

RIVER RESTORATION IN NORTH RHINE-WESTPHALIA – A SURVEY TO  
DETERMINE THE POLITICAL COMMITMENT OF MUNICIPALITIES TOWARDS  
STIPULATED MEASURES

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By

Daniela Kreische

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I hereby declare that the master thesis submitted was in all parts exclusively prepared on my own, and that other resources or other means (including electronic media and online sources), than those explicitly referred to, have not been utilised.

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Daniela Kreische

2018



## **Abstract**

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Thesis supervised by Prof. em. Dr. Jürgen Friedrichs

The main objective of the Water Framework Directive is to achieve ‘good ecological status’ for all European water bodies by 2027. In North Rhine-Westphalia (NRW) the implementation of river restoration measures is progressing too slowly. The deadline will not be met if the current speed is maintained. Public acceptance of river restoration work is generally high. To determine whether it’s a lack of political will towards river restoration that is holding up the progress, a survey was conducted among local governments in NRW. The data presented here provides substantial evidence that municipal administrations in NRW are very committed towards implementing restoration measures. The financial situation of a municipality has a smaller influence on the commitment than expected. Allocating the task of river restoration to water and soil associations was found to have the greatest potential for stifling progress. Likely reasons for this as well as remedial measures are discussed briefly.

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## List of Abbreviations

<b>ANOVA</b>	Analysis of Variance
<b>AWB</b>	Artificial Water Bodies
<b>BUND</b>	German Federation for the Environment and Nature Conservation (in German: <i>Bund für Umwelt und Naturschutz Deutschland</i> )
<b>CIS</b>	Common Implementation Strategy
<b>e.g.</b>	exempli gratia, Latin for „for example”
<b>et al.</b>	et alii (Maskulinum), et aliae (Femininum), et alia (Neutrum), Latin for “and others”
<b>etc.</b>	et cetera, Latin for “and so on”
<b>EU</b>	European Union
<b>HMWB</b>	Heavily Modified Water Bodies
<b>ID</b>	Identification
<b>i.e.</b>	id est, Latin for „that is“
<b>inter alia</b>	Latin for “among other things”
<b>km/ km<sup>2</sup></b>	Kilometres/square kilometres
<b>LANUV</b>	The State Agency for Nature, Environment and Consumer Protection (in German: <i>Landesamt für Natur, Umwelt und Verbraucherschutz Nordrhein-Westfalen</i> )
<b>LAWA</b>	Federal/state working group with respect to water (in German: <i>Bund/Länder-Arbeitsgemeinschaft Wasser</i> )
<b>LNU</b>	No official English translation (in German: <i>Landesgemeinschaft Naturschutz und Umwelt e.V.</i> )
<b>LWG NRW</b>	Law on Water for North Rhine-Westphalia (in German: <i>Landeswassergesetz Nordrhein-Westfalen</i> )
<b>MIK</b>	Ministry of Internal and Local Affairs NRW (in German: <i>Ministerium für Inneres und Kommunales NRW</i> )
<b>MKULNV NRW</b>	The Ministry for Climate Protection, Environment, Agriculture, Conservation and Consumer Protection of the State of North Rhine-Westphalia (in German: <i>Ministerium für Klimaschutz, Umwelt, Landwirtschaft, Natur- und Verbraucherschutz des Landes Nordrhein-Westfalen</i> )
<b>MULNV NRW</b>	The Ministry for Environment, Agriculture, Conservation and Consumer Protection of the State of North Rhine-Westphalia (in German: <i>Ministerium für Umwelt, Landwirtschaft, Natur- und Verbraucherschutz des Landes Nordrhein-Westfalen</i> )
<b>NABU</b>	Nature and Biodiversity Conservation Union (in German: <i>Naturschutzbund Deutschland e. V.</i> )
<b>n. d.</b>	not dated
<b>NRW</b>	North Rhine-Westphalia
<b>SBS</b>	Subject to Budgetary Supervision
<b>WFD</b>	Water Framework Directive

# **1 Introduction**

## **1.1 The EU Water Framework Directive**

### **1.1.1 General Information**

On 22<sup>nd</sup> December 2000, the European Water Framework Directive (Directive 2000/60/EC) came into force. It bundles all water guidelines of the European Community that had existed prior to this guideline. The fundamental aim of the EU Water Framework Directive (short EU WFD) is to ensure that all natural surface and groundwater water bodies show a ‘good status’ by 2015 - at the latest by 2027. Once achieved, the good state must to be preserved for future generations and the resource water must be managed sustainably (European Commission 2016a).

Article 4 of the directive describes the ‘good status’. For surface waters, the ‘good status’ results from the ecological as well as the chemical condition of a body of water and is assessed according to the following criteria:

- Biological quality such as fish fauna, benthic invertebrates and aquatic flora: macrophytes, phytobenthos, phytoplankton
- Hydro-morphological quality such as river bank structure, river continuity or substrate of the river bed
- Physical-chemical quality such as temperature, oxygenation, pH-value and nutrient conditions
- Chemical quality, referring to environmental quality standards for river basin specific pollutants

The basic objective for groundwater bodies is a good chemical and quantitative state.

Under certain circumstances, deviations from the goals will be possible. Heavily modified or artificial water bodies (HMWB or AWB) need only achieve the ‘good ecological potential’ instead of the ‘good ecological status’. This is the best state such water bodies can reach without significant restrictions to their use. Good ecological potential and good chemical status are the environmental objectives for heavily modified and artificial water bodies.

The status for both, surface and groundwater is determined according to the principle "one out all out", i.e. the worst individual evaluation determines the classification of the overall condition.

One important aspect of the Water Framework Directive is the introduction of River Basin Districts. These areas have been designated, not according to administrative or political boundaries, but rather according to the river basin (the spatial catchment area of the river) as a natural geographical and hydrological unit. As rivers often cross national borders, representatives from several Member States have to cooperate and work together for the management of the basin (European Commission 2016b).

In order to achieve the objectives of the WFD, Member States periodically set up nationally and internationally coordinated river basin management plans and programmes of measures. Management plans provide information about the current state of the water bodies as well as the existing pressures and deficits. Further, they lay out the environmental objectives and evaluate how those can be achieved. Programmes of measures should include an itinerary of measures that are to be taken by 2012 in order to reach the environmental targets of the WFD by 2015, in justified cases, i.e. in the case of HMWB or AWB, by 2027 at the latest. Extensions should not be common place though; rather they should be exceptions. River basin management plans and programmes of measures are updated on a six-year cycle and were available for the first time at the end of 2009 (European Commission 2016b).

Water - and a sustainable use of this resource - concerns everybody. This is why the WFD promotes public participation at all stages of the planning and implementation process (European Commission 2016b).

For a good standardisation, a 'Common Implementation Strategy' (CIS) has been developed at European level. National experts from all member states develop guidelines to support the implementation. For Germany, the national government in coordination with the 'National/Federal working group with respect to water' (*Bund/Länder-Arbeitsgemeinschaft Wasser*, short LAWA) represent the German position in the CIS process (MKULNV NRW 2015).

LAWA is basically a central committee which coordinates and defines the implementation processes in Germany. Aim is to harmonise the approaches of the 16 federal states. LAWA has developed numerous methodologies and has written various instructions and text blocks for consideration and use by the federal states e.g. for the updating of river basin management plans and the programmes of measures (MKULNV NRW 2015).

The Water Framework Directive and its subsidiary directives have been adopted at national level by the Water Resources Act (*Wasserhaushaltsgesetz*), the Groundwater Ordinance

(*Grundwasserverordnung*) and the Surface Waters Ordinance (*Oberflächengewässer-  
verordnung*).

## **1.1.2 Implementation in North Rhine-Westphalia**

### **1.1.2.1 Incorporation into Federal Law**

In North Rhine-Westphalia (short NRW), the Water Framework Directive was incorporated into federal legislation by the amendment of the Law on Water NRW (*Landeswassergesetz NRW*, short LWG NRW).

### **1.1.2.2 Organisation and Responsible Authorities**

Currently in its second cycle (2016 - 2021), the implementation process in NRW is in full swing. The second river basin management plan and the associated programme of measures have been available since the end of 2015. The results of the second inventory<sup>1</sup> (*Bestandsaufnahme*), which was completed in 2013, were used to derive important management issues and decisions on the measures to be taken; they constituted the basis on which the river management plan and the programme of measures were revised on. In order to enable public participation, the draft of the second river basin management plan – just like the first one - was presented to the public in 2014, and the document then revised on the basis of the comments. At the end of 2018, the first half of the current cycle will be over. For this, a second interim report (*Zwischenbericht*) is currently under preparation (as of February 2018). The interim data will be collated and processed nationwide, then sent to the EU commission.

North Rhine-Westphalia has a water network of more than 50,000 km in length and around 5,100, mostly very small, lakes. The objectives of the Directive apply to all waters. In the river basin management plan, all streams and rivers with a catchment area of more than 10 km<sup>2</sup> (totalling 14,136 km) and the 49 larger lakes and reservoirs with a surface of more than 50 hectare are considered (MKULNV NRW 2015). For these water bodies, reporting is mandatory; they are ‘subject to reporting’ (*berichtspflichtig*).

North Rhine-Westphalia has shares in the international river basins Rhine, Ems and Maas as well as the national river basin Weser. At this level, the coordination with other federal states of Germany and/or other European Member States takes place, as well as reporting to the EU Commission.

The Ministry for Environment, Agriculture, Conservation and Consumer Protection of the

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<sup>1</sup> giving an analysis of the river basin’s characteristics, a review of the environmental impact of human activity on the status of surface waters and on groundwater and an economic analysis of water use

State of North Rhine-Westphalia<sup>2</sup> (short MULNV NRW) with seat in Düsseldorf is the highest water authority (*Oberste Wasserbehörde*) in NRW, and leads the implementation of the Water Framework Directive. The MULNV is responsible for drawing up the programme of measures as well as the river basin management plan, and is thus accountable for all management decisions, such as defining the management objectives. The MULNV also organises public participation at state level. The State Agency for Nature, Environment and Consumer Protection (short LANUV) assumes the strategic and technical support during the implementation and helps with the drafting of the river basin management plan (MKULNV NRW 2015).

For the management planning, the land area of North Rhine-Westphalia was divided into 14 sub-basins. Each sub-basin is coordinated by an office located in one of the five regional governments (*Bezirksregierungen*): Arnsberg, Detmold, Düsseldorf, Köln and Münster. As upper water authorities (*Obere Wasserbehörden*), the regional governments are responsible for all administrative decisions on water bodies that fall under the designation of ‘primary water bodies’ (*Erste Ordnung*) i.e. Lippe, Ruhr, Sieg and Ems and ‘secondary water bodies’ (*Zweite Ordnung*) e.g. Agger, Emscher, Erft and Wupper<sup>3</sup>. Further, the regional governments are responsible for public participation at the regional level which they see to *inter alia* by organising round tables. They also contribute in the preparation of the management plan. On primary water bodies<sup>4</sup>, the regional governments conduct maintenance and regulatory work, and along with that, measures of rehabilitation and restoration (MKULNV NRW 2015).

At the level of the 54 districts and independent cities (*Kreise und kreisfreie Städte*), the lower water authorities (*Unteren Wasserbehörden*) are responsible for all administrative decisions that concern water bodies not belonging to the primary or secondary water bodies; the so-called ‘other water bodies’ (*Sonstige Gewässer*). At their reasonable discretion they undertake measures that are necessary to achieve the management objectives; this can be, for example, monitoring, causal research, planning, coordination, and the ordering and authorisation of measures (MKULNV NRW 2015).

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<sup>2</sup> Please note: Prior to summer 2017, The Ministry for Environment, Agriculture, Conservation and Consumer Protection of the State of North Rhine-Westphalia (MULNV NRW) was known as The Ministry for Climate Protection, Environment, Agriculture, Conservation and Consumer Protection of the State of North Rhine-Westphalia (MKULNV NRW) – the ‘climate protection’ was omitted in summer 2017 by the new NRW government

<sup>3</sup> as defined by Article 2 of the Law on Waters NRW; note: on federal waterways, the regional governments are responsible only where the Federal Waterways and Shipping Administration is not responsible

<sup>4</sup> with the exceptions of those federal waterways that fall under the jurisdiction of the Federal Waterways and Shipping Administration

In North Rhine-Westphalia, the implementation of the river basin management plan takes place at the level of so-called planning units (*Planungseinheiten*), continuous subsections of a catchment area. In total, there are currently 80 planning units. Planning unit profiles (*Planungseinheiten-Steckbriefe*) contain evaluation results (reviewing the current state), as well as programme measures for individual water bodies or groups of water bodies (MKULNV NRW 2015). As a rule, a programme measure only describes the general necessities of action, for example ‘HYOW U 17’ would mean ‘Measures to improve the habitat in the water body by alterations to the course, banks and/or sole including accompanying measures’.

The programme measures have been concretised in so-called implementation timetables (*Umsetzungsfahrplänen*) and wastewater disposal concepts. These documents contain individual measures with location reference and time frame i.e. what exactly is planned for each individual water body. The preparation and updating of these documents – always with public participation - is the task of those responsible (*Maßnahmenträger*) e.g. municipality or water association, whereby it is a matter of regional agreement who participates in the cooperative development of these plans. The so-called regional collaborations (*regionale Kooperationen*) that were formed for the drawing up of the implementation timetables principally cover the geographical areas of the respective planning units but there are a few more of them than there is planning units (MKULNV NRW 2015).

### **1.1.2.3 Progress of Implementation**

Of all the 15,062 programme measures set out in the 2009 programme of measures, only a very small proportion was completed by the time of the first interim report in 2012, i.e. around 5%. This was mainly owned to the fact that too few individual measures had been implemented. A small percentage of the measures (almost 2%) were under construction, but by far the largest proportion (around 70%) was in the planning stage. It was anticipated, though, that most of those measures in planning would not be completed by 2015 (MKULNV NRW 2012).

The most important pressures on NRW’s water bodies and thus core issues of water management are:

- Nutrient and pesticide inputs from agriculture
- Entries of certain (chemical) pollutants into water bodies
- Poor river structures (lack of hydro-morphological features) and a lack of continuity,

being the main reasons for poor ecological status

To reduce the nutrient and pesticide inputs from agriculture, a comprehensive consulting project was established by the NRW Chamber of Agriculture (*Landwirtschaftskammer NRW*), which in 2012 already reached a large number of farmers, who mostly responded positively to the offer and sought the advice (MKULNV NRW 2012). However, the results of the 2013 inventory showed no trend reversal in the pollution of groundwater with nitrate and pesticides, proving that the measures stipulated in the first implementation cycle were neither effective nor sufficient enough to achieve any improvements. As this was found nationwide, the German government planned to amend the Fertilizer Ordinance (*Düngerordnung*) to bring it more in line with the requirements of sustainable water protection (MKULNV NRW 2015).

The construction or upgrading of waste water treatment plants (mixed and rainwater) was anticipated to make a major contribution on reducing the pollution of surface waters but again, only few, about 13%, of the programme measures in this sector were implemented by 2012 (MKULNV NRW 2012).

The largest part of the programme measures is taken up by those that aim to improve the structure of rivers and streams. In the progress of industrialisation and land consolidation, rivers and streams were straightened and regulated; dams were built for drinking water, and storage depots for industrial wastewater were constructed. Watercourses that had been altered over decades in such ways could no longer - or only to a significantly reduced extent - fulfil their natural functions. In the coming years, NRW's watercourses will have to be ecologically rehabilitated; they will have to be "restored" (see also the following section: '*River Restoration in NRW*'). Around 100,000 individual measures have been developed for this purpose - with intensive public participation – and set out in the implementation timetables (MKULNV NRW 2015). By 2012, only about 1% of the programme measures aiming to improve hydro-morphology had been fully implemented, indicating the need for speeding up the implementation process (MKULNV NRW 2012).

By the time of the last inventory in 2013, only 6% of the examined 13,750 kilometres of watercourses in NRW showed an intact ecosystem. 94% were in a moderate to poor ecological status (MULNV NRW 2015). Considering that it is the plan to get 40% of NRW's water bodies in a good ecological status by 2027 (MULNV NRW 2015), the implementation progress is far too slow. For all measures for which no extension of the deadline has been specified in the management plan and which are not implemented within the deadline, a

justification must be given. An evaluation of the reasons showed that financial and personnel bottlenecks lead to delays on the part of the authorities and those responsible for implementation. However, with respect to hydro-morphological measures, the reasons for the delays were also: insufficient availability of riparian land and a general lack of acceptance. In order to increase the speed of implementation, assistance, e.g. with the planning of measures and with grant application etc., will be necessary beyond the financial support. Increasing the acceptance and willingness to support measures, e.g. the willingness to give riparian land to restoration projects, must be accompanied by an intensification of public-relations work (MKULNV NRW 2012).

## **1.2 River Restoration in NRW**

### **1.2.1 General Information**

Europe's watercourses shall be clean and full of life. This is what the EU Water Framework Directive calls for (see above in section '*The EU Water Framework Directive*'). With the construction of many sewage treatment plants in the 1970s, the water quality of North Rhine-Westphalia's water bodies has improved significantly. Clean water alone is not enough to sustain life though.

Water bodies as we know them today have been shaped by human hands. We have modified them over time according to our needs and destroyed natural habitat in the process. Rivers were developed into straight and fast transit routes or dammed to serve as drinking water reservoirs. In some places, weirs were built in order to regulate water levels or to produce energy. In other places, rivers were squeezed into tight beds to gain land for agriculture. To protect developed areas from flooding, rivers were straightened and dykes were built. As a result of all these alterations, river channels today lack varied hydro-morphological features, but it is these that are so important to sustain diverse aquatic and riparian communities.

That is why, it is now one of the objectives of the water management sector in the NRW to protect natural river reaches and to return human-impacted rivers to more natural conditions. The over-riding aim of such river restoration projects is to re-engineer rivers, to improve their ecological value and biodiversity, while maintaining their flow-carrying capacity and enhancing public appeal.

Watercourse rehabilitation and restoration measures come in many shapes and sizes: planting vegetation along river banks, for example, is a kind of watercourse rehabilitation, or installing

deadwood in the river bed, removing fixations, dismantling weirs and installing fish ladders. Watercourse rehabilitation measures also include the re-connection of oxbow lakes and floodplains. It is important to note that the river engineering and construction work is only the beginning; the ultimate goal is to end up with a river that will evolve over time (MULNV NRW n.d.a.).

Riparian strips give a river space to develop and evolve. They create a gap between agricultural area and water. Rainfall can flush sediment - contaminated with fertilizer or pesticides - into the water. Shore strips reduce these entries. These strips are sometimes planted with native bush and tree species, or they may be left bare so that natural vegetation succession can take place. Either way, vegetation will provide shading (Blaue Richtlinie 2010).

A fairly inexpensive measure is the introduction of deadwood. Running waters are dynamic habitats in which natural processes of landing and ablation occur. If one influences the hydrodynamics of impaired water bodies deliberately by inputting deadwood, machine use can largely be dispensed with; an inherently dynamic development can occur. Trees are felled so that they fall into the water. Over time they retain driftwood and foliage. This leads to erosion in some places and deposition of sediment in other places. The riverbed is raised. Straightened waters slowly take a meandering course again (Blaue Richtlinie 2010).

If a river is left to its own devices and river maintenance is reduced, these natural processes will eventually occur of their own volition. Therefore, passivity is also a kind of watercourse rehabilitation. Of course, this will only work where no permanent structures have been put into the river.

Often, however, a much greater input - both financially and technically - will be required. Until the 1970s, the banks of many lowland rivers were fortified e.g. with riprap. The river was forced into a trapezoidal profile, with the same structures along the banks, equal depths and equal width. Elsewhere, dikes and embankments were built to prevent the surrounding areas from flooding. In order to restore such river sections to their full ecological potential, one needs the surrounding areas, i.e. the floodplains. Riparian land is thus acquired or otherwise made available e.g. via compensation payments. The riprap or dikes can be removed, and the river gets the chance to follow its natural dynamics as a lowland river with numerous meanders. Sometimes, islands, shallow water zones, scarp faces, pools and bays are created in addition to the removals. This will increase channel and hydraulic complexity and provide suitable habitat for a large variety of aquatic organisms - and all in a relatively small

space. The re-connection of the floodplains has three direct consequences: On the one hand, floodplains provide habitat for many species. On the other hand, at high watermark the water simply has more room to disperse, which undoubtedly is very positive in view of climate change. Lastly, floodplains have a natural filtering capacity, which improves the self-cleaning power of the river.

Some fish species and many other aquatic organisms migrate at different seasons - either to reach suitable spawning or feeding grounds or to find places to overwinter. Transverse structures like weirs delay or prevent the upstream and downstream migration of river organisms. This can cause a shift in fish populations and may even lead to the extinction of individual species. On top of that, such barriers affect the natural transport of sediment, which is the essential basis for the hydro-morphological evolution of the rivers bed and shore. In places where weirs are no longer needed, they can be removed. Where this is not possible, an artificial flow around the weir - a fish ladder - can be installed. The fish recognise these by the current and can take this alternative route (Blaue Richtlinie 2010).

In places where river banks are heavily developed, rehabilitation measures will be restricted to the river bed. To improve the flow dynamics and naturalness of a city river, gravel bars can be constructed. This brings more oxygen into the river and promotes the reintroduction of fish such as eel or salmon (see Photo 1).

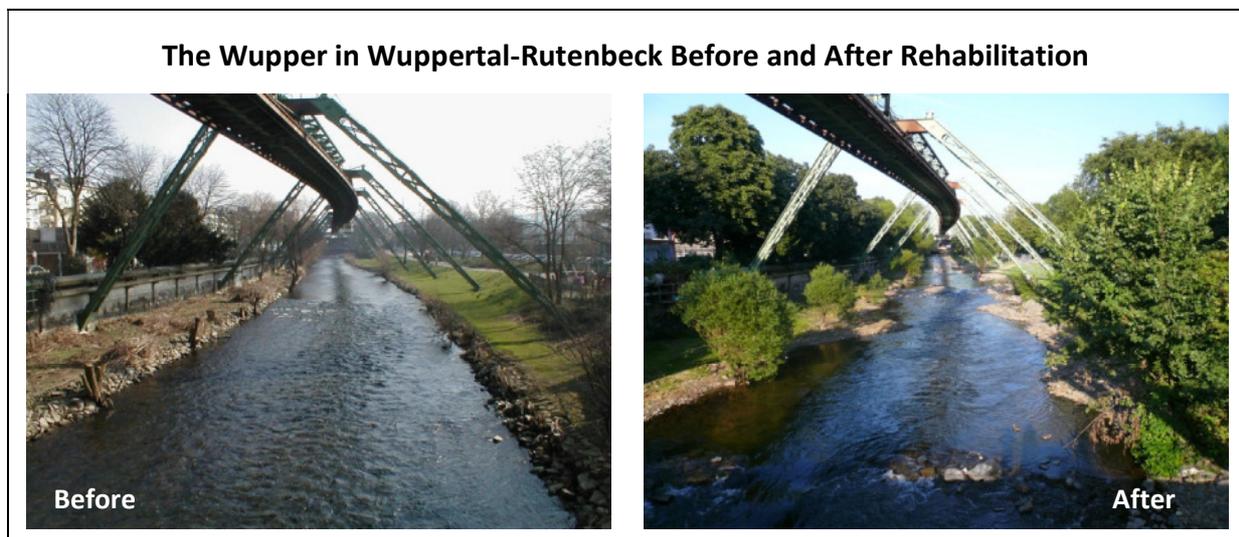


Photo 1: The ecological rehabilitation of the River Wupper in Wuppertal often involves the construction of gravel bars. With kind permission of *Ingenieurbüro Reinhard Beck*, Wuppertal.

Natural streams and rivers exhibit typical morphological features or structures. These are determined by conditions such as the climate, the valley's shape and the geological

substratum. For instance, the riverbed may be sandy or gravelly, the course of the river may be curved, meandering or branching, the banks steep or shallow. On top of this, man-made alterations such as straightening, canalisation, damming, bank reinforcement etc. will also influence the appearance of a river (MULNV NRW 2018a).

All of these aspects together make up the river structure (*Gewässerstruktur*). The river structure is assessed section by section. All individual structures of a section will be determined and compared with the structures that the river would have without human modifications, the so-called 'structural ideal' (*Leitbild*). Therefore, the river structure is basically a measure of deviation from the original state. For the grading, a seven-level scale is used. The best grade (Grade 1 - unaltered) exhibits all the structures of the 'structural ideal'. The description of the 'structural ideal' is based on the morphological river type. The north of NRW, for instance, is dominated by rivers of Type 14: Sand-dominated Lowland River. But even in heavily modified water bodies there may still be aquatic life. Only by comparison with the components that indicate the biological quality of a river (e.g. composition and abundance of benthic invertebrate fauna, fish fauna and aquatic flora) it can be decided whether rehabilitation measures are necessary to achieve an improvement of the ecological status in accordance with the EU WFD (LANUV 2018).

All individual hydro-morphological measures that are necessary to get a water body into a good ecological status are laid down in the implementation timetable. When these measures were drawn up, two important concepts were taken into account: the concepts of 'radiance effect' (*Strahlwirkung*) and 'stepping stone' (*Trittstein*).

The starting point of the 'radiance effect' is a (near)-natural section of river, the so-called 'radiance origin' (*Strahlursprung*), exhibiting a stable, species-rich and abundant aquatic community; hence being itself in a very good or good condition. The 'radiance origin' must have a certain length - or this length must be accounted for in the planning of measures - so that it can produce the necessary 'surplus' of organisms. The 'radiance distance' (*Strahlweg*) is the stretch of river into which the organisms of the 'radiance origin' can enter; either actively or passively. Colonisation is usually not possible here, but it allows the functional exchange between neighbouring 'radiance origins'. 'Stepping stones' are small, structurally rich sections of river that provide a variety of good habitats. They can be colonised at least partially and thus extend the 'radiance distance'. Via selective structural improvements to water bodies in the sense of these concepts, it is possible to enhance the ecology of an entire catchment area

(MULNV NRW 2018b). Such targeted measures also help to minimise the use of resources and the need for agricultural land.

Watercourse rehabilitation has many positive effects. Improving the river structure not only promotes the colonisation with aquatic organisms. It also helps to reduce the damaging effects of floods, as rising rivers have room to expand on the floodplains. But near-natural streams and rivers not only have ecological benefits, they also have economic, social and cultural values. In the public's eye, the recreational value of rivers has increased. Townspeople increasingly seek the experience of nature on their own doorstep and not only in far-away countries (see Photo 2).



