The Impact of Nature Based Solutions on Recreation: The River IJssel as a Case Study

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Figure: (Ubels, 2018)

TAUW

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PREFACE

Voor u ligt de scriptie van mijn Bachelor Eindproject voor de bachelor Civiele Techniek aan de Universiteit Twente. Het project ging over de invloed van Nature Based Solutions op recreatie. De IJssel is hierbij genomen als casus. Ik heb dit project gedaan in opdracht van het bedrijf TAUW, in het kader van het EU-project RECONECT. In totaal duurde het onderzoek en het schrijven van de scriptie elf weken, van 3 mei 2021 tot 16 juli 2021.

Hoewel dit onderwerp mij niet als eerste te binnen schoot toen ik aan mijn Bachelor Eindopdracht dacht, heb ik het erg interessant gevonden me hierin te verdiepen. Het afnemen van een enquête is voor mij een nieuwe ervaring geweest en ik heb zeker dingen geleerd die ik kan meenemen als ik in de toekomst een soortgelijke opdracht ga doen. Tijdens het project ging niet alles zo snel als ik had gewild en gehoopt, maar toen de zaken eenmaal begonnen te rollen is ook mijn enthousiasme opgelaaid.

Ik heb tijdens de elf weken veel gehad aan de (bijna) wekelijkse gesprekken met mijn begeleiders. Vanuit de UT heeft Rutger Siemes mij enorm geholpen door mee te kijken en mee te denken over oplossingen van problemen waar ik tegenaan liep. Mijn begeleiders bij TAUW, Rick Veenhof en Christa Fung-A-Loi, stonden altijd voor me klaar om mij een kijkje te laten nemen binnen het werken bij TAUW. Daarnaast wil ik hun bedanken voor hun kritische kijk op mijn onderzoek en mijn scriptie. Ook wil ik alle collega's die ik heb gesproken bij TAUW bedanken voor alle tips en hulp die ze mij hebben gegeven. Tevens wil ik alle respondenten van de enquête hartelijk bedanken voor de deelname. Zonder hen was dit project simpelweg niet mogelijk geweest.

Als laatste heb ik veel gehad aan morele steun van vrienden en familie, waar ik altijd terecht kon als ik er even niet uit kwam of juist als ik afleiding nodig had. Vooral de motiverende woorden en oprechte interesse van mijn ouders hebben me geholpen dit project goed af te kunnen ronden.

Ik wens u veel leesplezier.

Juliana Bruil

Enschede, 14-07-2021

SUMMARY

This research is aiming to study the recreational activities in Nature Based Solutions (NBSs) as part of the EU-project RECONECT. A Nature Based Solution is a way to solve flood risk problems by using techniques inspired by, supported by, or copied from nature. In this analysis, nine different NBSs along the river IJssel in the Netherlands are used as a case study. These NBSs were part of the project Room for the River (RftR) as commissioned by Rijkswaterstaat and they were implemented from 2006 to 2017. The nine NBSs are divided into six groups based on geographical location: Westervoort, Zutphen, Deventer, Veessen-Wapenveld, Zwolle and Kampen.

To conduct the research, two different methods were used for this assessment: a survey amongst recreators of the area and a spatial data analysis in the program ArcMap. The main result of the survey was that 42% of the respondents do visit the NBSs more often after the implementation of the Room for the River measures. Furthermore, the main activities that people do in the areas are walking and cycling and 38% of the surveyed do not want to spend any money on maintenance of the areas. The outcome of the spatial data analysis was determined by doing a Multi-Criteria Analysis (MCA) that assessed the NBSs on six different criteria, after which a final score was given to each NBS. This MCA illustrates that the area near Deventer is the most attractive for people to visit. This was partly confirmed by the results of the survey. The willingness to pay for the NBS near Deventer was higher than for the other NBSs and respondents of the survey indicate that they travel longer to the NBS near Deventer than to the other NBSs. The overall conclusion of this research is that NBSs do have some impact on recreation.

SAMENVATTING

Met dit onderzoek wordt getracht het aspect recreëren binnen Nature Based Solutions (NBSs) in beeld te brengen vanuit het EU-project RECONECT. Een Nature Based Solution is een manier om problemen omtrent overstromingsrisico op te lossen door middel van technieken die geïnspireerd of gekopieerd zijn vanuit de natuur, of die worden ondersteund door natuurlijke processen. Als casus is gekozen om negen verschillende NBSs langs de IJssel te onderzoeken. Deze NBSs zijn een deel van het project Ruimte voor de Rivier (RvdR), dat van 2006 tot 2017 is uitgevoerd in opdracht van Rijkswaterstaat. De negen NBSs zijn onderverdeeld in zes groepen gebaseerd op geografische ligging: Westervoort, Zutphen, Deventer, Veessen-Wapenveld, Zwolle en Kampen.

Om het onderzoek uit te voeren zijn twee verschillende methodes gebruikt: een enquête onder recreanten in het gebied en van ditzelfde gebied een ruimtelijke data analyse in het programma ArcMap. Het voornaamste resultaat van de enquête is dat 42% van de respondenten de NBSs vaker bezoekt na uitvoering van het Ruimte voor de Rivier project. De voornaamste activiteiten die mensen doen in de gebieden zijn wandelen en fietsen en 38% van de geënquêteerden wil geen geld uitgeven aan onderhoud voor de gebieden. Het resultaat van de ruimtelijke data analyse is bepaald met een Multi-Criteria Analyse (MCA) waarin de NBSs worden beoordeeld op zes criteria, waarna elk gebied een eindscore krijgt. Deze MCA wees de NBS bij Deventer aan als het aantrekkelijkst voor mensen om te bezoeken. Dit is deels bevestigd door de resultaten van de enquête. De bereidheid om te betalen was hoger voor de NBS bij Deventer dan voor de andere NBSs en respondenten van de enquête gaven aan dat ze langer reizen naar de NBS bij Deventer dan naar andere NBSs. De algemene conclusie van dit onderzoek is dat NBSs tot op een bepaalde hoogte een invloed hebben op recreatie.

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1 INTRODUCTION

An innovative and sustainable way of hydrometeorological hazard protection is the use of Nature Based Solutions (NBSs). NBSs create a green way of solving problems related to flood protection, for example. At the same time, they also affect the surroundings, including people living near NBSs and people that visit them. This research assesses the impacts of Nature Based Solutions on recreational activities by considering the Room for the River measures that were taken along the river IJssel as a case study. The research is a part of the Bachelor Thesis for the bachelor of Civil Engineering at the University of Twente. The research is an assignment for the company TAUW, a consultancy company that is active in the Netherlands on different topics, such as water, soil, and sustainability.

1.1 PROJECT BACKGROUND

This research is a part of an EU-wide project called RECONECT in which an evaluation of the measures resulting from the Room for the River project is done. Those two projects are described below.

1.1.1 RECONECT

RECONECT is a Europe-wide project with different Nature Based Solution (NBS) projects involved. It is an abbreviation that stands for **R**egenerating **ECO**systems with **N**ature-based solutions for hydro-meteorological risk r**E**du**CT**ion. A smart selection of letters results in the name. RECONECT started in 2018 and is planned to end in 2024. The initial plan was to end in 2023, but due to the impact of Covid-19, this has been delayed to 2024.

Throughout Europe, there are ten different projects that participate in the RECONECT project, located in eight different countries. In each project, there is looked at a Nature Based Solution in a hydro-meteorological risk reduction project in rural areas (RECONECT Consortium, 2018). For these projects, there are different goals established that need to be addressed in the areas water, nature, and people. Each subject has its own goal and sub-goal, as can be seen in Table 1, which shows the goals for the evaluation of the Room for the River project. In this research, the category 'people' and the topic of socio-economic impacts have been addressed by looking at recreational opportunities. More information on the scope of the project is explained below.

