

Can water resilient city strategies and projects be realized in practice? The Governance Assessment Tool

Hans Bressers & Gül Özerol

Department of Governance and Technology for Sustainability (CSTM)
University of Twente, the Netherlands

ABSTRACT

Cities and regions all over the world strive for more sustainable development and for the ability to absorb and recover from disruptions back into a liveable status, a goal that is often called “resilience” nowadays. Working towards making a city more resilient implies the design and adjustment of city-wide strategies and concrete projects. For both strategies and projects their contribution to becoming more “water sensitive” and resilient depends on whether they can be realized in practice. The “governance assessment tool” is designed to get more insight in this. Are the social and administrative circumstances helpful or restrictive for realizing a specific strategy or project in practice? That is not only important while trying to get things done. Already when designing or adjusting a strategy or a project, one should reckon with its feasibility in practice.

The governance assessment tool discerns five dimensions of governance and uses four evaluative criteria. Learning from dozens of real-life water projects first of all showed the importance of *completeness* (E.g.: aren't there community organisations missing that are needed to get things done? Or are there authority rights missing?). A second criterion is that of *coherence* (E.g.: aren't the problem perceptions so divergent that a common basis for agreements is missing? Do different policy sectors like water management, spatial planning, energy transition, health and flood protection demand contradictory requirements?). To avoid the obstacles in time and to fully use the opportunities as they arise requires adaptive management. That is why the governance assessment tool also acknowledges the importance of *flexibility* in the social and administrative context, allowing for such adaptiveness. Lastly, long time-horizons and dynamic circumstances create the need for a stable and strong *pressure for change* towards moving in the direction of a water-sensitive and resilient city.

The governance assessment tool has by now been used in research projects in fifteen countries for assessing the support for water projects and on top of that also in six countries for measures of other policies, like energy policy and sustainable industrial parks. This shows the broad applicability of the tool. However, all of these projects were done by researchers, that understood the theory behind the tool. In the framework of Interreg project CATCH (on water-sensitive cities) a version was developed that gives much clearer guidelines for its use, at the expense of being much more specific (on working towards a water-sensitive city or somewhat more broadly, a resilient city; and viewed from the perspective of local civil servants or administrators). This paper presents and discusses this specified version.

1 Introduction

Impacts of climate change threaten human wellbeing and natural resources in urban areas, but the governmental authorities often lack the capacity to cope with these impacts (WWAP, 2017; Leal Filho et al., 2019). Adaptation to climate change poses a particular challenge in Europe, where the increased frequency and intensity of droughts, rainfalls and heatwaves are attributed to climate change (Smaniotto Costa et al., 2015; Guerreiro et al., 2018). Climate change also negatively affects the quantity and quality of urban water resources in many European countries (Georgi et al., 2016). Urbanization puts additional pressure on the sustainability of water resources, since urban populations are both the main consumers and polluters of water globally (WWAP, 2017), and in Europe (Georgi et al., 2016).

Starting from early 2010s, resilience has become a prominent concept for addressing climate change in urban areas (Leichenko, 2011; Brown et al., 2012; Meerow et al., 2016; Ribeiro and Gonçalves, 2019). In the context of climate change, resilient cities can be described in terms of multiple attributes. Leichenko (2011) categorizes these attributes under three main themes: 1) Cities should deal with climate change as one of the many stresses that they experience, such as population growth and migration; 2) Cities should demonstrate multiple resilience-oriented characteristics, such as flexibility, diversity, adaptive governance, and capacity for innovation and learning; 3) Cities should integrate their climate resilience efforts with broader development plans.

Scientific and grey literature is rich with multiple approaches to support cities in assessing their strengths and weaknesses about climate resilience from a water management and governance perspective. These approaches often build on existing concepts, such as Integrated Water Resources Management (IWRM), Integrated Urban Water Management (IUWM) and Water Sensitive Urban Design (WSUD). For instance, the 'City Blueprint' approach by Koop and Van Leeuwen (2016) provides insights into the implementation of IWRM and IUWM in practice: 1) The trends and pressures framework 2) The city blueprint framework 3) The governance capacity framework. The Water Sensitive Cities (WSC) framework builds on IUWM and WSUD to integrate political, hydrological and ecological aspects of urban design and resilience (Wong and Brown, 2009; Brown et al., 2016). The framework proposes three pillars of action: 1) Cities as water sensitive communities and networks 2) Cities as water catchments 3) Cities as ecosystem service providers. Finally, the 'Water Wise Cities' concept builds on WSUD and the pillars of the WSC framework, which are merged into four levels of action (IWA, 2016): 1) Regenerative water services for everyone 2) Integration of urban planning with the water cycle 3) Basin-connected cities 4) Water-wise communities.

As the above concepts and approaches demonstrate, urban climate resilience is not a status or goal to be achieved. Instead, it is a co-production process that involves various stakeholders from public and private sectors, civil society and academia (Muñoz-Erickson et al., 2017). The multi-stakeholder and multi-level character of urban climate resilience requires paying attention to the governance context that consists of the instructional structure underlying the use and management of water and other natural resources. A common way for cities to put urban climate resilience in practice is to design and implement

water-related strategies and projects. It is essential to understand how the governance context affects the design and implementation of such strategies and projects in cities. This paper aims to provide insights on such governance factors that can support or hinder the realization of strategies and projects towards urban climate resilience. The remaining sections of the paper provides an overview of the development and application of a governance assessment tool and the insights from tailoring the tool for practitioners in the North Sea Region.

2 Assessing the supportiveness of the governance context

Transforming the cityscape into more climate resilient and water sensitive formats, requires a multiplicity of often rather complex interventions. Moreover, these interventions need not just have a large extent, a wide palette of infrastructural and communal measures, but also need to be well-integrated into a coherent set in which the measures reinforce each other's efficacy. Implementation of such package will likely require a substantial number of years. This adds to the complex and dynamic character of such implementation process.

