounding reservoir and transmitted to surface water treatment plant at Samonta Sena. The surface water treatment plant at Samonta Sena is surrounded by agricultural land of local famers. The farmers used the nearby river for livelihood practices. The proposed area for the surface water treatment plant covered part of the river. Therefore, the project decided to relocate the river to the west side of the surface water treatment plant plot (figure 15).

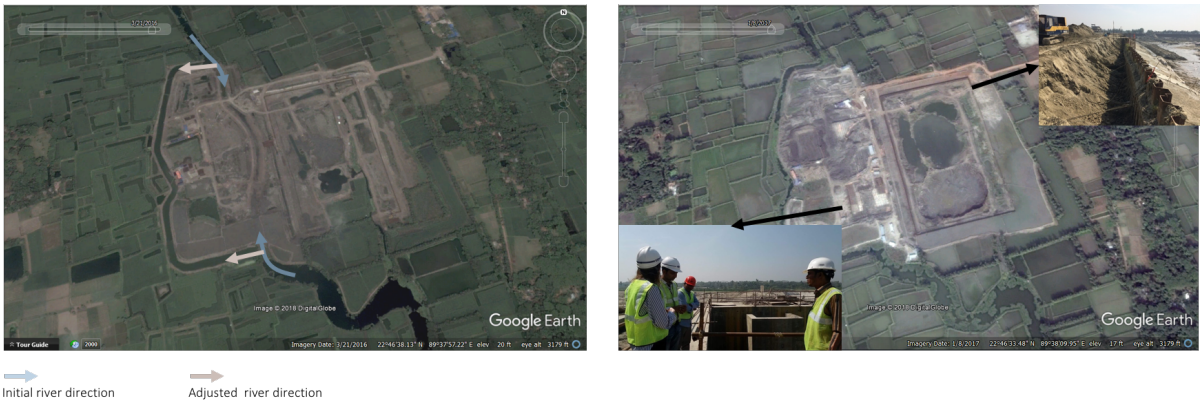

Figure 15: Water treatment plant at Samonta Sena (left 2017 & right 2018)

The purified water will be distributed to consumers through a system of smaller storage reservoir, overhead tanks and piped distribution networks (figure 16) (Asian Development Bank, 2011).

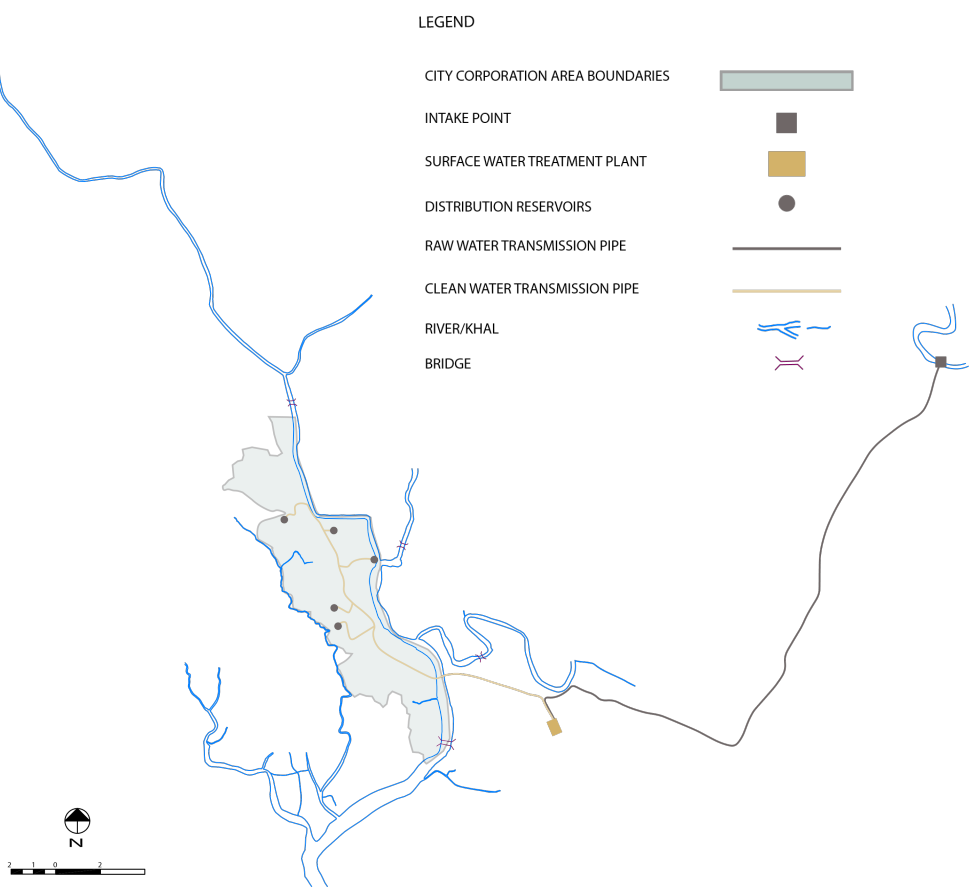

Figure 16: Distribution of surface water


5

ADAPTIVE PLANNING WORKSHOP

Chapter 5

In this chapter thedesigned adaptive planning approach for long-term sustainable WASH will be examined by means of an adaptive planning workshop with WASH experts from Simavi. Khulna' Water Supply Project (KWSP) is used as case study to examine the steps of the adaptive planning approach. The approach consists of three systematic steps (chapter 3); (1) defining the impact and critical assumptions of the programme, (2) defining relevant uncertainties by using contextual scenarios, and (3) defining adaptation actions and the timing of the actions. In this chapter the following question will be researched: how do development organisations interpret the systematic steps of the adaptive planning approach for long-term sustainable WASH services? The chapter start with a description of the workshop purpose, preparation and design. Hereafter, the finding of the steps of the adaptive planning approach will be reported and reflected one by one.

5.1 Workshop preparation and design

The purpose of the workshop is to address the understanding that Simavi can cope with uncertainty in an adaptive way, and to examine the systematic steps in the adaptive approach for long-term sustainable WASH.

To prepare this workshop, the project documents of Khulna' Water Supply Project were studied to be able to construct a Logical-Framework for the project and to formulate the contextual scenarios. Within the documents there has been searched for project impacts, outcomes, outputs, inputs, project activities, involved actors, project risks and contextual conditions. To obtain content for the contextual scenario, the project documents were complemented with literature and reports about events in Bangladesh. The contextual scenarios were discussed with an expert from a consultancy firm within this knowledge field. To be able to facilitate the workshop, reports and documents about how to facilitate workshops were studied. The main aspects which were taken into consideration during the workshop were, ensure an open process, sufficient incentives for progress and substantive quality. A questionnaire was designed for the WASH experts to give feedback on the content and process of the workshop. The aim of this questionnaire was to learn and improve the facilitation of the workshop and to gain the WASH experts opinion about the content of the adaptive planning approach.

The adaptive planning workshop, following the preparation and design, has been organized at the head office of Simavi on Wednesday December 20th 2017. Four employees of Simavi (hereafter WASH experts) participated in the full workshop, whereas one employee participated during the second half of the workshop. Two Senior Programme Officers (WASH), two Programme officers (WASH) and one PME Manager WASH Alliance participated in the workshop (figure 17). The spoken language during the workshop was English. The whole workshop was recorded and summarized afterwards.

The workshop started with an introduction step to introduce the topic of this thesis and with an introduction to the case study to the group of participants. This was done to provide a first understanding of the water situation in Khulna city. Hereafter the workshops have been divided into three steps, following the same three systematic steps of the adaptive planning approach for sustainable WASH.

The first step in the adaptive planning approach for sustainable WASH was designed to reflect on the long-term goals and impact of the project and to reflect on the project assumptions and the criticality of these assumptions. Based on the available project documents, a Logical Framework was manually designed to illustrate the change among the results-chain for the project. The project assumptions were directly quoted from the project documents. The long-term goals and impact of the project were presented to the group of participants on a screen, even as the project assumptions. The participants of the workshop were asked to individually write down their first thoughts about the long-term goals and impact of the project and their first thoughts about the project assumptions.

In the second step contextual scenarios, used to examine the vulnerability of the assumptions to future plausible events, were introduced to the participants. Four contextual scenarios for Khulna city in 2025 were specifically developed (manually by the author of this thesis) to offer scope to views of the future that differ from existing trends in order to be able to investigate the robustness of Khulna' Water Supply Project. The scenario logic

approach of Schwartz (1996) was used, where a 2x2 matrix is designed by placing two key uncertain driving forces on the vertical and horizontal axes. The two driving forces were defined after carefully reading reports about contextual event effecting Khulna and analysing the available project documents online of the Asian Development Bank (2010) and Japan International Cooperation Agency (2011). Two contextual events were mentioned in the project documents that could shape the future and concerned the drinking water situation in Khulna city. Urbanization due to migration and climate change impacts. These two events were also multiple times mentioned in reports about challenges in Bangladesh. This scenario approach had a qualitative nature, and leads to global, easy recognizable descriptions of images of the future that have the objective to stimulate discussions and reactions. The sequential step was to define relevant uncertainties. Relevant uncertainties that derive from plausible futures and make assumptions vulnerable to be overturned. The four plausible futures were divided among the participants. The participants were asked to read the assigned scenario and to individually write down the uncertainties that were relevant within their scenario.

Within the third step of the workshop the participants were asked to write down relevant adaptation actions within their scenario. Actions that need to be conducted when their assigned plausible future state of the world would be the reality of Khulna city in 2025. After the uncertainties and adaptation actions were formulated on paper by each participant individually for their assigned scenario, the participants were asked to present their finding to each other. These findings were discussed within the group of participants. As part of the third step of the workshop the timing of these actions had to be defined. Due to lack of workshop time, this component has not been included in the workshop.

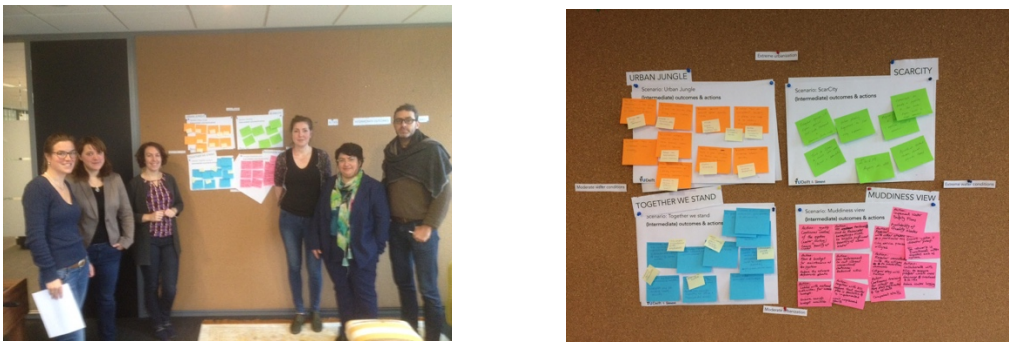

Figure 17: Adaptive Planning Workshop at the head office of Simavi, December 2017

5.2 Step 1: Impact & critical assumptions

Within this paragraph the findings of the first step within the workshop will be discussed. The WASH experts reflected on the long-term goals and impact of the Khulna' Water Supply Project. Thereafter they reflected on the critical assumptions of the project.

5.2.1 Content

In this first step a Logical Framework has been used as the basis for the project to illustrate the content of the results-chain. It should be noticed that this differs from the Theory of Change that Simavi uses as basis. It is a more simplistic representation with less detailed elaboration on the *how* question. The Logical Framework includes the impact, outcomes and intermediate outcomes of the project (figure 18). The impact of the project is to *improve urban services in Khulna city*. For Khulna' Water Supply Project three outcomes are defined; *water sources in Khulna city are augmented and managed sustainable; expended and reliable access to potable water in Khulna*

city; and *Khulna WASA manages the water supply system professional and sustainable.* Ten intermediate outcomes contribute to the three outcomes.