Table 1: Subjects and their goals for Demonstrators B (RECONECT Consortium, 2021)

Challenge area	Topic of the goal	Sub-goal
WATER	Water quantity	A. Flood risk reduction
NATURE	Habitat structure	B. Shifts in land use and land cover
	Biodiversity	C. To maintain and enhance biodiversity
PEOPLE	Socio-economics	D. Increase recreational opportunities

1.1.2 Room for the River

The motivation for the plan of the Room for the River project was threats of large flooding of Dutch rivers in 1993 and 1995. The main idea was to give the rivers more space in case of high discharges. Furthermore, there was aimed to create a more attractive river area (de Boer, 2021). Since 2006, the Dutch government has executed the Room for the River project by altering river beds to give the water more space. This is done by, for example, moving dikes, creating extra channels, lowering floodplains and more. In total, the river profile was altered at 34 locations in The Netherlands. The entire Room for the River project ended in 2019 when the lock in the Reevediep was opened (IJsseldelta Programma, n.d.).

1.2 SCOPE

This research focuses on the 'people' indicator of the RECONECT project. The topic of that area is to assess the socio-economic impacts of Nature Based Solutions. A new nature area often attracts recreators. Recreation then in turn can lead to tourism, which gives opportunities for economic growth as a socio-economic impact of the new nature area (Kreilkamp, Bergner, & Mauser, 2016). Therefore, in this research, recreational opportunities as a result of the NBSs are evaluated, since there is a knowledge gap on the socio-economic impacts of NBSs.

To assess this, the river IJssel is used as a case study. The river IJssel is taken to be the water stream from the Dutch city of Westervoort to the city of Kampen. The project borders of the Room for the River NBS measures that are done in the IJssel river basin serve as the physical scope of this research.

1.3 RESEARCH OBJECTIVE

Based on the scope of this research the objective is as follows.

"This research aims to assess the impacts of the Nature Based Solutions on recreational activities by taking the Room for the River measures that were done along the river IJssel as a case study."

1.3.1 Hypothesis

One of the goals of the Room for the River project was to create a more attractive river area. This means that there was aimed to increase recreation in the area by constructing walking and cycling paths, placing benches, and improving the quality and quantity of nature in the area (de Boer, 2021). The expected outcome of the research is therefore that there is more recreation in the area than before the implementation of the NBSs.

1.3.2 Research Questions

The research questions and sub-questions follow the research objective.

1. *How has the number and composition of recreators changed after the implementation of Nature Based Solutions?*
   1.a. How has the behaviour of people visiting the NBSs changed?
   1.b. Which types of recreation are done in the NBSs?
   1.c. What is the willingness to pay for facilities and features of the NBS?

2. *To which extent do the Nature Based Solutions along the river IJssel stimulate recreational activities in the area?*
   2.a. What are variables that indicate recreational activities?
   2.b. How well do the NBSs support recreational activities in the area?

1.4 OUTLINE

In this introduction, the project context, research objective and research questions were described. The theories that are needed to answer the research questions are given in Chapter 2. Three topics are important: Nature Based Solutions, recreational activities and conducting a survey research. After that, the case study is presented. Chapter 3 describes the methods that are used in the research. There are two different methods used, a survey research and a spatial data analysis by doing a Multi-Criteria Analysis. Then, in Chapter 0 the results are given. The last three chapters (5, 6 and 7) give a discussion, conclusion and recommendation, respectively.

2 THEORETICAL FRAMEWORK

In this theoretical framework, different topics are assessed, based on their relevance to the research. The three main topics give more theoretical background about Nature Based Solutions and how to evaluate them, the nature of recreational activities, and some theory about conducting a survey. Furthermore, the case study is presented.

2.1 NATURE BASED SOLUTIONS

A hot topic of the last couple of decades is sustainability. The term rests on three pillars: society, economy and ecology, as described in the Brundtland Report in 1989. In this report, a broad definition of sustainable development is described and a framework for policies and strategies that can lead to a new development paradigm is posed (Baker, 2016, pp. 7-41).

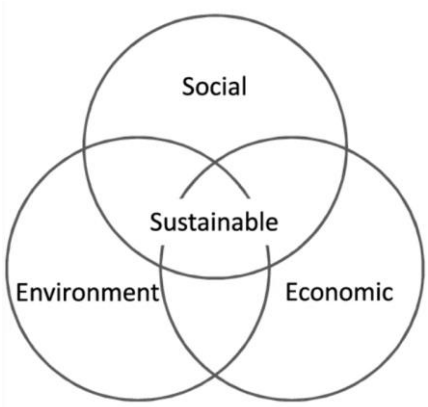


Figure 1: The three pillars of sustainability (Purvis, Mao, & Robinson, 2018)

In 2015, the United Nations created an agenda for sustainable development, on which seventeen goals are based for the year 2030 (SDGs). The goals vary within the three pillars of sustainability as described above, with as main themes people, planet, prosperity, peace, and partnership (United Nations, 2015). This research will assess the social aspects of an NBS. This can be related to Sustainable Development Goal 3: good health and well-being.

Nature Based Solutions are defined in 2015 by the European Commission as "*living solutions inspired by, continuously supported by and using nature, which are designed to address various societal challenges in a resource-efficient and adaptable manner and to provide simultaneously economic, social, and environmental benefits"* (Maes & Jacobs, 2017). It is clear that NBSs follow the three pillars of sustainability as described above. It is, however, a very broad term that needs more clarity. Maes and Jacobs give the following definition: "*any transition to a use of ecosystem services with decreased input of non-renewable natural capital and increased investment in renewable natural processes"* (Maes & Jacobs, 2017). This definition is more focused on the ecology pillar of sustainability and seems to leave out the other two (equally important) parts. A third, more practical way of defining an NBS is *"techniques inspired by, supported by, or copied from nature"* (Spyrou, et al., 2021). Spyrou et al. mention that this means that nature can be used in hydrometeorological hazard problems instead of human-made constructions that harm the environment. In the definition, there seems to be more focus on the environment and less on social and economic aspects, but the article notes that also anthropogenic factors need to be taken into account in an NBS.

Evaluating a Nature Based Solution

Because NBSs are a fairly new concept, there is little research done on evaluating it. One project that does try to assess NBSs is OPERANDUM (OPEn-air laboRAtories for Nature baseD solUtions to Manage environmental risks), which started in 2018 and is planned to finish in 2022. Financed by the European Commission, OPERANDUM uses so-called open-air laboratories to find the effectiveness of different NBSs (OPERANDUM, 2021). They specified five main categories of indicators to assess the performance of an NBS: indicators for integrated environmental performance; indicators of human health and well-being; indicators for public involvement; indicators of transferability; and engineering and financial aspects (Kumar, et al., 2019, pp. 73-74).

For this research, especially the second category is interesting to look at. Indicators related to human health and well-being are about the physical and mental health of people and the availability of green space for people. Examples of indicators for this category are: increase in walking and cycling areas, increase in recreation opportunities, happiness indicators, accessibility to green areas, reduced number of deaths from air, water and soil pollution (Kumar, et al., 2019, p. 75).

Another report on evaluating NBS projects, written by an Expert Working Group for EKLIPSE, notes that indicators for an assessment of an NBS differ per case. For each separate NBS project, appropriate indicators should be considered. The report describes different factors that determine which indicators need to be chosen to evaluate an NBS, including: the objective of the measure; the type of measure; the potential expected impacts (direct and indirect, positive and negative); the resources and skills available; and the scale of the analysis (Raymond, et al., 2017, p. 44). They give a great range of different indicators and the method to assess the specific indicator. The most interesting and important indicators and methods are shown in Table 2.