In Contextual Interaction Theory (Bressers, 2009) implementation processes are nested in layers of context. Apart from the specific case context (like geographical circumstances and previous interventions and decisions), and what is called the wider contexts (like technological developments, the political system and economic development of decline), there is the so-called structural context that consist of the joint governance conditions in policy field and sectors of society that are relevant for the implementation of the measures. This governance context can be to some degree supportive and to some degree restrictive for the ability to implement the measures. The Governance Assessment Tool provides a systematic guidance to assess such degree of supportiveness.

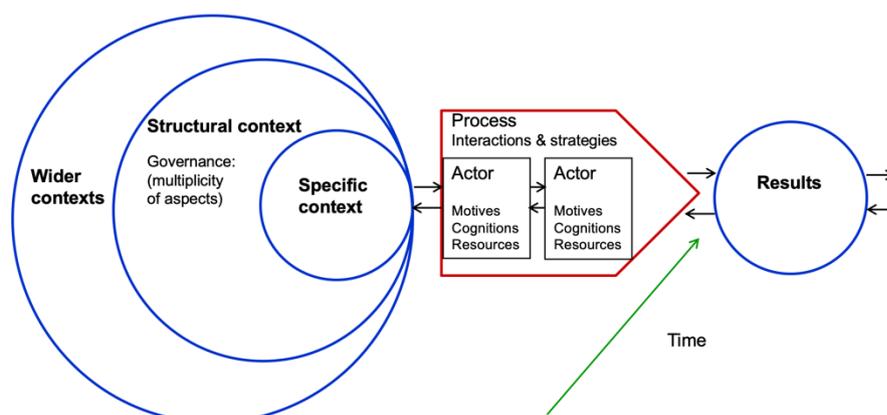


Figure 1, Interaction processes influenced simultaneously by various layers of context (source: Bressers a/o., 2016)

The concept of governance that is used was developed from the concept of policy as “the pursuit of an actor to attain certain goals with certain means”. It recognizes that in fact there are multiple actors in networked relationships over multiple levels and scales, and that goals are socially constructed on the basis of multiple problem perceptions, and that means are not just instruments of change, but also the responsibilities and resources for

their implementation (Bressers & Kuks, 2003). In the European Euawareness project (on integrated water management in six European countries) these five dimensions of governance were assessed in terms of *extent* (completeness) and *coherence*, criteria that were introduced by Knoepfel, Kissling and Varone (2001). In their work these were applied on institutional natural resources regimes (INRR), elaborating further on the work of Elinor Ostrom. In the Euawareness project they were first applied on dimensions of governance, where they were demonstrated to positively relate to the development of more sustainability in the water bodies studied (Bressers and Kuks, 2004).

In the New Rurality project, sponsored by the French research council ANR, long-term implementation of river restoration was studied in which the “complex and dynamic” nature of such processes led to the addition of two extra criteria to determine the degree of supportiveness of the governance context: *flexibility*, allowing for adaptive strategies of dealing with obstacles and chances during the process and *intensity*, the combined pressures to move into a more sustainable direction (De Boer and Bressers, 2011).

On this basis a first version of the Governance Assessment Tool was developed (Kuks, Bressers, De Boer, Vinke-De Kruijf, Özerol, 2012) and applied in a pilot study on a Dutch project in river Meuse. A further developed version was later applied extensively in the European DROP project (on drought resilience policies in six regions). In this large project, international scientific assessment teams visited all six case regions twice and discussed the relevant governance issues with many practitioners from government and broader society, leading to very well-informed assessments (Bressers, Bressers and Larrue, 2016). Among others this also led to the ambition to develop the Governance Assessment Tool in such a way that practitioners would be no longer be just informants of scientific researchers, but could be really involved in making the assessments or even enabled to make them themselves.

The overview table of the Governance Assessment Tool (GAT) as it has been used in among others the DROP project, is shown in Table 1.

Governance dimension	Quality of the governance regime			
	Extent	Coherence	Flexibility	Intensity
Levels and scales	How many levels are involved and dealing with an issue? Are there any important gaps or missing levels?	Do these levels work together and do they trust each other between levels? To what degree is the mutual dependence among levels recognised?	Is it possible to move up and down levels (upscaling and downscaling) given the issue at stake?	Is there a strong impact from a certain level towards behavioural change or management reform?
Actors and networks	Are all relevant stakeholders involved? Are there any stakeholders not involved or even excluded?	What is the strength of interactions between stakeholders? In what ways are these interactions institutionalised in stable structures? Do the stakeholders have experience in working together? Do they trust and respect each other?	Is it possible that new actors are included or even that the lead shifts from one actor to another when there are pragmatic reasons for this? Do the actors share in ‘social capital’ allowing them to support each other’s tasks?	Is there a strong pressure from an actor or actor coalition towards behavioural change or management reform?

Problem perspectives and goal ambitions	To what extent are the various problem perspectives taken into account?	To what extent do the various perspectives and goals support each other, or are they in competition or conflict?	Are there opportunities to re-assess goals? Can multiple goals be optimized in package deals?	How different are the goal ambitions from the status quo or business as usual?
Strategies and instruments	What types of instruments are included in the policy strategy? Are there any excluded types? Are monitoring and enforcement instruments included?	To what extent is the incentive system based on synergy? Are trade-offs in cost benefits and distributional effects considered? Are there any overlaps or conflicts of incentives created by the included policy instruments?	Are there opportunities to combine or make use of different types of instruments? Is there a choice?	What is the implied behavioural deviation from current practice and how strongly do the instruments require and enforce this?
Responsibilities and resources	Are all responsibilities clearly assigned and facilitated with resources?	To what extent do the assigned responsibilities create competence struggles or cooperation within or across institutions? Are they considered legitimate by the main stakeholders?	To what extent is it possible to pool the assigned responsibilities and resources as long as accountability and transparency are not compromised?	Is the amount of allocated resources sufficient to implement the measures needed for the intended change?