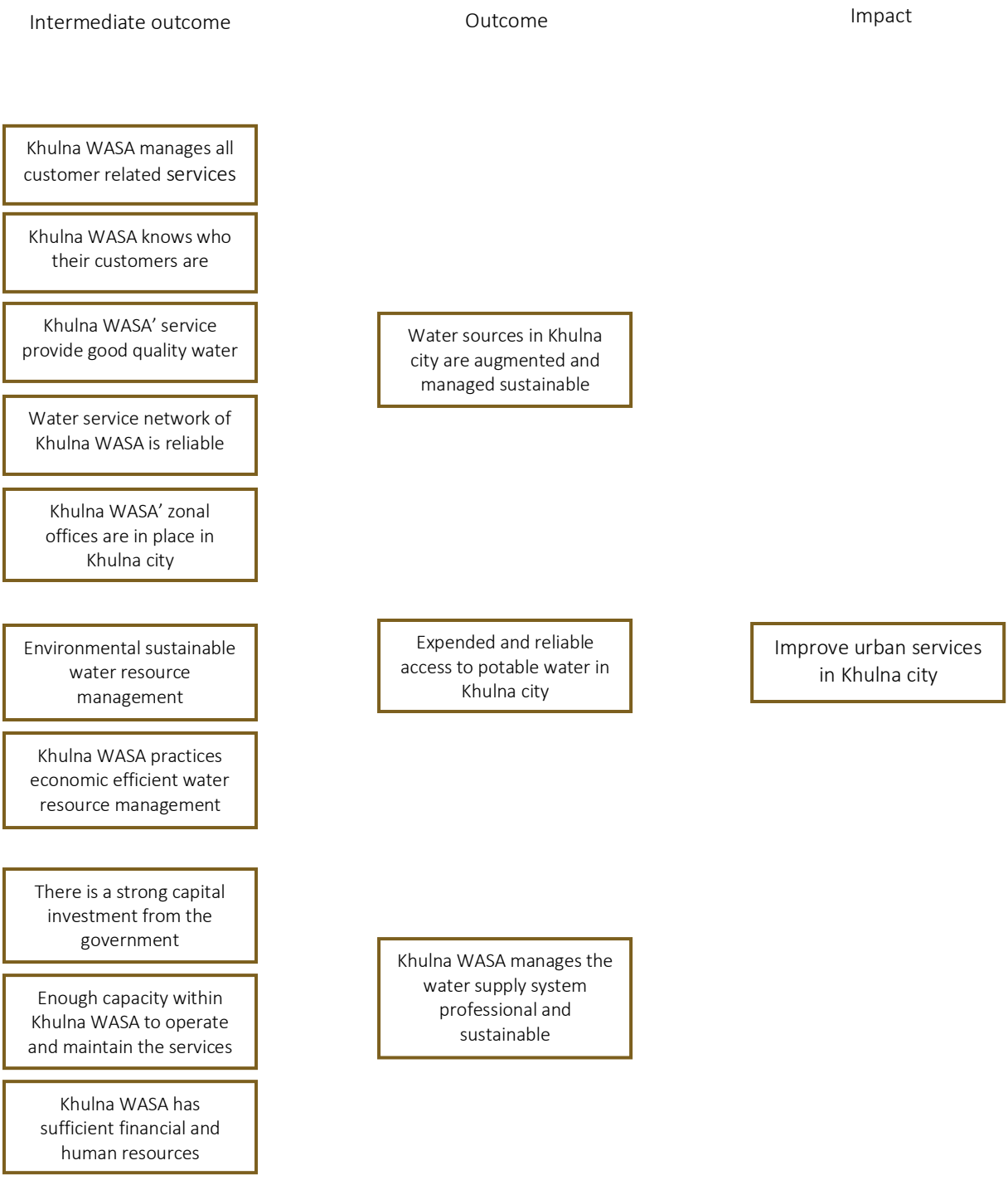

Figure 18: Log-frame Khulna' Water Supply Project (manually design by the author of this thesis)

The same as in the Theory of Change, assumptions play an important role in the Logical Framework. Assumptions in a Logical Framework should have the intention to analyse dependencies that would influence the programme's success. Five project assumptions are formulated for the project (Asian Development Bank, 2011).

1) Khulna City does not expand to fringe areas

2) Population of Khulna City does not grow too rapidly as a result of large migration

3) Abstraction of groundwater by private wells does not increase substantially

4) Households are willing to connect to the KWASA network

5) Competent managers and engineers apply for posts and are recruited

5.2.2 Findings

The Logical Framework has been jointly discussed with the WASH experts. They expressed their thoughts about the incompleteness of the Logical Framework. As they are used to work with the Theory of Change, they expressed they doubts about what they describe as the 'missing middle'. This is the part between the intermediate outcomes and the outcomes, and how these lead to desired goals being achieved. They overall opinion was that this Logical Framework presented a very basic and limited overview about how the project team though the achieve 'improved urban services in Khulna city'.

The project assumptions have been analysed individually by the WASH experts. They were asked to write down their observations about the assumptions. The first three assumptions express future situation which are assumed not to happen. The overall responds by the WASH experts was that they did understand that the first three assumptions would be desirable not to happen for the future of Khulna city, but they questioned it this would be reality. They argued that the project assumptions seemed 'optimistic' and 'unrealistic'. One WASH expert expressed this by arguing:

'You need to do something to make sure that assumption 3, abstraction of groundwater by private wells does not increase substantially.'

The WASH experts also formulated required conditions to make sure the assumptions would hold in the future as well. Although this was not asked they spontaneously did because apparently they felt the urge to find ways to make sure the assumptions would hold. One of the participants gave an example to illustrate this for assumption three, four and five:

'If Khulna WASA provide quality water or if they have an affordable connection cost and demand creation strategy, then households are willing to connect. Also if they provide good conditions for their staffs then they can attract competent managers. And if they register private wells and regulate the use then they will get less ground water extraction.'

Another participant responded to this statement with questioning if the government can help here. For example, with regulations and rules about groundwater abstraction.

5.2.3 Reflection

The WASH experts expressed their thoughts about the basic and simplistic representation of the Logical Framework. Next, they questioned if the project team kept their five project assumptions independent from their desires about the future of Khulna city. The WASH experts argued that they were not convinced that the assumptions would stay unaffected during the project horizon. They seemed 'unrealistic', where after the WASH experts formulated required conditions to increase the chance that they will. The overall consensus was that the

project planners of Khulna' Water Supply Project seemed optimistic about the critical assumptions of the project. In other words, the validity of the project assumptions has been questioned.

This step was designed to create dialogue about the long-term objectives and the critical assumptions of the project. The WAS experts seemed to feel comfortable when assessing the criticality of the project assumptions.

5.3 Step 2: Contextual scenarios & uncertainty

In this second step, contextual scenarios were introduced to the WASH experts to examine the vulnerability of the assumptions to future plausible events. Thereafter, the WASH experts formulated uncertainties within a specific scenario that would affect the objectives of KWSP according to them.

5.3.1 Contextual scenarios

A basic objective of the KWSP was that Khulna WASA would accommodate the future drinking water demand of the inhabitants of Khulna city. In order to assess the robustness of the project plan with respect to the future, context scenarios were developed. The main question these scenarios would have to answer was: What are different plausible futures for the water situation in Khulna city? The scope of the scenarios is the future of the water supply situation in Khulna city in Bangladesh and developments that could affect this. Given the time-scope of the project, a time horizon till 2025 was chosen.

There were two contextual events mentioned in the project documents of KWSP (Asian Development Bank, 2009) that could shape the future states of the world for Khulna city and were out control of the project stakeholders. Urbanization due to migration and climate change impacts.

The urban context can be characterized by extreme urbanization and moderate urbanization. A moderate level of urbanization means a predicted influx of people from outside of Khulna city and a moderate drinking water demand. An extreme urbanization situation creates an extreme dynamic and heterogenic environment with a bigger change of intense conflicts among stakeholders. It also means a high demand for drinking water. Climate change impacts can be translated to the uncertain water conditions in Khulna city. The water conditions situation can be characterized by moderate or extreme water conditions. Moderate water conditions mean that climate change impacts are minimal and that the water stress stays moderate in Khulna city. Extreme water conditions caused by extreme climate change events means that water stress will increase in Khulna city (figure 19).

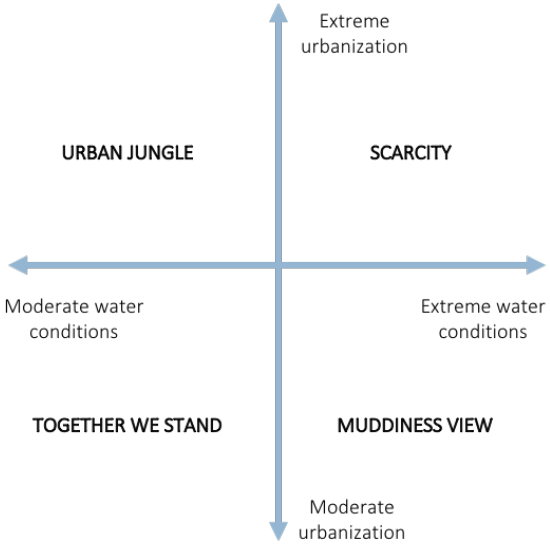

Figure 19: Contextual scenarios for Khulna city in 2025

This resulted in the following four scenarios:

Urban Jungle: Khulna is still the 3th largest city of Bangladesh in 2025. In previous year the urbanization rate has increased enormously. People from different places moved to Khulna city to look for a better living and work opportunities. This heterogenic group of inhabitants settled mainly in the fringe areas of Khulna city. In 2025 pollution is one of the biggest challenges for Khulna WASA. New industries arise upriver from the water intake point in Mollarhat. Industrialization has been responsible for higher water consumption with correspondingly higher levels of waste. Surface waters are substantially polluted by agricultural, industrial, domestic, and municipal sources. Khulna WASA is forced to abstract more groundwater to equalize the water quality and reach the quality norm again. The nationally recognized extreme urbanization situation in Bangladesh puts pressure on the government and Khulna City Corporation (KCC). Conflicting interest among the government, KCC and Khulna WASA leads to a smaller capital investment by the government. With less financial resources it is hard for Khulna WASA to meet the quality and quantity demands of the inhabitants.

ScarCity: As a result of migration from rural areas in Bangladesh, the population growth in urban areas has been high. In 2025 the county's urban population is doubled to 74 million, or 40% of the total population. The growth rate in Khulna follows this trend and increased enormously. Rivers near Khulna city are already affected by salinity intrusion, and the sea level rise caused by climate change is expected to exacerbate the problem of salinity intrusion. In addition, unsanitary practices of new inhabitants contribute significantly to the deterioration of surface water quality. Therefore, the use of surface water for drinking requires elaborate and expensive treatment, including clarification and disinfection. Climate change induced hazards such as intense rainfall, cyclones, flooding and salinity intrusion are expected to exacerbate the already alarming migration flows. Recovering from such crises is putting a drag on Bangladesh's economic growth, with a forecasted annual climate loss by 2050 will amount to 2% of GDP. As a result, international organisations and donors step up to support the drinking water situation in Khulna.

Together we stand: In 2025 in Khulna city, the influx and outflux of people has declined, leading to a sense of relative stability in the city. Compared to the past years, Khulna WASA is now focusing on wastewater management. Meanwhile, the existing water supply infrastructure is not properly operated and maintained, causing poor services for the inhabitants of Khulna city. Operational efficiency is typically low, characterized by large network losses. This results in a lower service standard with shorter supply hours and lower quality of water. Donor and government funds are reduced as result of the moderate and manageable contextual conditions in Khulna. In addition, Khulna WASA have to fund operation and maintenance through water charges. However, tariffs tend to be too low to finance proper operation and maintenance, which was not prioritized in budget allocation. Due to lack of funding and a shortage of capable staff at the Khulna WASA and the Khulna City Corporation, the city lacks comprehensive understanding on future risk and vulnerability.

Muddiness view: A shocking sea level rise is reached in 2025. Khulna is hit particularly hard by climate change. The melting of Himalayan glaciers, increasing monsoon rainfalls, more frequent cyclones, rising sea level and the intensifying erosion of rivers have a large impact on the inhabitants of Khulna and their livelihood. Some inhabitant hesitates to connect to the Khulna WASA network again after the most current cyclone destroyed their connection. Others are not willing to pay for the services of Khulna WASA because the water quality has dropped significantly. As a result, inhabitant tend to abstract more groundwater from their private wells. International attention to the extreme water conditions in Bangladesh leads to more support from the government and international donors, especially Khulna is high listed due to its location. Khulna WASA receives more support what leads to sufficient financial and human resources within the authority. But the concerned central ministry, the local municipality, and Khulna WASA do not have strong institutional capacity to improve municipal services efficient.

5.3.2 Uncertainty

The scenarios were divided among the WASH experts. Each WASH expert individually defined uncertainties within their scenario. Table 4 present the finding of the WASH experts. Similar uncertainties were mentioned within different scenario. These uncertainties can be clustered to spatial development uncertainty, water quality & quantity uncertainty affecting Khulna WASA' performance, financial uncertainty of Khulna WASA and uncertainty about the management capacity of Khulna WASA. Other than the clusters, five single uncertainties were defined by the WASH experts (table 4).

	Scenarios			
Uncertainty clusters	**Urban Jungle**	**ScarCity**	**Together we stand**	**Muddiness view**
Spatial development	Unplanned settlements in the fringe areas	Informal settlements		Migration from rural area to slums
	Rapid urban population growth in the future			Unplanned growth of city
Water service	Poor urban water services	Poor service	Large network losses, lower service standard, shorter supply hours and lower quality of water	
	Khulna WASA is not able to meet service standards, what can create a negative image of Khulna WASA	Surrounding states (they share rivers) could influence water quality and quantity		
a. Quality	Low water quality due to pollution of surface water	Water quality influences industries and farming (fertility)		The network cannot deliver sufficient water quality
	Reduced water quality can lead to complains of customers	Rising sea levels will influence surface water quality		Quality of water reduces due to network deficiency such as leaks and illegal connections
	Salinity leads to water pollution	Surrounding and upstream salinity will affect surface waters		Water logging
b. Quantity	Reduced groundwater level	Illegal connections, water losses of network (*)		NRW through illegal connections (*)
Financial	Khulna WASA has limited financial resources	Illegal connections, water losses of network (*)	Government funds are reduced	Despite the donor attentions there is not enough investment
	High investment costs to connect to fringe areas		Water tariffs are too low	NRW through illegal connections (*)
			Budget allocation is not prioritized	
Management capacity of Khulna WASA			Shortage of capable staff within Khulna WASA	Turnover of competent staff due to difficult situation in Khulna city

			Operation and maintenance is lacking	
Single uncertainties				
Demand	High water demand in Khulna city: domestic, industry and agriculture			
Conflicting interest	Conflicting interest among the government, Khulna City Cooperation and Khulna WASA			
Health		Poor health conditions (due to flooding)		
Climate				Extreme weather conditions: cyclone, floods, heavy rains, etc.
Corruption				Corruption

Table 4: Uncertainty dimensions clustered

*Uncertainty can apply to multiple clusters

Unplanned city growth and growth of informal settlements affect the drinking water situation in Khulna city according to the WASH experts. Uncertainty about the future water quality and quantity in Khulna city are also defined as future uncertainties. The WASH experts mentioned possible causes as pollution (e.g. due to salinity), water logging, deficiencies such as leaks and illegal connections and the sea level rise. Limited resources, high investment costs to connect the fringe areas, large non-revenue water, reduced government costs and too low water tariffs are mentioned as uncertainties, that can be clustered under the heading financial uncertainty. Uncertainties about the management capacity of Khulna WASA are defined by the WASH experts as well. Shortage of capable staff, turnover of competent staff and lack of operation and maintenance are mentioned as uncertainty within this cluster. Other than these clusters of uncertainty, the water demand in the future has been seen as an uncertainty, even as conflicting interest among stakeholders, health conditions, extreme weather conditions and corruption.