Photo 2: This restored section of the River Bega in Lemgo demonstrates beautifully the benefits of river restoration: ecological improvement, flood protection and scenic enhancement. People love to have access to "their" river. Source: Bezirksregierung Detmold, 2017, Broschüre "Gewässerentwicklung mit Mehrwert", <https://www.flussgebiete.nrw.de/gewaesserentwicklung-mit-mehrwert-7600>

### 1.2.2 Allocation of Responsibilities

According to article 62 of the Law on Water for North Rhine-Westphalia (*Landeswassergesetz NRW*, short LWG NRW), it is the 396 municipalities of NRW who are chiefly responsible for river maintenance on secondary and other water bodies. River maintenance is defined by article 61 of the same law as the clearance and cleansing of the river bed and the river banks. Further, Article 62 stipulates who the municipalities may transfer this obligation to. This may be the municipality's district administration (*Kreisverwaltung*), a water association (*Wasserverband*) or some other institution under public law (*Anstalt des öffentlichen Rechts*). According to article 63 of the LWG NRW, third parties, including organisations other than public law institutions e.g. commercial enterprises

or municipal subsidiaries may also assume the river maintenance in a municipality. The LWG NRW stipulates further, under Article 68, that entities responsible for river maintenance are also responsible for river regulation/development (*Gewässerausbau*) which also encompasses measures of rehabilitation and restoration.

In North Rhine-Westphalia there are two types of water associations: 1) water associations with special legal status (*Sondergesetzliche Wasserverbände*), and 2) water and soil associations (*Wasser- und Bodenverbände*); both public institutions.

With regard to water resource management, water associations with special legal status assume state responsibilities such as the operation of reservoirs, the treatment of waste water from private and commercial sources, flood control, irrigation and land drainage as well as maintenance, regulation and rehabilitation of water bodies. The members of such associations are municipalities, district administrations, commercial enterprises, i.e. industries that use water and discharge wastewater, as well as providers of drinking water. They pay membership fees. The tasks and duties of these associations are defined in the respective Articles of Association (*Verbandssatzung*). They are legally supervised by the Environmental Ministry of NRW (MULNV NRW n. d. **b.**).

Similar to the water associations with special legal status, the water and soil associations, too, perform water and land management work in the interest of the public and for the benefit of their members. Under the National Waterworks Act (*Gesetz über Wasser- und Bodenverbände des Bundes*), they are assigned a wide variety of duties in North Rhine-Westphalia. Dyke associations, for instance, see to the protection of life and property from flooding. Other associations address issues such as maintenance and regulation of water bodies, supply of drinking water, wastewater treatment, or the irrigation and drainage of fields. They fulfil their tasks in functional self-government and under voluntary leadership. Depending on the location of the association's headquarters, the regional governments or the district administration exercise direct supervision over the association. The highest level of supervision lies with the Environmental Ministry of NRW (MULNV NRW n. d. **b.**). Members of water and soil associations are generally all those who benefit from the activities of the association and therefore contribute to its costs, primarily farmers and landowners who operate in the association's operational area. Municipalities, who have transferred one or more of their responsibilities (e.g. river maintenance/regulation) to one or more water and soil association will be their members too, and pay contribution fees. Which specific tasks the water and soil associations undertake in the context of river maintenance/regulation is set out

in the respective Articles of Association.

### 1.2.3 Funding of Measures

According to Article 72 of the LWG NRW, the state of North Rhine-Westphalia grants subsidies for rehabilitation/restoration measures that serve the general good i.e. where a cause-based allocation of the anthropogenic pressures and alterations on water bodies – which was partly done centuries ago – is not possible. As measures are generally very expensive, those responsible cannot carry the costs alone. As already mentioned, municipalities, small water and soil associations and - in some parts of the state - water associations with special legal status are responsible for watercourse rehabilitation/restoration. Their expenditures (including those for land purchase and/or compensation payments for the use of land, hydraulic engineering and construction work, after care and monitoring) can be refunded by up to 80%; municipalities under budget supervision (*in Haushaltssicherung*) may receive up to 90% funding. Measures are generally funded on the basis of the funding guidelines for measures of the "Action programme for the rehabilitation of secondary water bodies in North Rhine-Westphalia" (2002)<sup>5</sup> or the "Guidelines on the granting of benefits for hydraulic engineering measures including dams" (2009)<sup>6</sup> (MKULNV NRW 2015). For the period 2010 to 2027, the state of North Rhine-Westphalia plans to invest more than 2 billion Euros in watercourse rehabilitation. The state's own share will be approximately 70%, i.e. 1.5 billion Euros (MULNV NRW n. d. a.). The funds for the implementation of the EU-WFD are taken from the revenues of the water abstraction levy (*Wasserentnahmeentgelt*) which the state has been charging for the abstraction of water from all water bodies (ground and surface) since 2004 (LANUV n. d.).

### 1.2.4 Public Acceptance

A number of publications from western European countries have shown that wherever people are asked, they perceive the changes of river restoration to rivers and their floodplains as positive. Moreover, it has become apparent that people's expectations of river restoration, e.g. for enhancing scenic beauty, for promoting biodiversity and for alleviating flood risk, are almost congruent with the goals of the Water Framework Directive. Tunstall et al. (2000) assessed public attitudes to restoration works on three rivers in England using questionnaires and in-depth interviews with local residents and restoration-scheme managers after the

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<sup>5</sup> In German: „Aktionsprogramm zur naturnahen Entwicklung der Gewässer zweiter Ordnung in Nordrhein-Westfalen“ (2002)

<sup>6</sup> In German: Richtlinien über die Gewährung von Zuwendungen für Maßnahmen des Wasserbaus einschließlich Talsperren (2009)

restorations had been conducted. They found that the restored rivers were well used and highly valued by the local public. At all three sites, the residents approved of the restoration work, and at two sites they considered that the schemes offered 'value for money'. Junker and Buchecker (2008) conducted a representative Switzerland-wide survey to assess people's perceptions of the visual attractiveness of restoration scenarios. They used photographic simulations that showed different scenarios of river restoration and related the reported preferences to experts' assessments of the ecological integrity of these scenarios. The public's aesthetic preferences related more positively to eco-morphological quality than the authors had expected and were primarily influenced by perceived naturalness. Even slightly improved eco-morphological quality was rated higher aesthetically. So the authors concluded that the aesthetic outcomes of even small efforts to restore rivers are viewed positively by the public. In the Netherlands, Buijs (2009) conducted a comprehensive study of public attitudes towards river restoration in three floodplains, both before and after river restoration. The study combined quantitative questionnaires with open interviews. Local residents were found to be generally supportive of river restoration projects. The authors came to the conclusion that - although restoration may diminish feelings of attachment to an area - for most people this negative effect will be compensated by the positive effects on scenic beauty and perceived protection from flooding. In Germany, publications on public support for river restoration are rather underrepresented. Only in recent years has this topic been given attention. Surveys from across the country have shown that - more often than not - local residents approve of river restoration. Restored rivers and streams are gratefully accepted and used for a multitude of recreational activities e.g. cycling, walking and jogging along river banks; enjoying nature, bathing, picnicking and fishing. As seen in other studies, ecological aspects play a surprisingly strong role for people and the willingness to contribute financially to restoration projects is principally high (Haase et al.; Frör; Lindow: all unpublished). In NRW the local attitude towards the ecological improvement of the Emscher River's mouth was also overall positive (Heldt et al. 2016).

It is highly important to understand that public perception of, and acceptance for river restoration is not a stable property and that it will vary with time and place. Spatial heterogeneity in public support has been found by various authors. Schläpfer and Witzig (2006), Vermaat et al. (2016) and Tunstall et al. (2000) found pronounced rural-urban differences in the support of river restoration. In all three surveys, landscape appreciation and support from the public increased with increasing population density. In contrast, river

restoration in rural areas may face a certain kind of resistance. In Buijs' (2009) survey, people arguing against river restoration challenged safety arguments and highlighted potential threats to sense of place and to agriculture. Another important aspect that needs to be kept in mind is that acceptance levels can and will change over time. A high level of acceptance among the general public must not be taken for granted and continuous work will be required to keep acceptance levels up. Thus, public information, consultation and involvement will remain paramount.

### **1.3 Municipalities in NRW**

#### **1.3.1 General Information**

The state of North Rhine-Westphalia consists of a total of 396 politically independent municipalities, 23 of these are independent cities. The remaining 373 municipalities belong to 31 administrative districts and are distinguished as follows: major district-affiliated town, medium-sized district-affiliated town, district-affiliated town and district-affiliated parish (Information und Technik Nordrhein-Westfalen, 2013). The functional designations give an indication of the population size of the municipality but also describe the municipality's legal status. The independent cities, for example, constitute a district in their own right. They have to conduct all administrative tasks by using their own personnel. The designations to major and medium-sized district-affiliated towns not only indicate a large or medium-sized population, respectively, but also obligate these towns by law to take on some additional tasks. Smaller and less powerful municipalities have not been assigned such additional tasks and here their district administration remains responsible (MIK NRW n. d. a.).

Based on their geographical location, the municipalities of NRW are assigned to one of five regional governments: Arnsberg, Detmold, Düsseldorf, Köln and Münster. The regional governments do not pass any legislation. Within the federal state authority, they act as a mid-level agency, concerned mostly with administrative decisions on a regional level for the affiliated districts and municipalities (MIK NRW n. d. b.).

#### **1.3.2 Financing of River Restoration Measures**

Depending on the direction the municipality has decided to take, the financing of rehabilitation projects will shape accordingly. Municipalities, who have taken watercourse rehabilitation into their own hands, have to ensure that sufficient personnel are available. In addition, they have to finance 20% of the costs of projects themselves. For many municipalities – especially those with financial difficulties - even 20% of the costs of projects

will be difficult to budget for. The state has therefore decided to support municipalities who are subject to budgetary supervision by refunding up to 90% of the costs. Additionally, these municipalities can request an extension of the implementation deadlines up to the year 2027. In this way they can spread the costs over a longer period of time (MKULNV NRW 2015).

Municipalities, who are unable to manage a balanced budget and get into debt, will become ‘subject to budgetary supervision’ (*unterliegen der Haushaltssicherung*). These municipalities are obliged by law to draw up a budget management plan that states exactly how the budgetary deficit is to be reduced in the coming financial years (MIK NRW n. d. c.). With the Consolidation Pact 2011 (*Stärkungspaktgesetz 2011*) a lump sum of EUR 5.76 billion has been made available to help such indebted municipalities in North Rhine-Westphalia (MIK NRW n. d. d.). Since 2012, municipalities who are obliged to draw up a budget management plan as well as municipalities participating in the Consolidation Pact (*Stärkungspakt*) are recorded as ‘municipalities under budgetary supervision’ (MIK NRW n. d. e.). Originally intended as an exception, budgetary supervision has become common place in North Rhine-Westphalia. In 2014, more than one third of all municipalities were in this financial situation (Städte- und Gemeindebund NRW 2014).

One of the ways in which municipalities can co-finance rehabilitation projects is via eco-compensation (*Ökologische Ausgleichszahlungen*) in accordance with the interference-compensation scheme (*Eingriffs-Ausgleichs-Regelung*) of the Federal Nature Conservation Act (*Bundesnaturschutzgesetz*). The basic concept behind this scheme is that of “non-deterioration” (*Verschlechterungsverbot*) for nature and landscape. Unavoidable interventions, e.g. building developments, should be compensated by measures of nature conservation (Bundesamt für Naturschutz 2017). An investor or developer intending to build on green field sites will be bound to pay a specific sum of money, which the municipality in turn is obliged to invest in measures of ecological enhancement.

If a municipality has decided to hand over the rehabilitation of river reaches to someone else, it will not be exempted from costs. Districts and water associations will be refunded up to 80% of the cost of measures too, but they will pass on the remaining costs to their members (in line with Article 69 LWG NRW). What kind of work exactly the association will perform and what financial contribution it demands from its members is laid down in the Articles of Association, which are usually passed once a year (personal communication with the head of an environmental service company).

### 1.3.3 Position and Power of the Mayor

Mayor and council (*Rat*) are the two most important constituents in a local autonomy (*Kommunale Selbstverwaltung*); they share the powers of shaping a community. The municipal code (*Gemeindeordnung*) for the state of North Rhine-Westphalia provides the framework of local self-government and sets the rules for mayor, council and citizens. Both, mayor and council are elected directly by the citizens living in the municipality. All mayors in North Rhine-Westphalia work full-time. The members of the council on the other hand work in an honorary capacity.

In North Rhine-Westphalia, a mayor is in a particularly influential position, as he is not only head of the local administration (*Stadtverwaltung*), but also chair of the council and thus supreme political representative (dual capacity). With that, he is not only responsible for the execution of the council's decisions which he sees to with the help of his administration; but can also significantly influence the political decisions of the council. Council members are legally not bound by instructions, orders or programmes in their activity; they are subject *only* to their conscience. Council decisions are determined by vote. This usually requires a simple majority (Gehne 2014).

As chairman of the council, the mayor sees to – *inter alia* – the following tasks: drawing up of the session's agenda, compiling the documents that provide the council members with appropriate information; and conducting the meeting. These duties are usually carried out by the mayor in a neutral and apolitical way, but some tasks open up opportunities for him or her of influencing the council's work by acting or omitting. Whilst drafting the agenda, for example, the mayor may put those items that he or she would like to see decided on the list (action) and topics that he considers not ready for decision are dropped from the agenda (omission). In addition, as a session leader, he can also - to a certain extent - steer the debates of the council (Gehne 2014). The members of a council are ordinary people who devote their spare time to being in the service of the community. They frequently don't have enough time to prepare themselves for the numerous and often complex issues that arise in council meetings. A thorough preparation of a particular topic by the mayor and his administration and an informative and passionate presentation of the topic can thus help in winning the council over. Depending on how a mayor uses the opportunities for action which open up to him/her, the role of the council's chairman may lead to an increase in power (Gehne 2014).

Being a member as well as chair of the council, the mayor has the right to vote. If there is a draw in the votes of the council members, then the vote of the mayor will be the decisive one.

The execution of the council's decisions includes distribution and supervision of the ongoing tasks, but the mayor may reserve certain items to himself and handle individual matters single-handedly (Gehne 2014).

Since all budgetary decisions of a municipality – thus also those concerning financial investments for river rehabilitation – must be decided in the council, it is not least dependent on the commitment of the mayor, whether a project receives approval and gets the go-ahead. So, to have a mayor who is personally convinced of a certain idea e.g. vibrant rivers, will be a huge advantage, because he can – via a neat presentation of the topic as well as in face-to-face discussions with individual council members - convey the advantages of a particular project and convince the council of the importance of implementing it.

#### **1.4 Objectives of this Study**

In North Rhine-Westphalia, the implementation of the EU Water Framework Directive is progressing too slowly. Especially with regard to hydro-morphological improvements there is still a great need for catching up. The main objective of this work was therefore to identify potential reasons for this slow pace. Public support for river rehabilitation and restoration work is generally high. In the aftermath of restoration projects, local residents usually perceive the changes to rivers and floodplains as positive and appreciate the newly restored reach for its recreational benefits. But has the importance of this task been recognised in the town halls? With municipalities being principally responsible for conducting restoration measures, the question arises of whether municipal administrations have come to value vibrant water bodies for their many benefits and understand the need for rehabilitating degraded river systems. Being head of administration as well as head of council, a mayor is in a powerful position. He can push the implementation of measures forward or make sure the subject is kept form view. His attitudes and commitment are particularly important which is why this study tried to capture these specifically. Aside the mayor's attitudes there may be other obstacles to the timely implementation of measures like the financial situation of the municipality or the allocation of the task (i.e. who is actually responsible for conducting river restoration measures). On top of that, regional variations may exist across the state of NRW which need to be identified. Are urban municipalities more committed and embrace the task of river restoration more readily than rural once? Does the geographical location make a difference at all to the commitment? An online survey was conducted to collect empirical data that would help to answer these questions and shed some light onto the current progress of implementation across NRW's municipalities.

## **2 Methods**

### **2.1 Participants and Procedure of Data Collection**

The data for this investigation was collected using an online survey. A link to this survey was sent to the e-mail addresses of the 396 municipalities of North Rhine-Westphalia along with a covering letter requesting participation. The e-mail addresses were obtained from the webpage of the Ministry of Internal and Local Affairs in NRW<sup>7</sup>. The online survey was active from April 18 until May 16, 2017. During that time participants were able to fill in the questionnaire at their own convenience. Participation was voluntary and anonymous. The questionnaire was provided in German. Both, German original and English translation can be found in the Appendix.

To break the survey into manageable sections that would not overwhelm the respondents, the 29 questions were divided between seven pages (please note, these were web tool pages). This way, topic-related questions could be presented together, and – later on in the survey - the respondents could be split into two groups, each receiving a different set of questions (details explained in *‘Variables of Part 2’*).

### **2.2 The Variables**

Essentially, the questionnaire consisted of two parts. Part 1, questions 1-20, was designed to be answered by all municipalities whilst part 2, questions 21-29, contained one question for municipalities who had transferred the task of river management to local water associations and eight questions for those who were themselves responsible for river management.

#### **2.2.1 Variables of Part 1**

Part 1 of the survey contained the following: five questions to classify the municipalities including one question that asked if the participant had, as a child, played along rivers; three questions to measure the respondent’s acceptance of river restoration (using a Likert rating scale); five questions to evaluate the respondent’s commitment towards river restoration (again Likert scale); five further questions on the respondent’s commitment towards river restoration, this time asking for detailed information (multiple choice); and two open-ended questions - to be answered in note form. All questions in part 1, except for the two open-ended questions at the end, were compulsory.

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<sup>7</sup> To be found under <http://www.mik.nrw.de/en/themen-aufgaben/kommunales/kommunale-adressen-neu.html> (viewed April 5, 2017)

### **2.2.1.1 Classification Questions and General Information**

The first classification question asked about the municipality's functional designation. As already mentioned, the state of North Rhine-Westphalia consists of 396 politically independent municipalities. These are distributed as follows: 23 independent cities, 35 major district-affiliated towns, 129 medium-sized district-affiliated towns, 84 district-affiliated towns and 125 district-affiliated parishes (IT.NRW n. d.).

The second classification question enquired about the government region the municipality belonged to. As mentioned in the introduction, there are five government regions in North Rhine-Westphalia: Arnsberg, Detmold, Düsseldorf, Köln and Münster.

The third classification question sought to establish who is responsible for conducting river maintenance and, along with that, for rehabilitating and restoring the municipality's river reaches. As mentioned before, this can be either the municipality itself or one of the following: the municipality's district administration (*Kreisverwaltung*), an association with special legal status (*Sondergesetzlicher Wasserverband*), a water and soil association (*Wasser- und Bodenverband*), or a third party e.g. a commercial enterprise or municipal subsidiary. As it is not very common in NRW for river maintenance to be conducted by third parties, these were not included in this survey.

The fourth classification question was included in the survey to get an idea about the financial situation of the participating municipalities. Participants were simply asked to specify whether their municipality was subject to budgetary supervision.

Following on from the classification categories, a question was included to determine whether or not the respondent had played along rivers in his/her childhood.

The classification questions and the general question on the respondent's childhood nature experiences were used to group the respondents and to determine differences between the groups. In part 2, the two groups of respondents of question 21 (i.e. regarding the river restoration obligations) were given different sets of questions (details explained in '*Variables of Part 2*'). For answering questions 1-3, respondents were asked to select the appropriate items, whilst question 4 and 5 were to be answered with "Yes" or "No".

### **2.2.1.2 Acceptance Statements**

The next three statements were devised to evaluate the respondent's attitude towards natural and vibrant water bodies. (Semi)-natural rivers and their floodplains provide habitats for many aquatic organisms and alleviate flood risk. Such benefits are generally well understood and

widely accepted. However, the benefits of natural water bodies for communities extend beyond these ecological ones. Two such benefits were taken into consideration here i.e. the positive influence on people's emotional state (e.g. Ulrich 1981) and the positive effects for the municipality itself by way of providing attractive spaces for recreation (e.g. Åberg and Tapsell 2013). These 'socio-medical' benefits of natural water bodies are less widely accepted, and were therefore considered suitable to demonstrate the different attitudes of respondents towards natural water bodies.

The aforementioned statements used a Likert Scale to evaluate the answers. The Likert Scale was chosen because it is the most widely employed scale for measuring attitudes and opinions (Likert 1932). To answer the three statements, the respondents had to decide if they (1) Strongly agree, (2) Agree, (3) Neither agree nor disagree, (4) Disagree, (5) Strongly disagree. Points were assigned to each statement of the Likert Scale; strongly agree was 1 point, agree was 2 points, neither agree nor disagree was 3 points, disagree was 4 points, and strongly disagree was 5 points. The questions were worded so that agreement indicates a positive (i.e. accepting) attitude.

#### **2.2.1.3 Commitment Statements in Likert Scale Format**

The next five statements were constructed to get a measure of the respondents' commitment towards watercourse rehabilitation/restoration. Again, Likert rating scales were employed. The respondents were asked to give their opinion on the importance of: a) the mayor's commitment, b) the involvement of nature conservation associations, c) having in-depth knowledge on the subject of river restoration, d) early participation of the municipality, and e) public information. Inspiration for these questions was drawn from the relevant pieces of laws i.e. the EU Water Framework Directive and the 'Law on water for NRW' (*Landeswassergesetz NRW*) as well as from the river basin management plan (MKULNV NRW 2015), a federal document. In addition, various conferences on the implementation of the EU WFD had been attended which also provided valuable input for this study. These laws, documents and conferences emphasise(d) the importance of the aforementioned aspects for a successful implementation of river restoration measures. Attitudes towards such aspects were therefore considered ideal to determine the respondent's commitment.

#### **2.2.1.4 Commitment Questions in Multiple Choice Format**

The following five questions picked up the subjects of the preceding statements but, this time, sought to obtain detailed insights of the respondents' commitment by presenting a number of possible responses (multiple choice). The response items were devised by talking to different

experts such as a former employee of the Environmental Ministry NRW, two water protection officers (from two different local governments), the head of an environmental service company (sewerage system maintenance), two mayors, an employee of a well-established water association, an employee of *Wassernetz NRW*, as well as three voluntary employees of the ‘German Federation for the Environment and Nature Conservation’ (*Bund für Umwelt und Naturschutz Deutschland*). For all of these questions, participants had the opportunity to give their own answers.

#### **2.2.1.5 Short Answer Questions**

The final two questions of part 1 were designed as open-ended questions to allow respondents to elaborate on their general experience and opinions, hopefully providing unique and unanticipated answers. These questions asked the respondents what social and managerial skills they considered important for dealing with property owners, and what – if anything - would help them progress the river restoration measures in their municipality.

#### **2.2.2 Variables of Part 2**

Part 2 of the survey, questions 21-29, was constructed so that an automatic split would occur and municipalities who had transferred the river management obligations to local water associations would be asked to answer question 21 whilst municipalities who had not done so (i.e. were themselves responsible for conducting river restoration) would be presented with questions 22 to 29. In part 2 there were no further questions for municipalities who had entrusted their district governments with these obligations. Only some of the questions in part 2 were compulsory. These are marked with a red asterisk.

##### **2.2.2.1 Question on Municipalities’ Perception of the Capabilities of Their Water Association(s)**

Question 21 asked the respondents to what extent they considered the water associations, in charge of the river restoration in their municipality, capable to fulfil certain qualifications. According to a former employee of the Environmental Ministry NRW, river restoration requires a certain financial capacity as well as in-depth knowledge of the subject. However, conviction and motivation are equally important (personal communication). These three items were therefore constituent parts of this question. Likert scales were used to evaluate this question.

##### **2.2.2.2 Questions on the Current Situation in Municipalities That Conduct River Restoration**

The last eight questions were relevant only for municipalities who had not transferred the duties of river maintenance and - along with that - the duties of watercourse rehabilitation/restoration. They were devised to get an idea of the progress and the current

state of river restoration in the municipalities. To obtain a measure of the municipalities' achievements, question 22 requested a figure for the percentage of waterways that had been rehabilitated by the end of 2016. This was followed by enquiring as to how many people worked on the subject of river restoration in the administration of the municipality. The next two questions regarded funding and financing of projects. The state of NRW supports river restoration measures by paying up to 80% of the costs; projects in municipalities under budgetary supervision may even be funded up to 90%. The municipality's own contribution may be covered via cost allocations (*Umlagen*), eco-compensation (*naturschutzrechtlicher Ausgleich für Eingriffe in Natur und Landschaft*) and – under certain circumstances – donations. Following on from a question that sought to determine whether the respondent had ever - in budgetary discussions - made funds available for proposed rehabilitation projects, there were three questions that aimed to gather some information on: i) how the respondents inform the council of the benefits of watercourse rehabilitation; ii) how riparian land is made available for rehabilitation projects; and iii) what issues may constitute possible barriers for the stipulated rehabilitation measures in the municipality. The multiple choice items presented in these three questions were compiled by consulting various previous studies (Weyand, BUND-Kreisgruppe Warendorf/NABU Kreisverband Warendorf, Schweer, and Müller, all unpublished). The final question was included to determine how respondents perceive the willingness of their citizens to pay for rehabilitation measures, and asked the respondent to select the appropriate answer in Euro.

### **2.3 Specific Design of the Survey**

One of the aims of this survey was to capture the mayors' political commitment towards river restoration. Questions 5-9 were designed to do just that. They requested the mayor's *personal* attention. Unfortunately, mayors are busy people who normally delegate duties like completing scientific surveys to the appropriate administrative staff. This questionnaire was developed to make allowances for this: the respondents were able to temporarily withdraw from the survey, and, by noting down an individual ID code, forward the survey to the mayor. Once the mayor had made his contribution, the original respondent could pick up the survey again and answer the remaining questions.

## 2.4 Analysis

The two parts of this survey were analysed separately. The first part was designed in such a way that the questions could be examined for interactions. For the analysis, therefore, only those participants were used who had answered all the compulsory questions of the first part (i.e. questions 1-18). The second part (i.e. questions 21-29) was designed so that each question could be analysed for itself. Thus, no-one had to be excluded from any of the questions in part 2.

In order to quantify the attitudes and opinions of respondents, this study employed a five-point rating scale – a so-called Likert Scale - that ranged from “1=strongly agree” to “5=strongly disagree”. Data collected on such scales is referred to as ordinal data as it can be ranked e.g. answer (1) is more positive than answer (2) and so on. When it comes to analysing ordinal data, one thing must be considered: it does not lend itself to calculating arithmetic mean values or averages. There are two reasons for this. First, Likert scales are arbitrary. The value assigned to a Likert item has no objective numerical basis; it is simply determined by the researcher designing the survey. Secondly, to be able to treat the results of Likert scales as interval-level data from which averages could be calculated, the categories of the scale must be equidistant, meaning the "psychological distance" between category 1 and 2 must be the same as between category 3 and 4, and so on. A good Likert scale will present a symmetry of categories about a midpoint (e.g. around a “neutral”) with clearly defined linguistic qualifiers. In such symmetric scaling, equidistant attributes will typically be more clearly observed or, at least, inferred<sup>8</sup>. But even if a researcher presents what he or she believes are equidistant categories, it may not be interpreted as such by the respondent. It is for these reasons that assumptions based on the mean scores of ordinal data may lead to misinterpretations. It is therefore generally recommended to present the results of Likert scales as bar charts – containing response frequencies - and outline the findings descriptively. The median (i.e. the number found exactly in the middle of the distribution) is a measure of central tendency and can be used in support of the statements.