Table 1, The matrix format of the Governance Assessment Tool (source Bressers a/o. 2016)

Apart from small verbal assessments per cell, the results were in many cases also summarized in colour code graphs, like the example shown below in figure 2.

Dimensions	Criteria			
	Extent	Coherence	Flexibility	Intensity
Levels and scales	+0	0++	+	0-
Actors and networks	+	+++	+	0+
Problem perspectives and goal ambitions	+	0++	0	0-
Strategies and instruments	+	0	0+	0-
Responsibilities and resources	+	-	+	0

Colours **red**: restrictive; **orange**: neutral, **green**: supportive

Figure 2, Assessment of supportiveness governance conditions in the DROP Vechtstromen case, source: Bressers a/o., 2016

In the meanwhile, the Governance Assessment Tool has been applied extensively in scholarly research, not just in the Netherlands, but also in many different countries. At the field of water policy and climate adaptation, these were:

- Netherlands
 - Regge River restoration (De Boer & Bressers, 2011)
 - Vecht River restoration (Bressers & Bressers, 2017)
 - Frisian and Overijssel wetland Nature Parks (a/o. Lordkipanidze, 2019)
 - Overijssel climate adaptation, CATCH+ (Baack, ongoing)
- Canada

- Spencer Creek Stewardship Action Planning (De Boer, 2012)
- Mexico
 - Wastewater governance: Casiano Flores et al. (2016); Casiano Flores et al. (2017). Casiano Flores et al. (2019b)
 - Urban water transitions: Casiano Flores et al. (2019a)
- Romania
 - Tecucel River Integrated Water Management project (Vinke-De Kruijf et al., 2015)
- Turkey
 - Water and land governance for irrigated agriculture (Özerol et al., 2012; Özerol and Bressers, 2015)
- UK
 - Governance context for coastal innovations (Vikolainen et al., 2017)
- US
 - Governance context for green infrastructure implementation in Hoboken, New Jersey (Staas, 2017)
- Iran
 - Rafsanjan water conservation (Mirnezami, 2016, Mirnezami et al. 2019)
 - Taleghan watershed (Ebrahimi-azarkhran et al., 2018)
- Vietnam
 - Mekong Delta (Kuks, 2012)
 - Ho Chi Min City water agency (De Boer et al., 2012)
- Palestine
 - Water governance in the West Bank (Judeh, Haddad, Özerol, 2017)
 - Reuse of treated wastewater around Jericho (Al-Kathib, Shoqeir et al., 2017)
- United Kingdom, Germany, Belgium, France, Netherlands
 - Drought resilience measures (DROP project) (Bressers, Bressers, Larrue, 2016)

Most of the applications were in the fields of water policy and climate change adaptation. However recently also a number of studies were added that applied the GAT in other fields. Outside these water-related fields, the following studies were concluded:

- Mexico
 - Sustainable industrial parks (Kreiner and Franco, 2019)
- India and Singapore
 - 0-energy buildings (Jain, 2018)
- China
 - Urban mining (Xue, 2018)
 - Sustainable industrial parks (Zhang, 2020)
- Indonesia
 - Climate change mitigation in the transport sector and selected co-benefits in Bandung city, Indonesia (Gunawan, 2019)
- Nigeria
 - Adoption of energy efficient appliances by households (Gana & Hoppe, 2017)

As the empirical evidence builds up, the added value of comparative analyses becomes prominent, especially focusing on water governance (Özerol et al., 2018). The GAT provides such a comparative framework, which was applied in several comparative studies around the world:

- Bressers et al. (2016) and Özerol (2019): Drought governance in North-west Europe
- De Boer et al. (2016): Collaborative water management in Canada, Mexico, Netherlands, Romania and Turkey
- Rouillard et al. (2016): Urban water management innovations in Denmark, Germany, Spain
- Casiano Flores et al. (2019b): Wastewater treatment policies of three subnational cases in central Mexico

In fact, there is no reason to assume that the applicability of the GAT is limited to any set of policy fields. Whenever policies involve the implementation of measures in a complex and dynamic setting the GAT with its 20 cells offers a structure to assess the degree to which the governance context is supportive or restrictive for their realization. This broad applicability however comes at a price: the users need to have a good understanding of the critical essence of each of the cells regarding their impact on the supportiveness of governance. The questions that fill the cells are helpful, but need to be very general in order not to make the usability of the tool too narrow, implicitly already aiming at a certain policy field. This makes the tool a “researchers’ tool”, and for most practitioners containing too much general terminology and not linking enough to their own sector’s language-in-use to be recognizable. This was the problem we faced when we wanted to involve practitioners in the governance assessment in the CATCH project on water sensitive cities in seven Northwest European cities.

3 Applying the Governance Assessment Tool to climate resilient and water sensitive cities: The CATCH project

3.1. Background of the CATCH project

CATCH (water sensitive Cities: the Answer To CHallenges of extreme weather events) is an international collaboration project that is being implemented between 2017 and 2021 within the scope of the EU Interreg North Sea Region Programme. The project focuses on the specific context and needs of midsize cities for climate change adaptation. It brings together a transdisciplinary team of ‘practice’ and ‘knowledge’ partners from six countries (Belgium, Denmark, Germany, the Netherlands, Sweden, and the United Kingdom). The practice partners are four local authorities (Zwolle Municipality, Enschede Municipality, Arvika Municipality, Norfolk City Council) and five regional authorities (Värmland County, Province of Overijssel, Water Authority Vechtstromen, Flanders Environmental Agency, Oldenburg and East Frisian Water Association), whereas the knowledge partners include two universities (Jade University of Applied Sciences from Germany and the University of Twente from the Netherlands) and a consultancy firm (Royal HaskoningDHV).