5.3.3 Reflection

The aim of this step was to, through the four contextual scenarios, reduce a large amount of uncertainty to a handful of plausible alternative futures, to then define the most relevant uncertainty dimensions in the plausible alternative futures. These uncertainty dimensions can be clustered to spatial development uncertainty, water quality & quantity uncertainty affecting Khulna WASA' performance, financial uncertainty of Khulna WASA and uncertainty about the management capacity of Khulna WASA.

The WASH experts found scenario planning as tool to define uncertainties valuable. They did not hesitate to define uncertainties. They argued: '*Scenario thinking has to be done with local stakeholders, they need to understand the bigger context to ensure smooth implementation.' - 'Yes, I think it could be an interesting exercise for local stakeholder to think more ahead and be aware about the possible impact of the programme. But be aware that not all local partners are used to think in the future depending per country. A good introduction and enough time is needed.'- 'With a good facilitation, yes! The process will be more important than exact scenario. I think doing it with local stakeholders and triggering the idea of proper planning is the added value.' - 'They should definitely be involved since you want to give the ownership to them. After leaving, the scenario planning is still relevant (urbanization will not be finalised in the next 5 years of our programmes). Ideally, you want to increase their capacity in this.'*

Also scenario planning has been revealed as additional value to planning of programmes and project. The WASH experts argued: *'It could be good to be aware about the changes you possibly need to make to achieve sustainably – which is becoming more and more important.'- 'Programmes / projects can be designed to mitigate uncertainty and improve sustainability in long-term'* – 'It can help the service provider adapt their plan and mitigate unwanted outcomes.'

5.4 Step 3: Adaptation actions & timing

The aim of the third step in the adaptive planning approach is to define appropriate adaptation actions that are tailored to different plausible future conditions and to articulate the timing of these actions to make the planning process able to adapt to future uncertainty.

5.4.1 Adaptation actions

The WASH experts were asked to individually formulate adaptation actions. They were formulated separate from the uncertainties within a scenario. Yet after discussing them collaboratively, the actions can be connected to the uncertainty clusters (table 5).

Spatial development	Water service	Financial	Khulna WASA management	Demand	Climate	Conflicting interest
Make urban development plan	Develop complain services for customers	Develop a business plan	Training for staff so they stay motivated and up-to-date	Survey on demand in different consumer groups	Make system disaster proof	Communication strategy development with stakeholders
Together with KCC ensure that master plan is realistic and is implemented	Collaboration with KCC to ensure proper waste water drainage and treatment and re-use	Law enforcement to cut illegal connections	Regular consultation with other stakeholders in particular KCC	Regular consultation with the citizens to understand demands		Regular consultation with other stakeholders in particular KCC
Integrated urban approach with KCC	Invest in system technologies	Lobby with national authorities for increased budget	Training to Khulna WASA	Awareness raising communities to hold Khulna WASA accountable		Consultation and coordination with beneficiaries
	Use technologies such as rainwater harvesting	Collaboration private sector				

Table 5: Adaptation actions related to uncertainty clusters

Collaboration between the stakeholders, especially Khulna WASA and KCC is defined as an adaptation action to cope with future spatial development uncertainty. But also to cope with future uncertain qualitative and quantitative water services and plausible conflicting interests. Adaptation actions as the development of a business plan, law enforcement to cut illegal connects, lobby activities and collaboration with the private sector are defined to cope with future financial uncertainty of Khulna WASA. According to the WASH experts, training to Khulna WASA' staff and consultation with other stakeholders was an appropriate adaptive action to cope with uncertainty about the management capacity of Khulna WASA. To cope with uncertain water demand, a survey on demand and consultation with citizens was defined as adaptation actions. Also, the water supply system of Khulna

WASA need to be made disaster proof to deal with climate uncertainties. Then, with possible conflicting interest among beneficiaries can be coped by developing a communication strategy and with regular consultation.

The type of adaptation actions mentioned by the WASH experts concerned collaboration among beneficiaries, social and demand driven approaches, policy activities and institutional capacity strengthening. The adaptation actions seemed quite generic, meaning that they seemed applicable to a cluster of uncertainties.

5.4.2 Timing

Although the timing of actions is an important component in the adaptive planning approach for sustainable WASH, this component is not captured in the adaptive planning workshop. Due to lack of workshop time the WASH experts were not able to address the timing of the adaptation actions.

When the workshop would have allowed to consider the timing component, the WASH experts would have to consider when the current project plan would fail to meet the objectives. This would be the moment that the project cannot ensure sufficient and qualitative drinking water to the current and future citizens of Khulna city. The critical assumptions play an important role in this because they articulate the dependencies that would influence the programme's success. So the moment that they will be overturned, the project will fail and the adaptation tipping point is reached. The WASH experts raised the question if the actions could be implemented directly after project completion. They do not seem to depend on how the future would unfold.

5.4.3 Reflection

Within this third step, the WASH experts were able to define some adaptation actions within their assigned scenario. The type of adaptation actions mentioned by the WASH experts concerned collaboration among beneficiaries, social and demand driven approaches, policy activities and institutional capacity strengthening. The adaptation actions were applicable to a cluster of uncertainties. The WASH experts raised the question if the actions can be implemented directly after project completion because they seemed logical to conduct anyway and they do not seem to depend on how the future would unfold.

5.5 Conclusion

The purpose of the workshop was to address the understanding that Simavi can cope with uncertainty in an adaptive way, and to examine the systematic steps in the adaptive approach for long-term sustainable WASH.

The WASH experts were able to critically assess the project assumptions. The overall consensus among the WASH experts was that the project planners of Khulna' Water Supply Project seemed 'optimistic' about the 'unrealistic' critical assumptions of the project. The validity of the project assumptions has been questioned. Yet the WASH participant defined uncertainties that make the critical assumptions vulnerable to be overturned by future events. The uncertainties can be clustered to spatial development uncertainty, water quality & quantity uncertainty affecting Khulna WASA' performance, financial uncertainty of Khulna WASA and uncertainty about the management capacity of Khulna WASA. To cope with these future uncertainties, the WASH experts defined adaptation actions. This concerned collaboration among beneficiaries, social and demand driven approaches, policy activities and institutional capacity strengthening. The adaptation actions are applicable to a cluster of uncertainties. The WASH experts addressed that the adaptation actions need to be implemented anyhow. They do not seem to depend on how the future would unfold.

All WASH experts seemed enthusiastic about the workshop design. They found scenario planning as tool to define uncertainties valuable. A WASH expert argued *'it was refreshing to think about different possibilities that need to be considered looking to uncertainty'.* According to the WASH experts, scenario planning as tool can stress the added value of proper planning but ideally more time is needed for the workshop. Development organisations should be aware that the local partners are not always used to think about the future but according to one WASH experts it would be good to increase their capacity in this. Scenario planning has been described as a good tool to support smooth implementation of the programme.


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6

ADAPTIVE PLANNING FIELD RESEARCH

Chapter 6

In this chapter the designed adaptive planning approach for sustainable WASH will be examined by means of interviews with project stakeholders in Dhaka and Khulna in Bangladesh. Again, Khulna' Water Supply Project is used as case study to examine the three steps of the adaptive planning approach. The approach consists of three steps (chapter 3); (1) defining the impact and critical assumptions of the programme, (2) defining relevant uncertainties by using contextual scenarios, and (3) defining adaptation actions and the timing of the actions. This approach has been examined during field-research in Bangladesh to obtain a deeper understanding of the three steps for this case study project. In this chapter the following question will be researched: how do the local stakeholders interpret the systematic steps of the adaptive planning approach for long-term sustainable WASH services? The chapter starts with a description of the field-research purpose, preparation and design. Hereafter, the finding of the steps of the adaptive planning approach will be reported and reflected one by one.

6.1 Field-research preparation and design

The purpose of the field-research is to examine the systematic steps in the adaptive approach for sustainable WASH.

During a period of four weeks, between January and February 2018, field-research was conducted in Bangladesh. As it was not possible to organize the same workshop as in the Netherlands, semi-structured interviews to examine the three steps of the adaptive planning approach were conducted. Nine interviews with representatives of six organisations in Dhaka and Khulna were conducted (table 6). These organisations have a direct relationship with the project (e.g. loan provider, executive organization) or these are organizations (e.g. municipality) which decision making will affect the project. Most of the interviewees were strategic management staff members (ADB, JICA, KCC, Khulna WASA), whereas one interviewee within Khulna WASA is a project staff member and two interviewees of KDA and DHPE had an operational function within their organization. Both the strategic management staff members and the project staff members are hereafter called project stakeholders. Except for one, all interviews were in English. This one Bengali interview was translated during the interview to English. During all interviews, a junior faculty member from Khulna University of Technology was present to support the progress of the content and to reduce some misconceptions due to cultural differences. Five out of the nine interviews were recorded and transcribed. The other four interviews were not recorded on the request if of the interviewee and are therefore summarized.

Interview	Organisation	Function
1	Asian Development Bank (ADB)	Senior Project Officer KWSP
2	Japan International Cooperation Agency (JICA)	Senior Representative (Urban Development) + Programme Officer
3	Khulna City Corporation (KCC)	Chief Planning Officer
4	Khulna WASA	Deputy Managing Director (Finance & Admin) + Computer Engineer
5	Khulna WASA	Managing Director
6	Khulna Development Agency (KDA)	Assistant Town Planner
7	Khulna WASA	Assistant Engineer PMU KWSP
8	Department of Public Health and Engineering (DPHE)	Executive Engineer
9	Khulna WASA	Deputy Managing Director & Project Director KWSP
Other activities		

Fieldwork Matumdanga	KUET, Department of Urban and Regional planning	Junior Faculty member
Visit small treatment plant	KUET, Department of Urban and Regional planning	Junior Faculty member
Visit water supply treatment plant of KWSP	Khulna WASA	Assistant Engineer PMU KWSP

Table 6: Overview of interviewees

The tree steps of the adaptive planning approach were embedded in semi-structured interviews. The first two interviews were conducted with the ABD and JICA in Dhaka. Both organization provide loan to Khulna WASA to realize the project. The first step of the adaptive planning approach was about impact and critical assumptions, therefore it was important to validate the constructed Logical Framework of Khulna Water Supply Project and discuss the project assumptions. This was done with the Senior Project Officer of the KWSP from the ADB initially and thereafter with the Senior Representative (Urban Development) and the Programme Officer of JICA. Within both interviews, step one of the adaptive planning approach was addressed.

Within the remaining interviews, all three steps of the approach were addressed. These interviews started with an introduction to this thesis and an introduction to the function of the interviewee. Hereafter the output and outcomes of the project and the project assumptions were discussed. Also, features from different contextual scenarios (same as chapter 5) were mentioned to the interviewees with a sequel question to formulate relevant uncertainties. Sometimes this organically brought up some actions to cope with the uncertainties, while sometimes it did not. The mentioned uncertainties and actions were intertwined during the interview as natural response to the evolvement of the interview.

Next to six direct and indirect stakeholders, there were three contractors involved with the physical work of the project, and one consultancy firm. Conducting interviews with these parties would provide more detailed insight to the project components. Due to the fact that the existence of these contractors and consultant was noticed late, to be precise during the interview with the Assistant Engineer from Khulna WASA, there was not enough time to arrange interviews with these involved parties.

Other than the nine interviews, three relevant activities were conducted during the field-research period in Khulna. Five households in the peri-urban village Matumdanga were questioned to understand their drinking water situation and to obtain an understanding of change in water supplier after city expansion of Khulna. Secondly, two visits were organized to water supply treatments plants. The first visited plant was a plant currently in use for governmental institutions. The second plant, was the water treatment plant under construction for KWSP. All three activities gave more detailed insight to substantiate the results of the interviews.

6.2 Step 1: Impact & critical assumptions

In this first step the long-term goals and impact of the project have been reviewed, even as the critical assumptions of the project.

In the previous chapter a Logical Framework (manually designed) has been used as the basis for the project to illustrate the content of the results-chain. The Logical Framework is adjusted after a high-level stakeholder from the ADB illustrated the intended Logical Framework of the project. The adjusted Logical Framework emphasizes that Khulna' Water Supply Project together with other projects of the ADB, such as their sewerage project, contribute to the impact: *improved urban services in Khulna city.* The impact is defined by and for the ADB projects and can therefore not directly be seen as the project impact for Khulna WASA. However, the outcome of the project, *expanded and reliable access to potable water in Khulna city*, refers to Khulna WASA. The output is divided

into three components: delivery of augmented and sustainably managed water sources; development of an extended and efficiently managed distribution network; and establishment of professional and sustainable corporate management of Khulna WASA. This first component is covered by JICA, the second component by the ADB and the third by Khulna WASA. Figure 20 illustrates the Logical Framework with outsourced project output.

The first two physical components are divided in five smaller components. The five components of the output are outsourced to contractors with contractual payments based on delivery of pre-determined outputs. Three contractors are involved, Chinese Geo Engineering Corporation, China Harbour Engineering Company Ltd and Ranken Maple. SMEC is the consultant for the third component of the output and is engaged to provide management development support to Khulna WASA, to transform the authority into a professionally managed corporate body. SMEC provided mechanical and electrical designs, a corporate business plan, financial management, performance monitoring and support and capacity development to Khulna WASA management Note that these are the adaptation actions that the WASH experts defined to cope with uncertainty about the management capacity of Khulna WASA.