To determine whether the attitudes/opinions of individual groups of respondents differed significantly, two statistical tests were used: the Kruskal-Wallis Test when five groups had to be compared and the Mann-Whitney *U* Test when there were only two groups to be tested against each other. For both methods it is important that the data was collected from two (or

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<sup>8</sup> This section was adapted from the following and assessed on June 23, 2017:  
[https://en.wikipedia.org/wiki/Likert\\_scale](https://en.wikipedia.org/wiki/Likert_scale)

more) different and independent groups or subjects (here: mayors or admin staff, e.g. from five different government regions). This type of data is referred to as unpaired data<sup>9</sup>. Both, Kruskal-Wallis and Mann-Whitney *U* Test are non-parametric alternatives to parametric tests like ANOVA and *t*-test. They are used when the data is measured at ordinal level and when it cannot be guaranteed that the underlying population follows a normal distribution. Both procedures use a null and the alternative hypothesis. The null hypothesis is a statement that claims that all samples come from populations with the same medians, and the alternative hypothesis is that the population medians differ. The null hypothesis is rejected in favour of the alternative hypothesis if the calculated probability value, *p*, falls below the significance level ( $p < 0.05$ , alternatively  $p < 0.01$  or  $p < 0.001$ ). The smaller the *p*-value the more significant is the difference between the medians. In the case of the Kruskal-Wallis Test (i.e. when comparing more than two groups) the alternative hypothesis does not imply that all medians are unequal, it merely indicates that at least one pair of medians is unequal. To discern which of the sample pair combinations are significantly different, a post-hoc test like the Dunn's test would have to be run. As none of the Kruskal-Wallis Tests conducted for the analyses of this survey's data indicated unequal medians, it was not necessary to perform any post-hoc examinations.

Online calculators were used to perform the tests. The online calculator for the Kruskal-Wallis Test can be found at <http://faculty.vassar.edu/lowry/kw401.html> (viewed August 23, 2017) and the online calculator for the Mann-Whitney *U* Test at <http://vassarstats.net/utest.html> (viewed August 23, 2017).

To evaluate the short answer questions, the individual comments were manually sorted into categories and each category given an appropriate name. For instance, comments such as “empathy”, “sensitivity”, “being able to empathise”, “to put oneself in somebody's position”, “to muster an understanding for other opinions” and “to consider the individual needs of citizens, each project is different” would be collated in the category “Empathy/Ability to show understanding”. Items in each category were counted and presented as a percentage of the total number of comments.

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<sup>9</sup> As opposed to paired data, which is collected from the same subjects but at two (or more) different points in time (e.g. before and after medical treatment).

## 3 Results

### 3.1 Response Rate and Participation

Of the 151 respondents recorded by the online survey tool, 67 had failed to fully complete the compulsory questions of part 1 and thus were excluded from the analysis. Exclusion was necessary to be able to conduct the analysis as intended i.e. to examine for interactions. Given a total of 396 municipalities, 84 usable surveys represent a 21.2% response rate.

It was anticipated when designing this online survey that, in many local authorities, the mayor would – on receipt of the questionnaire – forward it to the appropriate staff. However, questions 5 to 9 were meant to be answered by the mayor *personally*. This questionnaire provided a solution to this potential problem: the participant was able to interrupt the survey at this point and, by way of an individual code, pick it up again later once the mayor had made his contribution and answered the questions intended for him. Despite this provision, question 5 (the first question to be answered by the mayor personally) proved to be a “knock-out” question as here the number of participants steeply dropped from 151 to 100. A further 16 respondents quit before reaching the final compulsory question, so that only 84 could be considered for analysis of part 1.

It is plausible that these numerous drop-outs shifted the percentage distribution slightly towards smaller municipalities i.e. district-affiliated parishes (see Figure 1) as it is often in these smaller municipalities that the mayor is ‘closer’ to the issue of river restoration and therefore less inclined to pass the survey on to someone else in his administration. It is likely that without the complication of having to pass the questionnaire back and forth, more questionnaires would have been fully completed. Although it is, of course, unfortunate that so many municipalities dropped off at this question, the initial idea of this study, i.e. to evaluate the political commitment of the mayors, required the survey to be constructed in this way.

Of the 38 participants from municipalities that had delegated the task of river restoration, 33 proceeded to the second part and answered the final question that was applicable to them (question 21). Of the 46 participants from municipalities that had taken on the task of river restoration themselves, 41 proceeded to the second part and answered the questions that were designed for them (questions 22-29) but only 37 continued until the end.

### 3.2 Classification and General Information

Analysis of the classification questions showed that the participating municipalities constituted an approximate representative sample of municipalities in NRW. In terms of both functional designation (see Figure 1) and geographical affiliation (see Figure 2), the distribution of municipalities who participated in this survey was very similar to the actual distribution in NRW (see inset charts).

The majority of municipalities were district-affiliated parishes (40%), followed by medium-sized district-affiliated towns (27%), district-affiliated towns (17%) and major district-affiliated towns (12%, see Figure 1). Independent cities made up 4%. Whilst district-affiliated parishes were slightly overrepresented (by 8%; for explanation see above under ‘*Response Rate and Participation*’), medium-sized district-affiliated towns were slightly underrepresented (by 6%).

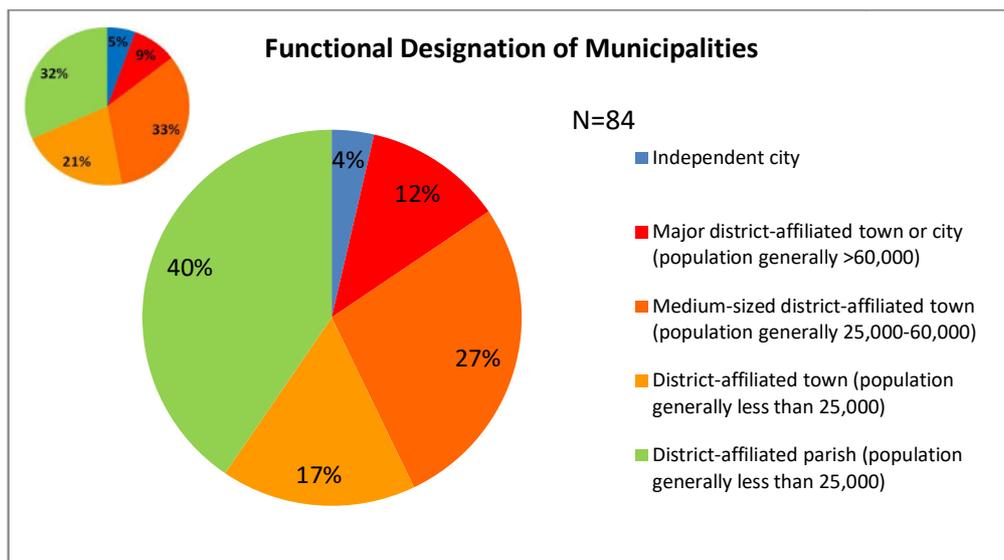


Figure 1: Functional designation of participating municipalities (percentage distribution); inset chart showing the actual distribution of municipalities in North Rhine-Westphalia (figures taken from: IT.NRW n.d.). N=84.

Municipalities from all five governmental regions took part in this survey (see Figure 2). Whilst municipalities affiliated to the regional government of Münster were slightly underrepresented (by 8%), those from the governmental region of Detmold were slightly overrepresented (by 6%). The participation in Köln, Düsseldorf and Arnsberg was representative of the actual distribution in NRW.

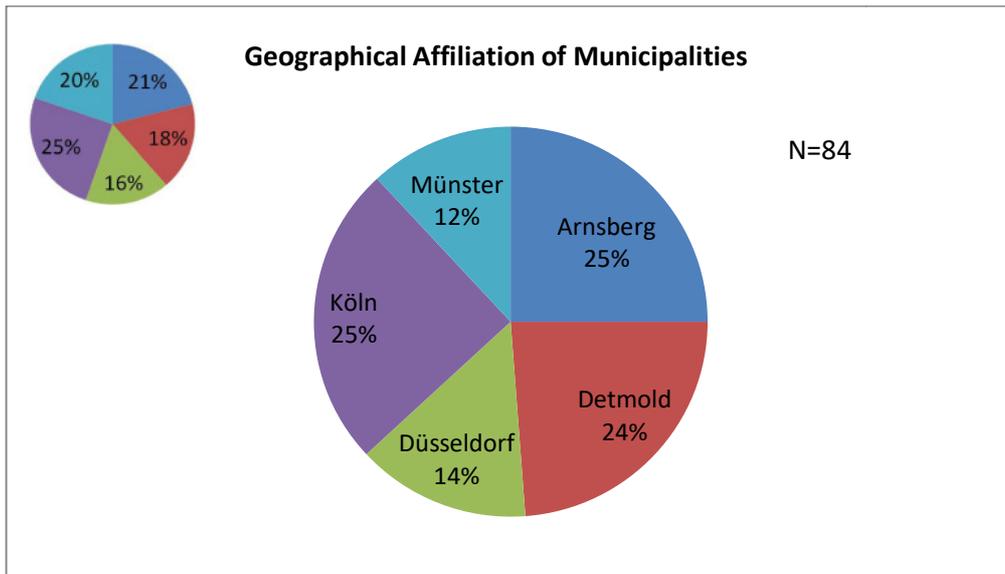


Figure 2: Geographical affiliation of participating municipalities to the five government regions of North Rhine-Westphalia (percentage distribution); inset chart showing the actual distribution of municipalities in North Rhine-Westphalia (figures taken from: Information und Technik Nordrhein-Westfalen, 2013). N=84.

More than half of the municipalities who participated in this survey were themselves responsible for implementing the stipulated river restoration measures (about 55%). Of those municipalities who had transferred this obligation, about 21% had assigned a water association with special legal status whilst 19% had entrusted one or more water and soil associations with the implementation of their measures. In 5% of cases, the district administration was in charge of the municipality's river restoration.

According to the survey results, 39% of municipalities were, at the time of the survey, subject to budgetary supervision (N=84) and the majority of mayors had played along rivers in their childhood (87%, N=84).

### 3.3 Acceptance of River Restoration

When the acceptance statements on Likert scale were analysed across all municipalities, the results show that the greatest majority of mayors responded with "strongly agree" to statement 6 (regarding people's psychological health) and statement 7 (regarding the municipality's attractiveness) and that the number of mayors who strongly agreed with statement 8 (regarding the provision of leisure facilities) was almost equal to the number of those who agreed with this statement (see Figure 3). Taking into account both positive responses it can be seen that 87% of mayors either agreed or strongly agreed with the statement regarding people's psychological health, 94% of mayors either agreed or strongly agreed with the

statement regarding the attractiveness of a municipality, and 81% of mayors either agreed or strongly agreed with the statement that river restoration is at least as important as providing leisure facilities in a municipality. It can also be noticed from the chart that no-one strongly disagreed to any of the acceptance statements and that – with respect to the neutral and negative responses – the trend lays to the neither rather than the negative.

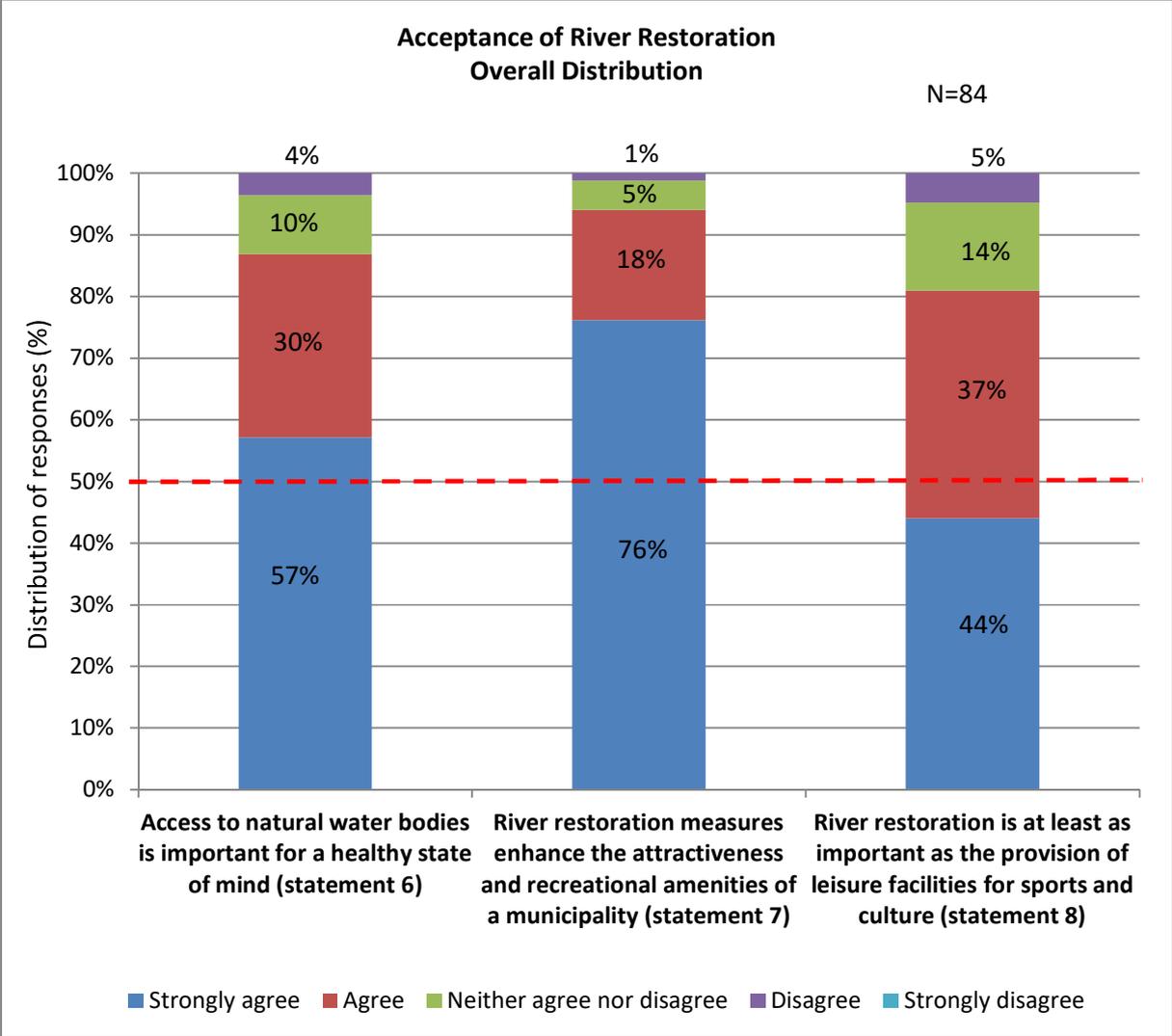


Figure 3: Distribution of responses (%) to acceptance questions of all participating municipalities (N=84).

As it was mentioned previously, one objective of this work was to determine whether the acceptance of river restoration would be influenced by certain factors such as the functional designation and the geographical affiliation of the municipality, the responsibility situation (i.e. whether or not the municipality was responsible for river restoration), the budget situation of the municipality (i.e. whether or not the municipality was subject to budgetary supervision) and the mayor’s childhood river experience (i.e. whether or not he/she had played along rivers). Answers on the Likert scale statements 6, 7 and 8 were analysed in order

to check for significant differences between the various groups. The Kruskal-Wallis-Test was used to establish whether the functional designation of the municipality or its geographical affiliation would affect the acceptance, and the Mann-Whitney  $U$  Test was employed to determine whether differences in acceptance would arise between municipalities who were responsible for their river restoration and those who had transferred this task, as well as between municipalities who were subject to budgetary supervision and those who were not. The Mann-Whitney  $U$  Test was also used to find out whether the acceptance of river restoration would differ between mayors who had played along rivers in their childhood and those who had not done so.

Neither the functional designation nor the geographical affiliation of the municipality affected the mayors' acceptance of river restoration (statements 6-8) in any significant way.

When comparing the acceptance results of those municipalities who were themselves responsible for restoring their rivers and streams ( $N_{\text{responsible}}= 46$ ) to those who had transferred this obligation ( $N_{\text{transferred}}= 38$ ), a significant difference was *only* found for statement 8 "River restoration is at least as important as the provision of leisure facilities for sports and culture" (result significant at  $p<0.05$ ). As the mean ranks<sup>10</sup> for the population "responsible" (Mean Ranks<sub>responsible</sub>= 37.1) was smaller than the mean ranks for the population "transferred" (Mean Ranks<sub>transferred</sub>= 49) it can be concluded that municipalities who had taken the restoration of their water bodies in their own hands responded more positive to this statement compared to municipalities who had entrusted someone else with it. Figure 4, showing the distribution of responses for statement 8, clearly illustrates this difference in attitude.

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<sup>10</sup> Please note: mean ranks are typically generated by Mann-Whitney  $U$  online calculators and may serve for descriptive purposes when presenting the data. They are, however, not part of the actual calculation i.e. the actual Mann-Whitney  $U$  Test.

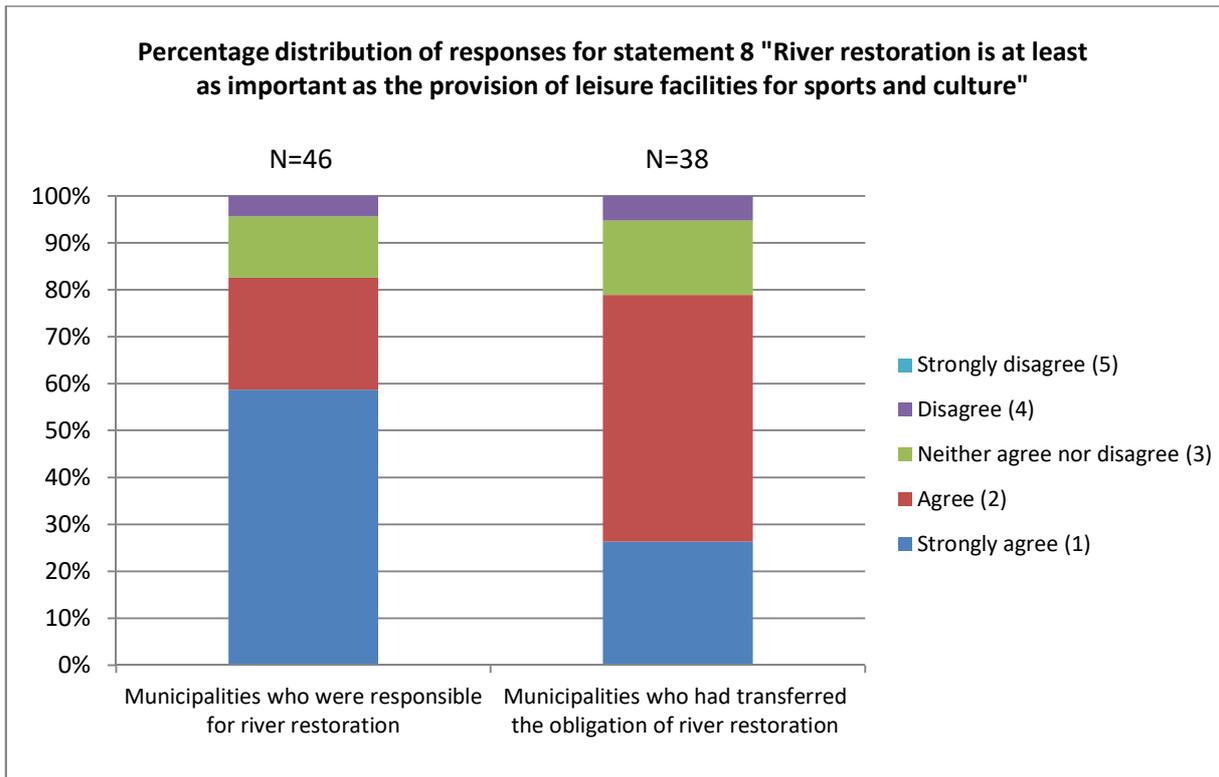


Figure 4: Distribution of responses (%) for statement 8 "River restoration is at least as important as the provision of leisure facilities for sports and culture". Municipalities who were themselves responsible for restoring their water bodies answered significantly more positive (Mann-Whitney  $U$  Test  $p < 0.05$ ) than municipalities who had transferred the task of river restoration.

With respect to the budget situation of municipalities it was found that none of the three acceptance statements generated a significant difference between municipalities who were subject to budgetary supervision and municipalities who were not subject to budgetary supervision.

Having played along rivers as children, mayors responded significantly more positive to statement 6 "Access to natural water bodies is important for a healthy state of mind" compared to those who had not played along rivers ( $N_{\text{played}} = 73$ ,  $N_{\text{not played}} = 11$ , Mean Ranks<sub>played</sub> = 40, Mean Ranks<sub>not played</sub> = 58.9, result significant at  $p < 0.01$ ). Figure 5 visualises this difference in answers. Statistics failed to show significant differences for statements 7 and 8.

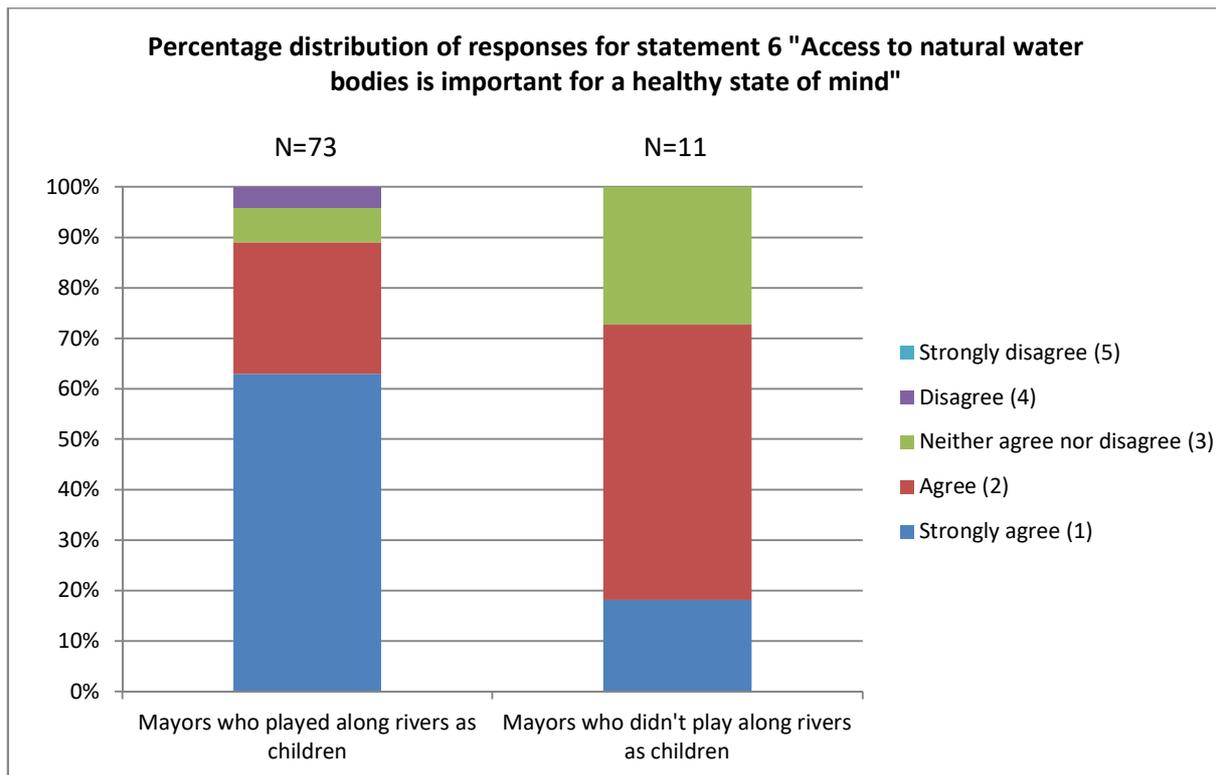


Figure 5: Distribution of responses (%) for statement 6 "Access to natural water bodies is important for a healthy state of mind". Mayors who had played along rivers in their childhood answered significantly more positive (Mann-Whitney *U* Test  $p < 0.01$ ) than mayors who had not done so.

### 3.4 Commitment towards River Restoration in Likert Scale Format

Analysis of the commitment statements across all municipalities shows that it is only in response of statement 11 (regarding the importance of a comprehensive preparation with the subject of river restoration) that most municipalities opted for "strongly agree" (see Figure 6). To most other statements the majority of municipalities responded with "agree", the exception being statement 13 (regarding the importance of informing the general public) where the number of municipalities who strongly agreed was almost equal to the number of those who agreed. The statement regarding the involvement of nature conservation associations (statement 10) shows the greatest spread of responses, with 4% of respondents even disagreeing strongly here. None of the other statements generated strong disagreement. Overall it can be noticed that, with respect to the neutral and negative responses, the trend lays to the neither rather than the negative.