The overall objective of CATCH is to demonstrate and accelerate the redesign of urban water management of midsize cities to become climate resilient by following the principles

of the WSC framework. For this purpose, the project team is co-designing an online decision support tool (DST) and the practice partners are implementing pilot measures, with an ultimate goal of developing a climate adaptation strategy for each partner city. The DST includes four components, one of which is the GAT. As shown in Table 2, seven pilot measures are being implemented within the scope of the project.

Table 2. CATCH partner cities and pilot measures (Özerol et al., 2020)

<i>City</i>	<i>Country</i>	<i>Population</i>	<i>Pilot measure</i>
Herentals	Belgium	27.000	Designing a green-blue area in a city development area
Vejle	Denmark	55.000	Redesign of a playing field for water storage during heavy rainfall
Oldenburg	Germany	164.000	Traffic information for road users during heavy rainfall
Enschede	The Netherlands	158.000	'Pinkeltjes Square' - stepping stone in the restoration of a city brook
Zwolle	The Netherlands	124.000	Developing a community building strategy and serious game
Arvika	Sweden	14.000	Constructed wetlands to reduce the effect of climate change on water quality
Norwich	UK	140.000	Community-led technological solutions for flood protection in the city

Over the last decade, all CATCH partner cities have experienced one or several impacts of climate change, such as heavy rainfalls, more frequent and intense floods, water quality degradation and heat stress. These shared experiences motivate the partner cities to implement the pilot measures that can provide insights into the feasibility and effectiveness of climate adaptation strategies and projects.

3.2. Co-production of knowledge within the CATCH project

To develop the DST, the CATCH team adopted a transdisciplinary research approach by involving academic and non-academic participants in the knowledge co-production process. As the GAT is one of the four elements of the DST, its development for the CATCH purposes followed the same approach. To increase the likelihood of achieving the project objectives, the knowledge co-production processes focused on the understandability and applicability of knowledge (Bracken et al., 2015). For this purpose, the research process was adjusted to the practitioners' needs and realities; the practitioners were encouraged to question the ideas or concepts that were raised during the project and to promote their own knowledge; and an iterative process was followed so that all partners could learn from each other and develop a common understanding and shared 'language'.

Several characteristics of midsize cities require special attention to their climate adaptation needs. Local and regional governments responsible for implementing climate adaptation measures often lack the necessary financial and personnel capacity. At the same time, increasing urgency is felt to deal with the impacts of extreme weather and climate events.

To tackle this trade-off between capacity and urgency, midsize cities need decision support tools that are both easy to use and appealing to create awareness and dialogue among stakeholders (Özerol et al., 2020). The midsize cities in the North Sea Region share the common features of being located in high-income and politically stable countries, but they also differ in their social, climatic and geographic conditions. Taking these similarities and differences into account, the CATCH team thrived to develop the DST in way that it would be simple and appealing on the one hand, and relevant and detailed on the other hand.

In the context of the CATCH project, some of the criteria in the GAT were given a new name to make the essence of their meaning easier to understand and also the dimensions of governance were described in such a way that it is easier to relate them to the kind of issues that play a role in the formation and implementation of climate resilience measures in cities, among others by formulating them from the perspective of administrators and civil servants at the municipal level. This led to the following descriptions of the basic ingredients of the GAT.

3.3. The Practitioners' Version of the GAT

The governance assessment tool discerns five dimensions of governance and uses four evaluative criteria. Learning from dozens of real-life water projects first of all showed the importance of *completeness* (E.g.: aren't there community organisations missing that are needed to get things done? Or are there authority rights missing?). A second criterion is that of *coherence* (E.g.: aren't the problem perceptions so divergent that a common basis for agreements is missing? Do different policy sectors like water management, spatial planning, energy transition, health and flood protection demand contradictory requirements?).

When the strategies and projects to become a resilient city have long time horizons and complex interactions among actors and more interplay among scales, their realization in practice often becomes more dynamic and less predictable. Not only will the strategies need to be adaptive and regularly adjusted to new situations and insights, but also projects will likely meet obstacles at some point and hopefully also unexpected opportunities. To avoid the obstacles in time and to fully use the opportunities as they arise requires adaptive management. That is why the governance assessment tool also acknowledges the importance of *flexibility* in the social and administrative context, allowing for such adaptiveness. Lastly, long time-horizons and dynamic circumstances create the need for a stable and strong *pressure for change* towards moving in the direction of a water-sensitive and resilient city.

These four evaluative criteria are applied to five dimensions of governance:

Levels and scales

Sustainable and resilient city strategies and projects do not only have a scale of their own, but also need to be adjusted to other scales. Each project fulfils a role at a larger scale than its own. For instance, for water management strategies, most often the scale of the surrounding catchment area is important. When it comes to the feasibility of strategies and projects it is not so much the hydrological or geographical scales, but the social and

administrative levels that count. The municipal level sits in a structure of higher-level authorities (like provinces, federal states, regional/national water authorities and national government) and even non-governmental organisations (NGOs) from which it can receive support, but also to which it often needs to adjust. Are these higher-level authorities playing their role when needed? How does this interplay of levels affect the realization of strategies or projects?

Actors and networks

The success of sustainable and resilient city strategies and projects rarely depends only on municipal actors. On the contrary, it is often essential to involve multiple actors, like community organizations, private companies, universities, water authorities, housing corporations and environmental NGOs. It is also probably not the first time that the municipality deals with those stakeholders. On water and other subjects, previous contacts and perhaps even stable network relations have been established in different occasions, such as consultative committees, regular meetings and thematic platforms.

Problem perceptions and ambitions

Cities are almost by definition quite dense. This implies that sustainable and resilient city projects and the strategies leading to them will always interact with several existing uses of the space, buildings and infrastructure, and with other problems and ambitions, such as transport, energy transition, housing, job creation. Some organisations will see a very different scope of problems when looking at the city or the project site than sustainability or resilience. That will also be the case among the project partners and even among the different departments of the municipality. Thus, sustainability and resilience need to be continuously balanced with, and where possible, integrated into other ambitions, even though in the long run these other ambitions cannot do without.