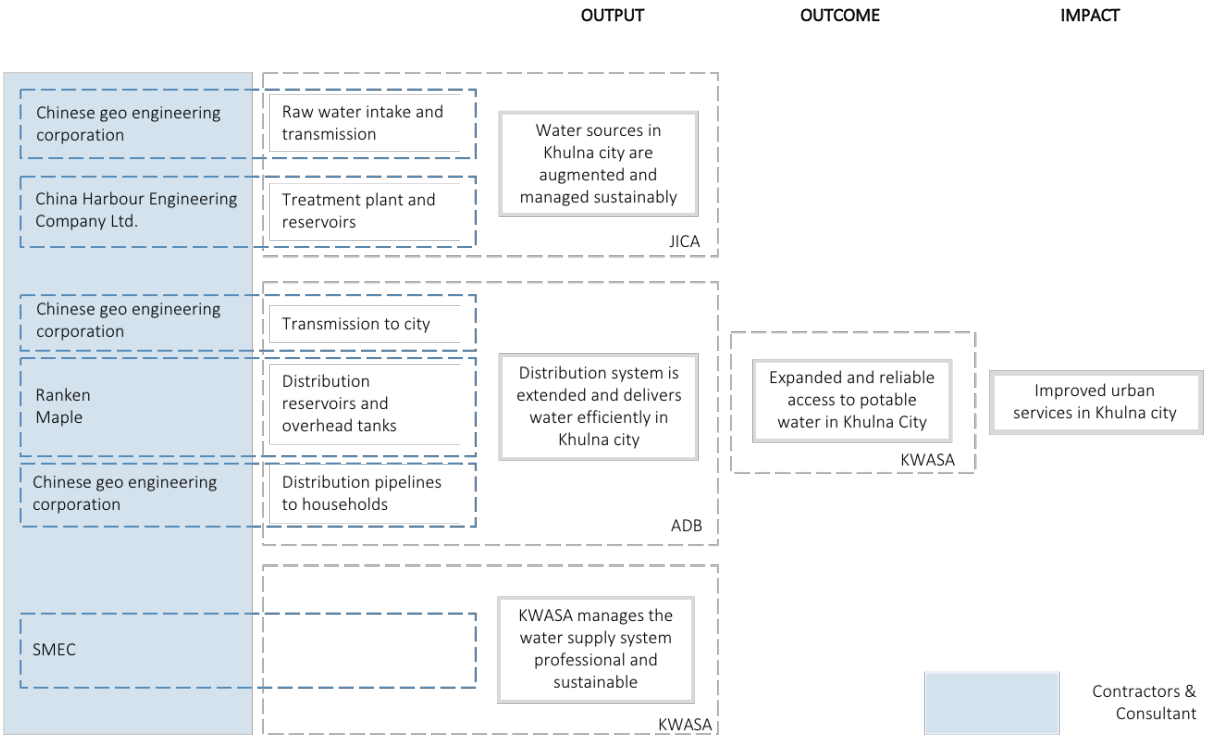


Figure 20: Logical Framework with outsourced output for KWSP

The five project assumptions as introduced in paragraph 5.3 were verified by a high-level stakeholder from the ADB and therefore can still be seen as the project assumptions:

1) Khulna City does not expand to fringe areas

2) Population of Khulna City does not grow too rapidly as a result of large migration

3) Abstraction of groundwater by private wells does not increase substantially

4) Households are willing to connect to the KWASA network

5) Competent managers and engineers apply for posts and are recruited

The explanation given during the interview with this high-level stakeholder from the ADB about the Logical Framework and the project assumptions contained the following:

'Yes, in fact the Logical Framework and the assumptions are made at the beginning of the project. We have not changed anything, because in ADB process as soon as you develop a Logical Framework and it is approved, it is fixed. But in time our understanding is better. Now the assumptions can be different, but it is there.'

This high-level stakeholder from the ADB realized that there is more known about the current state of the world that there was at the beginning of the project, 'their understanding is better'. The stakeholder argued that the assumption *Khulna city does not expand to fringe areas* has already been overturned. Any understanding if this would affect the long-term goals and impact of the project is not something that receives attention. Although, assumptions in a Logical Framework should have the intention to analyse dependencies that would influence the programme's success.

The main concern of the project stakeholders was towards the output of the project. The high-level stakeholder from the ADB emphasized the focus on the outputs with:

'The consultant reports how much there have been achieved. What we are reporting is basically on the outputs. If we achieve the output, these outcomes can be achieved.'

6.2.1 Reflection

The Logical Framework has been designed at the start of the project. The outputs, outcomes and impact are fixed in the Logical Framework for the entire project. There is little attention payed to the content of the project assumptions. Although the stakeholders recognized that some assumptions were vulnerable to be overturned by future event, during the interviews, there was no intention to assess them along the way. It seems that the project's success is defined as the realization of the outputs. The project stakeholders did not question the relationship between the success of the project and the assumptions. There can be concluded that the project stakeholders did not critically questioned the validity of the project assumptions.

6.3 Step 2: Contextual scenarios & uncertainty

In this second step, features from the contextual scenarios, as introduced in paragraph 5.4, examined the vulnerability of the assumptions to future plausible events (table 7). Although the project stakeholder argued that the assumptions were indeed vulnerable to be overturned by future event, they do not address this in more detail and therefore do not know what uncertain dimensions could occur within their planning horizon. Together with the interviewees there was explored which uncertainties can be relevant to the project.

Features	
- willingness to connect (citizens)	- Salinity
- willing to pay (citizens)	- expensive treatment due to contamination
- groundwater abstraction	- operation and management strategy
- support of donors / international aid	- non-revenue water
- institutional capacity	- capacity of Khulna WASA staff
- development in fringe areas	- financial resources
- water surface pollution	

Table 7: Features of the four contextual scenarios

6.3.1 Contextual scenarios

The aim of this step was that the features embedded in the contextual scenarios would stimulate discussion and reactions about uncertainty in the future. Some observations will be explained to get a better understanding about how the stakeholders reacted when they were confronted with plausible future scenarios.

When the features from the plausible scenarios were introduced the overall responds from the interviewees was optimistic toward these features. To the question if it will be a threat that people are not willing to connect to the water supply system of Khulna WASA, a high-level stakeholder of Khulna WASA responded:

'They will, it gives better quality. Also their private wells in dry season it will dry. Because water level is decreasing.'

To the question, can the usage of private wells be an issue for Khulna WASA, a high-level stakeholder (Senior Project Officer of the project) from the ADB responded with:

'No, although there are a lot of private wells. As you know Khulna is coastal region. You have a lot of saline and minerals in the water. And hardness was also a problem as far as I remember. If the city has a good water systems people will gradually stop using groundwater. They will prefer surface water. You will see in Khulna city that the water quality is not that good. Plus, it is costly for the people because they have to go every deep, difficult process.'

And according to another high-level stakeholder from Khulna WASA, people are looking up to governmental services. The most power in these bodies, people can trust the service and if Khulna WASA provide cheap rate for the connections it is better than using private wells. He argued that good quality is needed, and in the end it is more cost effective for households. To the question if it would be possible that people are not willing to pay, another high-level stakeholder responded:

'It should not be because if they calculate what is the tariff in Khulna and what is it in other residents, in this case it is low in Khulna. It is 1000 L for one unit, so it is so cheap this price. It is very less. So in a month one family will pay around 2 dollars. Per month.'

Then, it seemed that there is the tendency to shift the responsibility towards others. Khulna WASA is in the end not responsible for the repayment of the loan to ADB and JICA. This responsibility is for the government of Bangladesh. Next to this, according to a middle-level stakeholder of JICA, 'they have the duty of free paying their loan' and this is one of the biggest challenges. There can be questioned it there is a lack of financial responsibility.

Khulna WASA does have full trust that they will receive loan again for a next project. According to a high-level stakeholder, the second Water Supply Project can start after the city expansion plans are approved by the government. He argues that if JICA and the ADB do not provide loans, then the government will find a way. But probably ADB will provide loan. This is in line with the statement of a high-level stakeholder form ADB. This stakeholder stated that there will be loan for future expansion of the supply system. A middle-level stakeholder from JICA expressed his concerns about this issue. He agreed that the demand for drinking water will increase in the future. But other areas need infrastructure investments as well, so the middle-level stakeholder from JICA indicates that their recourses should be balance. This suggest that there are more project competing for projects loans in Bangladesh.

6.3.2 Uncertainty

There were two overarching uncertainties defined by the interviewees that will influence Khulna' Water Supply Project. The first uncertainty is about the population growth and expansion of Khulna city, and therefore influences

the service area of Khulna WASA and the design of their projects. The second uncertainty is the financial sustainability of Khulna WASA, that influences the operation and maintenance of the project and the financial sustainability of the project. Both uncertainties will be addressed, and additional information is given to provide a better understanding of these two themes in Bangladesh.

Uncertainty 1: Current and future city coverage area

The biggest concern of two high-level stakeholders within Khulna WASA is the commission of the surface water treatment plant by June 2018. The capacity of the water treatment plant is designed for 110,000 m3 / day. According to the calculation in 2009 this should have been sufficient to serve all citizens in Khulna city up till 2025. But a big problem in Khulna is that there are no accurate numbers of the population. The current number of citizens according to KCC is 1.500.000, this derives from 2014 and this is still used as the current number of citizens in Khulna city.

'We try to take the highest number. But we think maybe in 10 years we will arrive to this city corporation number. It is now not more than 1.2 million. But there are some people, floating people. Coming in the morning for different works and going back in the evening but sometimes staying for the night at their relatives. Those people are also included in the population. We have to cover that also.'

As recognized by a high-level stakeholder of Khulna WASA, the capacity of the plant is under-dimensioned because the water treatment capacity to serve the current 1.500.000 citizens of Khulna city should already produce 143,276 m3 / day in 2018 instead of 110.000 m3 / day. By the time the treatment plant will operate, Khulna WASA can serve 75% of the citizens instead of 100% which was the original target. Following the Compound Rate of Growth Method the capacity of the treatment plant should be 198,000 m3 / day in 2025. If no additional capacity is available, Khulna WASA can only service 56% of the citizens of Khulna city (by the end of the project scope). Table 8 displays the calculations for the current and future capacity of the treatment plant.

Item / year	2018 (KCC)	2025 (KWASA)	2025 (KCC)
Population	1,500,000	1,314,000	1,854,000
lpcd	113	113	126
Domestic water demand	169,500	148,044	233,604
Non domestic water demand	18,833	16,449	25,955
Both demand	188,333	164,493	259,559
Leakage after WTP (%)	18	18	18
Average day water requirement (m^3/d)	229,674	200,602	277,560
Seasonal Peak factors	1.15	1.15	1.15
Maximum day water requirement (m^3/d)	264,126	230,692	319,193

Existing supply capacity (m^3/d)	125,850	125,850	125,850
Additional supply capacity to be installed (m^3/d)	138,276	104,842	193,343
Water losses after WTP (5)	5	5	5
Water treatment capacity to be installed	143,276	**110,000**	198,000
Coverage percentage of Khulna city	100%	75%	56%

Table 8: Future capacity of the treatment plant (own calculations)

There is no certainty about the number of citizens in Khulna city in 2018 and 2025. When the city expansion will be approved by the government, the water supply boundary will shift for Khulna WASA as well. Currently, the rapid and largely uncontrolled urban expansion of Khulna city has affected drinking water availability in Khulna's peri-urban areas. The water supply service in these peri-urban areas is now covered by the Department of Public Health and Engineering. The DHPE installs drinking water infrastructure, mainly deep tube wells following approval of a tube well license by a Water and Sanitation (WATSAN) committee at the sub-district level. Households can apply for tube well licenses via written applications throughout their union office.

One of the villages now covered by the DPHE is Matumdanga (figure 21). Drinking water users face shortage of tube well infrastructure to meet their needs. Since 1996, DHPE has installed only one deep tube well in the village despite repeated applications from Matumdanga. A lot of households have invested in shallow tube wells. Only 22% of households use water from shallow tube wells for drinking, the majority of the households (58%) are without shallow tube wells. This shows the dependency on the deep tube well for drinking water supply (Gomes & Hermans, 2016). When the city expansion plans are approved by the government, Matumdanga will be brought under urban jurisdiction. Thereafter, Khulna WASA will become the official drinking water service provider as per the WASA Act (2008) for Khulna city. If this happens, drinking water users from Matumdanga will get their water supply from Khulna WASA.

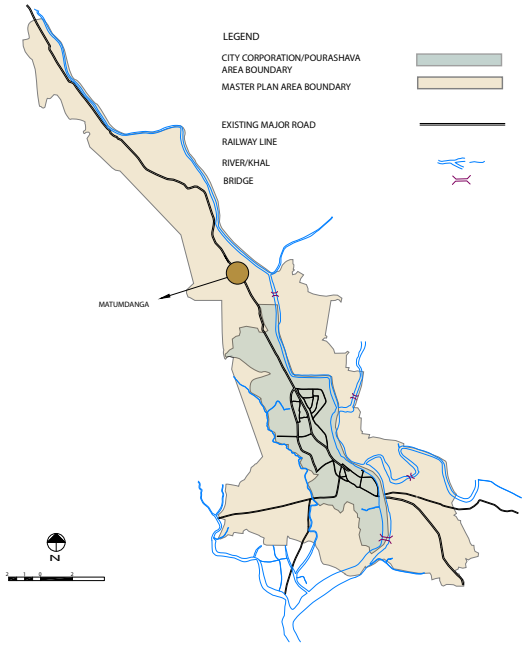


Figure 21: Matumdanga in respect to Khulna city

Figure 22: Interview with inhabitants of Matumdanga

During the interview with a high-level stakeholder of Khulna WASA there has been argued that if peri-urban areas will be included in the city boundaries, the expectations of those citizens will rise. He argues that 'Khulna WASA should have a strategy to cope with this'. In order to see what the expectations are, two groups of citizens (five families see figure 22) with access to a tube well were questioned. Citizens with moderate living conditions and citizens with marginalized living conditions. This second group seemed eager to connect to the future pipeline system of Khulna WASA because they were hopeful that the quality of water would improve, even if they have to pay of the service. For them, in rainy season water logging is a big problem. This affects the quality of their water from their shallow tube well. The citizens with moderate living conditions seem to have doubts about the future change in service provider. They describe their water quality as sufficient and experience less problems during rainy season. So they do not see the immediately urge to connect to the piped line water system.