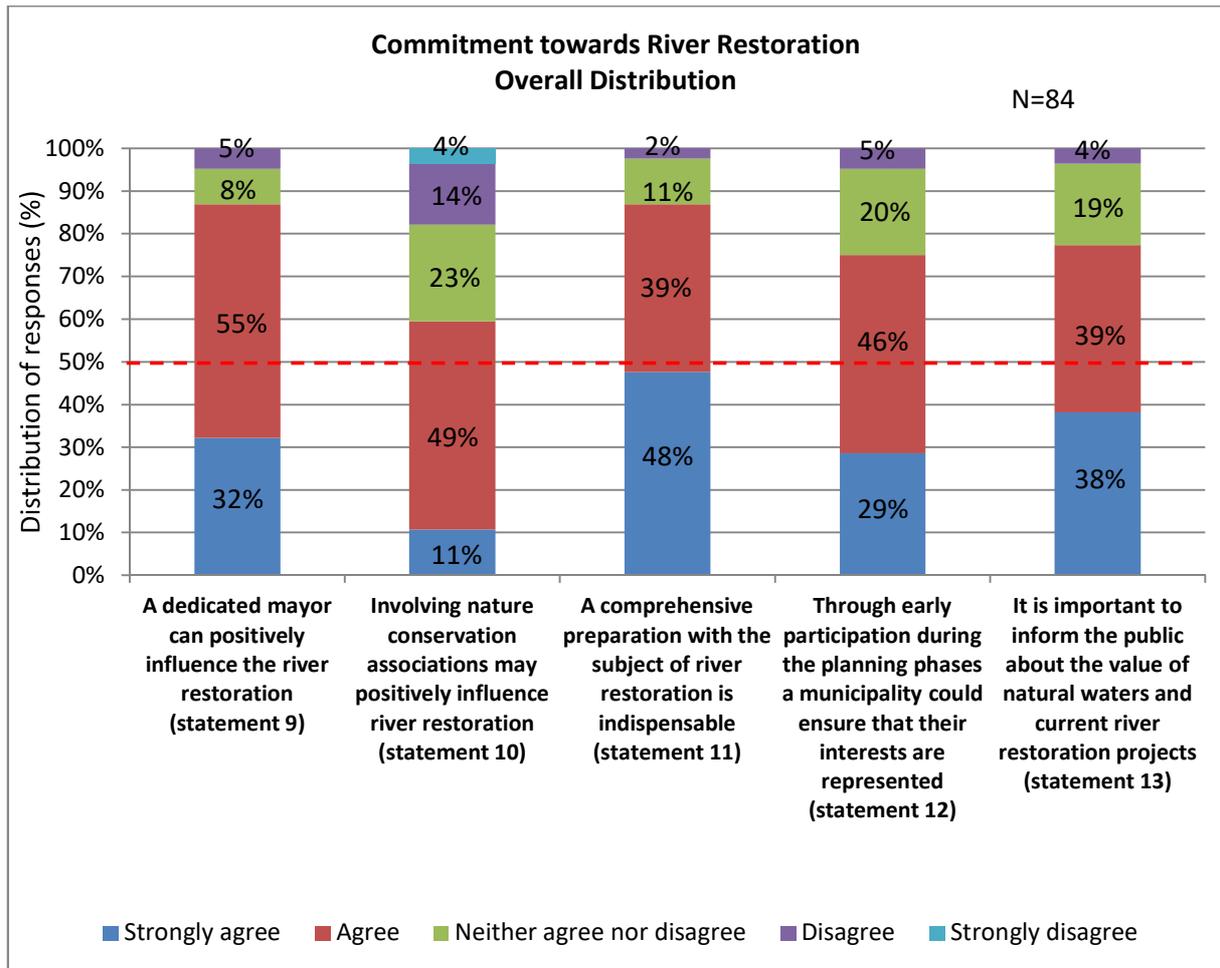


Figure 6: Distribution of responses (%) to commitment questions of all participating municipalities (N=84).

Another objective of this thesis was to find out whether the municipality's commitment towards river restoration would be influenced by: a) the functional designation, b) the geographical affiliation of the municipality, c) the responsibility situation and d) the municipality's financial situation<sup>11</sup>. As before, Kruskal-Wallis-Tests and Mann-Whitney *U* Tests were performed in order to check for significant differences between the various groups, this time for Likert scale statements 9-13.

Neither the functional designation nor the geographical affiliation of the municipality affected the municipality's commitment towards river restoration (statements 9-13) in any significant way.

Significant differences in responses between the two situations of responsibility were found for statement 9 "A dedicated mayor can positively influence river restoration" as well as for

<sup>11</sup> Whether the mayor's childhood nature experiences would affect the commitment results was not investigated since these survey results were not directly linked. As a reminder: most of the commitment questions did not necessarily have to be answered by the mayors themselves.

statement 13 “It is important to inform the public about the value of natural waters and current river restoration projects”. Municipalities, who had refrained from transferring their responsibility of river restoration ( $N_{\text{responsible}}= 46$ ) had a more positive attitude towards both statements compared to those who had transferred their responsibility ( $N_{\text{transferred}}= 38$ ). Statistics generated for statement 9: Mean Ranks<sub>responsible</sub>=38.4, Mean Ranks<sub>transferred</sub>= 47.4, result significant at  $p<0.05$ . Statistics generated for statement 13: Mean Ranks<sub>responsible</sub>=38.3, Mean Ranks<sub>transferred</sub>= 47.6, result significant at  $p<0.05$ . Figure 7 and Figure 8 show the distribution of answers for statement 9 and 13 respectively. No significant differences in opinions were found for statements 10, 11 and 12.

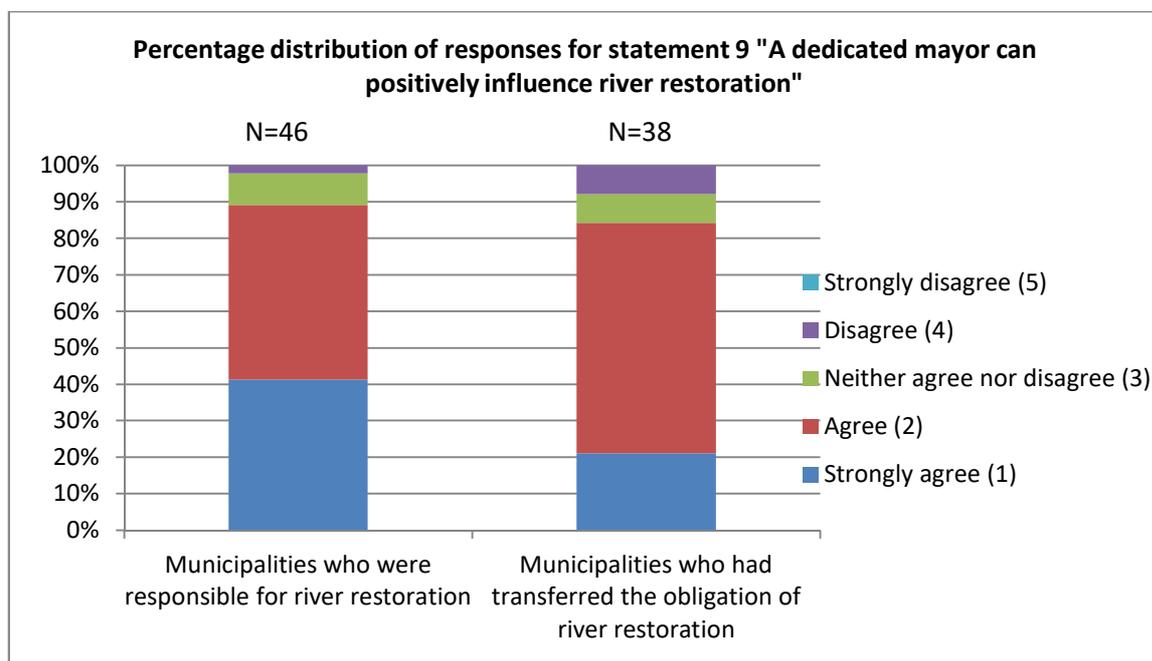


Figure 7: Distribution of responses (%) for statement 9 "A dedicated mayor can positively influence river restoration". Municipalities who were themselves responsible for restoring their water bodies answered significantly more positive (Mann-Whitney  $U$  Test  $p<0.05$ ) than municipalities who had transferred this obligation.

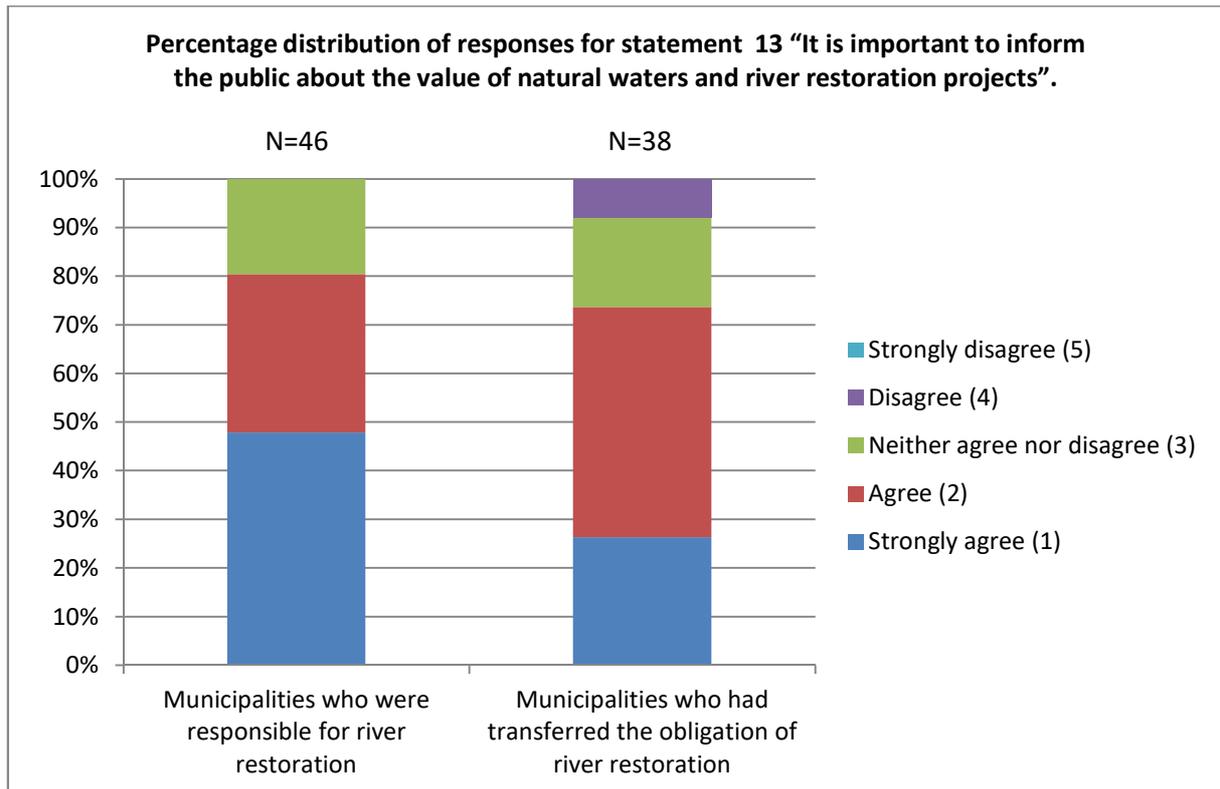


Figure 8: Distribution of responses (%) for statement 13 "It is important to inform the public about the value of natural waters and current river restoration projects". Municipalities who were themselves responsible for restoring their water bodies answered significantly more positive (Mann-Whitney  $U$  Test  $p < 0.05$ ) than municipalities who had transferred this task.

With respect to the budget situation of municipalities it was found that none of five commitment statements generated a significant difference between municipalities who were subject to budgetary supervision and municipalities who were not subject to budgetary supervision.

### 3.5 Commitment towards River Restoration in Multiple Choice Format

When the multiple choice commitment questions were analysed and the response rates calculated separately for municipalities who conducted river restoration themselves (hereafter referred to as self-municipalities) and those who had transferred this obligation to other entities (hereafter referred to as trans-municipalities), it can be noticed that, by and large, the response rates of the two categories were very similar for most items and noticeably differed only occasionally (see Figure 9). Likewise, response rates between municipalities who were subject to budgetary supervision (hereafter referred to as SBS-municipalities) and those who were not (hereafter referred to as Non-SBS-municipalities) differed only for some of the response options provided in the commitment questions.

Regarding the actions that mayors and their administrative staff undertake to progress the river restoration in their municipality (see question 14 in Figure 9) response rates from self-municipalities were noticeably higher than those from trans-municipalities for three of the response items, these being: “providing financial resources in budget planning deliberations”, “informing about funding options”, and “creation of jobs/contacts”. Yet other items, such as “participating at meetings of the Water Association”, and “arranging for increased contributions to the Water Association” generated higher response rates from trans-municipalities. All other response options yielded very similar response frequencies from both categories of municipalities. Very few municipalities in both categories had “not taken any action”. When comparing response frequencies from SBS-municipalities to those from Non-SBS-municipalities, it can be noticed that – within the category “trans-municipalities” – SBS-municipalities responded to some of the items more frequently than Non-SBS-municipalities. This was particularly noticeable for “informing the general public” and “mediating between various interest groups”. Within the category “self-municipalities”, clear differences between SBS-municipalities and Non-SBS-municipalities could only be seen for “participating in events” and “helping with land acquisition and land management” where Non-SBS-municipalities responded more frequently.

With respect to the involvement of environmental associations (see question 15 in Figure 9) response frequencies to the individual items did not differ substantially between the two categories. Quite a few municipalities in both categories admitted that they “don’t involve environmental associations at all”. Clear differences in response frequencies between the two financial situations could only be seen within the category of trans-municipalities, and only for involving “committees/panels” where SBS-municipalities responded more frequently than Non-SBS-municipalities.

When mayors and their administrative staff were asked about their expertise and where they got it from (see question 16 in Figure 9) the data shows that for “private study”, “science” and “media” the response rates seen from self-municipalities were higher compared to trans-municipalities; whereas for “local water association” it was the trans-municipalities that responded more frequently. All other response items do not show substantial differences between the two categories. Very few municipalities in both categories opted for “no expertise obtained”. Quite a few municipalities obtained their expertise “from somewhere else”; many of these specifying “own staff” (see Table 1). Clear differences between SBS-municipalities and Non-SBS-municipalities could only be seen for “local water association”

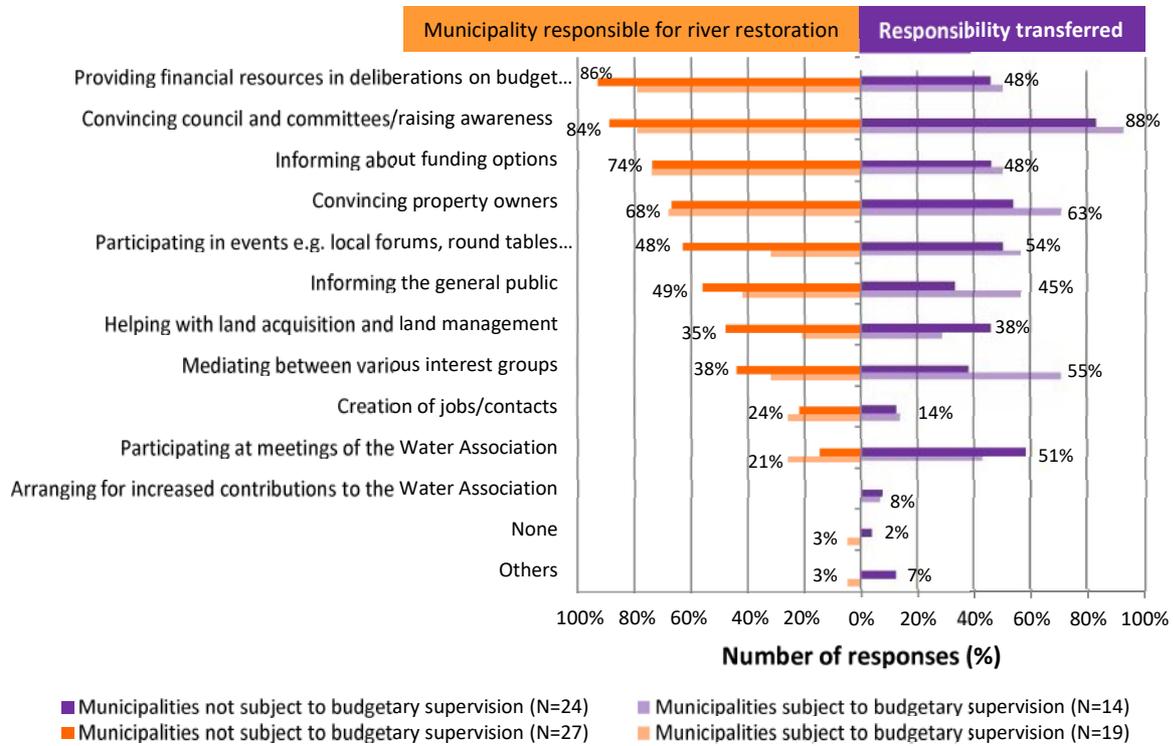
and “science” within the category of self-municipalities where SBS-municipalities responded more frequently; and for “private study”, “science” and “environmental associations” within the category “trans-municipalities” where Non-SBS-municipalities responded more frequently to the former two items and SBS-municipalities responded more frequently to the latter item.

Analysis of the question about the municipality’s involvement during the 1<sup>st</sup> and 2<sup>nd</sup> planning phase (see question 17 in Figure 9) reveals that differences in response rates arise only for “joining regional collaborations” where self-municipalities responded more frequently than trans-municipalities. All other response items generated very similar response rates from both municipality categories. Very few municipalities in both categories didn’t get involved at all. Clear differences between the two financial situations of municipalities could only be seen for “joining regional collaborations” and “using the consulting service offered by the *Kommunal Agentur NRW*” within the category “trans-municipalities” where Non-SBS-municipalities responded more frequently to the former item and SBS-municipalities responded more frequently to the latter item.

The data on the efforts of informing the general public (see question 18 in Figure 9) shows that self-municipalities responded more frequently than trans-municipalities to many response items; these being: “educational events at schools and pre-school nurseries”, “displaying the travelling exhibition *Vibrant Waters*”, “excursions”, “guided tours of current project sites”, “guided river adventure tours” and “river and stream sponsorships” whereas trans-municipalities responded more frequently to “handouts and flyers in the town hall”. All other response options yielded very similar response frequencies from both categories of municipalities. Very few municipalities in both categories would claim “no efforts undertaken”. Clear differences between the two financial situations of municipalities can only be seen for “press releases” and “river and stream sponsorships” within the category “trans-municipalities” where Non-SBS-municipalities responded more frequently to the former item and SBS-municipalities responded more frequently to the latter item. Substantial differences between the two financial situations can also be noted for “guided tours of successfully implemented projects”, “guided river adventure tours” as well as “river and stream sponsorships” within the category “self-municipalities” where Non-SBS-municipalities responded more frequently to the former item and SBS-municipalities responded more frequently to the latter two items.

**Difference in commitment (multiple choice questions) between municipalities who are responsible for river restoration and those who have transferred this responsibility**

**Actions taken by the mayor/administration to push along the implementation of river restoration projects (question 14)**



**Ways in which the mayor/administration involve environmental organisations in matters of river restoration (question 15)**

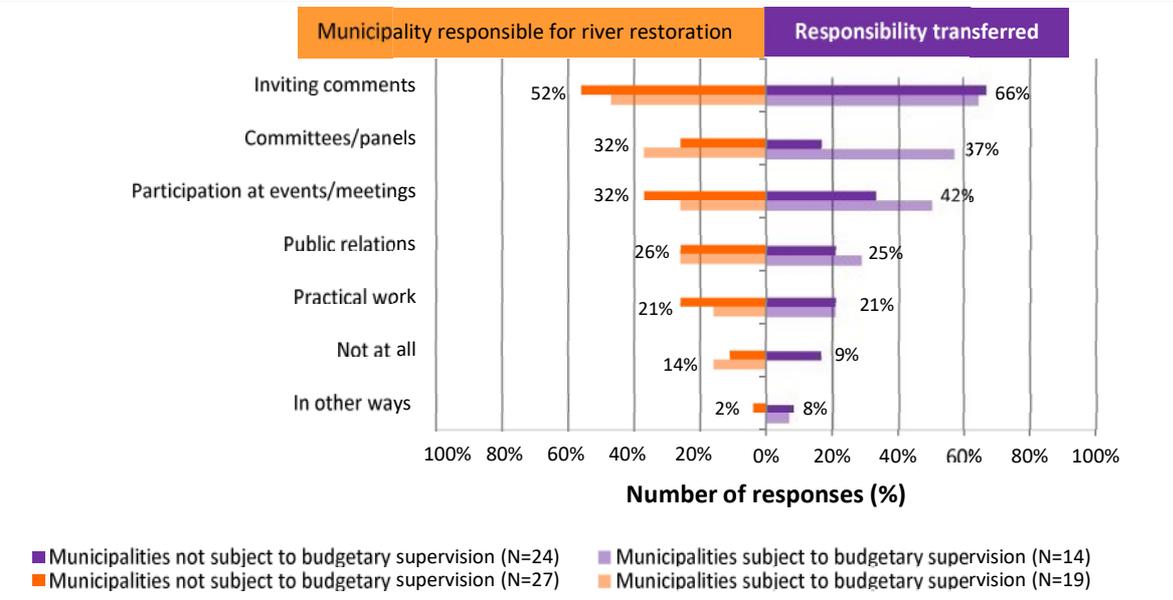


Figure 9 (cont'd overleaf): Difference in responses (as % of the number of respondents in the respective groups) to the multiple choice commitment questions between Self-municipalities (orange) and Trans-municipalities (purple). Non-SBS-municipalities are shown in dark (orange and purple) and SBS-municipalities are shown in light (orange and purple). The percentage rates provided within the charts constitute averages between Non-SBS-municipalities and the respective SBS-municipalities.

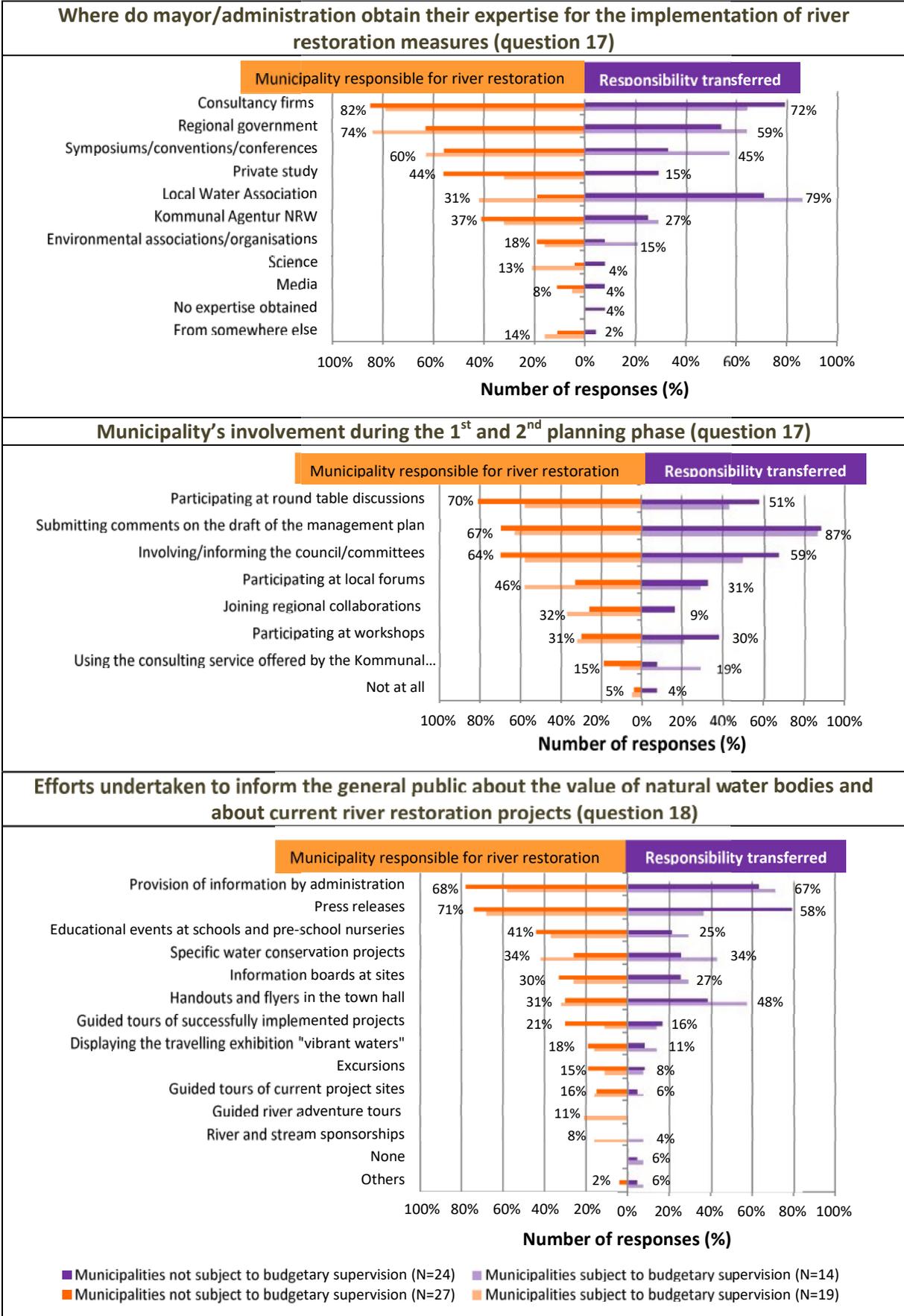


Figure 9 (cont'd): Difference in responses to the multiple choice commitment questions between Self-municipalities (orange) and Trans-municipalities (purple). Non-SBS-municipalities are shown in dark (orange and purple) and SBS-municipalities are shown in light (orange and purple).

Table 1: Comments in the item “Other” for the multiple choice commitment questions (Q14-18). For phrasing of the questions refer to Figure 9 above.

	Responsibility of river restoration lies with the municipality		Municipality has transferred the responsibility of river restoration	
	<i>Municipality not subject to budgetary supervision (N=27)</i>	<i>Municipality subject to budgetary supervision (N=19)</i>	<i>Municipality not subject to budgetary supervision (N=24)</i>	<i>Municipality subject to budgetary supervision (N=14)</i>
<b>Question 14</b>	-	www.weser-werre-else.de	Additional planning in surrounding built-up area; provision of municipal lands; promoting volunteerism	-
<b>Question 15</b>	Not yet, is in progress.	-	Supporting the activity “Nature Challenge” of the local fishermen association; planned measures were presented to delegates at an informational event	As part of the scoping-days via the water association with special legal status
<b>Question 16</b>	Own administrative staff; own specialists; district administration	Own personnel; work group; implementation timetables and concepts	Staff members with relevant training/experience	-
<b>Question 17</b>	-	-	-	-
<b>Question 18</b>	Activities by various organisations (fishing club)	-	During Water Body Assessment	Via the water association with special legal status

### 3.6 Short Answer Questions

More than half of the respondents who completed the compulsory questions of part 1 (questions 1-18) proceeded to the voluntary questions (Q19 and Q20) and shared their views and opinions about what they thought were important skills for dealing with land owners, as well as what they thought would help them progress the river restoration in their municipality. Some answers were just single words; others were expressed as short sentences. Some respondents gave one answer; others listed several ideas.

When all answers from the skill question were categorised and graphed (see Figure 10), it becomes apparent that certain skills were deemed important irrespective of whether the municipalities had transferred the responsibility of river restoration, these being: “good negotiating and mediating skills”, “persuasive power/ability to raise awareness”, “empathy/ability to show understanding”, “openness/honesty/trustworthiness” as well as “technical expertise/background knowledge”. Other competences like an “ability and willingness to compromise”, “good argumentation skills” and “perseverance/patience” were specified only – or for the most part - by municipalities who had put themselves in charge of their river restoration.