Table 2: Relevant types of indicators, units of measurement and methods of assessment that are used to assess socio-economic impacts of NBSs (Raymond, et al., 2017, pp. 68-71)

Indicator	Unit of measurement	Example of method of assessment
Use values attached to green/blue areas	Qualitative or €	Mapping of user values using qualitative surveys on user preferences or contingent valuation
Number of users and public awareness	€, n of visitors/year	Contingent valuation method, travel cost, counting visitors, qualitative approaches
% of accessible public green space per capita	M^2/person	GIS mapping and analysis, including nearest neighbour analysis
% of citizens living within a given distance from the NBS	Persons	GIS mapping in order to take into account existing barriers and access ways, statistics
Increase in number and percentage of people being physically active	Days with physical activity	Questionnaires to ask for the number of days on which physical activity took place

2.2 Recreational Activities

Recreation is *"(a way of) enjoying yourself when you are not working"* (Cambridge University Press, n.d.). It is a very broad concept because there are numerous ways to enjoy yourself outside of work. The importance of recreation has been confirmed by many studies, claiming that leisure has a positive impact on the mental and physical health of people (Torkildsen & Taylor, 2010). Recreation activities can be categorized in different ways, based on objective and function. This way, a distinction can be made between active and passive, mental and physical, home-based and away from home, technological-based and nature-based (Metin, Katirci, Yüce, & Saricam, 2017).

A study by Metin, Katirci, Yüce and Saricam (2017) created an inventory list of a wide variety of recreational activities divided into twelve categories: basic entertainments; mental activity, relaxation

and self-awareness; sports and exercises; music; art; dance; hobbies; play/video games; social activities; human services; nature activities/open-air recreation; hedonic activities.

The recreation activities in the NBS areas along the river IJssel fit mostly in the categories sports and exercises and nature activities/open air recreation. However, there are some activities in other categories that might occur in the area of interest. Appendix B provides a full list of all activities mentioned by Metin, Katirci, Yüce and Saricam (2017), with the relevant activities for this research marked.

2.3 SURVEY RESEARCH

A way to collect data from people is to do a survey research. There are several methods of surveys like telephone, face-to-face, mail, and internet surveys (Singleton & Straits, 2012), the latter being most often a questionnaire. Surveys are a good way to gather data about people's opinions, human behaviour, or preference. The goal of a survey depends on the methods of instrumentation that are used and this gives quantitative outcomes, qualitative outcomes or a combination (Ponto, 2015). In this research, a combination of qualitative and quantitative outcomes is desired, corresponding to the different research questions.

There are different steps to follow for good survey research, being interviewer recruitment and selection; interviewer training; pretesting; contacting respondents and gaining cooperation; interviewing; and supervision and quality control (see Figure 2) (Singleton & Straits, 2012, pp. 78-79).

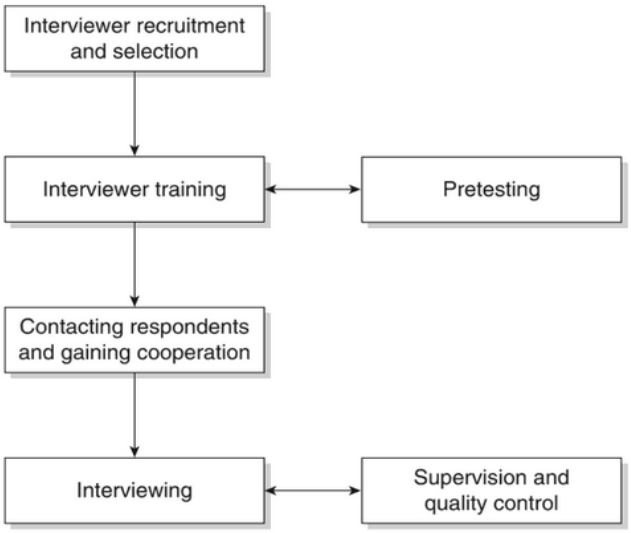


Figure 2: The different steps in a survey research (Singleton & Straits, 2012, pp. 78-79)

These six different steps should be followed in a survey research. All steps are explained more in detail in the methodology in Section 3.

2.3.1 Designing survey questions

There are different methods to design appropriate survey questions depending on the goal and topic of the survey (Fowler, 1995, p. 78). There are several things to keep in mind when designing questions, as described by Fowler (1995).

1. Questions must be consistent and there must be no ambiguity, meaning that all respondents interpret the question the same way.
2. Make sure that people understand the questions and the context of the questions.

3. Make sure that people know how to answer the questions.
4. The different answers and opinions of respondents must come forward in the response alternatives.
5. A wider range of possible responses gives more information about the answers and opinions of the respondents.

A good way to validate the survey questions is pretesting (Singleton & Straits, 2012, pp. 81-83), (Harkness, 2008, p. 63).

2.3.2 Possible errors in survey research

There are different ways in which errors can occur in a survey research. They have to do with coverage, sampling, nonresponse and measurement. De Leeuw, Hox and Dillman describe this as the cornerstones of survey research (de Leeuw, Hox, & Dillman, 2008, p. 4). These four kinds of errors are described in this section.

Coverage error has to do with the representation of the population. It is desired to have a good coverage of the entire target population in the sample that is used in the research (de Leeuw, Hox, & Dillman, 2008, pp. 7-8). The most common error that is made is under-coverage, which occurs when not all types of people in the population are represented in the sample. The opposite can also be the case and this is called over-coverage (Lohr, 2008, p. 102).

Another type of error is sampling error. Because it is almost always impossible to investigate the whole target population, a sample is taken. From the value of the variable of interest that is determined via the sample, the value for the population is determined, given a certain confidence interval (de Leeuw, Hox, & Dillman, 2008, p. 9). It is, however, possible that this sample does not contain a complete representation of the population and in that case, a sampling error occurs.

In a survey research, it may occur that not all respondents answer all questions, which leads to a nonresponse error. This means that some random people from the sample did not answer the survey (unit nonresponse), or did not answer each question in the survey (item nonresponse). There is a problem when there is a correlation between non-responsiveness and some other characteristic of that person (Lynn, 2008, p. 37).

A measurement error can occur when there are mistakes made in the data collection. To limit the measurement error, the first thing is to make the questionnaire well-designed, such that the questions are understandable and respondents know how to answer them (de Leeuw, Hox, & Dillman, 2008, p. 11).

All the kinds of errors that are mentioned need to be taken into account and the errors must be limited as much as possible, or at least possible errors should be mentioned explicitly.

2.4 Case Study: The River IJssel

The Room for the River project has been implemented in all large rivers in the Netherlands. This includes the river IJssel, which runs northwards through the middle part of the Netherlands. The IJssel splits from the Rhine near Westervoort and flows after 127 km into the Ketelmeer near Kampen (Rijkswaterstaat, n.d.). In this research, nine different locations along the IJssel are studied. At these locations, the Room for the River project has used a Nature Based Solution. In total, there are ten adjustments made in the IJssel for the Room for the River project. However, one of them was a dike strengthening, which is not considered an NBS and therefore it is not included in this research. The other nine measures consist of different types, such as lowering floodplains and relocating dikes. For

simplification, some NBS measures are merged when they are located close to each other. This resulted in the following six locations of the NBSs: Westervoort/Arnhem, Zutphen, Deventer, Veessen-Wapenveld, Zwolle and Kampen (see Table 3 and Figure 4).

Table 3: Grouping of the nine Room for the River measures into six locations

1	Westervoort/ Arnhem	Dike relocation at Hondsbroeksche Pleij (Neder-Rijn/Arnhemse- en Velpsebroek)
2	Zutphen	Dike relocation at Cortenoever
		Dike relocation at Voorsterklei
3	Deventer	Lowering floodplain at Bolwersplas, Worp en Ossenwaard
		Lowering floodplain at Keizers- en Stobbenwaarden en Olsterwaarden
4	Veessen-Wapenveld	Hightide gully at Veessen-Wapenveld
5	Zwolle	Lowering floodplain at Scheller en Oldeneler Buitenwaarden
		Dike relocation at Westenholte
6	Kampen	Lowering floodplain at Beneden-IJssel

Figure 3: Map of the geographical orientation of the area in which the NBSs lie (red rectangle).