Styles and instruments

City strategies and projects often reflect certain policy implementation styles. Such styles can be more or less consensual, or be more like directives or more like incentives. They can concentrate on the construction of facilities or aim more on behavioural changes. They be short-term or long-term oriented and imply much or little communication with the community. For the water sector, or for the collaborating sectors involved in the strategy or project, various options might be available, provided for instance by laws, regulations and white papers. It is also possible that some policy sectors or budget providers (including external subsidies) require the use of certain instruments, procedures or timelines regardless of whether this makes the realization of the strategy or the project easier. To what extent are the available options used? And do they reinforce each other or not?

Responsibilities and resources

In order to realize strategies and projects in practice, there should be some clarity about who is responsible for what part. That is even more important when the implementation cannot be done by the municipality alone but needs the collaboration between several

partners in more than one sector, as will often be the case. The other side of the coin is that responsibilities need to come with resources that enable to achieve them. These resources are not just money, but also administrative rights, professional expertise and political support. When collaborating well with partners, the resources of the municipality may be combined with those of the others.

4 Transferring a research tool into a self-assessment tool for practitioners

While the reformulations and specifications shown above in section 3.3 certainly improved the understanding by the representatives of the “practice partners” (municipalities and regional governments) in the CATCH project, these still were a long shot from enabling them to use the Governance Assessment Tool independently as a tool for self-assessment and for focusing their internal debate on the feasibility of measures and their options to improve such feasibility. In order to achieve that, a further specification and streamlining with the issues of climate resilient and water sensitive cities was necessary.

Transferring a scientific framework into a real “tool”, that can be more widely used, not only by people that are trained to understand underlying theory, proved a real challenge. Again, there is a trade-off in terms of streamlining and simplification requiring a further narrowing down of topic of application. Only in this way it is possible to translate the topics of the 20-cell matrix of the GAT into more “real-life” questions, that can serve as indicators for the assessment elements. As the CATCH project follows the concept of water sensitive cities as a form of urban climate adaptation these concepts were carefully kept in mind while “translating” the scientific meaning of the assessment elements of GAT into questions and pre-coded answers that are recognizable for municipal civil servants and administrators working of the subject. The result is shown in the Appendix below.

In the CATCH project this re-design will get its functionality as an online, interactive tool that provides the user with the assessment results and recommendations right after the assessment. The testing of the tool by the practice partners is ongoing and the tool will be finalized by late 2020.

Appendix

Governance Assessment Tool

Strategies and projects have the potential to make your city water sensitive. How much they fulfil this potential in practice depends on the chance of a successful implementation. The governance assessment tool (GAT) will help you to get insights in this chance. The GAT uses four evaluative criteria (completeness, coherence, flexibility and pressure for change) on five dimensions:

1. Levels and scales

Water sensitive city strategies/projects are adjusted to other scales. The feasibility of city-level strategies/projects do not depend so much on the hydrological scales, but more on the social and administrative levels. The municipal level is also connected to higher-level authorities, such as provinces, federal states, regional and national authorities, and the national government.

2. Actors and networks

The success of water sensitive city strategies/projects depends on more actors than just the municipality. It is essential to involve stakeholders, such as community organizations, private companies, water authorities, housing corporations and environmental NGOs. It is possible that the municipality already cooperates with some of these actors on this or other subjects.

3. Problem perceptions and ambitions

Water sensitive city strategies/projects always interact with existing uses of the urban space, and other ambitions, such as energy transition, housing and job creation. Some organisations will see a different scope of problems when looking at the city. Water sensitivity needs to be continuously balanced with, and where possible, integrated into other ambitions.

4. Policy styles and instruments

City strategies/projects often reflect certain policy implementation styles. Various instruments might be available, provided for instance by laws, regulations and white papers. Some policy sectors or budget providers might also require the use of certain instruments, procedures or timelines, regardless of whether this facilitates the realization of the strategy or the project.

5. Responsibilities and resources

To realize strategies/projects, there should be clarity about who is responsible for what, especially when the municipality cooperates with several partners in multiple sectors. Resources, such as money, rights, expertise and support, should be available to fulfil these responsibilities. When the municipality and other partners collaborate, they can also combine their resources.

The questions of the GAT will take you stepwise through all of these aspects. When answering the questions, it is important that you keep in mind whether you are focusing on a project or a strategy.

	Assessment criteria			
Governance dimensions	Completeness	Coherence	Flexibility	Pressure for change
Levels and scales				
Actors and networks				
Problem perspectives and goal ambitions				
Styles and instruments				
Responsibilities and resources				

Completeness

Think about: Are there stakeholders missing that are needed to get things done? Or are there any unassigned responsibilities or missing resources?

1. Are all relevant higher-level authorities involved in the strategy/project?
 - a. Yes.
 - b. No, but it is not a problem.

- c. No, and it is a problem.
 - d. We don't know.
 - e. This is not important.
- 2. Are all actors that could contribute to the strategy/project involved?
 - a. Yes.
 - b. No, but it is not a problem.
 - c. No, and it is a problem.
 - d. We don't know.
 - e. This is not important.
- 3. Are all other problem perceptions and ambitions that relate to the same urban space taken into account?
 - a. Yes.
 - b. No, but we expect that it will not be a problem.
 - c. No, we focus on water goals.
 - d. We don't know.
 - e. This is not important.
- 4. Are the different options for implementation styles and combinations of instruments taken into consideration during the design of the strategy/project?
 - a. Yes.
 - b. No, but we considered most of the familiar options.
 - c. No, we left options out to focus on the construction of water works.
 - d. We don't know.
 - e. This is not important.
- 5. Are the responsibilities for different parts of the strategy/project clearly assigned and facilitated with the necessary resources to fulfil them?
 - a. Yes.
 - b. No, not all of them.
 - c. No, not at all.
 - d. We don't know.
 - e. This is not important.