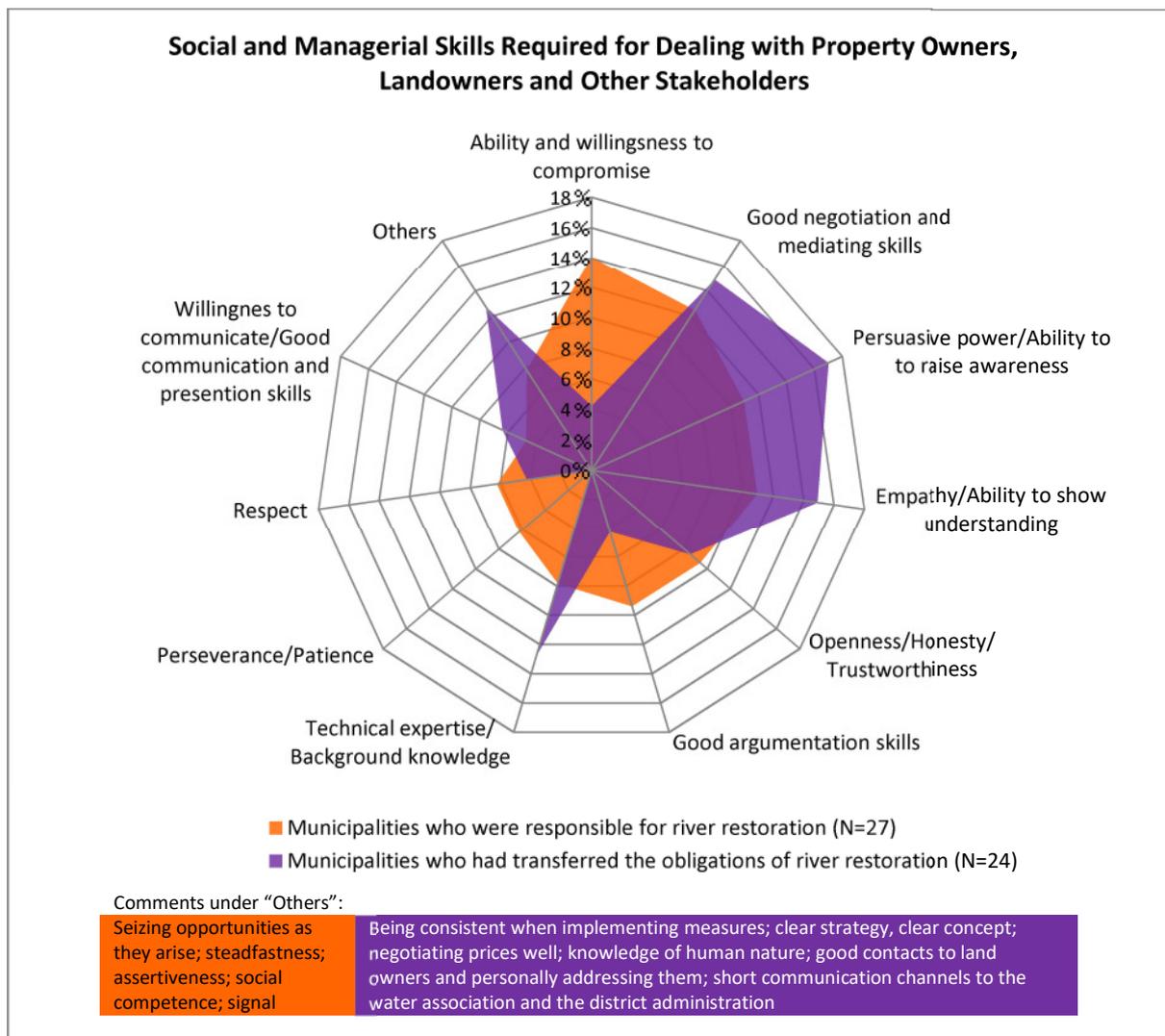


Figure 10: Distribution of answers (%) to the question “In your opinion, what social and managerial skills should a mayor (or his administration) have in order to deal with property owners, landowners and other stakeholders? Municipalities who are responsible for river restoration are presented in orange (N=27), municipalities who have transferred this responsibility are presented in purple (N=24).

Figure 11 gives a summary of answers generated by the question “If you could wish for anything to help you progress the river restoration measures of your municipality, what would it be?” Municipalities frequently specified “more support from politics and legislation”, “less bureaucracy” and “better financial capacities of the municipality”, and this was irrespective of whether they were actually in charge of their river restoration or had entrusted someone else with it. “More financial support”, “more administrative staff” and “appreciation from others” were identified by both categories of municipality but considerably more often by those who had taken river restoration in their own hands. Only municipalities who were themselves responsible for their river restoration wished there would be a “higher availability of land”.

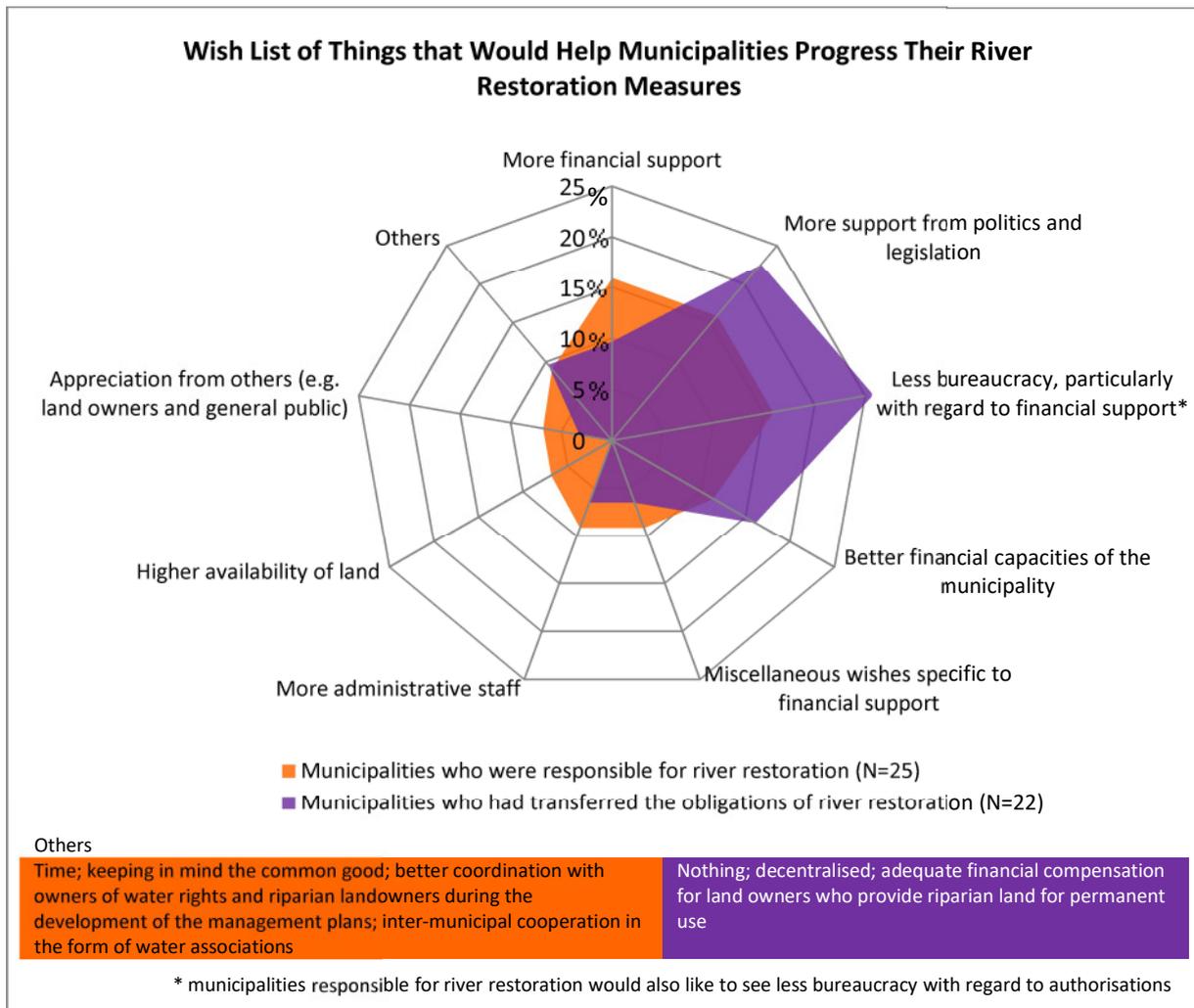


Figure 11: Distribution of answers (%) to the question “If you could wish for anything to help you progress the river restoration measures of your municipality, what would it be?” Municipalities who are responsible for river restoration are presented in orange (N=25), municipalities who have transferred this responsibility are presented in purple (N=22).

### 3.7 Municipalities’ Perception of the Capabilities of Their Water

#### Association(s)

An important objective of this survey was to determine what factors presented significant limitations to the acceptance of, and commitment to, river restoration and the progress that is being made. In order to establish whether the responsibility situation constituted a limiting factor, this study aimed to measure the respondents’ perception of the capabilities of their local water association to fulfil certain qualifications required for the task of river restoration. The qualifications used in the question were: expertise, financial capacities and motivation/conviction. Mann-Whitney *U* Tests were conducted to determine whether there would be any difference in opinions if municipalities had transferred the task of river restoration to one of the large water associations (i.e. those with special legal status in NRW) or if they had entrusted one or more of the smaller water and soil associations with this task.

Results obtained from the statistical tests show that, with respect to all three qualifications, municipalities were significantly more confident in the capabilities of their water association if it was one of the water associations with special legal status ( $N_{\text{Water assoc. special}}= 17$ ) rather than one or more of the smaller water and soil associations ( $N_{\text{Water and soil assoc.}}= 16$ ) who conducted their river restoration. Please refer to Table 2 for the Mean Ranks values<sup>12</sup> and the level of significance generated by the statistical analysis. Figure 12 shows the distribution of answers for all three qualifications.

Table 2: Mean Ranks and level of significance generated by Mann-Whitney *U* Test for the question “To what extent do you (or your administration) consider the water association(s) – assigned with the tasks of river restoration in your municipality - capable to fulfil the following qualifications needed for such tasks?”

	Mean Ranks		Level of significance
	River restoration is conducted by water associations with special legal status (N=17)	River restoration is conducted by one or more water and soil association(s) (N=16)	
Expertise	12.9	21.4	p<0.01
Financial capacity	12.4	21.9	p<0.01
Motivation/conviction	11.9	22.4	p<0.001

<sup>12</sup> Please note: mean ranks are typically generated by Mann-Whitney *U* online calculators and may serve for descriptive purposes when presenting the data. They are, however, not part of the actual calculation i.e. the actual Mann-Whitney *U* Test.

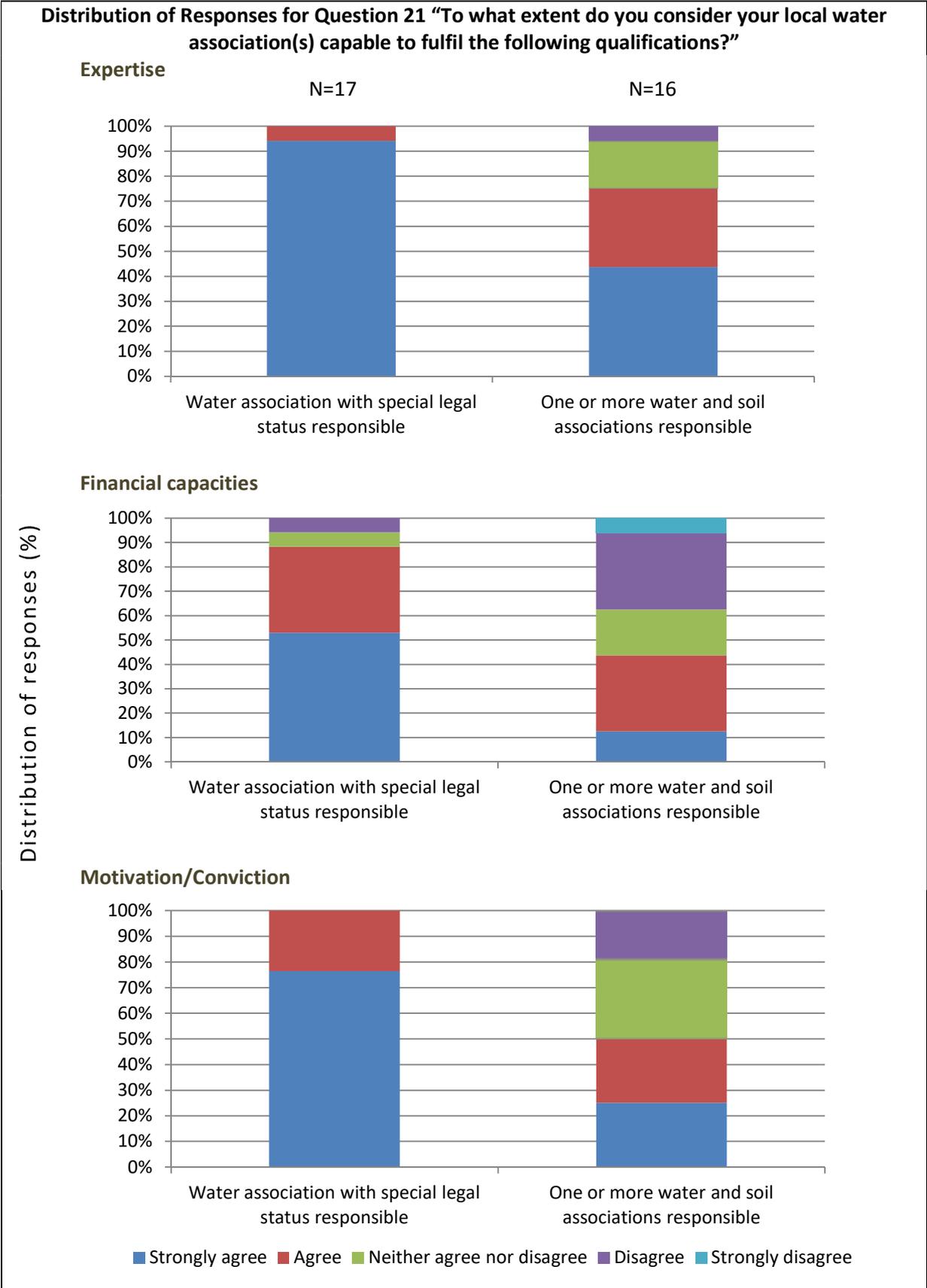


Figure 12: Distribution of responses (%) for question 21 “To what extent do you consider your local water association(s) capable to fulfil the following qualifications?” For all three qualifications, municipalities were significantly more confident in the capabilities of their local water association if it was one of the water associations with special legal status instead of one or more of the water and soil associations who conducted their river restoration (p-values: Expertise: 0.01; Financial capacities: 0.01; Motivation/Conviction: 0.001)

### 3.8 Current Situation in Municipalities That Conduct River Restoration

When the average was calculated for the length of waterways<sup>13</sup> that had been restored in the participating municipalities by the end of 2016 the result obtained was **14%** ( $\pm 3.1$ ) (N=41).

Detailed analysis on the restored length of waterways shows that the great majority of municipalities had restored between 0 and 10% of their rivers and streams by the end of 2016 (73%, see Figure 13). About 12% of municipalities had achieved restoration rates between 11% and 20%, and 5% of municipalities had returned between 21% and 30% of their watercourses to a semi-natural state. Only 8% of municipalities had attained restoration rates above 30%.

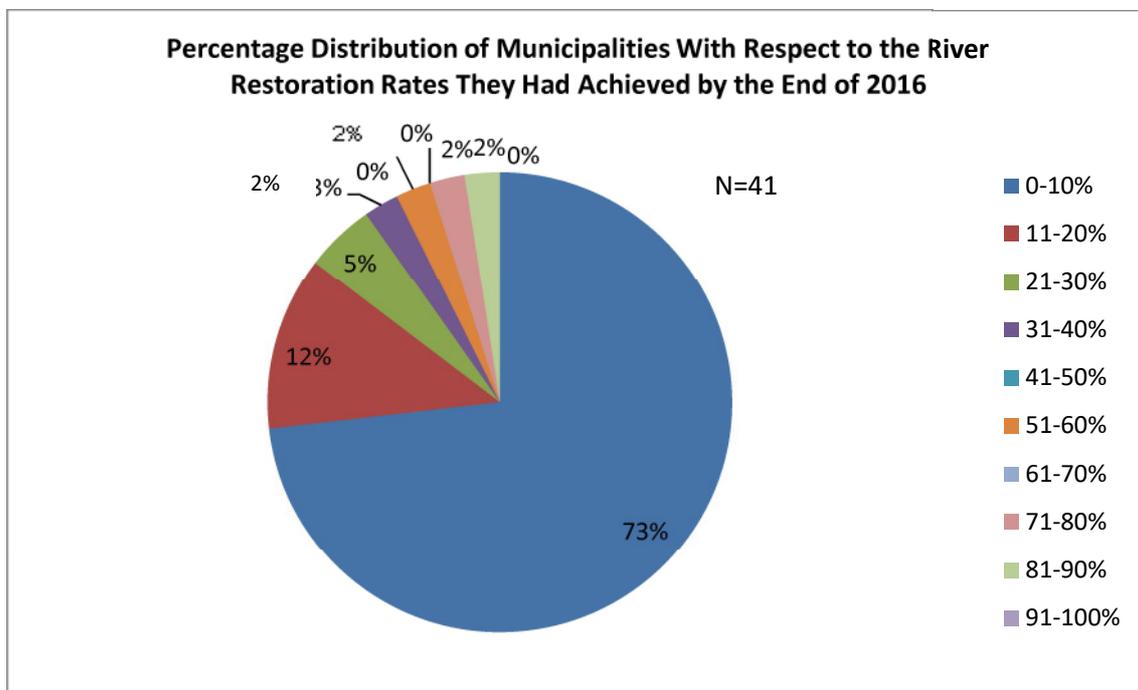


Figure 13: Distribution of municipalities (%) with respect to the length of waterways (as percentage to the total length) which they had restored by the end of 2016. N=41.

The average restoration rate per government region was not calculated here. A comparison of these results would not have been very meaningful due to the small sample sizes (e.g.  $N_{\text{Münster}}=0$ ,  $N_{\text{Köln}}=5$ ,  $N_{\text{Düsseldorf}}=4$ ).

Although it might have been interesting to investigate whether a mayor's early-life nature experiences would affect the efforts made towards river restoration and possibly result in higher restoration rates, this was not analysed. Drawing conclusions from data that was derived from such a small number of replies would not make much sense. (i.e.  $N_{\text{played}}= 36$ ,  $N_{\text{not played}}= 5$ ).

<sup>13</sup> subject to reporting (2<sup>nd</sup> order and other watercourses)

The box plot shown in Figure 14 compares the river restoration rates of Non-SBS-municipalities and SBS-municipalities. In both categories, the median for the restored length of rivers lay beneath 10%: **7%** for municipalities who were not under budgetary supervision (N=25); and **9.5%** for municipalities who were subject to budgetary supervision (N=16). In both categories of municipalities, the dispersion of river restoration rates was very high (0 to 85% and 0 to 80%).

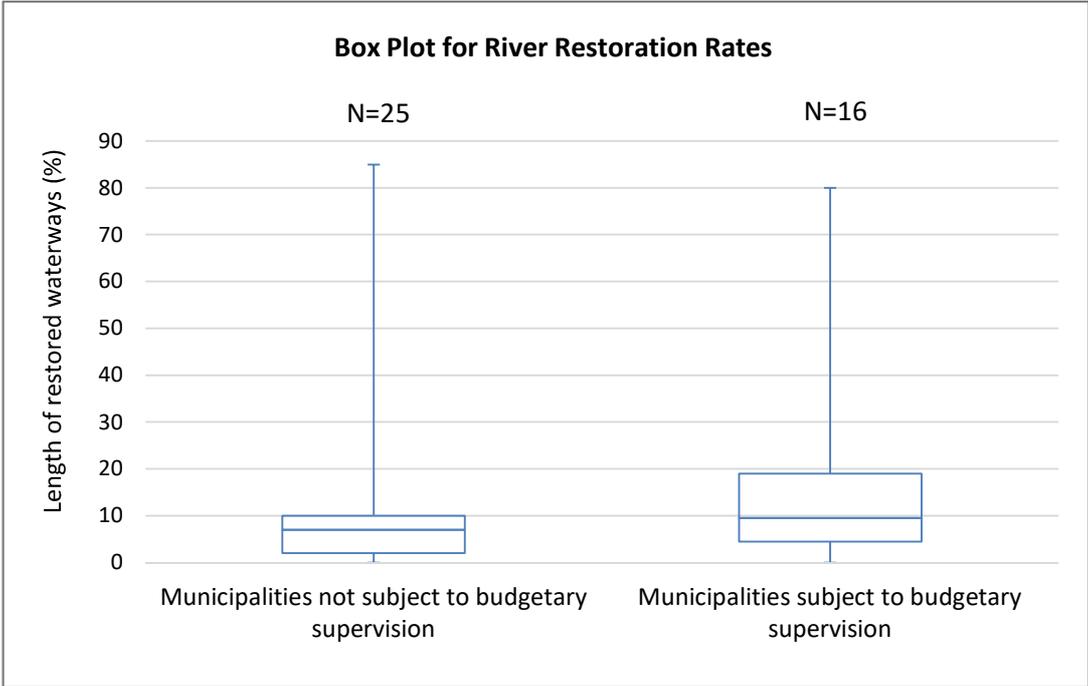


Figure 14: Comparison of the river restoration rates (as percentage to the total length of waterways) between municipalities that were subject to budgetary supervision (N=16) and municipalities that were not subject to budgetary supervision (N=25). Box plot shows restoration rates that had been achieved by the end of 2016.

The average number of administrative staff responsible for issues of river restoration in municipalities who were subject to budgetary supervision (N=15) was **1.2** ( $\pm 0.2$ ) and ranged between 0.2 and 3. In municipalities not subject to budgetary supervision (N=24) the average number of personnel was calculated to be **0.9** ( $\pm 0.1$ ) with a range of 0 to 3.

By the time of the survey, more than half of the participating municipalities had not used any of the financial processes listed in question 24 to cover their own contribution of the costs of river restoration (see Figure 15). Ecological compensation payments had provided financial means to about one quarter of municipalities and at least one in eight municipalities had made use of cost allocations. Money from donations had only been important to about 2% of municipalities. Differences in responses between the two budget situations were only minor.

Analysis of the restoration rates in municipalities who said they had not yet used any financial processes to cover their contribution of the costs (N=23) revealed that these municipalities had, in fact, restored between 0 and 40% of their rivers and streams, on average 9% ( $\pm 2\%$ ). When the restoration rates were calculated separately for the two categories, the following averages were obtained: 10% ( $\pm 3\%$ ) for municipalities who were subject to budgetary supervision (N=8) and 8% ( $\pm 3\%$ ) for municipalities who were not subject to budgetary supervision (N=15).

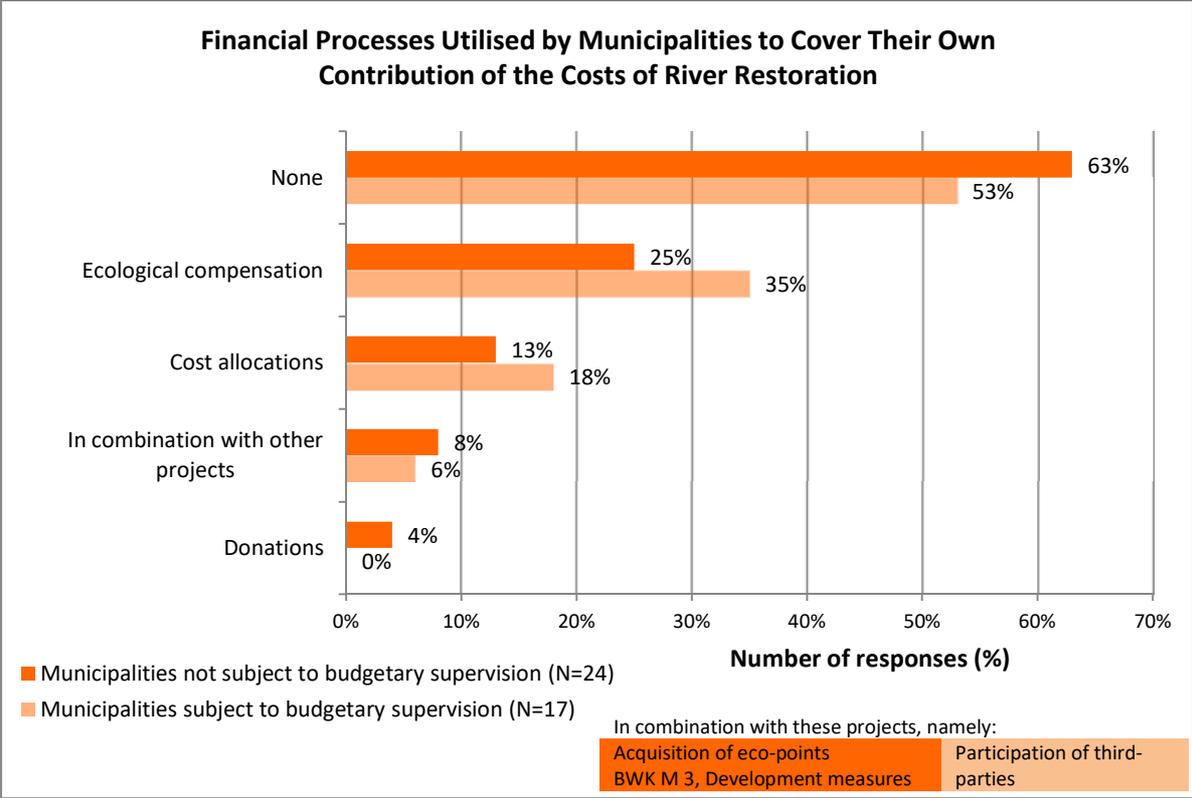


Figure 15: Response frequencies to the question “Which of the following financial processes has your municipality utilised to cover its own contribution of the costs of river restoration i.e. generally 20% but 10% for municipalities under budgetary supervision?”

By the time of the survey, 39 out of 40 municipalities (97%) had made funds available for river restoration measures in budgetary discussions and had justified these (N=40). The municipality that had failed, up to that point, to make funds available was a “municipality under budgetary supervision”.

By far the most widely used approach for informing council members about the benefits of river restoration were presentations held by the municipality’s administrative staff (over 60%, see Figure 16). Almost half of the participating municipalities had invited external presenters for the purpose of informing the council. Demonstrating advantages in discussions was less

frequently specified compared to the presentations (24% for Non-SBS-municipalities and 12% for SBS-municipalities). Regarding tours of successfully implemented projects, it can be noted that slightly less municipalities subject to budgetary supervision used this approach compared to those not subject to budgetary supervision (6% and 20% respectively). The number of respondents stating that they had not yet done anything to inform their council members lay below 10%.