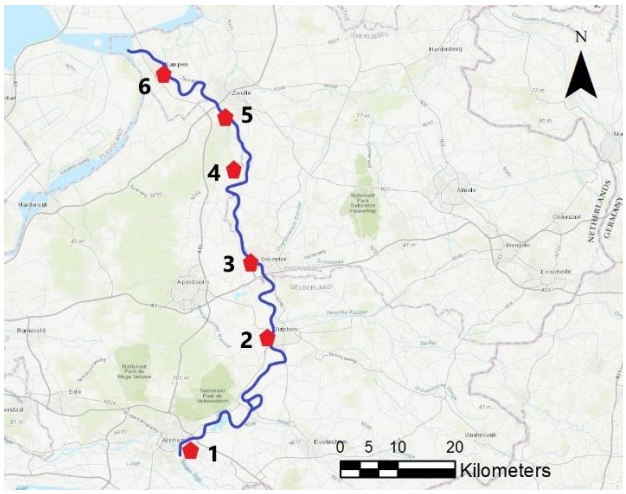


Figure 4: Zoom-in of the red rectangle of Figure 3. The red pentagons represent the six NBSs along the river IJssel as mentioned in Table 3. The blue line is the river IJssel, which flows to the north.

Table 3 shows that there are roughly three types of measures: dike relocation, lowering the floodplain, and creating a hightide gully. A dike relocation means that the old dike is either removed or lowered and that there is a new dike constructed more towards the hinterland. This way, the river is has a wider floodplain that floods in times of high river discharges. These floodplains can also be lowered themselves to give the river more room. Often, side channels are created in the lowered floodplain. A hightide gully is similar to a side channel, but a hightide gully is located further from the river and is sided by dikes on both sides (Rijkswaterstaat, n.d.). Figure 5 shows visualizations of these three measures. All of the NBSs in the IJssel are visualized and explained in Appendix A.

Figure 5: Visualizations of the Room for the River measures that are taken in the river IJssel: relocating the dike, lowering the floodplain, and creating a hightide gully (Rijkswaterstaat, n.d.)

The changes that have been made to the river profile have an impact in the everyday life of people using the area near the river, either for living, work or leisure. According to Ingwer de Boer, former General Director for the Room of the River project, the river IJssel is the most natural and attractive of the large Dutch rivers (Maas, Waal, Rijn and IJssel). Most of the natural meanders of the river are still present in the river bed. On top of that, the IJssel flows mostly through a rural area. The combination of these factors makes the river attractive for recreation (de Boer, 2021). Exact numbers of visitors to the area are not known, since it is publicly accessible and not closely monitored. However, there is an increase of visitors of tourism information centres such as 'IJssel Den Nul', which has seen an increase in recreators of the river area over the last few years (Mondeel, 2018).

3 METHODOLOGY

3.1 SURVEY RESEARCH

The first method connects to the first research question: "*How has the number and composition of recreators changed after implementation of Nature Based Solutions?"*. To answer this question and its sub-questions, the method that is used is an online survey questionnaire. To do this method, the steps as described in Section 2.3 in Figure 2 were followed the best possible way.

Interviewer recruitment and selection

For this research, Juliana Bruil conducted the interview and questionnaires, so there is no recruitment or selection process.

Interviewer training

The task of the interviewer consists of four parts: find a method for contacting respondents; contact respondents; collect data from the respondents; and assess data (Lessler, Eyerman, & Wang, 2008, pp. 451-452). The interviewer should be competent in all four parts. In this research, this was done by doing literature research on conducting a survey research and by contacting experts from the company TAUW and by experts from the Danish Technical University.

Pretesting

After a preliminary survey has been made, it needs to be pretested to make sure that the questions are understandable and unambiguous. This can be done by experts, being other interviewers. These people can review the survey and give feedback on the questions. The survey for this research was checked by experts from the company TAUW and by experts from the University of Twente and the Danish Technical University. This way of pretesting is called cognitive interviewing and it should be done before field pretesting. In field pretesting, the actual survey is sent to people to observe the process and to see if any problems arise (Singleton & Straits, 2012, pp. 81-83). To pre-test, the survey was sent to three different people, being experts on the subject. After discussing and implementing feedback, the final questionnaire was constructed. In Denmark, some field pretesting rounds were done. Appendix C shows the full questionnaire, both in Dutch and in English.

Contacting respondents and gaining cooperation

Because the research is largely location-based, the method of contacting respondents was based on the six locations of the NBSs. Google Maps was used to find appropriate locations in the NBS areas where people that use the area would come. A complete list of these locations is posted in Appendix D. In this research, there were two methods of contacting respondents and getting data: online and offline.

The online method consisted of contacting relevant persons, associations, companies and organisations via email and/or Facebook chat. An overview is shown in Table 4. They were asked to help spread the survey by posting the link on their Facebook page, on their website or in their newsletter. There were 83 such contacts. Besides this, the survey was spread in eleven relevant public Facebook groups of which recreators in the area might be a member.

The offline method consisted of visiting the sites and asking people in person to fill in the questionnaire. The main approach was to ask people to do the online survey on-site, but people were also given a flyer to do the questionnaire at home. Besides this, 44 locations were visited in person. At these locations, flyers were distributed and/or a poster was put up, containing information about the survey and a QR-code and a link to the online questions. Those locations consisted of appropriate companies, shops,

and recreational hotspots that recreators of the area might visit. Examples are camping grounds, supermarkets, and restaurants/cafes, as can be seen in Table 5. At those locations, 500 flyers in total were distributed and 5 posters.

Table 4: Contact list of the online distribution of the survey: count per type of organisation.

Type	Count online
Public Facebook group	11
Tourist information	5
Newspaper	11
Community center	13
Scouting club	3
Sports club	14
Horeca	17
Church	6
Other	3
Total	**83**

Table 5: Contact list of the on-site distribution of the survey: count per type of location.

Type	Count on-site
Supermarket/shop	13
Camping ground	12
Horeca	8
Bird spotting hut	5
Information point	2
Marina	1
Other	3
Total	**44**

Next to that, 72 stickers were placed at suitable locations in the NBSs, such as cycling route maps, information boards and near resting areas (benches). Figure 6 and Figure 7 show two examples of locations where the stickers are placed. On the stickers, a QR-code which leads to the online survey was printed.

Figure 6: Picture of a sticker in a bird watching hut in the NBS Veessen-Wapenveld

Figure 7: Picture of a sticker on an information sign in the NBS near Deventer

In total, the survey was online and running for 29 days, from Thursday, June 10th, 2021 until Thursday, July 8th, 2021. There was aimed to have at least thirty respondents per area to be able to capture all different kinds of people. he simplified six areas were used for this. This means that in total, at least 180 completed surveys are needed for a significant result on the areas combined. The population of recreators in the area is unknown since there is no data available about the number of people that visit the area.

Interviewing

The survey in this research was made in an online tool created by Ramboll, called SurveyXact. People were asked to fill in the questionnaire either online or on paper by themselves. This means that the role of the interviewer was very minimal. Only when people filled in the survey on-site, some background information about the area was given. The respondents were influenced as little as possible to avoid disturbing the results.

In a questionnaire, errors often occur when a question is vague or interpretable in different ways. To prevent this, some pretesting was done, as mentioned above. Also, there was a question in the survey added that asked if people had any questions or additional comments. This way, any unclarities could be found. The questionnaire was conducted in Dutch since the project area is in the Netherlands and all respondents were Dutch. Both the Dutch and English versions of the complete survey are shown in Appendix C.