As of the end of 2018, after commissioning of the treatment plan, Khulna WASA will supply water to 75% of the citizens of Khulna city. Probably in the coming years Khulna WASA will target the existing supply gap rather than projected demand based on urban expansion (Gomes & Hermans, 2016). The existing residents might be prioritized over new residents. Thus, inhabitants of Matumdanga would likely still need to share tube wells or invest in private tube wells. Therefore, it is unclear whether drinking water access will improve in the future for this community.

Uncertainty 2: Financial sustainability

During the interviews a lot of comments were made about the financial uncertainties within Khulna WASA. A high-level stakeholder from JICA argues that the financial sustainability of Khulna WASA is one of the biggest challenges:

'No government want to make the public against them so I in our country, recently in almost every sector we have now paid the electricity bill, almost the producing costs. But water it is a huge government subsidy still, so we almost pay less than half we actually use. If you introduce sewage system by definition they (Khulna WASA)

have to double the tariff. Already the tariff is less than what is necessary. And Khulna WASA has a duty of free paying the loan, so the financial sustainability is one of the biggest challenges.'

Collecting revenue from the sale of available water service is the only source of revenue of Khulna WASA. This is now Tk. 3.500.000 per month, with no room for saving because everything will be spent. The water tariff in Khulna city is 5 taka per m^3 of residential use (table 9). From this revenue Khulna WASA has to do the operation and maintenance of their assets. A high-level stakeholder of Khulna WASA explained it as follows:

'Yes, actually in our country water supply counts as an utility service, like gas and electricity, government takes the responsibility not a single organization. It needs the investment of the donor agencies. Also we cannot decide to increase the price tariff of water, this is the government. It is already decided what is the price of water, tariff of water. But in general the government does not want to rise the tariff of water. Generally, the government provides a subsidy. But the individual organization should reach a certain level of financial position so that it can cover the operation and maintenance costs. It is very difficult to recover investment costs.'

Khulna WASA wants an appropriate tariff setting for the water usage, from Tk. 5/m^3 for domestic connection to Tk. 6.6/m^3 and Tk. 10/m^3 for non-domestic connection to Tk. 13.2/m^3 in order to make its operation and maintenance financially viable.

'But normally we do not express this in the country. It is like this, the present leader of the areas is elected, they say that water should be free for the people. But Khulna WASA tried to increase this. So it is a conflict between the government and the people. It should come from the government, but it will make them unpopular.'

According to the WASA Act, 1996 WASAs are empowered to increase water rates, with the Board's permission, up to 5 percent in a financial year otherwise they must seek approval from the Government. Dhaka WASA proposed that the Government should allow to increase rates up to 10 percent to meet growing costs. Whereas the water tariffs are low, reflecting in the low cost of operation and maintenance, the labour costs dominate. This is estimated at over 50 percent in almost every utility. Also, the current practice of writing off bad debts does not motivate Khulna WASA to enforce collection and presents a problem for many of them, as inaction in this regard can promote non-payment specifically for new residents. Electricity costs are also high, illustrating the exposure of water utilities to potential financial shocks if electricity prices for providers become unregulated.

Name of Utility	Residential tariff per 1,000L (BD taka)
Dhaka WASA	7.24
Chittagong WASA	6.57
Khulna WASA	5.00

Table 9: Water tariff rates (2012)

In order to collect the revenue, employees of Khulna WASA will go to the domestic water meters every month to read the amount of water usage. Hereafter, they provide a water bill to the households. According to a high-level stakeholder of Khulna WASA, 60% of the households are now covered by water meters. The others pay a fix amount per month of 2 dollars for the usage of Khulna WASA water supply services. Their bill will be delivered at their home every month as well. There are three options to pay:

- Got to the bank (9 days the time) (mostly used)
- Smart-card system / saving deposit (bank account) (not a lot of people in Khulna have this)
- Phone – G-pay / Sure pay (costly, you have to pay for service; you need to go to special places, it in every phone shop; currently done for electricity)

Most of the citizens go to the bank to pay their bill. The citizens have nine days to do this, if they will not pay within this nine days their water supply connection will stop working within 15 days. The second option, saving deposit is not used a lot in Khulna city. The Phone – G pay / Sure pay option is costly for most citizens. You have to pay for this service to use it and the citizens have to go to special places because you cannot charge your account in every phone shop.

Non-revenue water (NRW) has also a big say in the financial situation of Khulna WASA. Non-revenue water is a crucial issue for Khulna WASA. Non-revenue water is water that has been produced and is 'lost' before it reaches the customer. Losses can be real losses - through leaks, sometimes also referred to as physical losses - or apparent losses, for example through theft or metering inaccuracies. NRW is typically measured as the volume of water "lost" as a share of net water produced. High levels of NRW are detrimental to the financial viability of Khulna WASA, as well to the quality of water itself. The total water supply amount provide by Khulna WASA via tube wells and hand pumps is 69,400 m^3/day. From this amount 23% are water losses. The target for Khulna WASA after operating of the project is 10% as argued nu a high-level stakeholder of Khulna WASA.

The reputation and financial stability of Khulna WASA is fully depended on the quality and quantity of their services. Collecting revenue from the sale of available water service is the only source of revenue. NRW contributes to system loss, which is ultimately shorting the revenue.

6.3.4 Reflection

When the features within the plausible scenarios were introduced the overall responds from the interviewees was optimistic toward these features. They did not foresee bumps in the road ahead. The project stakeholders seemed to feel uncomfortable when considering plausible future events and project failure. Also it seemed that none of the stakeholder felt financial responsible or responsible to achieve the long-term goals formulated at the beginning of the project. This refers both to the loan providing stakeholders and the executive project stakeholders.

Still, two overarching uncertainties were defined by the project stakeholders. The first uncertainty was about the number of citizens in Khulna city and the future expansion of the city, and therefore influences the service area of Khulna WASA and the design of their project. The second uncertainty was the financial sustainability of Khulna WASA, that influences the operation and maintenance option of the project and the financial sustainability of the project. These two relevant uncertainties will make the critical assumptions vulnerable to be overturned.

6.4 Step 3: Adaptation actions & timing

The aim of the third step is to define appropriate adaptation actions that are tailored to different plausible future conditions and to articulate the timing of these actions to make the planning process able to adapt to future uncertainty.

6.4.1 Adaptation actions

There were four adaptation actions mentioned specificly during the interviews as reaction to the uncertainties. Two can be linked to uncertainty about the current and future converge areas for Khulna WASA' water supply services, and the other two to the uncertain financial sustainability of Khulna WASA.

Action 1: Expansion of the water treatment plant

Several times during the interview there was mentioned that an additional treatment plant is needed to be able to serve all citizens of Khulna city. This additional treatment plant has been seen as a sequential project for Khulna WASA. It can be defined as a reactive adaptation action to cope with uncertain future water demand and not as a proactive adaptive action, that has been considered at the start of the project.

By the time the treatment plant will operate, Khulna WASA can serve 75% of the citizens instead of 100% which was the original target. And by the end of the project scope in 2025 this will be 56% of the population of Khulna city based on the Compound Rate of Growth Method.

An additional water treatment project is needed to cope with the future demand. The following quote from a high-level stakeholder from ADB illustrates this:

'But this is happening, expansion to fringe areas.. fringe areas.. which is happening. So that is why we are going for another expansion.'

A high-level stakeholder from Khulna WASA argued with the same reasoning:

'City will growth, the number of people will increase. We will submit another project for the future.'

There can also been seen that the project was designed for one future state, no unexpected events have been taken in to account. A middle-level stakeholder from JICA argued that:

'We have already designed it for 2025, for the future population growth. In this case I don't think that the rapidly expansion or unusual expansion is calculated. Yes it can be a risk and in that case we have to expand. You see the current distributions system and transmission system will not have enough capacity. So they have to make another treatment plant.'

A high-level stakeholder from Khulna WASA suggested that a new treatment plant should be built with the same treatment capacity as the current treatment plant under construction. According to the stakeholder, this should be sufficient if the urban growth of Khulna city will be as expected (desired) based on the Compound Rate of Growth Method. This should be monitored closely because as noticed during KWSP it was not the case.

Action 2: Add the existing treatment plant for government institutions to the domestic supply system

A second adaptation action that is mentioned as responds to the uncertainty about the current and future converge areas for Khulna WASA' water supply services is to add an already existing treatment plant, now in use for government purposes, to the drinking water system of Khulna WASA for residential usage as well. By the time the treatment plant will operate, 75% of the citizens will be supplied with drinking water instead of 100% which was the original target. Khulna city has a treatment plant in operation next to Matumdanga. This treatment plant supplies now water to government institutions only.

This treatment plant has a capacity of 5.500.000 litter per day, according to an employee working at this treatment plant (table 10). He argued as well that in the winter the treatment plant operates for 8 hours per day to meet the water demand of the government institutions. In the winter this will be between 12 and 15 hours per day. This means that in the winter a capacity of 3.670.000 litter per day will not be use and in the summer a capacity of 2.750.000 litter to 2.060.000 litter. When the city boundaries increase and Khulna WASA will become the water provider of the peri-urban areas, the treatment plant can serve the areas around it, such as Matumdanga. Khulna WASA have to extend their piped system to reach these areas. The treatment plant next to Matumdanga can be connect to the piped water supply system so that it can complement the supply capacity to cope with the demand to potable water in Khulna city.

Treatment plant	capacity	5.500.000 L / day
Winter	8 hours / day	1.830.000 L / day
	Can be used - buffer	**3.670.000 L / day**
Summer	12- 15 hours / day	2.750.00 – 3.440.000 L / day
	Can be used - buffer	**2.750.000 – 2.060.000 L / day**

Table 10: Capacity treatment plant for government institutions

The 2.060.00 litter up to 3.670.000 litter per day is just a small amount of the demand-supply gap of 33.276.00 litter in Khulna city. It will therefore not make a substantial difference, but it can service surrounding villages such as Matumdanga in the future. The complementation of this treatment plant has been seen as an action to cope with the uncertainty about the current and future converge areas for Khulna WASA' water supply services.

Figure 23: Water supply treatment plant for governmental institutions

Action 3: Introduce District Metering Areas

The introduction of district metering areas in Khulna city has been mentioned as an adaptation action to cope with the uncertainty about the financial sustainability of Khulna WASA. Collecting revenue from the sale of available water service is the only source of revenue of Khulna WASA. This is now Tk. 3.500.000 per month, with no room for saving because everything will be spent. Big revenues losses occur due to non-revenue water. Currently an amount of 23 % of the supplied water are water losses. The target for Khulna WASA is 10 %. If they can reduce the losses to 10 %, it can provide them a revenue increase of Tk. 590.909 per month, what makes their monthly revenue Tk. 4.090.909.

In order to regulate the NRW, district meter areas (DMA) can be introduced in Khulna city. DMA are already in place in Dhaka city. In Dhaka, the WASA divided the networking to 100 DMA. A middle-level stakeholder from JICA proposed the division of the entire service area under Khulna WASA into five service blocks, around the distribution reservoirs (figure 23). The treated clean water from the surface water treatment plant will be conveyed to the five distribution reservoirs proposed for each zone through the transmission mains. In Khulna the distribution networks will be organized in five blocks managed by zonal offices. The blocks can be further divided

into DMA (10 per block). Amounts of inflow, outflow, and consumption can be diligently monitors for each DMA to identify the and minimize NRW. According to a high-level stakeholder from Khulna WASA, when there is identified that the NRW amount in a certain DMA is more than 10 percent, inspections in that particular DMA will follow.

Action 4: Increase water tariff

A second adaptive action defined by the stakeholder in Bangladesh is to increase the water tariff in Khulna city. Khulna WASA wants an appropriate tariff setting for the water usage, from Tk. 5/m^3 for domestic connection to Tk. 6.6/m^3 and Tk. 10/m^3 for non-domestic connection to Tk. 13.2/m^3 in order to make its operation and maintenance financially viable. According to the WASA Act (1996) WASAs are empowered to increase water rates up to 5 percent in a financial year, otherwise they must seek approval from the Government.

Year	2018	2019	2020	2021	2022	2023	2024
Taka	5.0	5.25	5.5125	5.7881	6.0775	6.3814	**6.7005**

Table 11: Domestic water tariff target

Within 6 years the appropriate tariff setting according Khulna WASA can be achieved for domestic connections (table 11). The same applies for the non-domestic connections (table 12).

Year	2018	2019	2020	2021	2022	2023	2024
Taka	10.0	10.50	11.0250	11.57625	12.1551	12.7628	**13.4010**

Table 12: Non-domestic water tariff target

6.4.2 Timing

Although the timing of adaptation actions is enclosed in the interview design, in practice the interviews did not consider this time aspects. As it was already challenging to define actions deriving from uncertainty and contextual scenarios, the time aspect seems out of range while conducting the interviews.

But when this would have been considered information that should be traced in order to determine whether the plan is meeting *expanded and reliable access to potable water for all citizens of Khulna city* should be specified. As explain earlier, the project will already not meet their objectives for success when the water treatment plant will be commissioned (75% of the citizens will be reached instead of 100%). Khulna WASA is not able to provide potable water to *all* citizens of Khulna city. So right after commissioning the adaptation action should be implemented. An additional treatment plant could be build but this would be time consuming and a high investment is needed. The additions of the existing treatment plant for governmental use could be added to the supply network. It would probably be less time consuming and a smaller investment is need but on the other hand the effect is less. Also increasing the water tariff can be an adaptation action. This could be a relative easy adaptation action to conduct because Khulna WASA does not depend on other parties. Introducing district metering areas can be a time-consuming action as well but can significantly reduce the amount of non-revenue water and therefore big revenue losses.