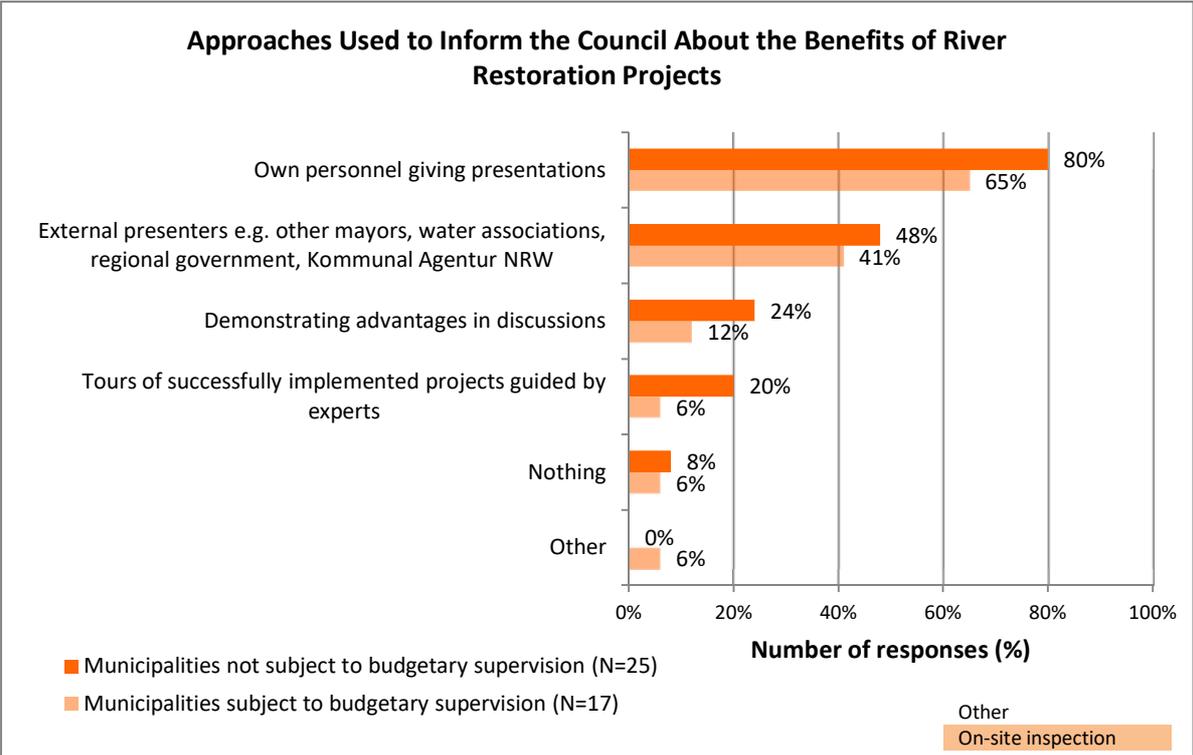


Figure 16: Response frequencies to the question “Which of the following approaches have you (or your administration) been using to inform your council about the benefits of river restoration projects?”

When municipalities were asked how they had managed to provide land for the implementation of river restoration projects, the majority answered: by purchasing land and offering this in exchange to riparian land owners (over 60%, see Figure 17). With respect to land lease, it was found that somewhat fewer municipalities subject to budgetary supervision used this strategy compared to those not subject to budgetary supervision (18% and 52% respectively). Approximately one third of municipalities had offered capitalised compensation for loss of use to land owners and at least one quarter of municipalities had utilised land consolidation processes to obtain riparian lands. The number of respondents who stated that they had not yet done anything to provide lands for restoring watercourses was relatively high (17% for Non-SBS-municipalities and 35% for SBS-municipalities). Only 5% of municipalities said they had used compulsory purchase orders to get hold of land. Some

respondents specified under “Others” that they had purchased riparian land directly i.e. without offering other areas in exchange (in total 4 respondents).

Analysis of the river restoration rates in municipalities who claimed they had not done anything to provide riparian lands for river restoration projects (N=10) revealed that these municipalities had, in fact, restored between 1% and 85% of their rivers and streams, on average 23% ( $\pm$  9%). When the restoration rates were calculated separately for the two categories, the following averages were obtained: 19% ( $\pm$  9%) for municipalities who were subject to budgetary supervision (N=6) and 28% ( $\pm$ 19%) for municipalities who were not subject to budgetary supervision (N=4).

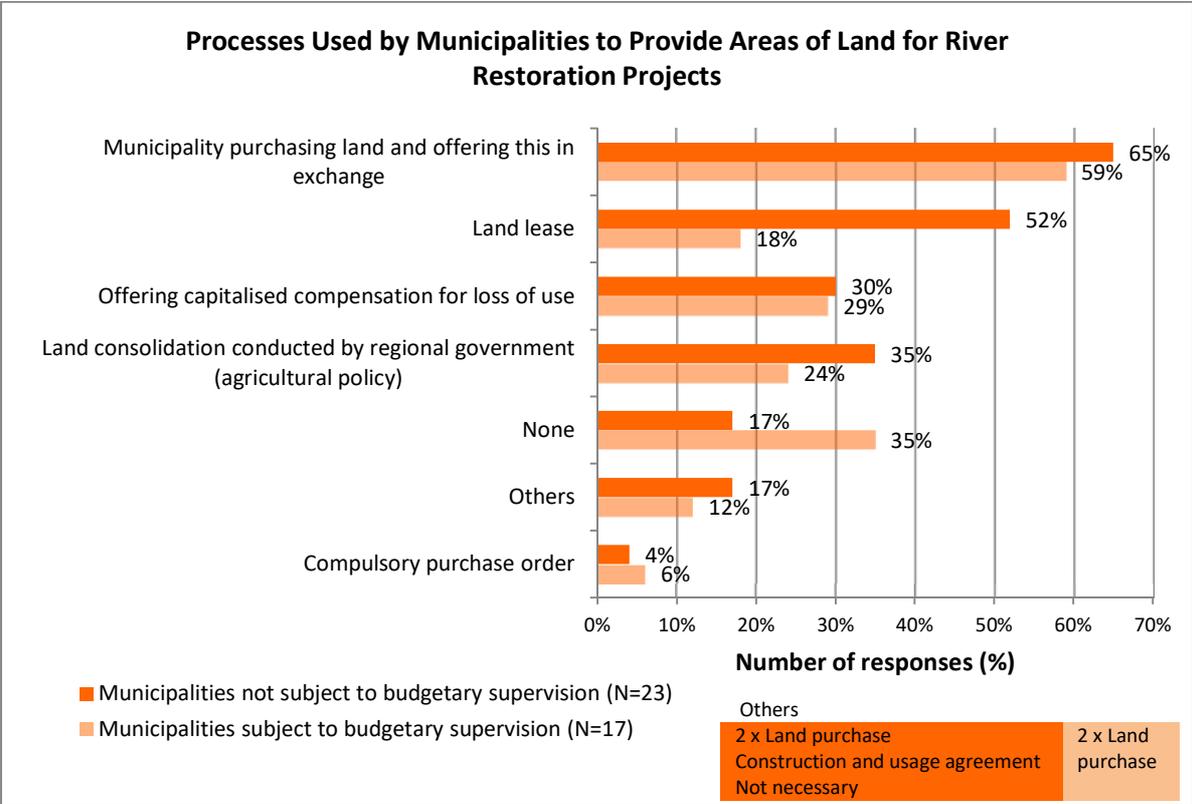


Figure 17: Response frequencies to the question “The implementation of river restoration projects often requires large areas of land. How have you been able to provide such areas in your municipality?”

Lack of riparian land was seen as the most important obstacle for the implementation of projects (over 70%, see Figure 18), closely followed by the financial situation of the municipality which was specified by roughly half of the respondents. Having to see to other problems, like refugees, also presented an important barrier for many municipalities (68% for Non-SBS-municipalities and 35% for SBS-municipalities). At least one in eight respondents saw a barrier in the lack of technical expertise. Slightly more municipalities subject to budgetary supervision regarded administrative expertise as a problem compared to those not subject to budgetary supervision (24% and 8% respectively). Some respondents mentioned high work load and being understaffed as additional limitations. About 5% of respondents didn't see any of the listed items as potential barriers.

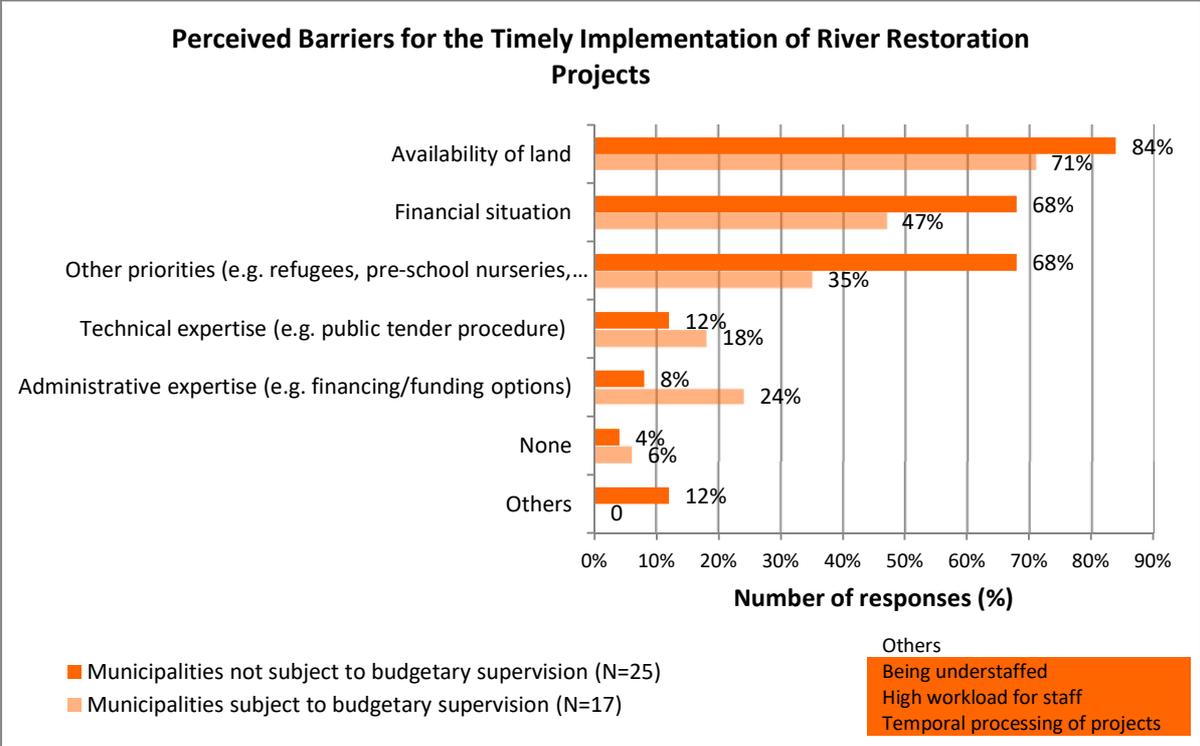


Figure 18: : Response frequencies to the question “What do you and your administration consider the most important barriers for implementing all stipulated river restoration measures in your municipality in due time?”

When respondents were asked how much they thought their citizens would be willing to pay (per capita and per year, and on top of property tax B<sup>14</sup>) for river restoration projects, the answers differed substantially depending on the budget situation of the municipalities (see Table 3). Whilst many municipalities believed that people would be happy to give 2 or 5 Euros, and this irrespectively of whether or not the municipality was subject to budgetary supervision, the greatest differences arose for “10 Euros” as well as for „Nothing”. Of the “less well-off” municipalities, around 44% thought that people would be unwilling to give any money towards river restoration, and no-one could imagine that people would give as much as 10 Euros. On the other hand, only 29% of the “well-off” municipalities expected people to give nothing but 9% believed that people would be happy to hand over 10 Euros. No-one in either category speculated that people would be willing to pay more than 10 Euros.

Table 3: Percentage distribution of municipalities with respect to their perception as to how much money their citizens would be willing to pay (per capita and per year, and on top of property tax B) for river restoration projects.

	<b>Municipalities not subject to budgetary supervision (N=21)</b>	<b>Municipalities subject to budgetary supervision (N=16)</b>
2 Euros	38%	37%
5 Euros	24%	19%
10 Euros	9%	0%
>10 Euros	0%	0%
Nothing	29%	44%

<sup>14</sup> Property taxes are individually determined and managed by the municipalities. Property tax A applies to agricultural and forestry properties and property tax B applies to all remaining properties.

## 4 Discussion

### 4.1 Overall Acceptance and Commitment towards River Restoration in NRW

The data compiled here suggests that the acceptance of river restoration and the commitment towards implementing the stipulated measures are very high across North Rhine-Westphalian municipalities. The answers received for the three acceptance statements as well as the five commitment statements were predominantly positive. Effectively, municipalities accept responsibility by getting engaged in the planning process, involving environmental organisations and informing the general public. But also, and even more importantly, mayors are convinced of the significance of river restoration and support this cause by getting involved. Such a high political will was not anticipated here and contradicts present opinion – expert as well as general opinion. The *Wassernetz NRW* conducted a survey on different aspects of local water protection amongst members of environmental organisations in NRW<sup>15</sup>. Many participants of this survey identified an absence of political will and a lack of sensibility to the benefits of water protection as important deficits that needed to be addressed (Schweer, unpublished). A survey conducted amongst participants of the "17. *workshop Flussgebietsmanagement 2016*" came up with similar results. This workshop takes place every year and invites representatives from all sectors of water resource management: engineers and natural scientists of water management facilities (e.g. water treatment and sewage treatment plants), economists in the field of environmental administration (including local administrations), delegates of environmental organisations as well as representatives of research and teaching. When this group of experts was asked about their opinion on the main obstacles for implementing river restoration measures, many identified – behind a lack of riparian land and conflicts over the use of water - a lack of political will as an important obstacle (Weyand, unpublished). This discrepancy between the results of the present study and the prevailing general and expert opinion is probably best explained by the relatively small number of participants in the present study. It is most likely that this survey only caught the attention – and hence gathered information - of municipalities with a keen interest in the subject of river restoration and those already very committed towards implementing measures. The fact that most participating municipalities had done the first step and had made funds available for river restoration measures in budgetary discussions serves as further support for this argument. Had all 396 municipalities been captured by this survey, the outcome of acceptance and commitment would almost certainly have been different.

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<sup>15</sup> the three formally accredited environmental organisations: BUND, LNU and NABU

Although acceptance and commitment were generally very high, the responses to individual questions do nevertheless vary and reveal slight differences in opinions. Within the acceptance statements, for example, access to natural water bodies was viewed as very important for people's well-being and mental health. Likewise, it was readily accepted that river restoration could enhance the attractiveness and recreational amenities of a municipality (e.g. for hiking, fishing, swimming, boating etc.). On the other hand, responses to statement 8 (that river restoration is at least as important as the provision of leisure facilities for sports and culture) were considerably less positive. This suggests that mayors are indeed aware of the importance of river restoration and emotionally convinced of the course. When municipalities have to prioritise, however, other obligations, like the provision of leisure facilities for sports and culture, often take precedence over river restoration projects. This problem also arose in a survey conducted amongst coalition party members of "*Bündnis 90/Die Grünen*" in local councils across NRW (Müller, unpublished). The report summarises: "The implementation of the Water Framework Directive at the local level is financially in strong competition with other municipal obligations and hence viewed critically in political committees". The results of the present study give further support to this argument: "other priorities" were identified as third most important obstacle for the timely implementation of river restoration projects - behind a lack of riparian land and insufficient financial resources. Municipalities are still reluctant to recognise the presence of beautiful riverscapes on a par with good infrastructure and ample leisure facilities (e.g. public baths, theatres, football pitches etc.). This emphasises the importance of creating a political framework within which situations of competition do not arise and within which municipalities do not have to prioritise. Rural municipalities with a deficit in leisure facilities not only need financial support but also convincing arguments. They need to be brought around to the idea that an attractive landscape - including restored river and streams - is just as important to people as having easy access to leisure facilities and that investing into river restoration may even help attract people to the town and reduce emigration.

Similar to the acceptance statements, the individual commitment statements also show slight variations in response. Of all commitment statements, the statement on the importance of involving environmental organisations generated the least agreement and thus exhibits the most pronounced spread of answers. The equivalent multiple choice question (i.e. on the involvement of environmental organisations) as well as the multiple choice question that enquired about the 'sourcing of information in order to acquire expertise' match this result, giving evidence that consulting and involving conservation organisations is occasionally not

very popular. These results are, perhaps, little surprising: nature conservation organisations do not enjoy the best of reputations - particularly at the local scale. Their demands are often *seen* as too extreme and unattainable, their approaches are often *viewed* as little compromising. Working with them is not always easy and *has the potential* to prolong the process of river restoration by making it more complicated than it needs to be (personal communication with a former employee of the Environmental Ministry NRW). As a result, members of environmental organisations often find it difficult to be heard and to get their points across. A survey conducted by the *Wassernetz NRW* (unpublished) confirms this: written statements from representatives of environmental organisations often go unnoticed and at committee and panel meetings<sup>16</sup> verbal comments are often disregarded or go unheard all together. For their part, the representatives of nature conservation organisations also see this as a problem and wish for better opportunities to participate and greater empowerment (Schweer, unpublished). In all fairness, there will be plenty of cities, towns and parishes in which environmental organisations and local government work well together, and certainly the results of this work reflect this: after all, 60% of participating municipalities considered the cooperation with the environmental organisations as being important. Nevertheless, it probably wouldn't harm to promote the cooperation of these two parties. Especially in towns where local governments still lack conviction and/or where they need help, a good cooperation between them and environmental organisations would be vital.

## **4.2 Potentially Limiting Factors**

### **4.2.1 Mayor's Childhood River Experiences**

Perhaps the most interesting association to be discovered by this study is the link between mayors' river-related childhood experience and their attitude towards vibrant water bodies later on in life. Social science literature provides extensive evidence that frequent and unencumbered childhood participation in "wild" nature such as playing in the woods promotes positive attitudes towards the environment as well a willingness to protect it in adulthood (Kals, Schumacher and Montada 1999; Bögeholz 1999; Wells and Lekies 2006; Chawla 2006). The knowledge of this positive effect of early-life nature experiences on environmental attitudes and behavior is what makes the outcome of the present study as important as it is interesting: mayors who played along rivers have a higher affinity to vibrant

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<sup>16</sup> that have been established across NRW to provide information and enable participation e.g. local forums and workshops, round tables and regional collaborations

water bodies and are more convinced that people need access to beautiful rivers for their emotional well-being and mental health. Mayors with such beliefs would naturally be more inclined to promote efforts of restoring river systems. However, it should be considered that the unbalanced number of respondents ( $N_{\text{played}} : N_{\text{not played}} = 73 : 11$ ) may have reduced the soundness of the statistical calculation. Hence, this result should be treated with caution. The unequal distribution of respondents between the two groups can be explained as follows: the average age of mayors in NRW is between 54 and 55 years (Bogumil and Heinelt 2012). People of this age spent a great deal playing outside when they were young. Given the dense network of rivers and streams across NRW, outdoor play would have included activities in and along water. Despite the need for caution when interpreting this result, recommendations for action can be derived and should be implemented. Although we cannot change someone's past, we can perhaps influence decision makers by way of pictures that show the beauty of successfully restored rivers and children playing merrily along the riverbanks (such as the picture shown in Photo 3). This way, decision makers may become more affiliated to (near)-natural water bodies and may feel a greater urge to get involved with river restoration projects.



Photo 3: This restored section of the river Werre in Detmold-Remmighausen is gratefully accepted by residents and visitors alike. Source: Bezirksregierung Detmold, 2017, Broschüre "Gewässerentwicklung mit Mehrwert", <https://www.flussgebiete.nrw.de/gewaesserentwicklung-mit-mehrwert-7600>

#### **4.2.2 Responsibility of River Restoration**

The results of this study suggest that the place of responsibility has great potential to affect the progress of river restoration. There are two aspects to this a) the extent with which municipalities who have delegated the task of river restoration accept the importance of this task and support their chosen entity in fulfilling it and b) the extent with which these municipalities perceive their chosen entity as possessing all the qualifications required for conducting such a task. In terms of acceptance, trans-municipalities do not differ much from self-municipalities. They, too, believe that restored rivers would be positive for residents and for the attractiveness of the community. However, they convey less agreement with the statement that restoring rivers is as important as providing leisure facilities. By placing river restoration in someone else's hand, municipalities do not only delegate the work but also the responsibility. They no longer have to deal with the issue. On the other hand, self-municipalities have to face and address the issue and – in the process - have come to understand that beautiful water bodies are on a par with leisure facilities such as theatres, public swimming pools and football pitches. They realise that restored rivers could promote contentment and possibly even help decrease emigration. In terms of commitment, trans-municipalities performed better than expected. Just like their self-conducting counterparts, they are convinced that environmental organisations should be involved, that extensive background knowledge of the subject is paramount and that by getting involved early i.e. during the planning phases the municipality's interests could be represented. Merely in two ways do trans-municipalities differ from self-municipalities: 1) mayors in trans-municipalities agree less readily that their committed efforts could aid river restoration and 2) mayors and/or administration of trans-municipalities do not feel responsible for informing the general public. On examination of the multiple choice commitment indicators it becomes clear that, in fact, the mayors' commitment is higher than what they indicated in the Likert scale statement: they raise awareness among council members, mediate between various interest groups, convince property owners, help with land acquisition and sensitise the public. This discrepancy in my data could be due to the design of the questions. Multiple choice questions record the number of actions someone undertakes but fail to reflect the intensity of these actions. Thus, without having to specify the strength of their efforts, participants can paint a better-than-real-life portrait of themselves. In terms of the importance of public information, Likert scale and multiple choice results match; trans-municipalities are less active when it comes to informing the general public. I argue that many of them leave this task to their water association, as indicated by one of the participants under "others".

In sum, when municipalities have transferred the responsibility of river restoration they appear to get involved and assist their chosen entity in fulfilling this task. A slightly reduced commitment can be forgiven; after all they delegated the job. But are they always satisfied with the performance of the entity they delegated the task to? With regard to the water associations' capabilities, the opinions greatly vary. For all three qualifications i.e. expertise, financial capacities and motivation, the water and soil associations are perceived as having lesser capacities than the water associations with special legal status. This raises the question why municipalities would hire someone they don't fully trust and don't regard as being capable. Could it be that they don't want the job done? After all, that would mean no increase in contributions to the water association and that - in turn - would be good for the budget! Further, municipalities seem to overlook that - at least for the lack of financial capacity - they are partially responsible. This applies to both types of water associations. Although water associations can apply for financial support<sup>17</sup>, they have to cover at least 20% of the costs of river restoration themselves. If the municipalities paid appropriate membership fees, the finances could surely be secured (personal communication with a former employee of the Environmental Ministry NRW). There is great potential for improvement here as, according to my data, only 8% of respondents had advocated for their water association and arranged for an increased contribution to them. With respect to the technical expertise, the water associations with special legal status are undisputable leaders – at least most of them. For decades they have been *the* experts on all aspects of water resource management: they own and maintain reservoirs, operate sewage treatment plants, see to flood control, monitor water quality and conduct research. Most water associations with special legal status that have been entrusted with the task of river restoration have a good standing with their members. They generally acknowledge the need for enhancing the ecological state of our water bodies and undertake restoration measures readily (personal communication with a former employee of the Environmental Ministry NRW). On the other hand, water and soil associations come from a different background. In the past, their main concern was keeping the river profile free of obstructions so that a proper drainage could be ensured and agricultural production would not be impeded. The smaller water and soil associations often have no qualified staff; instead farmers or contractors see to pending work such as in-bed weed control. Biological knowledge is often absent. Rethinking and adjustments in favour of ecological rivers seem to be slow and may require some support e.g. in the form of training (personal communication

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<sup>17</sup> With their regional government and to help with the costs of land purchase/compensation payments, hydraulic engineering measures, initial after care and monitoring.

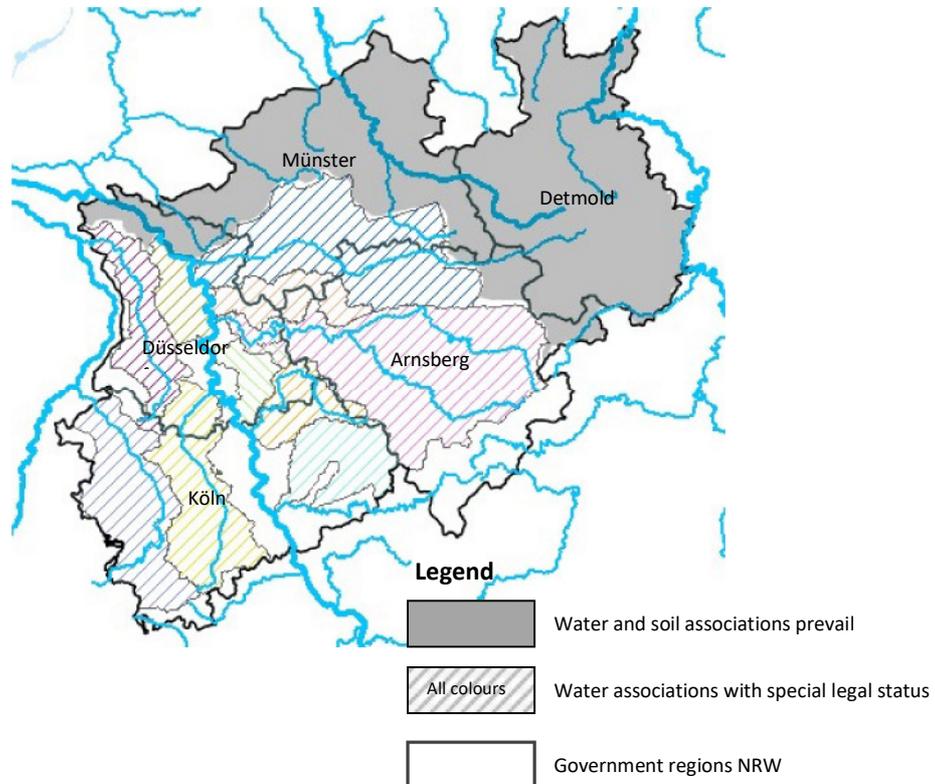
with a former employee of the Environmental Ministry NRW). Maybe it's the believe that water and soil associations still entertain rather traditional views (i.e. those of keeping rivers and streams well maintained without any considerations to ecological aspects) what causes so many municipalities to have such a negative opinion of their water and soil association's motivation, but I also argue that in some cases the municipality itself will be one that is unmotivated, and should search its own heart.

Considering this relatively poor performance of the water and soil associations<sup>18</sup>, the situation for river restoration per se looks bleak for areas where this type of water association predominates i.e. in the government region of Detmold and Münster (see Map 1) unless, of course, municipalities refrained from transferring the task. Since this is often the case in Detmold (personal communication with a former employee of the Environmental Ministry NRW) the situation here may be better than expected. In some cases, local governments have even retracted responsibility because they felt that river restoration would be better off in their own hands (personal communication with a watercourse rehabilitation officer).