Supervision and quality control

Often, interviewers are monitored and supervised by someone that can give feedback to the interviewer. This is done to control the quality of the survey (Singleton & Straits, 2012, pp. 92-93). For this research, there were supervisors from two parties: the University of Twente (UT) and the company TAUW.

Data analysis

The results of the survey were converted to an Excel file, in which the analysis was done. Keeping the research questions in mind, the following subjects were assessed: the change in frequency and travel time; the types of recreation; and the willingness to pay. Next to that, some general results were assessed.

3.2 Spatial Data Analysis

The second research question was: "*To which extent do the Nature Based Solutions along the river IJssel stimulate recreational activities in the area?*". The corresponding two sub-questions are assessed using different methods.

The first sub-question was: "*What are variables that indicate recreational activities?*". Firstly, the project was demarcated by determining which activities were considered in the research. All activities that could realistically happen in the NBS areas were determined, based on a research by Metin, Katirci, Yüce and Saricam (2017). All activities are placed into eight categories: relaxation, music, art, hobbies, games, social activities, human services, and nature activities. The whole list is shown in Appendix B. For each activity, the variables that indicate that activity were determined by looking at the features and facilities that are needed for that activity. the most needed variables were: paths (either asphalted, gravel or sand), grass fields (or open terrain), open water with a marina, and nature in general.

The second sub-question was: "*How well do the NBSs support recreational activities in the area?*". To answer this question, a spatial data analysis was done, using the program ArcMap, which uses a GIS (Geographic Information System). In ArcMap, one can create a map with different layers consisting of different features. The aforementioned variables (that followed from the first sub-question) are digitalized and placed in ArcMap either as a point, line or polygon as good as possible. Other features of the ArcMap file were a topographic map of the Netherlands of the year 2017 and an aerial photograph of the year 2020.

Then, a qualitative multicriteria analysis (MCA) was done to determine the impacts. This is an often-used method to analyse environmental impacts, according to a paper by Janssen (2001). In a multi-criteria analysis, the different options are evaluated against different criteria. In this case, the six NBSs function as the different options. The NBS gets a score for each criterion on a five-point scale (Dodgson, Spackman, Pearman, & Phillips, 2009, p. 39). A five-point scale with numerical scores is used, but this does not mean that the criteria are quantified. This means that it cannot be said that, for example, NBS A is two times 'better' than NBS B when NBS A scores 2 and NBS B scores 1 on the same criterion (Dodgson, Spackman, Pearman, & Phillips, 2009, p. 42). Thus, the scale that is used varies from 1 to 5, where 1 means 'very poorly' or 'a little' and 5 means 'very well' or 'a lot'. The scores were given based

on a linear scale, as far as this was possible. This means that the poorest scoring NBS automatically receives the score 1 and the best scoring NBS receives the score 5. The scores of the NBSs in between are then divided based on a linear scale for as much as this was possible. The criteria are not given weights to determine the final score, because all criteria are deemed equally important. This is because every criterion represents one or more recreational activities that happen in the area and those are all equally important, following the research questions. This means that the final score is qualitatively expressed, based on quantitative data subtracted from the GIS data and observations during visits to the areas.

To do the final assessment, all NBSs and criteria are placed in a performance matrix, where the scores are given. A final score was determined by adding the scores for the criteria. The criteria that were used are the length of walking and cycling paths; the amount of street furniture; the amount of open water swimming locations; the surface area of the NBS; and the amount of boat landing stages. The scores for the specific NBS were mainly based on the numerical value of the criteria while keeping in mind the qualitative characteristics of the criteria in that NBS.

To actually determine whether the NBSs support recreation, the results from the spatial data analysis were linked to the survey results. There was looked whether the spatial data could explain certain survey results, such as the number of recreators in the area, the frequency of visiting and the types of recreational activities that people do in the area.

4 RESULTS

4.1 SURVEY

In total 172 people completed the survey, but 206 people filled in at least the first question. For every question, the total number of respondents to that question is used. In this section, some general statistics are posted, followed by results that relate to the research questions. Results from all relevant questions of the survey are shown in Appendix E.

4.1.1 General results

The NBS near Deventer received the most responses (82 respondents) and the NBS near Zwolle the least (14 respondents). Only for Deventer and Westervoort, the minimum number of respondents of thirty was reached. Figure 8 gives an overview of the division of respondents per area. Figure 9 gives an overview of the division of people that did or did not visit any of the NBSs before implementation of the Room for the River measures. In total, 66% of the respondents said they did visit the NBS before Room for the River.

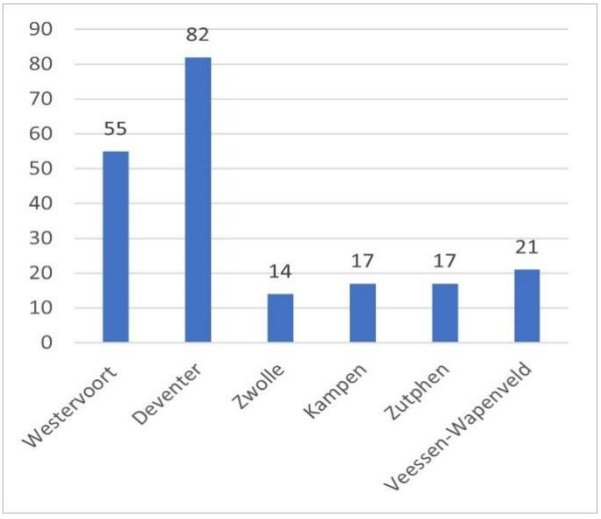


Figure 8: Division of respondents per area. n=206

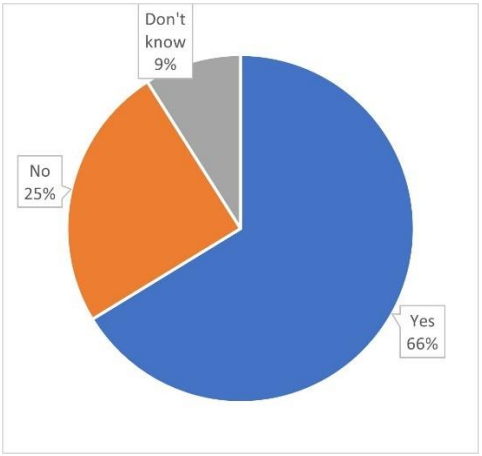


Figure 9: Division of people that did or did not visit the NBS before implementation of RftR (percentages). All NBSs are counted together. n=166

The results of the questions about travel distance and travel time should have a positive relation to each other since a longer distance should take someone more time to travel. This means that people that indicated that they have to travel a short time to the NBS should also have filled in that they have to travel a short distance. Figure 10 shows an overview of this relation, where the percentage of people that filled in a corresponding travel time and distance is given. Figure 10 clearly shows that approximately 90% of the respondents that have to travel less than 30 mins also have to travel less than 6 km (see left column in the figure, dark blue and orange combined). For distances longer than 1 hour, the travel distance is for 75% of the respondents larger than 50 km (see right column in the figure, light blue). The travel time in between, 30 mins to 1 hour, has a mix of different travel distances (see middle column in the figure).