Coherence

Think about: Aren't the problem perceptions so divergent that a common basis for agreements is missing? Do different policy sectors like spatial planning, energy transition, health and flood protection demand contradictory requirements?

1. Is your strategy/project well aligned with those of higher-level authorities?
 - a. Yes.
 - b. No, but it is not conflicting either.
 - c. No, it conflicts with the principles of higher-level authorities.
 - d. We don't know.
 - e. This is not important.
2. Does the municipality have collegial relationships with the other actors involved?
 - a. Yes, we are working like a team.
 - b. Not with all actors, but with some there is.
 - c. No, for some of these actors our strategy/project is really controversial.
 - d. We don't know.
 - e. This is not important.
3. Does your strategy/project create synergy and contribute to the ambitions of other sectors?
 - a. Yes.
 - b. No, but it does not conflict with other ambitions either.
 - c. No, it contains choices that clearly deviate from competing ambitions.
 - d. We don't know.
 - e. This is not important.
4. Does the combination of instruments create synergy and make their realization easier?
 - a. Yes.
 - b. No, but we could exclude aspects that might conflict with other parts.
 - c. No, we had to include aspects that might easily conflict with one another.
 - d. We don't know.
 - e. This is not important.
5. Are the responsibilities and resources of the actors involved supportive to one another, and do they facilitate cooperative activities to realize the strategy/project?
 - a. Yes.
 - b. Some responsibilities might compete with those of others, and there is probably going to be discussion about the distribution of input of resources.
 - c. No, we continuously debate about the division of responsibilities and resources.
 - d. We don't know.
 - e. This is not important.

Flexibility

Think about: Is it possible to change plans later in the project? Can stakeholders or authorities be added to the project in a later stage?

1. Can higher-level authorities be used in the implementation of your strategy/project or to help solve problems?
 - a. Yes.
 - b. Not really, all we can do is to make use of the actions they take anyway.
 - c. No.
 - d. We don't know.
 - e. This is not important.
2. Is it possible to include new stakeholders if this would be worth it?
 - a. Yes.
 - b. We can, after consultation with the partners.
 - c. No.
 - d. We don't know.
 - e. This is not important.
3. Can the ambitions of the strategy/project be changed when (new) opportunities or problems arise over time?
 - a. Yes.
 - b. Yes, but we need new political decision-making.
 - c. No.
 - d. We don't know.
 - e. This is not important.
4. Can the combination of instruments be changed when (new) opportunities or problems arise over time?
 - a. Yes.
 - b. Yes, but we will need new political decision-making.
 - c. No, we should follow the original plan as much as possible.
 - d. We don't know.
 - e. This is not important.
5. Is it possible to combine the resources from various sectors of the municipality and other partners to realise tasks that no one could do on their own?
 - a. Yes.
 - b. Yes, but we are careful to invest in other's tasks.
 - c. No.
 - d. We don't know.
 - e. This is not important.

Pressure for change

Think about: Do authorities or stakeholders push you in the direction of a water sensitive city? Does the project demand big changes?

1. Is there enough stable pressure from higher-level authorities to move in the direction of a water sensitive city?
 - a. Yes.
 - b. Not really, if we would do nothing, they wouldn't care.
 - c. No.
 - d. We don't know.
 - e. This is not important.
6. Is there enough stable pressure from other stakeholder(s) to move in the direction of a water sensitive city?
 - a. Yes.
 - b. Not really, if we would do nothing, they wouldn't care.
 - c. No.
 - d. We don't know.
 - e. This is not important.
7. Are the ambitions of your strategy/project very different from the current situation?
 - a. Yes.
 - b. Not very much but it is a first step in the right direction.
 - c. No.
 - d. We don't know.
 - e. This is not important.
8. Are the instruments demanding more adaptation from the citizens or other stakeholders than the current situation?
 - a. Yes.
 - b. Not really, it is not much different from the familiar.
 - c. No.
 - d. We don't know.
 - e. This is not important.
9. Is the total amount of resources enough to implement the strategy/project in the long term?
 - a. Yes.
 - b. Yes, but only for now.
 - c. No.
 - d. We don't know.
 - e. This is not important.

Results

Answers a	Supportive	Green
Answers b	Neutral	Yellow
Answers c	Restrictive	Red
Answers d	"We don't know."	?
Answers e	"This is not important."	Grey

Results table that the user will see after answering all the questions (*dummy only*):

Dimensions	Criteria			
	Completeness	Coherence	Flexibility	Pressure for change
Levels and scales	Red	Grey	?	Red
Actors and networks	Green	Green	Green	Yellow
Problem perspectives and goal ambitions	Green	Yellow	Grey	Red
Styles and instruments	Yellow	?	Green	Red
Responsibilities and resources	Yellow	Yellow	Green	Red

Interpretation and recommendations

The five types of answers to each question can be interpreted as below.

Supportive answers (*green cells*) refer to situations where governance supports the successful implementation of the strategy/project. Dealing consciously with the supportiveness of your governance context is not just a matter of looking where you can improve the “red” bars, but also of protecting the “green” ones.

Neutral answers (*yellow cells*) represent situations in which you don’t feel really supported but neither hindered by the context. It is good to think about whether this situation is likely to worsen or better in the near future. Are there developments ongoing that make you think that the situation might get worse, or will they be better in the near future? And if, so, is there anything you can do to prevent or help these developments?

Restrictive answers (*red cells*) need extra attention, as they indicate that the governance context restricts the successful implementation of the strategy/project. These items can be improved by taking actions to improve the aspect over the upcoming period, for instance platforms that facilitate the interaction of stakeholders and their problem perceptions. If it is not possible to change the restrictive situation of an item, you can look whether supportive items can compensate for this.