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<sup>18</sup> Without wanting to generalise too much here; there are many (often the larger) water and soil associations that do a good job. It should also be considered that 16 participants is not exactly a representative sample.

## Geographical Extent of Water Associations in North Rhine-Westphalia



© Geobasis NRW 2017, modified by author

Map 1: This map provides a general overview of where the two types of water associations occur. Water associations with special legal status prevail in the south-west. The north-east is dominated by water and soil associations. Please note: this map is not comprehensive; there are some specifics to be considered. For instance, not the entire area marked in grey is covered by water and soils associations; there are some, albeit few, areas/municipalities that are without ties to a water and soils association. These are not marked specifically on the map. Further, the water association with special legal status shaded in red (the *Ruhrverband*, in Arnsberg) is not actually responsible for river maintenance; and the water association with special legal status shaded in light blue (the *Wasserverband Eifel Rur*, in Köln) is only responsible for river maintenance in the lowland. Also, the water association shaded in green (the *Bergisch-Rheinischer Wasserverband*, in Düsseldorf) is an ordinary water and soil association; not one with special legal status. Also, some, albeit few, water and soil associations occur in areas where water association with special legal status are also present.

### 4.3 Non-Limiting Factors

#### 4.3.1 Municipality's Financial Situation

The data collected by this survey provides substantial evidence that the financial situation of a municipality *does not* constitute a significant limiting factor as neither the acceptance nor the commitment was influenced by the municipality's budget situation. The results show that municipalities work very hard at achieving their goals and that they do this independently of

whether or not they are under budgetary supervision. The responses to the multiple choice questions indicate a similar level of commitment from both: "well-off" and "less well-off" municipalities. The only difference in response frequencies large enough to be mentioned here is that seen for "helping with land acquisition and land management" where municipalities under budgetary supervision apparently get involved less frequently. There is room for improvement here and less well-off municipalities should try and catch up. Other than that there is really very little evidence that financial problems stifle involvement. In fact, financial problems appear to increase certain efforts and activities. Municipalities with financial strains, for example, engage more actively with the general public. They put comparatively more effort into informing residents about river restoration projects and they organise public events such as guided river adventure tours. On top of that, municipalities with financial worries create opportunities for river sponsorships. These will not only increase awareness but also help with the financing of particular projects. Furthermore, it seems that - when money is an issue - municipalities are more inclined to consult environmental organisations: they turn to them for information and use their expertise by inviting them to committee/panel meetings.

Further support to the argument that a strained budget does not inhibit the municipality's efforts is given by the second part of the questionnaire which was solely directed at municipalities who conduct river restoration themselves. In both categories of municipality (i.e. SBS-municipalities and Non-SBS-municipalities), virtually the same number of staff are responsible for restoration projects and very similar restoration rates have been achieved. Almost all municipalities had been successful in making funds available for river restoration projects in budgetary discussions – SBS-municipalities and Non-SBS municipalities alike. There are only very few examples where differences between SBS-municipalities and Non-SBS-municipalities become apparent. One of the ways in which the two categories differ is seen from their approaches to convince their council members. Tours to successfully implemented restoration projects do not seem as popular with SBS-municipalities. Perhaps it needs to be communicated to admin staff of all municipalities that such tours can actually be very effective in gaining the council's approval. Another difference arises in the perception of possible barriers. Comparatively more SBS-municipalities identified their lack of administrative expertise as a potential problem, something that needs to be addressed (and perhaps already is) by the *Kommunal Agentur NRW*<sup>19</sup>. Further differences show up in the ways in which municipalities provide areas of land along rivers for restoration projects. Land

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<sup>19</sup> The *Kommunal Agentur NRW* has been commissioned by the Environmental Ministry NRW to help municipalities with the task of river restoration.

lease always means a long-term financial strain, and this is perhaps the reason why this process of providing riparian land is less frequently used by SBS-municipalities. Surprisingly, almost one-quarter of municipalities stated that they had not used any of the conventional methods for obtaining land – as provided by the questionnaire. Judging by their river restoration rates, these municipalities have been actively implementing river restoration measures. So how do municipalities get projects on the way without prior land acquisition? There are several possible explanations for this. Firstly, in densely populated cities where river banks have been developed, river restoration will be restricted to the river bed and this makes land acquisition redundant. Secondly, it is also possible that municipalities already own suitable areas along rivers. Thirdly, cases have been known where restoration measures were implemented as compensation measures for construction projects - perhaps even without transfer of ownership (personal communication with the head of an environmental service company). Interestingly though, somewhat more SBS-municipalities than Non-SBS-municipalities stated that they had not done anything to provide riparian land. Since both categories had been active at implementing projects, this result is probably just random and need not be explained.

Even though the financial situation has virtually no influence on the commitment and performance of the municipalities, more than half of them identified financial strains as important obstacle; and many of them would wish for better financial capacities if they could – and this independently of whether or not the municipality was subject to budgetary supervision. River restoration projects are being funded by up to 80% (or indeed 90% in the case of SBS-municipalities), leaving the municipality with only 20% (or 10% in the case of SBS-municipalities) co-payment. Then why do so many municipalities have problems financing river restoration projects? The answer can be found within this survey: nearly 60% of municipalities specified that they don't use any of the common processes – as provided by the questionnaire - to finance their own share of the costs. Instead, they take the money out of the municipal budget. That this must be so becomes clear when the restoration rates of these municipalities are examined. They show that these municipalities have been actively restoring their waterways; and the only way to provide the money for this work (if they don't use ecological compensation payments, cost allocations or donations) would be to use their budget (personal communication with a former employee of the Environmental Ministry NRW and the head of an environmental service company). All municipalities - rich and poor - have a certain budget available to them with which they have to finance a huge number of projects including refurbishments of schools, the integration of refugees, road repairs etc.

There is always more work than there is money and projects have to be prioritised. Hence, independently of whether or not a municipality is under budgetary supervision, money will always be an issue. However, this wouldn't have to be the case if municipalities explored all the options of raising money i.e. cost allocations, ecological compensation payments and donations. The new 'Law on water in NRW' (*Landeswassergesetz NRW*, short LWG NRW) which became effective on 16<sup>th</sup> July 2016 intended to simplify the process of cost allocations. With articles 64 and 69, municipalities now have a legal instrument that allows them to split the costs of river restorations between *all* property owners in the river basin: properties in urban areas as well as those in the undeveloped outskirts<sup>20</sup>. After all, everyone benefits from restored rivers and, likewise, everyone is responsible for the detrimental changes to the river in the first place (e.g. via soil sealing and effluent discharges). Having the public's consent would be absolutely paramount for allocating costs in such a way. Studies have shown the general public to be very accepting of river restoration measures ((Haase et al.; Frör; Lindow: all unpublished) and, indeed, willing to pay for them. In an investigation commissioned by the *Wupperverband*, the majority of interviewees (general public) were willing to pay for remedial work to the Wupper with an average amount of 3.33 EURO per month and person (Liesenfeld, Stachowiak and Schillhabel 2012). However, it is still a common opinion amongst decision makers that citizens would not be happy to pay for restoration projects. Over one-third of the municipalities in the present survey believed that people wouldn't want to give anything. The common assumption of decision makers is that citizens understand their tax fees to already cover everything ("All-Inclusive-Mentality": personal communication with a mayor). Perhaps we need informational campaigns for decision makers and local politicians as much as we need informational campaigns for the public. Decision makers need to come around to the idea that cost allocation is a possible option to raise the money for covering the municipality's own share of the costs of river restoration measures.

#### **4.3.2 Municipality's Functional Designation**

This study found no association between the functional designations of the municipality and the respondents' acceptance for, and the commitment to, river restoration. Basically, the functional designations reflect a certain population size. Independent cities as well as major and medium sized district-affiliated cities/towns have large populations and can thus be considered as very urban places. In contrast, district-affiliated towns and district-affiliated parishes have smaller populations and can be regarded as rural environments. In light of these

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<sup>20</sup> Prior to the new LWG NRW, costs were only passed on to property owners outside of urban developments (personal communication with a former employee of the Environmental Ministry NRW).

considerations, the data of this study did not reveal any rural-urban differences in the appreciation of vibrant water bodies and the attitudes towards river restoration. There are two possible explanations for this lack of differences: a) there just aren't any differences between urban and rural municipalities or b) the small data set does not allow distinctions to become apparent. In the past, urban-rural differences in the support of river restoration have been found by various authors. Tunstall et al. (2000) assessed public attitudes to restoration works on three rivers in England and found that – although generally restoration works received much approval – people living in very urban environments seemed to perceive greater benefits from restoration measures. Vermaat et al. (2015) came to very similar conclusions. The authors estimated the success of river restoration using the ecosystem services approach. They quantified the annual economic value for eight pairs of restored and unrestored reaches across Europe and found that the total ecosystem service value was significantly higher in the restored reaches. They found further that the cultural aspects of river restoration, i.e. in terms of recreational hunting and fishing, kayaking, biodiversity conservation, appreciation of scenic landscapes, were more important in densely populated areas. Schläpfer and Witzig (2006) provide further evidence to the discourse that differences in acceptance of river restoration exist between rural and urban places. The authors estimated public support from municipal voting returns in Switzerland. About 140,000 citizens in the Swiss canton of Bern passed a ballot initiative to allocate about 3 million Swiss Francs annually to a canton-wide river restoration programme. The authors related voter's preferences to, *inter alia*, population density and found that support for the initiative increased with increasing population density. All these findings are very much in line with the findings of earlier studies which concerned themselves with the social bases of environmental concern and where scientists found that urban residents were more likely to be concerned about the environment than rural residents (Tremblay and Dunlap 1978; Liere and Dunlap 1980; Lowe and Pinhey 1982). In those days, researchers typically explained this relationship with a) urban residents being more exposed to environmental degradation, such as pollution; and b) rural residents having an economic dependence on resource extraction, e.g. via agriculture, forestry and mining, thus being less concerned about environmental protection. According to Tremblay and Dunlap (1978), utilitarian attitudes toward the environment may not be restricted to farmers and loggers, but can also be expected among rural residents not engaged in nature-extractive occupations due to a 'shared rural culture'. Therefore, it is very possible that an entire population of a rural area will oppose efforts of river restoration. Buijs (2009) conducted a comprehensive study of public attitudes towards river restoration in three Dutch floodplains. The author found that

emotional place attachment, rural values and agriculture were the main factors driving public opposition for river restoration. People who argued along these lines challenged safety arguments for river restoration and highlighted potential threats to sense of place and to agriculture. These findings are very interesting and also relevant for this work. They suggest that in rural places with a lot of agricultural production, wild and beautiful riverscapes may not be much appreciated; instead, the needs of the farmers may be given first priority.

Knowledge of potential rural-urban differences is important as it may affect the ways in which municipalities – urban vs. rural - are approached with information and how they may be encouraged to undertake river restoration measures.

Something that needs to be considered here is that the present study did not enquire about the participant's place of residence. It is highly likely that many respondents commute to work and that their living and working environments actually differ. They may live in the country but work in a city or vice versa. Nevertheless, administrative staff and the head of administration are expected to represent their community and act on behalf of their citizens. It is therefore plausible that administrative staff and mayor associate with their places of work and adopt the values and attitudes of the environment they work in – rural or urban - then address issues and problems accordingly. It is only via this presumption that a discussion on the potential differences in attitudes towards river restoration between urban and rural municipalities is warranted at all.

### **4.3.3 Municipality's Geographical Affiliation**

This study found no link between the geographical affiliation of the municipality (i.e. which government region it belongs to) and the general acceptance of river restoration or the general commitment to restoration measures. However, a larger and more representative dataset may have been able to show distinctions. The most prominent difference between the government regions arises from the topography and the resulting land use and land cover. The north of NRW is dominated by arable land; the south exhibits large areas of forest and pastures. In regions where arable land predominates, river structures have been altered most severely (compare Maps 2 and 3). This can be attributed to the requirements that agricultural practices have on rivers and streams. As mentioned before (see chapter "*Responsibility of River Restoration*") an orderly drainage of rain water has always been the first priority of river management work in areas with lots of agricultural production. Ecological aspects such as the course of the river (e.g. meandering), the shape of the river bed, the current velocity and the state of the river bank (e.g. presence of riparian vegetation) have often come second. These

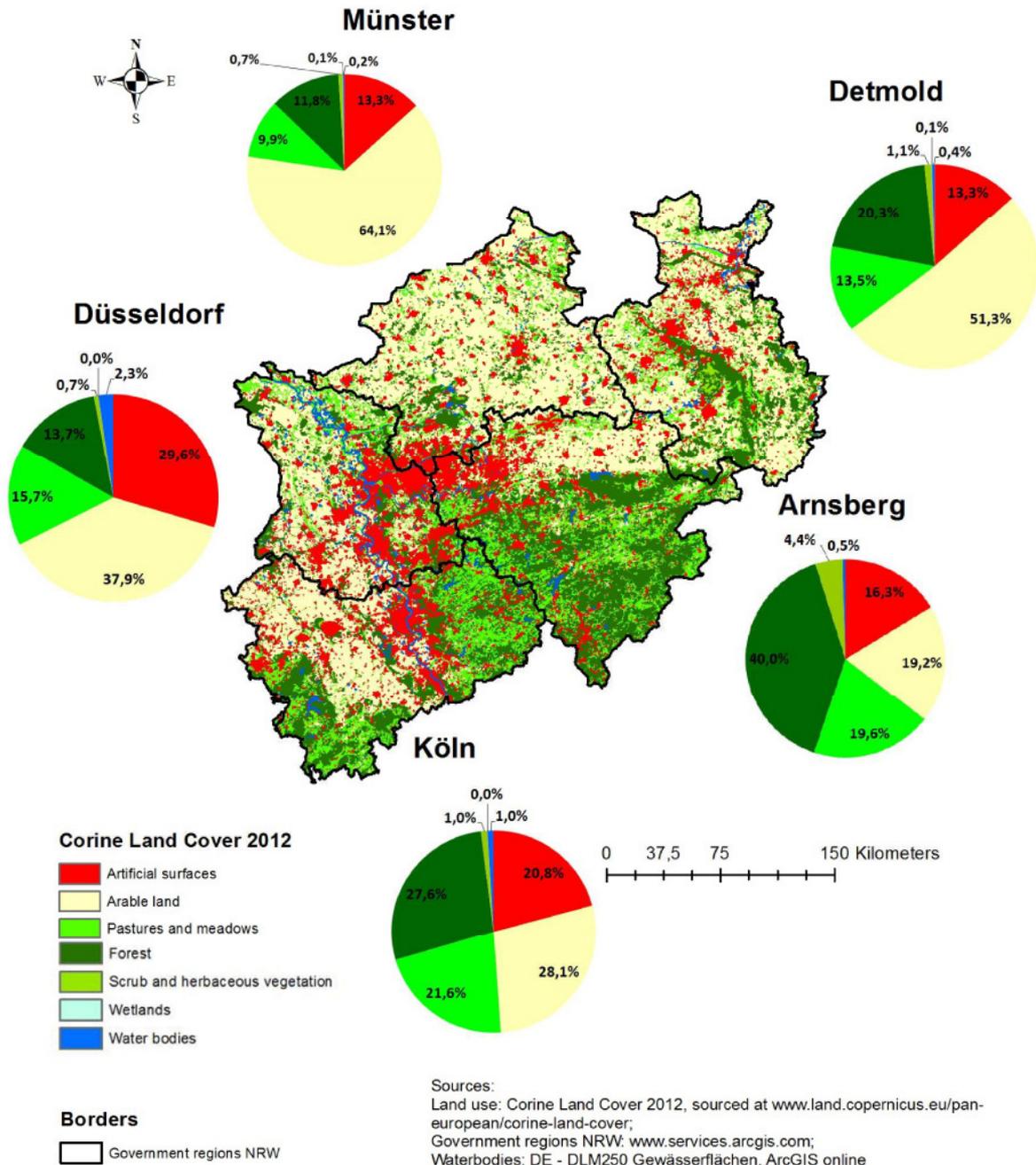
traditional views and practices may still be present and influence people's opinions about the value of vibrant water bodies and the importance of river restoration. On comparing the old with the new map of river structure quality (see Map 3 and Map 4), it becomes noticeable that - in the nine years that lie between these two maps - Düsseldorf, Köln and Arnsberg have worked on improving the structure of their rivers and streams – albeit only little so far. Also, it seems that in Münster and Detmold nothing has happened and that in fact their river structures have deteriorated further. To attribute this standstill or negative advancement to the traditional views described above would be the most reasonable conclusion here. However, saying that Münster and Detmold cling to old traditions and don't improve the structures of their rivers would be as wrong as it would be unjust. The evaluation methods were changed in-between the two surveys; many lowland rivers were assigned a different river type and this resulted in much higher demands on the structure and the biology of these rivers (MULNV NRW n.d.c.). Münster and Detmold were most affected by these changes; and this is probably one of the reasons why structural improvements in these regions do not become apparent (personal communication with a former employee of the Environmental Ministry NRW). So whilst we cannot rule out that traditional views persist and influence people's opinions about vibrant water bodies (see also the discussion on rural-urban differences in section '*Municipality's Functional Designation*'), we cannot use the data in these maps to draw conclusions along these lines.

Knowledge of potential differences between the government regions is important as it may help us address the issues in each region appropriately and find the best way of approaching local governments. Another important aspect is how the regional government (*Bezirksregierung*) handles the subject of river restoration. A regional government that is sympathetic and supportive – without being imperious - can facilitate the municipal implementation of river restoration measures to a great extent (personal communication with a former employee of the Environmental Ministry NRW). However, the commitment and competencies of the regional governments were not part of this work; they could be investigated in future studies though.

But not only the social skills of the people who pull the strings in the regional government are important; those of the mayors are vital too. Initially, river restoration may seem a solely technical topic; but social aspects play a huge role for its implementation in practice and must not be overlooked. A mayor should be willing and able to compromise and negotiate, have the power to persuade, show understanding, and be open, honest and trustworthy. Last but not

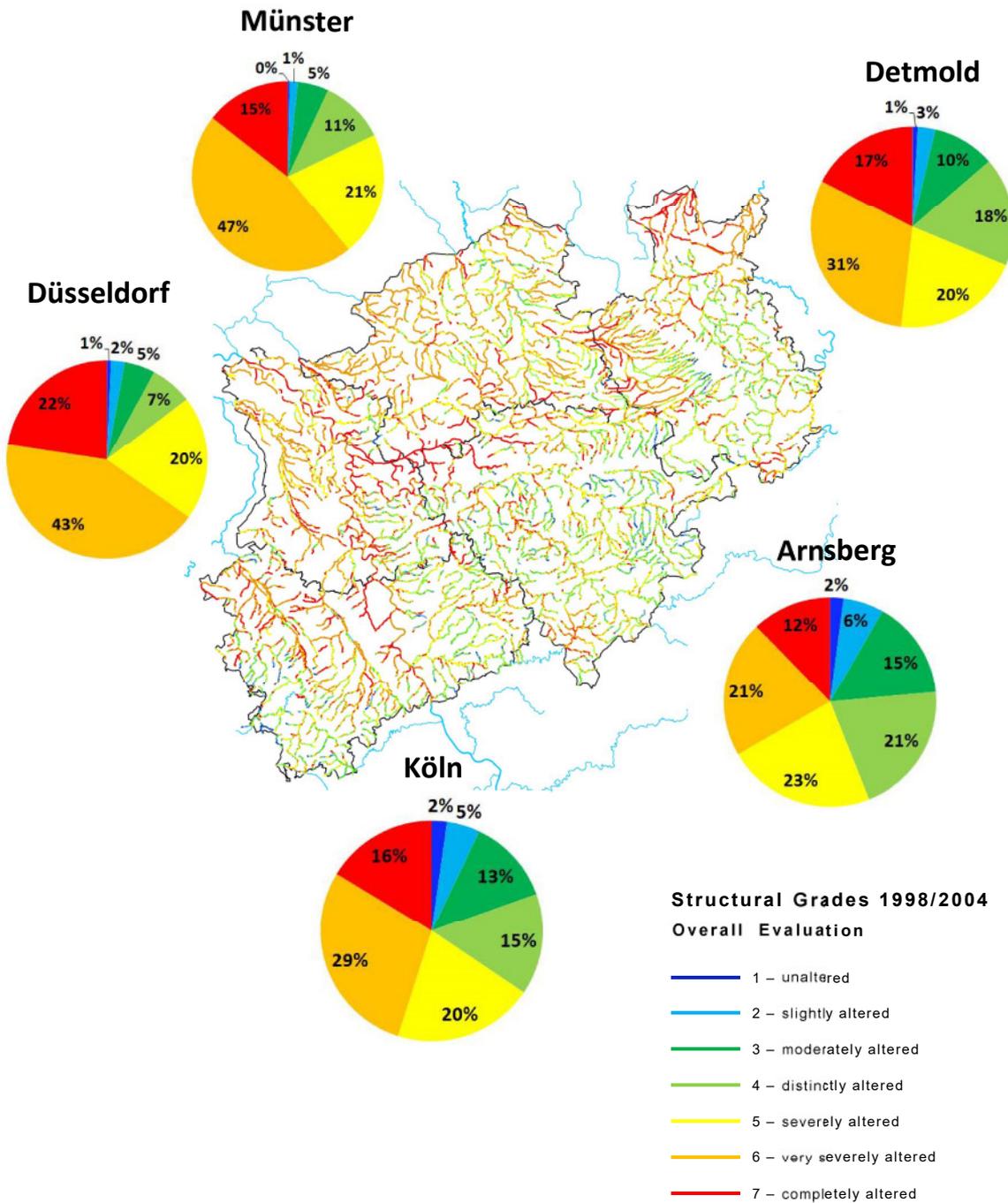
least, he or she needs patience and perseverance, and must not let himself/herself be discouraged by the slowness and inertia of many processes, e.g. land acquisition. All of these social competencies were listed by the mayors and/or administrative staff in this survey, proving once again that the majority of participants support the course of river restoration and get involved diligently in the implementation of measures.

## Land Cover in North Rhine-Westphalia by Government Region



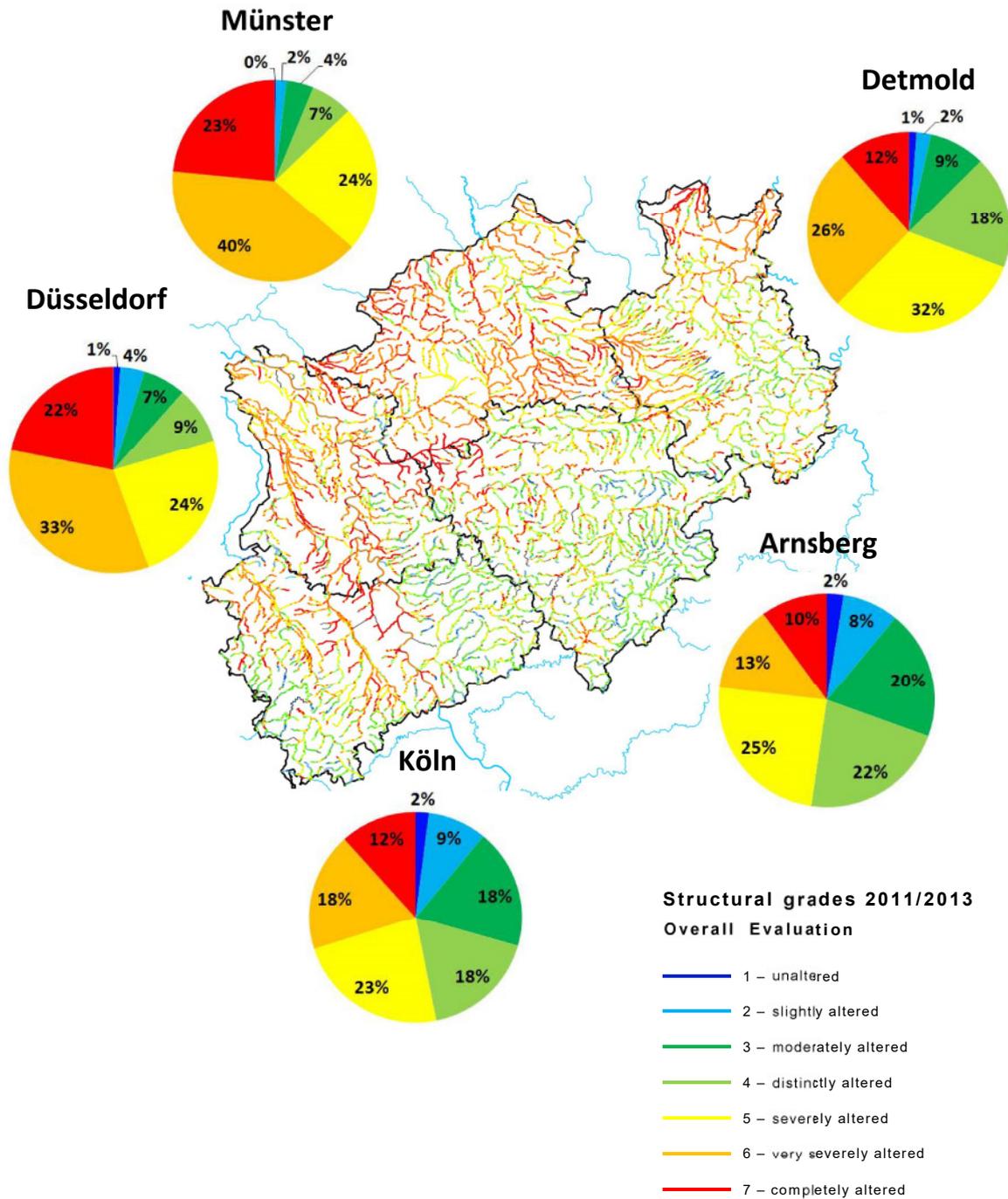
Map 2: Land cover in North Rhine-Westphalia in 2012. Inset charts showing the percentage distribution of land use classes in each government region (percentages derived in ArcGIS from Corine Land Cover 2012).

## Structural Quality of Rivers in NRW by Government Region 1998-2004



Map 3: Structural quality of rivers in North Rhine-Westphalia, mapped 1998-2004. Map shows the overall quality of the river structure. Inset charts show the percentage distribution of structural grades in each government region (percentages derived from data provided by the LANUV).

## Structural Quality of Rivers in NRW by Government Region 2011-2013



Map 4: Structural quality of rivers in North Rhine-Westphalia, mapped 2011-2013. Map shows the overall quality of the river structure. Inset charts show the percentage distribution of structural grades in each government region (percentages derived from data provided in ELWAS-WEB: <http://www.elwasweb.nrw.de/elwas-web/map/index.jsf>, viewed November 2017).