The actions can be compared on the duration of an adaptation action pathways, in other words the moment when a sequential adaptation action should be conducted. Probably the 'pathway length' of the 'increase water tariff' and 'add existing treatment plant' actions would be short. After 6 years the aimed water tariff level is reached, so the pathway ends. The 'add existing treatment plant' action could be sufficient until an adaptation action is available that supplies a significant larger amount of water to the households whereas this action would not make a difference anymore and could become expensive to operate and maintain. The pathways of the adaptation

actions ‘build an additional treatment plant’ and ‘introduce district metering areas’ would probably have a longer pathway. There can be questioned if the defined adaptation actions became corrective actions to cope with already occurring failure instead of actions guarding against future failure.

6.4.3 Reflection

Within this third step, the project stakeholders were able to define four adaptation actions. These adaptation actions can be linked to the two uncertainties from step two. Building a new water treatment plant was defined as an action, even as adding the remaining capacity of the water treatment plant, that is currently only in use for government utilities, to the domestic water supply system. Introducing district metering areas to regulate NRW and increase the water tariff incrementally were defined as adaptation actions as well.

These four defined actions seem to be realistic actions to implement. The construction of a new water treatment plant for Khulna city was mentioned by one of the loan providing stakeholders and was also mentioned by high-level stakeholders of Khulna WASA. As the means are available for this new project, building a new water treatment plant seems feasible. The second defined adaptation action was defined during the field-visit to the treatment plant. It was defined as action to cope with future uncertainty by staff members working at the treatment plant. Decision-making will not be done by this staff member but by more powerful members of Khulna WASA. Therefore, this adaptations actions seems less feasible. Nevertheless, the effort to implement this action is less than the other actions, so the powerful members of Khulna WASA may find it also a realistic adaptation action. The introduction of district metering areas can be seen as a realistic action as well. District metering areas do already exist in Dhaka. So the implementation practice can be copied from Dhaka WASA. As last, Khulna WASA is able to increase the water tariff slowly. For this adaptation action Khulna WASA does not depend on other actors what makes it a relative easy and feasible action to implement.

Although the timing of actions was enclosed in the interview design, in practice the interviews did not consider this time aspects. When the project stakeholders would have considered this, the consensus was probably that the actions could be conducted right after the project delivery.

6.5 Conclusion

The purpose of the field-research is to examine the systematic steps in the adaptive approach for sustainable WASH.

There was little attention payed to the critical assumptions of the project. Although the stakeholders recognized that the assumptions are vulnerable to be overturned by future event, there was no intention to assess them along the way. The project stakeholders did not question the relationship between success of the project and the critical assumptions. There can be concluded that the project stakeholders did not critically questioned the validity of the project assumptions.

The overall response from the interviewees was optimistic towards features within the contextual scenarios. They did not seem to foresee bumps in the road ahead. The project stakeholders seemed to feel uncomfortable when considering plausible future events and project failure. Also, it seemed that none of the strategic management stakeholders of Khulna WASA felt financial responsible or responsible to achieve the long-term goals formulated at the beginning of the project. They focussed more on the output of the project. For the adaptive planning approach, it is necessary to consider project failure and to have a sense of project accountability among the strategic management staff. Therefore, these two observations challenge the second step of the adaptive planning approach for sustainable WASH. Yet the project stakeholder (including strategic management staff and project staff) defined two uncertainties that can be caused by future events and make the project assumptions vulnerable. The first uncertainty is about the number of citizens in Khulna city and the future expansion of the city, and therefore influences the service area of Khulna WASA and the design of their project. The second uncertainty is the financial sustainability of Khulna WASA, that influences the operation and maintenance option of the project and the financial sustainability of the project.

Within this third step, the project stakeholders were able to define four adaptation actions. These adaptation actions can be linked to the two uncertainties from step two. Building a new water treatment plant has been defined as an action, even as adding the remaining capacity of the water treatment plant, that is currently only in use for government utilities, to the domestic water supply system. Introducing district metering areas to regulate non-revenue water (NRW) and increase the water tariff incrementally are defined as adaptation actions as well. Although the timing of actions was enclosed in the interview design, in practice the interviews did not consider this time aspects. When the project stakeholder would have considered the timing of the actions, the consensus would probably be that the adaptation actions should be taken as soon as possible. This is because the adaptation actions are defined as *corrective* actions to cope with the already occurring project failure. All adaptation actions can be implemented direct after project completion. The project stakeholders may prefer to implement certain actions first, depending on costs and benefits. But the actions do not necessarily have to be implemented one after the other because they all need to be implemented to contribute to project success.


7

EVALUATION OF THE ADAPTIVE PLANNING APPROACH

Chapter 7

The designed adaptive planning approach for long-term sustainable WASH has been examined twice. The approach aims to contribute to better planning for long-term sustainable WASH services. It is a pro-active approach where adaptation actions are formulated at the begin of the project planning to guard the plan against failure. The basic concept of the approach is to examine the critical assumptions of the project. The critical assumptions are the core around which the adaptation actions are defined. The adaptive planning approach for long-term sustainable WASH entails three steps; (1) defining the impact and critical assumptions of the programme, (2) defining relevant uncertainties by using contextual scenarios, and (3) defining adaptation actions and the timing of the actions. In this chapter the following question will be researched: how does the adaptive planning approach for sustainable WASH contribute to long-term sustainable WASH services? The chapter reflects on the applicability of the approach by evaluating the systematic steps and by considering the reasoning about project failure of scholars.

7.1 Evaluation of the adaptive planning approach

Table 13 summarizes the finding of the adaptive planning workshop and the field-research. The WASH experts who participated in the workshop can be seen as indirectly involved project stakeholder. The local project stakeholders in Bangladesh can be seen as directly involved project stakeholders.

The indirect project stakeholders critically assessed the project assumptions. All experts felt comfortable to assess the assumptions. They found the content of the assumptions 'optimistic' and 'unrealistic'. In other words, the validity of the project assumptions was being questioned. The project stakeholder did not express their concerns towards the validity of the project assumptions. They did not seem to consider the relation between the critical assumptions and project success and failure. It seemed that the project stakeholders associated the output of the project with project success. In addition, it seemed that no one bears the financial responsibility for the project, resulting in a lack of accountability among the stakeholders.

Both groups formulated uncertainties. The uncertainties defined by the indirect involved stakeholders and direct stakeholders do overlap. Scenario planning has been experienced as useful as it has been seen as a good point of departure to consider uncertainties for future plausible events.

The indirect project stakeholders had more difficulties to define feasible adaptation actions. They defined some adaptation actions but these seemed quite generic, meaning that the actions are applicable to broader context and not specific to one scenario. The actions can be applicable to a cluster of uncertainties and appeared to be actions to 'repair' the project. They found it difficult to define actions to cope with future uncertainties because the validity of the project assumptions was being questioned. The project stakeholders defined four adaptation actions, that seemed feasible to implement. Although the timing of actions was enclosed in the workshop and interview design, in practice both groups did not consider this time aspects. When the project stakeholders would have considered this, it would have probably been different than expected. Instead of considering appropriate timing of the adaptation actions in the future, the actions should be implemented already in the current state of the world because it seems that the adaptive tipping is reached already. The aimed long-term objectives are only reachable if the *corrective* actions would be implemented immediately after project completion. This make the actions reactive actions instead of proactive actions.

	WASH EXPERTS	PROJECT STAKEHOLDERS
Critical assumptions for project impacts	Questioned validity of the project assumptions	Did not questioned validity of the project assumptions
		Unconcerned attitude towards content
		Focus on project output

		Relationship with project success/failure not questioned
Uncertainty	Spatial development uncertainty Water quality & quantity uncertainty Financial uncertainty Uncertainty about the management capacity of Khulna WASA	Population growth and city expansion uncertainty Financial sustainability of Khulna WASA
		No financial responsibility clarity
Adaptation actions & timing	Actions are applicable to a broader context	Building new water treatment plant Complementation of the water treatment plant for governmental use to the current water supply system Introducing district metering areas to regulate NRW Increase the water tariff incrementally
	Feasible of actions is being questioned	Feasible actions
	Corrective actions	Corrective actions
	Implemented after project completion	Implemented after project completion

Table 13: Results of the systematic steps

The different groups, direct involved project stakeholders and indirect project stakeholders, reacted differently to the steps of the designed adaptive planning approach. Those directly involved in the project found it difficult to question the project assumptions. Those not directly involved were able to critically assess the project assumptions, but they could not propose specific actions.

A logical question is, do the adaptation actions contribute to a better planning for sustainable WASH if they were defined around the core of disputable critical assumptions? The disputable content of the critical assumptions appeared to cause project failure and the adaptation actions therefore needed to be corrective actions.

7.2 Reflection on the adaptive planning approach

A sequential question is, how it is possible that the project already starts with disputable critical assumptions? According to scholars (Walker et al., 2013) the success of projects rests on the critical assumptions. Isn't it then important to formulate 'valid' assumptions that contain relevant content?

7.2.1 Misinformation as failure factor

Flyvbjerg (2007) focused in one of his papers on problems and their causes in policy and planning for large-infrastructure projects. He identified as the main problem in major infrastructure developments pervasive misinformation about the costs, benefits, and risks involved.

In the transport sector, Bent Flyvbjerg, Nils Bruzelius, and Werner Rothengatter conducted a large and robust study of cost overruns in a sample of 258 major roads, tunnels, bridges, urban transit, and interurban rail project in 20 countries on five continents (Flyvbjerg, Bruzelius, & Rothengatter, 2003). Cost overruns are also a persistent problem on megaproject in other sectors. Large information and technology projects, such as new enterprise software, management support systems, or digital customer recordkeeping are notorious for cost escalations (Flyvbjerg & Budzier, 2011). In the energy sector, a 2014 study by Ansar, Flyvbjerg, Budzier, and Lunn (2014) found that of 245 large hydropower dam projects in 65 countries, the costs escalated on average by 90 percent between

the final approved budget and the completed project. For major global sporting events, Bent Flyvbjerg and Allison Stewart found in a 2012 report that for every Olympic Games between 1962 and 2012, the final costs were higher than anticipated at the time that the bid was submitted (Flyvbjerg & Stewart, 2012).

Matti Siemiatycki, an Associate Professor in the Department of Geography and Planning at the University of Toronto, suggest that if cost overruns on megaprojects were truthfully unexpected, they would follow a normal distribution over a large sample of projects. He argues that 'half the project would experience cost overruns and half would be completed under budget. But this is not the case. Evidence suggest that the distribution is highly skewed, and the cost of infrastructure megaprojects are systematically underestimated' (Siemiatycki, 2015).

Flyvbjerg (2007) argues that there are two explanations for misinformation.

The first are psychological explanations and refers to planning fallacy and optimism bias. Such explanations have been developed by Kahneman (1979), Kahneman and Lovallo (1993), and Lovallo and Kahneman (2003). For the planning fallacy, planners and project promoters make decisions based on delusional optimism rather than on a rational weighting of gains, losses, and probabilities. They overestimate benefits and underestimate costs. They involuntarily define scenarios of success and oversee the potential for mistakes and miscalculations. Consequently, planners and promoters chase initiatives that are unlikely to come in on budget or on time, or to ever deliver the expected results. Overoptimism can be found in cognitive biases, that is, errors in the way the mind processes information. This corresponds with the thoughts about the disputable project assumptions of the WASH experts during the adaptive planning workshop.

A second explanation are political-economic explanations. This occurs when planners and promoters deliberately and strategically overestimating benefits and underestimation cost when defining the outcomes of projects. They do this in order to increase the likelihood that it is their project, and not those of the competition, that gain approval and funding. According to such explanations planners and promoters purposely define scenarios of success and gloss over the potential for failure. Again, this results in the pursuit of ventures that are unlikely to come in on budget or on time, or to deliver the promised benefits. Strategic misrepresentation can be traced to political and organizational pressures, for instance competition for scarce funds or jockeying for position, and it is rational in this sense.

Cost overruns have afflicted government infrastructure project for decades. Scholars as Pickrell (1992) and Altshuler and Luberoff (2004) found that municipal governments officials applying for senior-level government funding have an incentive to underestimate the cost of their projects. They do so to make the projects more attractive to provincial or federal governments. Politicians and project promoters have an incentive to underestimate the costs of their desired infrastructure plans to make the plans more appealing to voters. And contractors competitively bidding for projects may strategically underestimate costs. They know that once they are awarded with the job, they can drive up the price through change orders.

Flyvbjerg (2007) argues that biases from overoptimism can be mitigated by simple reality checks, thus reducing the odds that people and organisations will rush blindly into unrealistic project. He finds that political-economic explanations best account for the available evidence: planners and promoters deliberately misrepresent costs, benefits, and risks in order to increase the likelihood that it is their projects, and not those of their competition, that gain approval and funding.

7.2.2 Critical assumptions and misrepresentation

Misrepresentation leads to an unrealistic project with overestimated benefits when defining the outcomes of the project (Flyvbjerg, 2007). Logically when aiming to realize these mispresented outcomes, misinformed critical assumptions are 'needed' as well (at the start of the project). In this case the critical assumptions are not formulated by the planner as something the planner believes but rather a condition to realize the mispresented outcomes of the project. This makes the critical assumptions a misrepresentation by it selves.