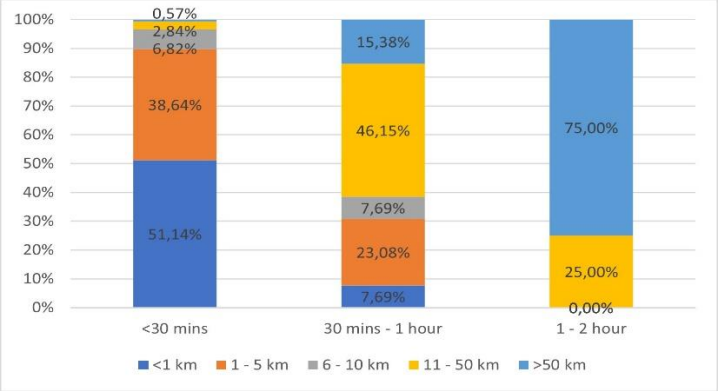


Figure 10: Cross-reference of the results of the survey for travel time ((horizontal axis) and travel distance (percentages on vertical axis). n=194

4.1.2 Frequency of visiting

One question in the survey was about the frequency of visiting the NBS and if people visit more often now that the area changed due to the Room for the River project. In total, 110 people answered that they did visit the NBS before the Room for the River implementations, which is 66% of all respondents. Figure 11 shows that 51% of the people that answered this question visit the NBS now about as often as before. In total, 42% of the respondents answered that they visit the NBS more often than before. This means either a lot more often or a little more often.

Figure 12 shows the differences between the frequency of visiting and the change in frequency of visiting. In general, 75% of the respondents that visit the NBS a lot more often are visitors that go to the NBS daily (see the left column in the figure).

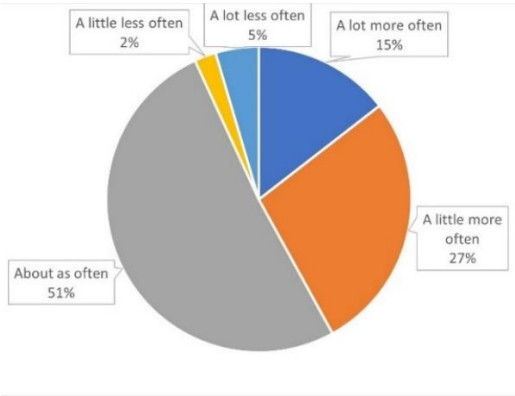


Figure 11: Result of Q1.6b of the survey for all NBSs combined: change in frequency of visiting the NBS. n=201

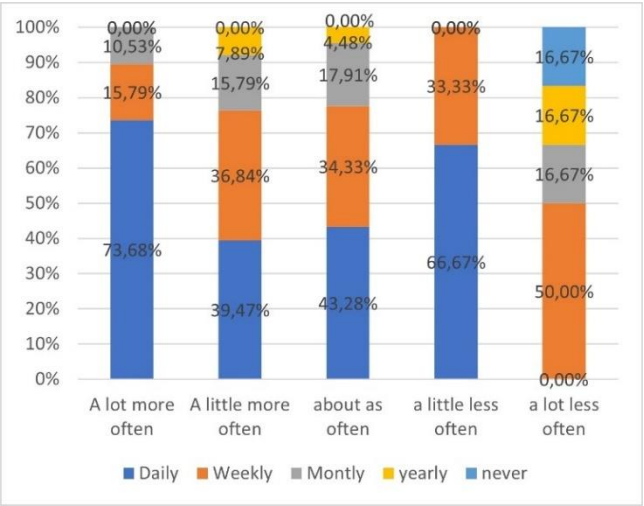


Figure 12: Cross-reference of the results of the survey for frequency of visiting ((horizontal axis) and change in frequency of visiting (percentages on vertical axis). n=133

4.1.3 Travel time

The same as the frequency of visiting was done for the travel time. Figure 13 shows that 89% of the people that answered this question has approximately the same travel time.

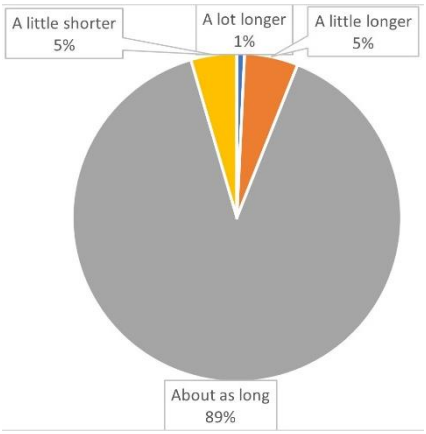


Figure 13: Overview of Q1.7b of the survey: do you have to travel longer? (percentages). n=133

4.1.4 Types of recreation

In the survey, there were 13 different types of recreational activities included. The most selected option was walking (21%), closely followed by cycling (17%). (Kite)surfing was selected the least (1%). Figure 14 gives an overview of the types of recreational activities that are done in the NBSs.

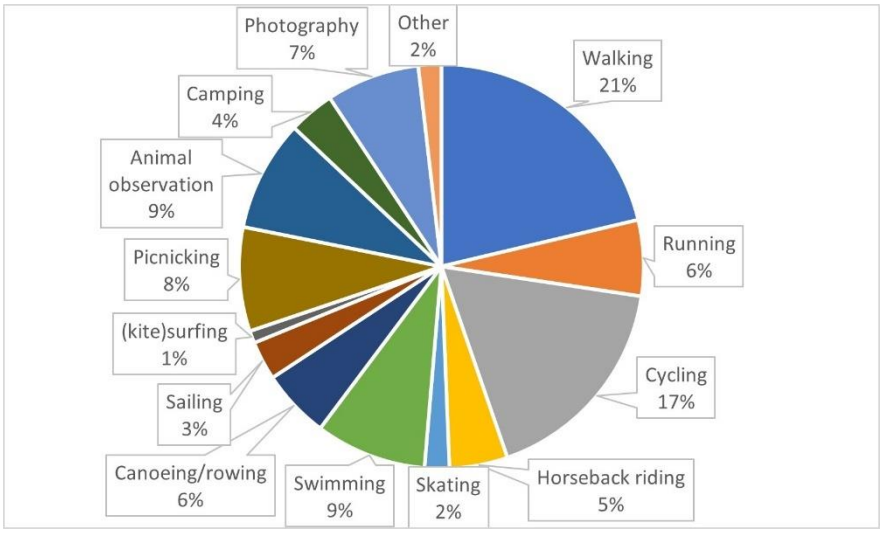


Figure 14: Overview of the results of question 2.4b of the survey for all locations combined: type of activity (percentages). n=709

4.1.5 Willingness to pay

The willingness to pay is a fictional amount of money that people are willing to spend on maintenance of the area. 38% Of the respondents does not want to spend any money on this. No respondents want to spend €64 on maintenance. The values in between vary among the respondents.

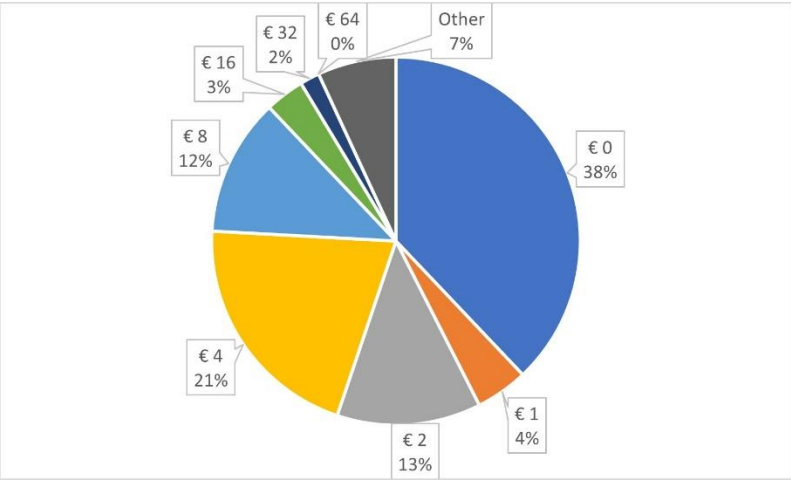


Figure 15: Overview of the results of question 3.1 of the survey for all locations combined: willingness to pay (percentages). n=174

4.2 Spatial Data Analysis

In the performance matrix, the scores of the multi-criteria analysis are given based on a qualitative assessment. This means that the areas are evaluated based on the criteria by giving them a score. The full assessment of every area, including actual numerical values of the criteria is shown in Appendix F.