#### **4.4 Limitations of the Study and Suggestions for Further Research**

The most important short-comings of this study were the low response rate and the non-representativeness of the sample. Although 38% of municipalities responded to my request and started completing the questionnaire, many had to be excluded from analysis as they had not answered all of the compulsory questions. The specific design of the survey which aimed to capture the opinions of the mayor and which allowed respondents to pass the questionnaire back and forth proved too complicated and time-consuming as many respondents discontinued at this point. The length of the survey seemed to be a problem, too, as 16 participants quit after having passed the ‘critical point’ but before reaching the last compulsory question. 20 questions is a typical – and reasonable - number of questions for scientific surveys so that the length of the questionnaire cannot be blamed. Nevertheless, this work ended up with a sample that seems to be biased towards participants who are more interested in the subject of river restoration; and perhaps the complexity and lengthiness of the questionnaire was partly responsible for this. Certainly, the impersonal nature of an online survey may have made participants feel less obliged to take part in the first place, and then to continue when things get difficult or lengthy. A non-response test could have been performed to determine whether non-respondents really did have different attitudes/opinions from respondents. That would have involved telephoning municipalities at random and asking them to answer the questions on acceptance and commitment. A comparison of the two groups would have been able to verify the assumption of a bias sample but the effort for this seemed in no relation to the gain. To increase the response rate, a reminder e-mail could have been sent out three or four weeks after the initial request. Not wanting to cause disapproval and stifle the success of any future academic surveys I refrained from doing so. However, a larger and more representative sample may have been able to reveal statistical differences in acceptance/commitment arising from the size (i.e. functional designation) and the geographical affiliation of the municipality.

Future studies on the political will towards river restoration should not solely rely on online surveys as a methodological tool as there may be a great likelihood to end up with a bias sample. Instead, it is recommended to analyse and evaluate official documents, such as the minutes of council and committee meetings, to obtain a measure of commitment and progress. Additionally, municipal homepages could be assessed for the presence of relevant topics.

Another large limitation arises from the use of multiple choice questions to evaluate commitment. Multiple choice questions cannot capture the intensity of one’s actions. For

example, they cannot distinguish between someone who talks to the public every week and someone who has done so only once in the last five years. Worse, closed-ended questions can bias people into giving a certain response. Predetermined answer items can reveal what the survey conductor is looking for, so people may be directly or indirectly influenced by the questions. However, the present study evaluated the commitment in two different formats: Likert scale and multiple choice. This allowed me to align and compare the results, so I feel confident that the overall picture is quite realistic.

For future studies tying into this work it is recommended to include enquiries among the general public. Questions like *“Have you heard about river restoration projects in your area?”*, *“Is it important to you that the rivers of your city are getting restored?”*, *“As a private individual, would you be willing to pay for restoration projects by way of an increased property tax? If Yes, how much?”* could be very interesting. Further, this survey’s result on the water associations’ capacities (or lack hereof) invites more detailed investigations. Surveys among water associations could help quantify obstacles and identify appropriate mitigating measures.

## 5 Conclusion

This study was undertaken with the primary aim of determining potential reasons for the slow progress of river restoration in North Rhine-Westphalia. The survey conducted for this purpose revealed that the majority of local governments have a very positive attitude towards river restoration and are indeed very committed to conducting restoration measures. Of all the factors that were investigated, the responsibility situation has the greatest potential to stifle progress, specifically when the task of river restoration is placed in the hands of water and soil associations. From the municipalities' point of view these associations lack know-how, financial capacity and conviction. Actions to strengthen water and soil associations are therefore necessary. Ecological knowledge, for instance, could be enhanced via training courses; and by merging several small associations, resources could be pooled. A very interesting outcome of this study is that mayors who played along rivers in their childhood are much more appreciative of (semi)-natural water bodies than those without such experiences. This is very positive indeed because the majority of mayors currently in office will have played along rivers in their childhood. With mayors having great influential power, it will certainly be an advantage if they see the importance of rehabilitating river systems. The data of this study also show that the financial situation of the municipality plays a relatively minor role. Despite tight budgets, local authorities do find ways to advance the river restoration work in their municipality. Nevertheless, municipalities would be well advised if they explored the option of allocating the costs of restoration projects to all property owners in form of a fee or tax. The amended Law on water NRW may prove itself suitable for this purpose but it will take a precedence case.

Unfortunately, the study is not very representative. It is very likely that only those municipalities with a keen interest in the subject participated. It must be assumed that the real situation across NRW is somewhat worse. Further studies are therefore required. For future surveys tying into this work, it is recommended to use other, additional, sources of data besides the questionnaire. Also, a larger and more representative data set may have been able show up differences in attitudes towards river restoration arising from the size of the municipality and the geographical location of the municipality. Insights into this would be important in order to find out what municipalities need and how to motivate them.

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# Appendix

## Municipal watercourse rehabilitation in NRW

### Page 1

Thank you for supporting my Master-thesis.

This questionnaire contains 21 questions for municipalities who have transferred all or most of their river maintenance obligations to local water associations and 28 questions for those who have not transferred this obligation.

It is possible to stop this questionnaire at any time and continue later. To do this, please note down the code that appears in the upper right hand corner after completion of the first page.

#### 1. What applies to your administrative unit? \*

- Independent city
- Major district-affiliated town or city (population generally >60,000)
- Medium-sized district-affiliated town (population generally 25,000-60,000)
- District-affiliated town (population generally less than 25,000)
- District-affiliated parish (population generally less than 25,000)

#### 2. Which government region does your municipality belong to? \*

Options to choose from:

Arnsberg  
Detmold  
Düsseldorf  
Köln  
Münster

#### 3. In your municipality, who is responsible for the river maintenance on “2<sup>nd</sup> order water bodies” and “other water bodies” – therefore also for the obligations under the Water Framework Directive? \*

- Municipality
- District administration
- Water association with special legal status in NRW
- One or more water and soil associations

#### 4. Is your municipality subject to budgetary supervision? \*

- Yes
- No

## Page 2

The following five questions or statements should be answered by the mayor personally. The survey can be interrupted at any time and continued at a later date – even from a different workplace. Just jot down the code shown at the top right.

**5. Mr./Madam Mayor: in your childhood, did you play along rivers? \***

Yes

No

**6. Mr./Madam Mayor: water does not only play a role for maintaining people's bodily functions, but having access to near-natural watercourses is also important for a healthy state of mind.\***

Strongly agree

Agree

Neither agree  
nor disagree

Disagree

Strongly  
disagree

**7. Mr./Madam Mayor: watercourse rehabilitation measures do not only have a positive effect on river ecology and flood protection but may also enhance the attractiveness and recreational amenities of a municipality.\***

Strongly agree

Agree

Neither agree  
nor disagree

Disagree

Strongly  
disagree

**8. Mr./Madam Mayor: the rehabilitation of natural and ecologically diverse water bodies is at least as important as the provision of leisure facilities for sports and culture.\***

Strongly agree

Agree

Neither agree  
nor disagree

Disagree

Strongly  
disagree

**9. Mr./Madam Mayor: a dedicated mayor can positively influence the watercourse rehabilitation in his/her municipality and promote the stipulated measures.\***

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Page 3**

**10. It is important that the mayor (or administrative staff) involves nature conservation associations (BUND, NABU, LNU) in questions of watercourse rehabilitation as this may positively influence the implementation of measures.\***

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**11. A comprehensive preparation with the subject of watercourse rehabilitation is indispensable in order to meet the challenges of governing this municipal task.\***

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**12. Through early participation during the 1<sup>st</sup> and 2<sup>nd</sup> planning phases (i.e. during the drafting of the river basin management plan, the programme of measures and implementation timetables) a municipality could ensure that their interests with regard to watercourse rehabilitation are represented.\***

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**13. Information to the public by the mayor (or his/her administration) about the value of natural waters and current watercourse rehabilitation projects is an important principle for successful municipal watercourse rehabilitation.\***

Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Page 4

**14. What actions have you (or your administration) taken to ensure that watercourse rehabilitation measures can be implemented? What do you consider your main responsibility? (Multiple answers possible) \***

- Convincing council and committees/raising awareness
- Mediating between various interest groups
- Convincing property owners
- Participating in events e.g. local forums, round tables discussions
- Creation of jobs/contacts
- Informing the general public
- Helping with land acquisition and land management
- Informing about funding options
- Arranging for increased contributions to the Water Association
- Participating at meetings of the Water Association
- Providing financial resources in deliberations on budget planning
- None
- Others (please state)

**15. How have you (or your administration) been involving environmental associations/organisations in matters of the watercourse rehabilitation in your municipality? (Multiple answers possible) \***

- Committees/panels
- Inviting comments
- Practical work
- Public relations
- Participation at events/meetings
- Not at all
- In other ways (please state)

**16. Where have you (or your administration) obtained the expertise for implementing the watercourse rehabilitation measures in your administrative area? (Multiple answers possible) \***

- Kommunal Agentur NRW
- Regional government
- Symposiums/conventions/conferences
- Environmental associations/organisations
- Local Water Association
- Consultancy firms
- Science
- Private study
- Media
- No expertise obtained
- From somewhere else (please state)

**17. How did your municipality get involved in the 1<sup>st</sup> and 2<sup>nd</sup> planning phase, i.e. during the development of management and action plans as well as the implementation timetables for your municipality? (Multiple answers possible) \***

- Submitting comments on the draft of the management plan
- Involving/informing the council/committees
- Using the consulting service offered by the Kommunal Agentur NRW
- Participating at round table discussions
- Participating at workshops
- Joining regional collaborations
- Participating at local forums
- Not at all
- In other ways (please state)

**18. Which of the following efforts have you (or your administration) undertaken to inform the citizens of your municipality about the value of natural water bodies and about any current watercourse rehabilitation projects? (Multiple answers possible) \***

- Handouts and flyers in the town hall
- Press releases
- Information boards at sites
- River and stream sponsorships
- Provision of information by administration
- Guided river adventure tours
- Excursions
- Guided tours of current project sites
- Specific water conservation projects
- Educational events at schools and pre-school nurseries
- Displaying the travelling exhibition "vibrant waters"
- Guided tours of successfully implemented projects
- None
- Others (please state)

**Page 5**

**19. In your opinion, what social and managerial skills should a mayor (or his administration) have in order to deal with property owners, landowners and other stakeholders? (Please answer in note form)**

**20. If you could wish for anything to help you progress the watercourse rehabilitation measures of your municipality, what would it be? (Please answer in note form)**

**Page 6**

**21. To what extent do you (or your administration) consider the water association(s) – assigned with the tasks of river maintenance in your municipality - capable to fulfill the following qualifications needed for such tasks: \***

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Expertise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Financial capacities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Motivation/conviction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Page 7**

**22. What portion of the total length of waterways subject to reporting (2<sup>nd</sup> order and other waters) in your municipality were rehabilitated by the end of 2016? \***

 %

**23. Which specialised personnel are responsible for issues of watercourse rehabilitation in your administration?**

Number and type of positions:

**24. Which of the following financial processes has your municipality utilised to cover its own contribution of the costs of watercourse rehabilitation i.e. generally 20% but 10% for municipalities under budgetary supervision? \***

Cost allocations

Ecological compensation

Donations

None

In combination with other projects (please state)

**25. In budgetary discussions, have you already made funds available for watercourse rehabilitation measures and justified these?**

Yes

No

**26. Which of the following approaches have you (or your administration) been using to inform your council about the benefits of watercourse rehabilitation projects? (Multiple answers possible) \***

Own personnel giving presentations

Demonstrating advantages in discussions

External presenters e.g. other mayors, water associations, regional government, Kommunal Agentur NRW

Tours of successfully implemented projects guided by experts

Nothing

Other (please state)

**27. The implementation of watercourse rehabilitation projects often requires large areas of land. How have you been able to provide such areas in your municipality? (Multiple answers possible)**

- Municipality purchasing land and offering this in exchange
- Offering capitalised compensation for loss of use
- Land consolidation conducted by regional government (agricultural policy)
- Land lease
- Compulsory purchase order
- None
- Others (please state)

**28. What do you and your administration consider the most important barriers for implementing all stipulated watercourse rehabilitation measures in your municipality in due time? (Multiple answers possible)**

- Technical expertise (e.g. public tender procedure)
- Administrative expertise (e.g. financing/funding options)
- Availability of land
- Other priorities (e.g. refugees, pre-school nurseries, dilapidated infrastructure)
- Financial situation
- None
- Others (please state)

**29. How much do you (or your administration) think the citizens would be willing to pay (per capita, per year) for the watercourse rehabilitation in their municipality (on top of property tax B)?**

- 2 Euros
- 5 Euros
- 10 Euros
- >10 Euros
- Nothing

## Page 8

Thank you for participating.

If you are interested in the results of this survey, I will be happy to provide them after completing my evaluations. In this case I have to ask you to send me a short message by email so that your data can remain anonymous: [dkreisch@smail.uni-koeln.de](mailto:dkreisch@smail.uni-koeln.de).

# Kommunale Gewässerentwicklung in NRW

## Seite 1

Vielen Dank, dass Sie meine Studienarbeit unterstützen.

Dieser Fragebogen enthält 21 Fragen für Kommunen, die die Gewässerunterhaltungspflicht an Wasserverbände übertragen haben und 28 Fragen für jene, die diese Pflicht nicht übertragen haben.

Sie können das Ausfüllen jederzeit unterbrechen, um zu einem späteren Zeitpunkt fortzufahren. Dazu notieren Sie sich bitte den Code, der nach Fertigstellung der ersten Seite auf allen folgenden Seiten oben rechts erscheint.

### 1. Was trifft auf Ihre Verwaltungseinheit zu? \*

- Kreisfreie Stadt
- Große kreisangehörige Stadt (i.d.R. >60.000)
- Mittlere kreisangehörige Stadt (i.d.R. 25.000-60.000)
- Kreisangehörige Stadt (i.d.R. weniger als 25.000)
- Kreisangehörige Gemeinde (i.d.R. weniger als 25.000)

### 2. In welchem Regierungsbezirk liegt ihre Kommune? \*

Bitte wählen... ▼

### 3. Wem obliegt die Pflicht zur Gewässerunterhaltung für die Gewässer zweiter Ordnung und die sonstigen Gewässern - somit auch die Verpflichtungen hinsichtlich der WRRL – in Ihrer Kommune? \*

- Kommune
- Kreisverwaltung
- Sondergesetzlicher Wasserverband
- Ein/mehrere Wasser-und Bodenverbände

### 4. Befindet sich Ihre Kommune in der Haushaltsicherung? \*

- ja
- nein

## Seite 2

Die folgenden fünf Fragen bzw. Aussagen sollten von Bürgermeister/in persönlich beantwortet werden. Sie können jederzeit die Umfrage unterbrechen und zu einem späteren Zeitpunkt fortfahren - auch von einem anderen Arbeitsplatz aus. Notieren Sie einfach den Code oben rechts, um später fortzusetzen.

### 5. Frau/Herr Bürgermeister/in: Haben Sie als Kind an Flüssen gespielt? \*

ja

nein

### 6. Frau/Herr Bürgermeister/in: Wasser spielt für Menschen nicht nur eine Rolle beim Aufrechterhalt ihrer Körperfunktionen sondern der Zugang zu naturnahen Gewässern ist auch wichtig für eine gesunde Psyche. \*

	Stimme vollkommen zu	Stimme teilweise zu	Neutral	Stimme eher nicht zu	Stimme überhaupt nicht zu
I	<input type="radio"/>				

### 7. Frau/Herr Bürgermeister/in: Gewässerentwicklungsmaßnahmen dienen nicht nur der ökologischen Gewässergüte und dem Hochwasserschutz, sondern wirken sich auch positiv auf die Attraktivität und die Naherholungsmöglichkeiten einer Kommune aus. \*

	Stimme vollkommen zu	Stimme teilweise zu	Neutral	Stimme eher nicht zu	Stimme überhaupt nicht zu
I	<input type="radio"/>				

### 8. Frau/Herr Bürgermeister/in: Gewässerentwicklung zum Wiederherstellen lebendiger und naturnaher Gewässer ist mindestens genauso wichtig wie das Schaffen von Freizeitangeboten für Sport und Kultur. \*

	Stimme vollkommen zu	Stimme teilweise zu	Neutral	Stimme eher nicht zu	Stimme überhaupt nicht zu
I	<input type="radio"/>				

**9. Frau/Herr Bürgermeister/in: Ein/e Bürgermeister/in kann durch ihren/seinen engagierten Einsatz auf die Gewässerentwicklungsbelange ihrer/seiner Kommune positiven Einfluss nehmen und die festgesetzten Maßnahmen voranbringen. \***

	Stimme vollkommen zu	Stimme teilweise zu	Neutral	Stimme eher nicht zu	Stimme überhaupt nicht zu
I	<input type="radio"/>				

### Seite 3

**10. Das Involvieren der Naturschutzverbände (BUND, NABU, LNU) in Gewässerentwicklungsfragen durch die Verwaltung/Bürgermeister einer Kommune ist wichtig und kann die Umsetzung von Maßnahmen positiv beeinflussen. \***

	Stimme vollkommen zu	Stimme teilweise zu	Neutral	Stimme eher nicht zu	Stimme überhaupt nicht zu
I	<input type="radio"/>				

**11. Eine umfangreiche fachliche Vorbereitung mit dem Thema der Gewässerentwicklung ist unabdingbar, um der Steuerung dieser kommunalen Aufgabe gerecht zu werden. \***

	Stimme vollkommen zu	Stimme teilweise zu	Neutral	Stimme eher nicht zu	Stimme überhaupt nicht zu
I	<input type="radio"/>				

**12. Eine Kommune konnte durch frühzeitiges Mitwirken während der 1. und 2. Planungsphase (d.h. beim Aufstellen der Bewirtschaftungs- und Maßnahmenpläne und des Umsetzungsfahrplans) ihre Interessen in Bezug auf Gewässerentwicklung vertreten. \***

	Stimme vollkommen zu	Stimme teilweise zu	Neutral	Stimme eher nicht zu	Stimme überhaupt nicht zu
I	<input type="radio"/>				

**13. Die Information der Öffentlichkeit seitens des Bürgermeisters (der Bürgermeisterin) / Verwaltung über den Wert naturnaher Gewässer und zu aktuellen Gewässerentwicklungsprojekten ist ein wichtiger Grundsatz für das Gelingen von kommunaler Gewässerentwicklung. \***

	Stimme vollkommen zu	Stimme teilweise zu	Neutral	Stimme eher nicht zu	Stimme überhaupt nicht zu
I	<input type="radio"/>				

## Seite 4

**14. Was unternahmen (bzw. unternehmen) Sie als BürgermeisterIn/Verwaltung, damit Maßnahmen zur ökologischen Gewässerentwicklung durchgeführt werden können? Worin sehen Sie hierbei Ihre größte Verantwortung? (Mehrfachnennungen möglich) \***

- Rat und Ausschüsse überzeugen/Verständnis wecken
- Zwischen verschiedenen Interessengruppen vermitteln
- Überzeugungsarbeit leisten bei Grundstückseigentümern
- An Veranstaltungen teilnehmen z.B. Gebietsforen, Runde Tische
- Schaffung von Stellen/Ansprechpartnern
- Breite Öffentlichkeit informieren
- Hilfe bei Flächen-Akquise/Flächenmanagement
- Fördermöglichkeiten bewusstmachen
- Verbandsbeitrags erhöhungen veranlassen/gewährleisten
- An Verbandsversammlungen teilnehmen
- Finanzielle Mittel in den Haushaltsplan-Beratungen zur Verfügung stellen
- Gar nichts
- Anderes, und zwar

**15. Inwiefern banden (bzw. binden) Sie (BürgermeisterIn/Verwaltung) die Naturschutzverbände in die Belange der Gewässerentwicklung Ihrer Kommune ein? (Mehrfachnennungen möglich) \***

- Gremien/Ausschüssen
- Stellungnahmen
- Praktische Arbeit
- Öffentlichkeitsarbeit
- Teilnahme an Veranstaltungen
- Gar nicht
- Anderweitig, und zwar:

**16. Woher holten (bzw. holen) Sie (BürgermeisterIn/Verwaltung) sich den Sachverstand zur Durchführung der für ihr Verwaltungsgebiet erstellten Gewässerentwicklungsmaßnahmen (Mehrfachnennungen möglich) \***

- Kommunal Agentur NRW
- Bezirksregierungen
- Symposien/Tagungen/Konferenzen
- Umweltverbände
- Wasserverband
- Planungsbüro
- Wissenschaft
- Selbststudium
- Medien
- Gar nicht
- Woanders, und zwar:

**17. Wie haben Sie als Kommune bei Gewässerentwicklungsfragen in den jeweiligen Planungsphasen der 1. und 2. Bewirtschaftungsperiode (also beim Aufstellen der Bewirtschaftungs- und Maßnahmenpläne und des Umsetzungsfahrplans für Ihre Kommune) mitgewirkt? (Mehrfachnennungen möglich) \***

- Abgabe von Stellungnahmen zu den Bewirtschaftungsplänen
- Beteiligung/Information des Rates/der Gremien
- Nutzung der Gewässerberatung durch die Kommunal Agentur NRW
- Teilnahme an Runden Tischen
- Teilnahme an Workshops
- Teilnahme an Kooperationen
- Teilnahme an Gebietsforen
- Gar nicht
- Anderweitig, und zwar:

**18. Welche der folgenden Gelegenheiten nahmen (bzw. nehmen) Sie (BürgermeisterIn/Verwaltung) wahr, um die Bürgerinnen und Bürger Ihrer Kommune über den Wert naturnaher Gewässer und zu aktuellen Gewässerentwicklungsprojekten zu informieren? (Mehrfachnennungen möglich) \***

- Info-Material im Rathaus
- Pressemitteilungen
- Info-Tafeln an Projekten
- Bachpatenschaften
- Auskunftgabe durch Verwaltung
- Bacherlebniswanderungen
- Exkursionen
- Baustellenführungen
- Konkrete Gewässerschutz-Projekte
- Aktionen mit Schulen und Kindergärten
- Aufstellung der Wanderausstellung zum Thema "Lebendige Gewässer"
- Besichtigung erfolgreich umgesetzter Gewässerentwicklungsmaßnahmen
- Gar keine
- Andere, und zwar

## Seite 5

**19. Welches menschliche und verwaltungsspezifische Geschick sollte ein/e BürgermeisterIn/Verwaltung beim Umgang mit Flächenbesitzern, Grundstückseigentümern und anderen Interessengruppen Ihrer Meinung nach besitzen? (Bitte stichwortartig antworten)**

**20. Was würden Sie sich als BürgermeisterIn/Verwaltung wünschen, um noch effektiver die Bewirtschaftungsziele in Bezug auf die Wiederherstellung naturnaher Gewässer voranbringen zu können? (Bitte stichwortartig antworten)**

### Seite 6

**21. Inwieweit sehen Sie (BürgermeisterIn/Verwaltung) den für die Gewässerunterhaltung Ihrer Kommune zuständigen Wasserverband (bzw. Wasserverbände) in der Lage, die folgenden Voraussetzungen zur Erfüllung der Gewässerentwicklungsmaßnahmen zu erbringen: \***

	Trifft vollkommen zu	Trifft teilweise zu	Neutral	Trifft weniger zu	Trifft gar nicht zu
Nötigen Sachverstand	<input type="radio"/>				
Finanzielle Möglichkeiten	<input type="radio"/>				
Motivation/Überzeugung	<input type="radio"/>				

### Seite 7

**22. Welcher Anteil bezogen auf die Gesamtlänge der berichtspflichtigen Gewässer (2. Ordnung und sonstige) in Ihrer Kommune ist bis Ende 2016 umgestaltet worden? \***

 %

**23. Welches Fachpersonal ist für Fragen der Gewässerentwicklung in Ihrer Verwaltung zuständig?**

Anzahl und Art der Stelle(n):

**24. Welche dieser finanziellen Prozesse wurden bzw. werden in Ihrer Kommune zum Decken des Eigenanteils von 20% (bzw. 10% für Kommunen in der Haushaltsicherung) genutzt? \***

- Umlagen
- Ökologische Ausgleichzahlungen
- Spenden
- Keine
- Kombination mit anderen Maßnahmen

**25. Haben Sie bereits finanzielle Mittel in den Haushaltsplan-Beratungen für Gewässerentwicklungsmaßnahmen zur Verfügung gestellt und vertreten?**

- ja
- nein

**26. Welche der folgenden Möglichkeiten nutzen Sie und Ihre Verwaltung, den Stadt- bzw. Gemeinderat vom Nutzen eines Gewässerentwicklungsprojektes zu überzeugen? (Mehrfachnennungen möglich) \***

- Vortrag der Verwaltung
- In Diskussionsrunden Vorteile darstellen
- Vortrag Externer (z.B. anderer Bürgermeister, Verbände, Bezirksregierung, Kommunal Agentur NRW)
- Besichtigung abgeschlossener Projekte in benachbarten Kommunen unter sachkundiger Führung
- Gar nichts
- Anderes, und zwar:

**27. Oft werden große Flächen in den Flusssauen benötigt, um Gewässerentwicklungsmaßnahmen zu verwirklichen. Durch welche Prozesse können in ihrer Kommune diese Flächen bereitgestellt werden? (Mehrfachnennungen möglich)**

- Anbieten von Austauschflächen, welche vorher durch Kommune erworben werden
- Angebot kapitalisierter Nutzungsausfallentschädigungen
- Flurbereinigung durch Bezirksregierung (Agrarordnung)
- Anpachten von Flächen
- Zwangsenteignung
- Keine
- Andere, und zwar

**28. Worin sehen Sie und Ihre Verwaltung die wichtigsten Defizite für eine fristgemäße Umsetzung aller festgesetzten Gewässerentwicklungsmaßnahmen in Ihrer Kommune? (Mehrfachnennungen möglich)**

- Technischer Sachverstand (z.B. bei Ausschreibungen)
- Verwaltungstechnischer Sachverstand (z.B. bei Finanzierung/Fördermöglichkeiten)
- Grundstücksverfügbarkeit
- Andere dringende Prioritäten (z.B. Flüchtlinge, Kindergarten, marode Infrastruktur)
- Finanzielle Voraussetzungen
- Eigentlich keine
- Anderes, und zwar:

**29. Wie hoch schätzen Sie (BürgermeisterIn/Verwaltung) die Summe pro Kopf und Jahr, welche die Bürger/innen Ihrer Kommune bereit wären, für Gewässerentwicklungsmaßnahmen auszugeben (zusätzlich zur Grundsteuer B)?**

- 2 Euro
- 5 Euro
- 10 Euro
- >10 Euro
- Nichts

## Seite 8

Vielen Dank für Ihre Teilnahme!

Wenn Sie an den Ergebnissen interessiert sind, sende ich Ihnen gern nach Abschluss der Umfrage meine Auswertung zu. Damit Ihre Daten anonym bleiben, muss ich Sie in diesem Fall bitten, mir eine kurze Mitteilung per Email zu senden:

[dkreisch@smail.uni-koeln.de](mailto:dkreisch@smail.uni-koeln.de)

» **Umleitung auf Schlussseite von Umfrage Online**