<i>Restrictive aspect</i>	<i>Possible compensation</i>
Completeness	Other criterion within completeness
Coherence	Other criterion within coherence
Flexibility	Other criterion within flexibility
Pressure for change	Other criterion within pressure for change
Completeness of actors is low	High flexibility to add them in process later on
	Open minded problem perception and goal ambition
...	...

To change the “**We don’t know**” answers (*question marks*): 1) think about the consequences of your situation and whether they will be restrictive, neutral or supportive, 2) gather more information, or 3) consult colleagues or the designer of the tool.

Finally, it is good to be self-critical when the “**This is not important**” (*grey cells*) answer is given too often. This might indicate that possible problems are overlooked and that your organization is not as capable to perform on its own as one would like to think. You should evaluate the risks that come with this aspect: What can be the consequence if this subject is restrictive? Is it really not important to take this governance aspect into account?

References

Al-Khatib N, Shoqeir J, Özerol G, Majaj L (2017). Governing the reuse of treated wastewater in irrigation: The case study of Jericho, Palestine. *Int. J. Global Environmental Issues*, Vol. 16, Nos. 1/2/3, 135-148.

Boer C de, Bressers H (2011). *Complex and Dynamic Implementation Processes. Analyzing the renaturalization of the Dutch Regge river*. University of Twente and Water Governance Centre, Enschede, The Hague.

Boer C de (2012). *Contextual Water Management. A study of governance and implementation processes in local stream restoration projects*. University of Twente, Enschede.

De Boer C, Bressers H, Goddek S, Vinke-De Kruijf (2012). *Report on the application of the Governance Tool for the steering centre for urban flood control (Ho Chi Min City)*.

De Boer, C., Vinke-de Kruijf, J., Özerol, G., Bressers, H. (2016). Collaborative Water Resource Management: What makes up a supportive governance system? *Environmental Policy and Governance*, 26(4), 229–241.

Bracken, L.J., Bulkeley, H.A., Whitman, G. (2015). Transdisciplinary research: understanding the stakeholder perspective. *Journal of Environmental Planning and Management*, 58(7), 1291-1308.

Bressers H (2009). From public administration to policy networks. Contextual interaction analysis. In: Stéphane N, Varone F (eds) *Rediscovering public law and public administration in comparative policy analysis. A tribute to Peter Knoepfel*. Presses polytechniques, Lausanne, pp 123-142.

Bressers H, Kuks S (2003). What does “governance” mean? From conception to elaboration. In: Bressers H, Rosenbaum W (eds) *Achieving sustainable development: The challenge of governance across social scales*. Praeger, Westport Connecticut, pp 65-88.

Bressers H, Kuks S (eds) (2004). *Integrated governance and water basin management. Conditions for regime change and sustainability*. Kluwer Academic Publishers, Dordrecht-Boston-London.

Bressers H, Bressers N, Larrue C (eds) (2016). *Governance for drought resilience*. Springer Open access.

Bressers H & Bressers N (2017). *Governance assessment rapport Ruimte voor de Vecht*, report to the Province of Overijssel.

Brown, A., Dayal, A., Rumbaitis Del Rio, C. (2012). From practice to theory: emerging lessons from Asia for building urban climate change resilience. *Environment and Urbanization*, 24(2), 531–556.

Brown, R., Rogers, B., Werbeloff, L. (2016). *Moving toward water sensitive cities: A guidance manual for strategists and policy makers*. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

Brugnach, M., Özerol, G. (2019). Knowledge Co-Production and Transdisciplinarity: Opening Pandora’s Box. *Water*, 11, 1–6.

Casiano Flores, C. (2017). *Context matters: Water governance assessment of the wastewater treatment plan policy in central Mexico*. University of Twente, Enschede.

Casiano Flores, C., Özerol, G., Bressers, H. (2017). “Governance restricts”: A contextual assessment of the wastewater treatment policy in the Guadalupe River Basin, Mexico. *Utilities Policy*, 47, 29–40.

Casiano Flores, C., Cromptvoets, J., Eugenia, M., Viniegra, I., Farrelly, M. (2019a). *Governance Assessment of the Flood’s Infrastructure Policy in San Pedro Cholula, Mexico: Potential for a Leapfrog to Water Sensitive Sustainability*, 11, 7144.

Casiano Flores, C., Özerol, G., Bressers, H., Kuks, S., Edelenbos, J., Gleason, A. (2019b). *The state as a stimulator of wastewater treatment policy: a comparative assessment of three subnational cases in central Mexico*. *Journal of Environmental Policy & Planning*, 21(2), 134–152.

Casiano Flores, C., Vikolainen, V., Bressers, H. (2016). *Water governance decentralisation and river basin management reforms in hierarchical systems: Do they work for water treatment policy in Mexico’s Tlaxcala Atoyac sub-basin?* *Water (Switzerland)*, 8(5).

Ebrahimiazarkhan F, Bressers H, Ghorbani M, Malekian A (2018). *Assessing the governance context for integrated watershed management in Taleghan, Iran*.

Gana J, Hoppe T (2017). *Assessment of the governance system regarding adoption of energy efficient appliances by households in Nigeria*. *Energies*, 10, 132.

Georgi, B., Isoard, S., Asquith, M., Garzillo, C., Swart, R.J., Timmerman, J.G. (2016). Urban adaptation to climate change in Europe 2016: transforming cities in a changing climate. Technical Report 12/2016, Copenhagen: European Environment Agency.

Guerreiro, S.B., Dawson, R.J., Kilsby, C., Lewis, E., Ford, A. (2018). Future heat-waves, droughts and floods in 571 European cities. *Environmental Research Letters*, 13(3), 034009.

Gunawan H. (2019). Climate change mitigation in the transport sector and selected co-benefits in Bandung city, Indonesia. University of Twente, Enschede.