Table 6: Performance matrix of the different areas

	Walking and cycling paths	Street furniture	Surface area of green spaces	Boat landing stages	Open water swimming locations	Bird watching huts	**Final score**
Westervoort	2	3	2	1	3	1	**12**
Zutphen	3	3	4	1	1	3	**15**
Deventer	4	5	3	4	5	5	**26**
Veessen-Wapenveld	5	1	5	1	1	3	**16**
Zwolle	3	3	1	1	1	5	**14**
Kampen	1	4	1	5	4	3	**18**

The table shows that the locations score very differently on the different criteria. All areas except Deventer have for at least one criterion the score 1. More interesting, Deventer does not have any scores lower than 3. Westervoort, on the other hand, does not have a score higher than 3 on any criterion. Table 6 shows that the NBS near Deventer clearly has the highest final score. The other areas have scores close to each other, but Westervoort has the lowest score.

4.3 Relation spatial data and survey results

In the spatial data analysis, the area near Deventer scored the highest (26 points) and the area near Westervoort the lowest (12 points). To find any reasons for this, the survey results of those two areas and the others combined were compared. Five components are compared: frequency of visiting; travel time; duration of stay; type of activity; and willingness to pay.

4.3.1 Frequency of visiting and travel time

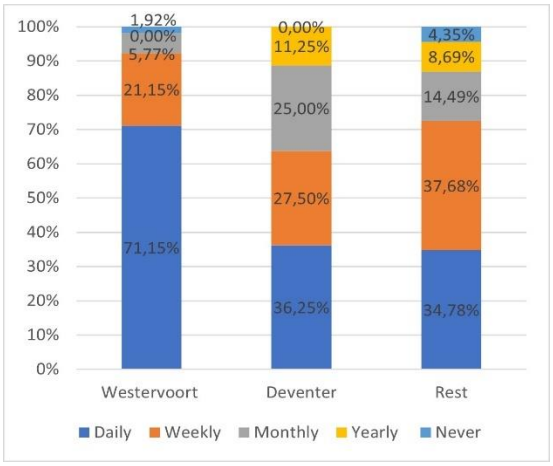


Figure 16: Comparison of survey results on frequency of visiting for Westervoort and Deventer (percentages). n=201

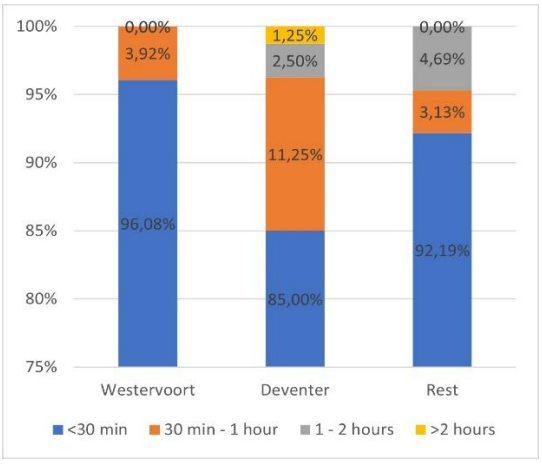
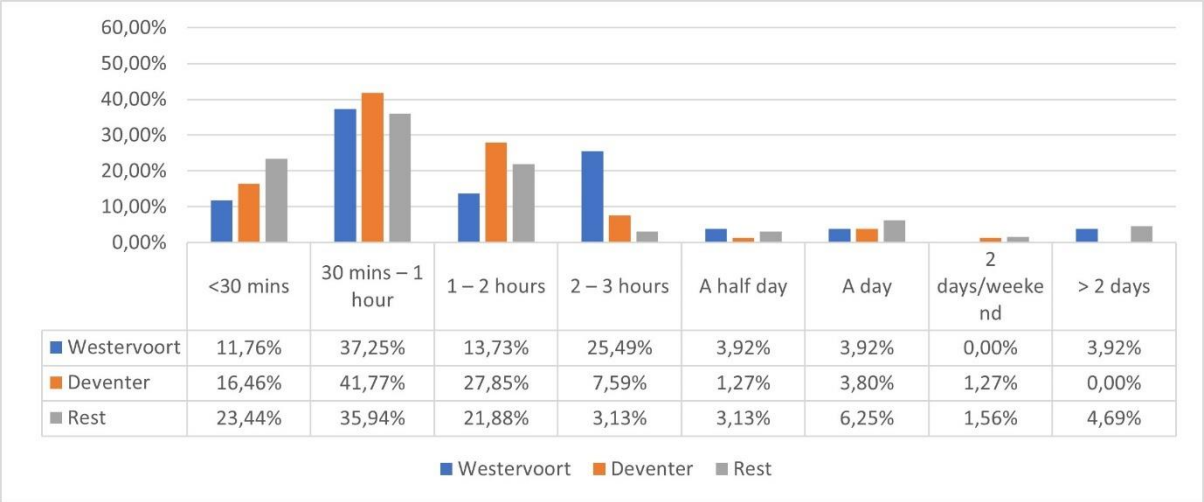


Figure 17: Comparison of survey results on travel time for Westervoort and Deventer (percentages, vertical axis starts at 75%). n=195

The frequency of visiting is quite different for Westervoort and Deventer and the rest. People visit the NBS near Westervoort mostly daily (71%), while the visitors of the NBS near Deventer and the others are more spread out over the different frequencies. 96% Of the respondents for the NBS near Westervoort mention that their travel time is less than 30 minutes. For Deventer, this is a little lower (85%) and some respondents travel between 30 minutes and an hour (11%).

4.3.2 Duration of visiting

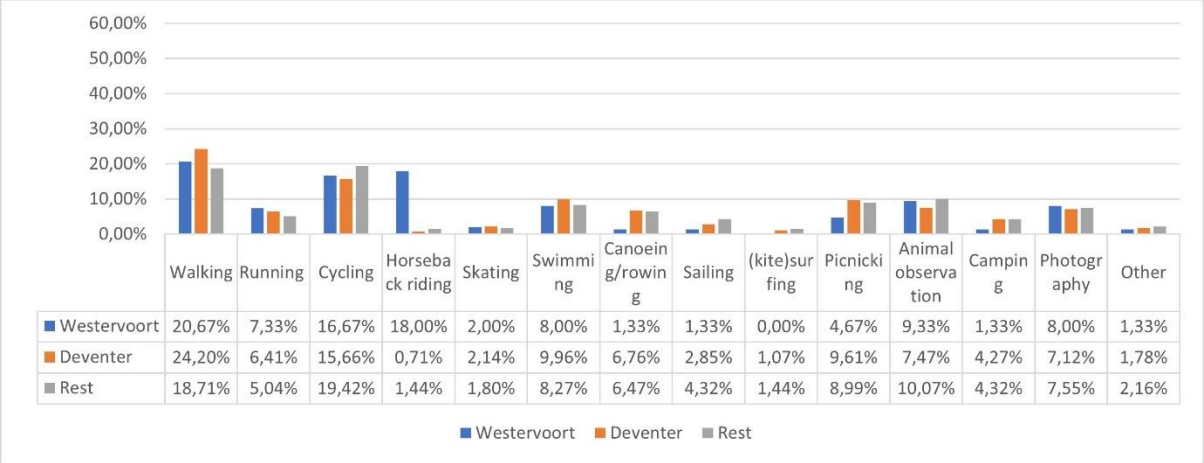


	<30 mins	30 mins – 1 hour	1 – 2 hours	2 – 3 hours	A half day	A day	2 days/weekend	> 2 days
Westervoort	11,76%	37,25%	13,73%	25,49%	3,92%	3,92%	0,00%	3,92%
Deventer	16,46%	41,77%	27,85%	7,59%	1,27%	3,80%	1,27%	0,00%
Rest	23,44%	35,94%	21,88%	3,13%	3,13%	6,25%	1,56%	4,69%

Figure 18: Comparison of survey results on duration of visit for Westervoort and Deventer (percentages). n=194

The duration of stay is for all areas quite similar. People that filled in the survey mentioned that they mostly stay in the NBS between 30 minutes and 1 hour (37%, 42% and 36% for Westervoort, Deventer and the rest, respectively. Especially the results for Westervoort are a bit different from the other two categories. 25% Of the respondents filled in that they stay 2-3 hours in the area, compared to 8% and 3% for Deventer and the others, respectively.