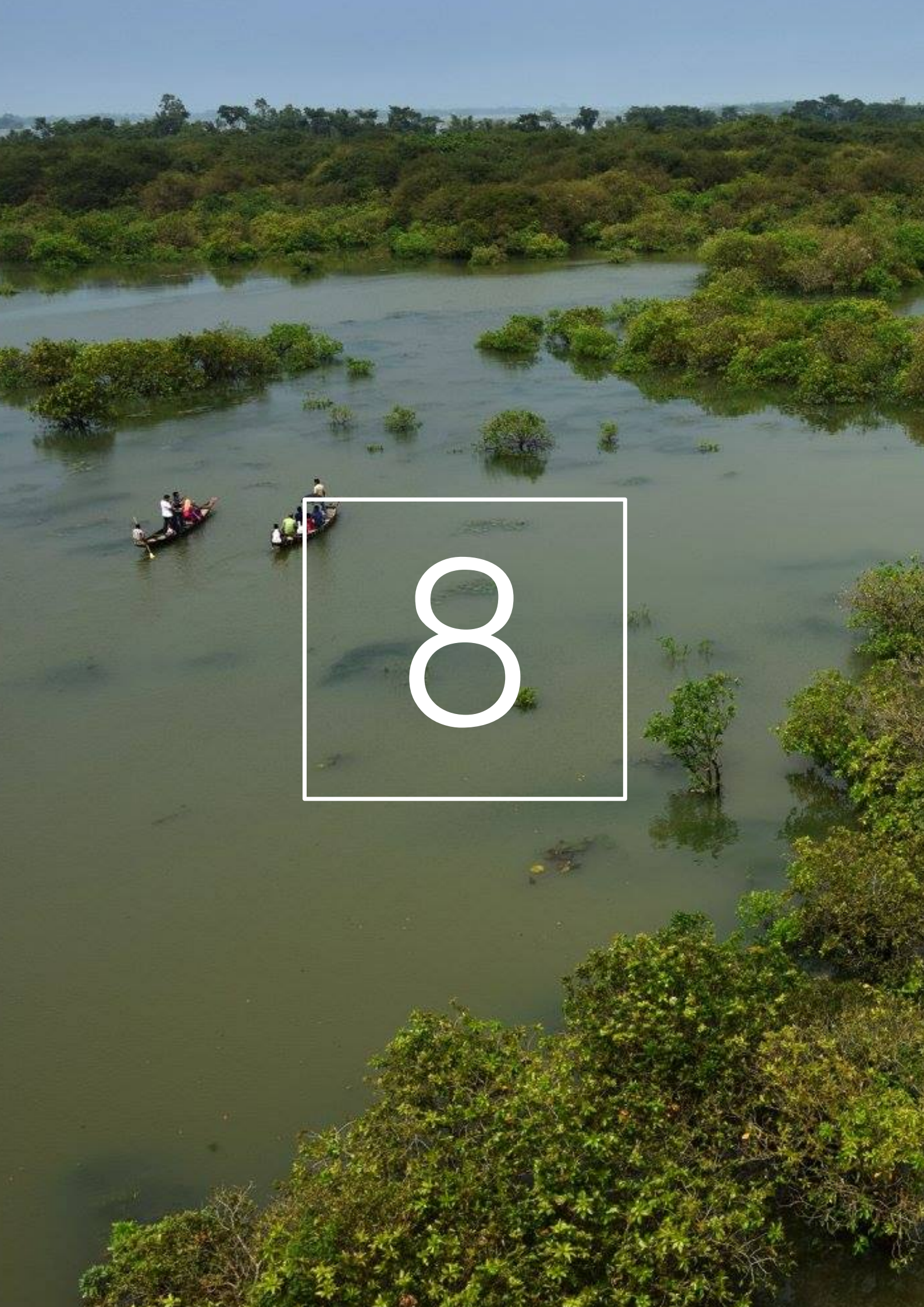
Treasury (2003) and Flyvbjerg, Glenting, and Rønnest (2004) argued that local authorities, local developers and landowners, local labour unions, local politicians, local officials, local members of parliament, and consultants all stand to benefit from a project that looks favourable on paper and they have little incentive to actively avoid bias in estimates of benefits, costs, and risks. They also argued that national bodies, like certain parts of the Department for Transport and the Ministry of Finance, who fund and oversee projects may have an interest in more- realistic appraisals. In case of Khulna' Water Supply Project, the national bodies have the same relationship with the international bodies (development banks and other donors) as the local authorities with the national bodies because project finance, loans, comes from international bodies and not from the national bodies themselves. With the same reasoning as Treasury (2003) and Flyvbjerg et al. (2004), the international bodies may have an interest in more- realistic appraisals. It is striking that the international bodies (referring to ABD) do not feel responsible either. Instead the international donor observed and agreed on the disputable critical assumptions. But in their turn, the international donor has a relationship with donor governments, often dominated by the funding aspect. They are pressured that the budgets of donor governments are spend. In any relationship, the provision of funds from one entity to another establishes a power imbalance that favours the donor, with the donor able to set the terms of the relationship, and the recipient ultimately forced to serve these terms (Morton, 2013). Following the reasoning of Flyvbjerg (2007) strategic misrepresentation can be considered as cause for the disputable content of the critical assumptions.

Competition between projects and authorities creates political and organizational pressures that in turn create an incentive structure that makes it rational for project promoters to emphasize benefits and deemphasize costs and failures. A project that looks highly beneficial on paper is more likely to get loan than one that does not (Flyvbjerg, 2007). The development organization WaterAid argued in a discussion paper on on-lending practices at the Asian Development Bank that when the loan is assigned, borrowers (e.g. Khulna WASA) know that they will be bailed out by state or central government if they are unable to repay loans and are therefore not very concerned about the terms and conditions. Note that a high-level stakeholder from Khulna WASA argued that the authority is not financial accountable for the project. So other than that organizations present their project more beneficial on paper, they do not always bear the financial accountability. They appeared to focus on justifying projects rather than critically scrutinizing them.

7.3 Applicability for the long-term sustainable WASH

There can be observed that 'misrepresentation' of critical assumptions of the project created hazard to all sequential steps of the adaptive planning approach for sustainable WASH. The critical assumptions seemed to fall in advance because they are constructed around misrepresentation. It can be noticed that the sequential defined adaptation actions seemed to be actions to *corrective* the project plan instead of guard. Implementation of these actions therefore need to be done immediately because the adaptation tipping point is reached already.

The observations challenge the adaptive planning approach for sustainable WASH. Purposely defining scenarios of success and gloss over the potential for failure, conflicts with the pro-active adaptive planning approach to define adaptation actions at the begin of the project to guard the plan against 'purposely ignored failure'. Therefore, it is questionable if the interest of the approach, to protect the plan so that long-term goals can be reached, serves the interest of all project stakeholders. This makes that the adaptive planning approach, as it is designed now, does not contribute to long-term sustainable WASH services.


8

CONCLUSIONS AND RECOMMENDATIONS

Chapter 8

In this thesis an adaptive planning approach for long-term sustainable WASH services has been researched, designed and assessed. This research emerged from the ambition of the Netherlands to contribute to international water and sanitation service delivery and to improve its long-term sustainability. Planning approaches of development aid organisations were brought to attention. In the first phase of this research the current planning approach of the Dutch NGO Simavi has been analysed to discover where this research can contribute best to support the high level objective; contributing to long-term sustainable WASH services. After literature research, a systematic step-wise pro-active adaptive planning approach has been designed. The approach has been examined by means of a case study, with the aim to examine the content of the approach and the applicability of the approach in local context. Hereafter, the observations of the examination were discussed based on literature insights from different scholars.

This chapter will provide answers to all sub-research questions and the main research question of this thesis; how can an adaptive planning approach conducted by development organisations contribute to long-term sustainable WASH services? The chapter ends with an additional elaboration on the research conclusion and provides recommendations.

8.1 Conclusions

Sub-research question 1: How do development organisations strategically plan their programmes to reach project impacts?

Results-Based planning approaches are widely used by many multilateral development organisations, bilateral development agencies and public administrations throughout the world. This approach aims to achieve improved performance and demonstrable results. In order to have a better understanding, the initiation phase of the programmes of the Dutch NGO Simavi has been analysed to gain insight to their planning approach for long-term sustainable WASH services. It appeared that although development organisations are aware that changing future conditions are expected to have significant implications for their WASH interventions and will be accompanied by uncertainty, they do not have a systematic step in their strategic planning approach to cope with uncertain conditions. Uncertain conditions are beyond the control of an organisation and can easily affect the project objectives along the way. This puts the long-term sustainability of the programmes at stake.

Sub-research question 2: How can an adaptive way of planning complement current strategic planning approaches of development organisations?

Sequentially, there has been researched how an adaptive way of planning can complement current strategic planning approaches of development organisations. Based on literature review, an adaptive planning approach has been designed consisting of three systematic steps to contribute to long-term sustainable WASH services. It is a pro-active approach where adaptation actions are formulated at the begin of the project planning to guard the plan against failure. This adaptive planning approach for long-term sustainable WASH is based on existing approaches for adaptive planning (Haasnoot et al., 2013) and includes the following steps: (1) defining the impact and critical assumptions of the programme, (2) defining relevant uncertainties by using contextual scenarios, and (3) defining adaptation actions and the timing of the actions.

This approach has been examined twice. First with WASH experts from Simavi in the Netherlands by means of an adaptive planning workshop and second with local project stakeholders in Bangladesh by means of interviews and supplementary field-visits. It appears that the results of the steps were different for the WASH experts; whom are not directly involved in the project, and the local project stakeholders; whom are directly involved in the project.

Sub-research question 3: How do development organisations interpret the systematic steps of the adaptive planning approach for long-term sustainable WASH services?

It can be concluded that WASH experts find it easy to question project assumptions and to identify critical assumptions for the project failure and success. However, during the adaptive planning workshop, they were not

able to formulate very specific adaptation actions. This resulted in generic actions meaning that the actions seemed applicable to a broader context and not specific to one scenario. Since, the validity of the project assumptions was questioned, their actions were more corrective actions to account for the assumptions that have clearly lost validity - and perhaps never had validity in the first place. For this the first steps of the approach were most useful.

Sub-research question 4: How do local stakeholders interpret the systematic steps of the adaptive planning approach for long-term sustainable WASH services?

It can be concluded that project stakeholders found it difficult to criticize and reassess project assumptions. They appeared to focus on justifying projects rather than critically scrutinizing them. The project stakeholders focused on the project and its outputs, but not on longer-term impacts. However, through the use of scenarios they did identify some uncertainties and, more importantly, some specific adaptation actions. These were framed not as actions to adapt current project activities, but to design additional activities after the current project was finished.

Sub-research question 5: How does an adaptive planning approach for sustainable WASH contribute to long-term sustainable WASH services?

It can be argued that project planners and promoters deliberately misrepresent costs, benefits, and risks in order to increase the likelihood that it is their projects, and not those of their competition, that gain approval and funding. Purposely defining scenarios of success and gloss over the potential for failure, conflicts with the pro-active adaptive planning approach to define adaptation actions at the begin of the project to guard the plan against 'purposely ignored failure'. Therefore, it is questionable whether all systematic steps of the approach serve the interest of all project stakeholders. This makes that the adaptive planning approach, as it is designed now, does not contribute to long-term sustainable WASH services.

Main research question: How can an adaptive planning approach conducted by development organisations contribute to long-term sustainable WASH services?

To be able to answer the main research question, some observations need to be summarized and shared.
First, it is questionable if Khulna' Water Supply Project meets all project objectives. The desired project situation (outcome) was determined and fixed before the project was started, together with the time needed to develop that situation with associated costs. These were established at a time point that the information about the project was minimum and the level of uncertainty was high. Each dimension has been provided with a limit. The outcome has a minimal limit, which is the complete set of requirements. The project cost has a maximal limit, which is the available project budget. The project time horizon has a maximal limit, which is the time schedule. With the definition of the three constraints at the very start of the project, the project was turned into in an ordinary linear planning process with a given 'prototype' as starting point.

It seemed difficult to produce reliable project outcome specifications with associated project assumptions. In consequence the outcome specifications cannot be met and the project has to be corrected immediately after the completion of the water supply treatment plant. This shows that the project is certainly not a linear planning process.

Second, an *adaptive* planning process has been considered as approach to reach long-term sustainable project impacts. The direct and indirect involved project stakeholders were asked to think of ways the plan might fail and design adaptation actions to guard against such failure. Whereas the indirectly involved stakeholders (referring to the WASH experts) were able to critically assess project assumptions, the directly involved stakeholder (local project stakeholder) found this difficult. Bent Flyvbjerg, Professor of Business at Oxford University and leading expert on megaprojects, provocatively argues that the causes of project failure can be assigned to wilful misrepresentation on the part of project planners and promoters (Siemiatycki, 2015). This may be an explanation for the questioned validity of the project assumptions, sequential project failure and the observation that the directly involved project stakeholders found it difficult to discuss project failure.

The outstanding question arising from this analysis is whether any of the directly involved project stakeholders have an interest and, equally important, the ability to move beyond misrepresentation to implement adaptive planning strategies that actually address project failure at the start of the project. Probably the answer to this question would be no, because of the incentive and accountability structure of project funding. None of the stakeholders involved in delivering projects would be willing to 'risk their job' to deliberately address project failure at the earliest stage of the project.

This research concludes that different groups react differently to the steps of the designed adaptive planning approach. This research shows that an adaptive planning approach does not contribute to long-term sustainable WASH services in environments where project incentives are on benefits and not on robustness.

8.2 Recommendations

As misrepresentation is an often-occurring phenomenon (Flyvbjerg, 2007), the adaptive planning approach should find a way to deal with misrepresentation when working in environments where incentives are on benefits and not robustness. This needs deeper elaboration.

A common response to project failure is that more efforts (time and money) are needed in order to achieve acceptable project outcomes. In most cases the initial scope cannot be met. Eventually the outcome will be less than is desired, whereas both the budget as well as scheduled time will be exceeded (De Ridder, 2016). International research shows that most infrastructure megaprojects experience project failure (Siemiatycki, 2015).

This means strong incentives for promoters to strategically misrepresent initial budgets and benefits to get a project approved, funded, and started, knowing that once work begins, only a few projects are ever halted (Siemiatycki, 2015).

This makes that the designed adaptive planning approach encounters resistance when working in environments where incentives are on benefits and not robustness.

In order to contribute to long-term sustainable WASH services in an adaptive way, it is important to objectively assess the criticality of project assumptions. With subtle organizational pressure to accentuate the positive, and evade accountability of involved stakeholders for project failure, it is recommendable that the criticality of the project assumptions will be accessed by an independent party (a party not directly involved in the project).