IWA (International Water Association). (2016). The IWA Principles for Water Wise Cities. London, UK: International Water Association. https://iwa-network.org/wp-content/uploads/2016/10/IWA_Brochure_Water_Wise_Communities_SCREEN.pdf (accessed on 29 July 2020).

Judeh T, Haddad M, Özerol G (2017). Assessment of water governance in the West Bank, Palestine, *Int. J. Global Environmental Issues*, Vol. 16, Nos. 1/2/3, 119-134.

Jain M (2018). Energy transition in the Indian building sector, University of Twente, Enschede.

Knoepfel P, Kissling-Näf I, Varone F (2001). Institutionelle regime für natürliche ressourcen. Helbing & Lichtenhahn, Basel.

Koop, S.H.A., van Leeuwen, C.J. (2015). Assessment of the Sustainability of Water Resources Management: A Critical Review of the City Blueprint Approach. *Water Resources Management*, 29(15), 5649–5670.

Kreiner I, Franco-García L (2019). A Strategic Evaluation Framework to Assess the Sustainability Level of Industrial Parks in the Post-global Economy, In: “Sustainable Development Goals and Sustainable Supply Chains in the Post-global Economy”, Chapter 11, *Greening Industry Networks Stud.*, Vol. 7.

Kuks S, Bressers H, Boer C de, Vinke-De Kruijf J, Özerol G (2012). Governance assessment tool. Institutional capacity. Report to the Water Governance Centre, University of Twente, Enschede.

Kuks S (2012). Governance in the Mekong Delta, report to the Mekong Delta Plan committee.

Leal Filho, W., Balogun, A.L., Olayide, O.E., Azeiteiro, U.M., Ayal, D.Y., Muñoz, P.D.C., ... Saroar, M. (2019). Assessing the impacts of climate change in cities and their adaptive capacity: Towards transformative approaches to climate change adaptation and poverty reduction in urban areas in a set of developing countries. *Science of the Total Environment*, 692, 1175–1190.

Leichenko, R. (2011). Climate change and urban resilience. *Current Opinion in Environmental Sustainability*, 3(3), 164–168.

Lordkipanidze M (2019). Governance for resilience. Assessing how governance influences implementation of resilience measures in nature areas. University of Twente, Enschede.

Meerow, S., Newell, J.P., Stults, M. (2016). Defining urban resilience: A review. *Landscape and Urban Planning*, 147, 38–49.

Mirnezami J (2016). Contextual approach to water resource conservation. Case study of Rafstanjan, Iran, Sharif University of Technology, Tehran.

Mirnezami J, De Boer C, Bagheri A (2019). Groundwater governance and implementing the conservation policy: the case study of Rafsanjan Plain in Iran. *Environment, Development and Sustainability*.

Muñoz-Erickson, T.A., Miller, C.A., Miller, T.R. (2017). How cities think: Knowledge co-production for urban sustainability and resilience. *Forests*, 8(6), 1–17.

- Özerol G. (2013). *Aligning the multiplicities in natural resource governance*. University of Twente, Enschede.
- Özerol, G. (2019). National and Local Actors of Drought Governance in Europe: A Comparative Review of Six Cases from North-West Europe. In I. La Jeunesse & C. Larrue (Eds.), *Facing Hydrometeorological Extreme Events: A Governance Issue*.
- Özerol, G., Bressers, H. (2015). Scalar alignment and sustainable water governance: The case of irrigated agriculture in Turkey. *Environmental Science & Policy*, 45, 1–10.
- Özerol, G., Bressers, H., Coenen, F. (2012). Irrigated agriculture and environmental sustainability: an alignment perspective. *Environmental Science & Policy*, 23, 57–67.
- Özerol, G., Vinke-de Kruijf, J., Brisbois, M. C., Casiano Flores, C., Corentin, G., Knieper, C., ... Schröter, B. (2018). Comparative studies on water governance: a systematic review. *Ecology & Society*, 23(4).
- Özerol, G., Dolman, N., Bormann, H., Bressers, H., Lulofs, K., Böge, M. (2020). Urban water management and climate change adaptation: A self-assessment study by seven midsize cities in the North Sea Region. *Sustainable Cities and Society*, 55, 102066.
- Ribeiro, P.J.G., Gonçalves, L. (2019). Urban resilience: A conceptual framework. *Sustainable Cities and Society*, 101625.
- Rouillard, J., Vidaurre, R., Brouwer, S., Damman, S., Ponce, A. A., Gerner, N. V., ... Termes, M. (2016). Governance regime factors conducive to innovation uptake in urban water management: Experiences from Europe. *Water (Switzerland)*, 8(10), 1–15.
- Smaniotto Costa, C., Norton, C., Domene, E., Hoyer, J., Marull, J., Salminen, O. (2015). Water as an element of urban design: Drawing lessons from four European case studies. In W. Leal Filho, V. Sümer (eds.) *Sustainable Water Use and Management*, 17–44. Cham: Springer.
- Staas L (2017). *Resilient governance for resilient cities – Assessing the governance context for green infrastructure implementation in Hoboken*. Thesis University of Twente, Enschede.
- Vikolainen, V., Flikweert, J., Bressers, H., Lulofs, K. (2017). Governance context for coastal innovations in England: The case of Sandscaping in North Norfolk. *Ocean and Coastal Management*, 145, 82–93.
- Vinke-de Kruijf J, Kuks SMM, Augustijn DCM (2015). Governance in support of integrated flood risk management? The case of Romania. *Environmental Development* 16:104–118.
- Wong, T.H.F., Brown, R.R. (2009). The water sensitive city: principles for practice. *Water Science and Technology*, 60(3), 673–682.
- WWAP (World Water Assessment Programme). (2017). *The United Nations World Water Development Report 2017. Wastewater: The Untapped Resource*. Paris, UNESCO.
- Xue Y. (2018). *Sustainable urban mining*. University of Twente, Enschede.
- Zhang Q. (2020). *Enhancing the sustainability of Chinese production*. University of Twente, Enschede.