Based on the findings of this research, it can be recommended that different components of the adaptive planning approach for long-term sustainable WASH services should be practiced by different involved parties:

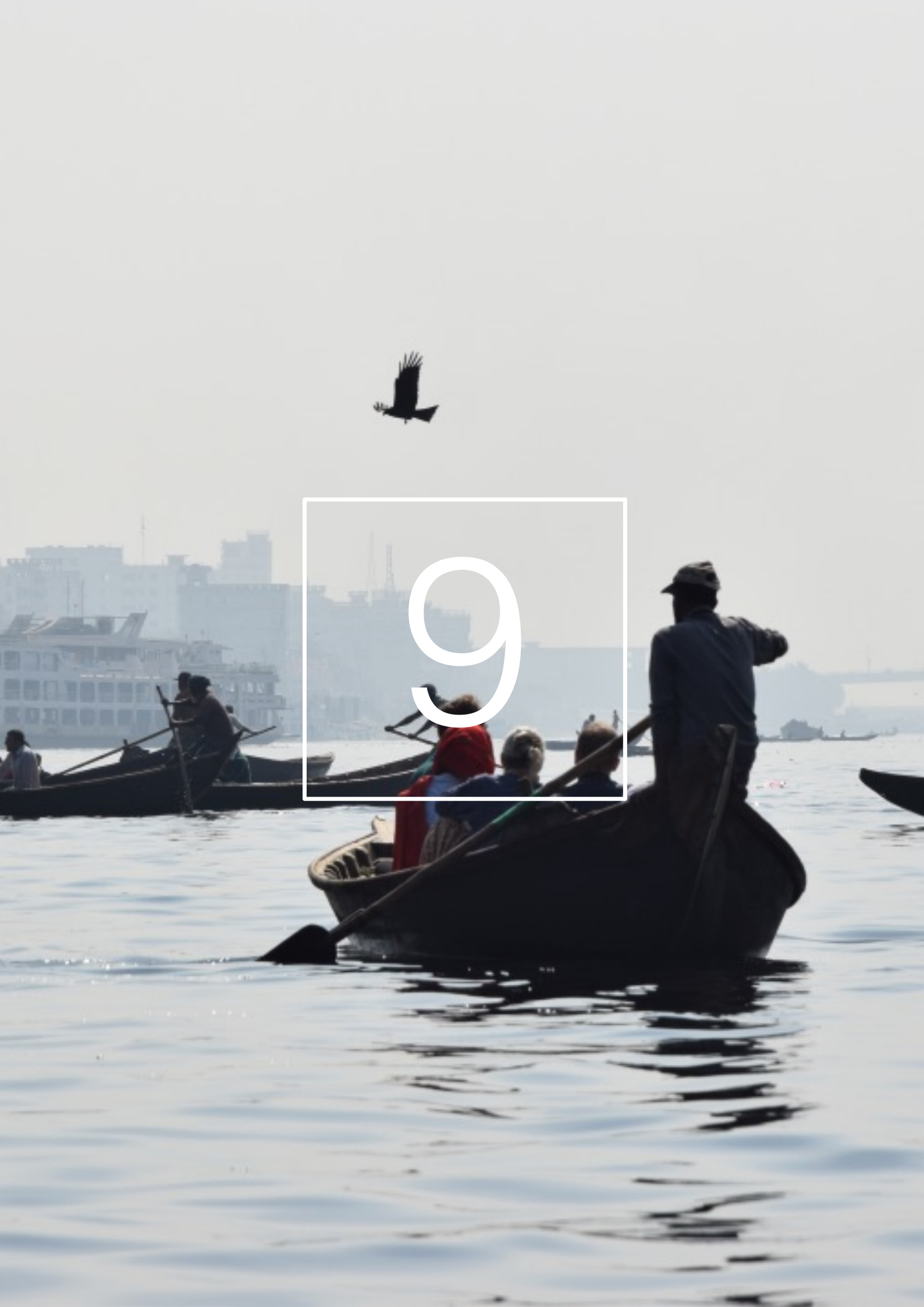
- Independent (not directly involved) WASH experts have to identify and review critical assumptions for project impacts
- Direct involved project stakeholders, via scenarios, have to identify adaptation actions
- An analyst or planning expert has to facilitate these steps and prepare the necessary inputs

The above recommendation is formulated for long-term sustainable WASH services but can be a recommendation for other sectors as well; sectors where directly involved project stakeholders are not willing and/or capable to independently identify and review critical assumptions for project impacts but are willing to plan their projects in an adaptive way.

This recommendation can apply to the Dutch NGO Simavi as well. This non-governmental development organization is a directly involved stakeholder in all their WASH programmes. In order to systematically address future uncertainties, they need to plan their programmes in an adaptive way. In a sector where most project incentives are on befits (Results-Based planning), this research recommends that Simavi together with local project partners, via scenarios, identifies adaptation actions. An independent WASH expert has to identify and review critical assumptions for project impacts. And third party is needed to facilitate the systematic-steps of the

adaptive planning approach for long-term sustainable WASH and to prepare the necessary inputs. In cases where Simavi is not a directly involved stakeholder, they can perform the roll of independent WASH expert to identify and review critical assumptions for project impacts. This role could possibility be embedded in the Dutch Water Alliance International consortium (WAI). Or, for example, the Dutch embassy in Bangladesh could encourage that active WASH organisations in Bangladesh, independently identify and review critical assumptions of projects impacts of other active Dutch WASH organisations in Bangladesh.

This research contributes to a sustainable WASH sector. It recommends that WASH programmes should be planned in an adaptive way whereby essential features of adaptive planning approaches should be performed by different stakeholders, when working in environments where incentives are on benefits and not on robustness.


9

REFLECTION

Chapter 9

Strategic approaches to plan in an adaptive way are not new. Adaptive planning approaches have been used to support for example the Thames flood risk management planning (Reeder & Ranger, 2011; Smith, Horrocks, Harvey, & Hamilton, 2011), the Dutch Delta Programme for water security and safety in the Netherlands (Delta Programme 2015, 2015; Haasnoot et al., 2013), conservation planning for forests in Australia (Colloff et al., 2016), and a dialogue about adaptive capacity in Indonesia (Butler et al., 2016). But research to adaptive planning in relation to international development aid has never done before, until now. This research provided new insights to adaptive planning approaches. In concludes that indirectly involved project stakeholder and directly involved project stakeholders react differently to essential features of adaptive planning approaches. This research recommends that an adaptive planning approach should find a way to deal with misrepresentation when working in environments where incentives are on benefits (results) and not on robustness. This relationship is not yet addressed in academic literature. Therefore, this research contributes to adaptive planning literature and gives the opportunity for follow-up research.

The results of this research were discussed with Simavi. This research has been recognized as valuable to Simavi with as main argumentation that it provided refreshing insights to deal with future uncertainties which unavoidably affect their WASH services. Although Simavi addresses future events that affect their WASH services, they do not consider the development of these future events. This research underpinned the importance of continuously reviewing changes in plausible futures to be able to react adaptively to uncertainty. Scenario planning is apricated as tool by Simavi and can complement their planning process. Besides this, the conclusions and recommendation of this research were useful for Simavi as well. They are willing to address the findings of this research to governmental officials with the aim to bring the relationship between adaptive planning and development aid to the attention.

This reflection chapter start with a thought of the author of this research that derived while writing the conclusion and recommendation chapter of this thesis. Hereafter, the strengths and weaknesses of the process will be discussed. This chapter ends with an elaboration on cross-cultural research.

9.1 Further elaboration on the research outcomes

As explained, project environments with incentives on benefits and with weak accountability structures seem to be a threat for adaptive planning approaches. In this thesis a division of roles for the designed adaptive planning approach is recommended to cope with such incentive and accountability structures, to contribute to long-term sustainable WASH services. But are the incentive and accountability structures not partly coming from development aid practices? And therefore, did this research provide a recommendation to development organizations to deal with this phenomenon, while this phenomenon may be caused by development aid itself?

Interesting to consider is an experiment run by two professors at the University of Toronto and Chicago. These two professors went to an electronic factory in China and they said ‘we are going to give you an 80 yuan (money in China) bonus’. They rolled out the bonus in different ways. To half of the workers they said ‘we are going to give you an 80 yuan bonus and if you don’t make us 10 extra calculators, we are going to take it back’. To the other half they said ‘make us 10 extra calculators and we will give you this bonus’. Same 80 yuan and yet what they found is that the groups that they are told ‘you already have this money but we are going to take it back’ worked a lot harder. They don’t want to lose. The other group was dealing with gains. We make this distinction in our minds (Hossain & List, 2012).

Abhishek Parajuli, a scholar from the University of Oxford, conducted a somehow similar experiment. He argues that tax income represents loss. It represents going to work every day. Aid income is coming from abroad and it does not represent those things and therefore people do not care as much. He continues that taxes make you demand accountability and when you get free money it switches off accountability demands. In one of his experiments he showed Nepalese people an article that shows corruption in Nepal. A politician in Nepal has stolen money. There were two versions of the article. There is only one difference in the articles. The first article talks

about the money is coming from foreign aid. The second article says the money is coming from taxes. That is the only distinction. The corruption case, the amounts involved, everything else is the same. He then asked Nepalese; how angry are you about this corruption case? Do you want to punish this politician? And if you do, how long do you want to send him to jail? According to Abhishek Parajuli (2017), the results bear out the theory. The people that read the tax story showed more anger. They want this person punished and they want to send him to jail a longer time. Across the board people felt the pain when there was tax money involved in a much bigger way than foreign aid was involved.

So foreign aid might have a negative impact on accountability demands. Lack of accountability perhaps harms sustainable development. In a way, development organisations (in general) are part of a larger systems that contributes to weak accountability demand and therefore harms sustainable development. The author of this thesis does not say to cut out the aid, but redesigning the funding with 'human nature', realize how human incentives work, built our aid programmes around that, rather than working against it.

9.2 Limitations of the research process

The most present limitations of the research process will be discussed. Emphasizing these limitations will help to learn from this research and to improve similar research in the future.

To start with, the participants of the workshop could have been chosen with more care. The participants were all representatives of Simavi and were interviewed earlier to obtain understanding of the planning practices within Simavi. Hereafter the same interviewees were asked to participate in the workshop. However, the participants did not all had sufficient understanding on the local context of Bangladesh. Participants with understanding of the local context would possibility be able to define more detailed uncertainties and actions. What seemed to happen now was that the participants used a lot of their own broader knowledge about the WASH sector and based on that they defined uncertainties and actions.

Then, the contextual scenarios for Khulna city could be written differently. Looking back, the content of the scenarios contained too much detailed information. There can be questioned if this affected the formulation of uncertainties by the participants. Perhaps, the most important uncertainties were already intertwined in the content of the scenarios. This could be an explanation as well why the participants seemed to formulate uncertainties based on the own understanding broader understanding of the WASH sector.

More detailed information could probably be obtained when there has been delved deeper into the answers of the interviewees in Bangladesh. There can be noticed that the researcher did not always asked comprehensive questions. It is expected that the interviewees occasionally gave the easiest answer to avoid discussions. These answers were excepted too quickly while many sequential questions could have been asked. Interview tactics have not been part of the bachelor or the master education curriculum of the researcher. As it is experienced as useful to have this dexterity, it is recommended to add this to the curriculum.

The case study for this research was chosen based on the personal interest of the researcher; a large-scale project with powerful stakeholders involved. It can be questioned if this have been the best choice. The project exists of many components, that makes it almost impossible to understand the whole project in the four weeks in Bangladesh. Besides, the long-term sustainability of WASH assets is a sensitive topic in Bangladesh. The experienced attitude of the interviewees towards the researched project was closed. Perhaps, when a smaller-scale project as case study had been chosen it was more accessible. The programmes of Simavi are 'smaller in scale', although the same group of stakeholders would be involved as all their programmes have a multi-stakeholder focus. The programmes of Simavi probably challenged the researcher in the same way.

9.3 Cross-cultural research

The experiences obtained during cross-cultural research are valuable to address because the experiences can help follow-up research in similar cultural environments. Most significant observations regarding cross-cultural

research are experienced in the field of data collection, the communication with local partners and being associated with unexpected entities.

In some cases, it was easier as a foreign student to get access to data. Also the amount of data obtained seemed to be more comprehensive than data provided to local student. A concrete example was the relative easy way I obtained the masterplan of the Khulna City from university officials, while local students didn't receive this information despite their multiple attempts. However in other cases, I had contrary experiences during data collection. A typical example of these type of experiences was the interview that was conducted with a representative of a local water authority. I interpreted signals from the interviewee that he was holding back detailed information, since I, as young foreign female student, probably would not understand the complexity of the problems in the local context. Subsequently, the received data from this representative was solely easy accessible data and not as profound as initially intended.

A second observation regards the communication with local partners in Bangladesh. Power distance in a visible phenomenon in Bangladesh. It was not always easy to approach representatives of organisations. Even when local partners tried to arrange appointments, this took a lot of time and effort. When conducting research in a high-power distance culture, one should be aware that every step in the research process may take more time compared to a low-power distance culture. In addition, the power distance also greatly affects the interaction between researcher and high-level interviewees. It is extremely important as a researcher to excessively express appreciation towards the interviewee regarding their time and effort. The diverging command of the English language of organisational representatives affected the communication between the researcher and the interviewee as well, which occasionally resulted in miscommunication. The final observation on communication with the local representatives regards distracting matters which are inherent to Bengali culture, such as constant background noise of traffic, interrupting phone calls and traditional tea moments. These matters can affect the quality of the interview, however a flexible mindset can help the researcher to cope with the distractions.

The last observation regards being associate as researcher with unexpected entities. When conducting research in Bangladesh, the researcher must be aware that he or she may be associate with the image of the institution he or she is doing research for. As experienced, one of the interviewees provided a compliment on the MOOCs that Delft University of Technology makes and explained that he follows them all. He expresses his appreciation towards the researcher for this great effort. These matters do not affect the quantity of the research, but it can make the researcher uncomfortable as the interviewee may have high expectations of the researcher based the association with high ranked entities.

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