4.3.3 Type of activity

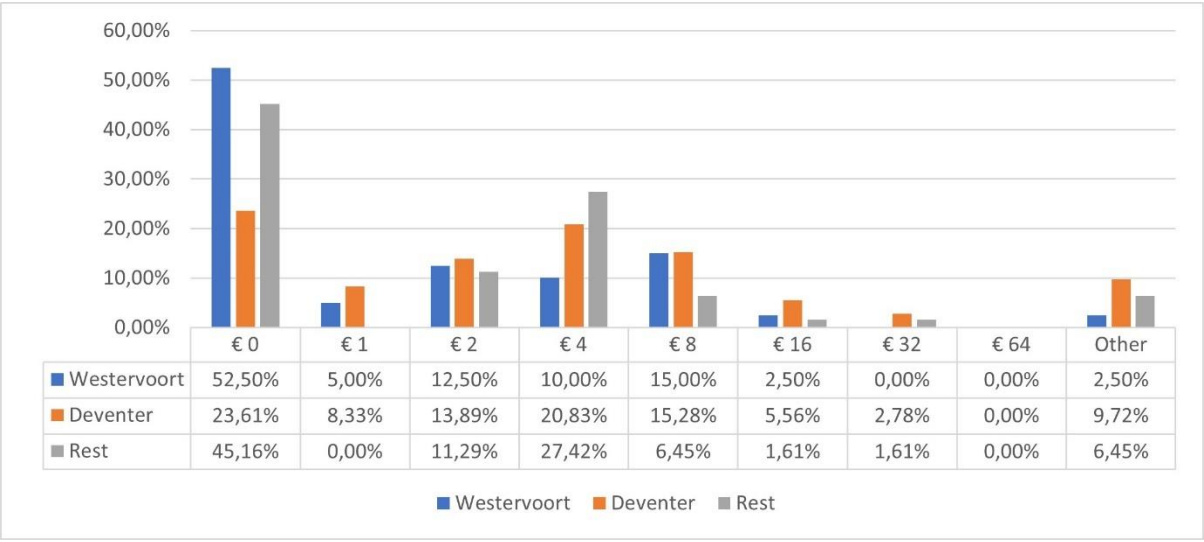


	Walking	Running	Cycling	Horseback riding	Skating	Swimming	Canoeing/rowing	Sailing	(kite)surfing	Picnicking	Animal observation	Camping	Photography	Other
Westervoort	20,67%	7,33%	16,67%	18,00%	2,00%	8,00%	1,33%	1,33%	0,00%	4,67%	9,33%	1,33%	8,00%	1,33%
Deventer	24,20%	6,41%	15,66%	0,71%	2,14%	9,96%	6,76%	2,85%	1,07%	9,61%	7,47%	4,27%	7,12%	1,78%
Rest	18,71%	5,04%	19,42%	1,44%	1,80%	8,27%	6,47%	4,32%	1,44%	8,99%	10,07%	4,32%	7,55%	2,16%

Figure 19: Comparison of survey results on type of activity for Westervoort and Deventer (percentages). n=709

In all areas, walking and cycling is the most popular activity (walking about 20% and cycling about 17%). The most remarkable differences in types of activity are horseback riding, canoeing/rowing and picnicking. Horseback riding is more popular in Westervoort (18% compared to 1%), while canoeing/rowing and picnicking are more popular in Deventer and the other locations. About 6.5% of the respondents mention that they canoe and/or row in the NBS near Deventer and the others, while only 1% does this for Westervoort. About 9% of the respondents selected the option picnicking for Deventer and the rest, compared to 5% for Westervoort.

4.3.4 Willingness to pay



	€ 0	€ 1	€ 2	€ 4	€ 8	€ 16	€ 32	€ 64	Other
Westervoort	52,50%	5,00%	12,50%	10,00%	15,00%	2,50%	0,00%	0,00%	2,50%
Deventer	23,61%	8,33%	13,89%	20,83%	15,28%	5,56%	2,78%	0,00%	9,72%
Rest	45,16%	0,00%	11,29%	27,42%	6,45%	1,61%	1,61%	0,00%	6,45%

Figure 20: Comparison of survey results on willingness to pay for Westervoort and Deventer (percentages). n=147

In general, respondents indicated that they were willing to pay more for the NBS near Deventer than Westervoort or the other NBSs. The majority of the respondents gave a WTP of €0 for the NBS near Westervoort (52.5%). For the other NBSs combined this was 45%. For Deventer, however, the WTP was more spread out over the different answers, with only 24% answering €0.

5 DISCUSSION

5.1 INTERPRETATION OF THE RESULTS

One of the results of the survey was that 42% of the respondents mention that they visit the NBS more often. A reason for this could be that the changes in the area made the NBS more attractive. However, the Covid-19 crisis probably also influenced this. According to the Dutch association Wandelnet there has been a large increase in the number of people that take a daily walk in the Netherlands (Wandelnet, 2021). This also recures in this research: people that say that they visit the NBS daily also mention that they visit more often than before. This could be people that live near the NBS and take a walk there as a break from their work.

Most respondents do not travel longer to the NBS compared to before the Room for the River measures. This is probably because they did not move houses during that time, which is confirmed by question 4.4 of the survey. 85% Of the respondents has been living in the same province for 10 years or longer. Of course, people could have moved houses within the same province.

A remarkable result was the large number of respondents of the survey that state that they do horseback riding in the NBS near Westervoort (18%). This could be explained by the fact that there is a riding school in that NBS that sometimes organizes riding routes through the NBS (Manege Ten Bosch, 2021). This riding school was also contacted to spread the survey amongst members. Perhaps the survey reached a lot of members of this riding school, which would influence the results for that NBS.

Overall the main activities that are done in the NBSs are walking and cycling (together 38%). As mentioned before, there has been an increase in people that regularly take a walk, which could explain this (Wandelnet, 2021). Furthermore, in 2019, the bicycle was the second most used mode of transport in the Netherlands, after the car. 45% Of the time that people spend on cycling is recreational (Centraal Bureau Statistiek, 2020). This explains the results quite well.

The willingness to pay for maintenance of the NBS was higher for Deventer than for the other areas. 76% Of the respondents are willing to pay something (so not €0) for Deventer, as compared to an average of 54% for the other areas. A straightforward reason for this is that people are more content and/or enthusiastic about that NBS. However, this difference can also be explained by looking at the type of respondents. It is not known exactly how people found the survey, but the survey was sent to all employees of TAUW that work in the office in Deventer. Employees of this company have probably relatively more money to spend and are wealthier than the average person in the Netherlands. They are also often experts on the topics NBSs and flood hazard and might therefore value this more than other people.

Only 1 out of 195 respondents stated that they travel longer than two hours to the NBS and only 9 out of 202 respondents stated that they travel more than 50 km. Based on this, it becomes clear that most of the visitors are people that live relatively nearby. People that live further away probably go to other natural areas to recreate. Only 22 respondents answered that they stay in the NBS for two days or more. This number was expected to be higher because during the field visits, 12 camping grounds were visited to spread flyers about the survey. Apparently, not a lot of people were reached this way.

5.2 LIMITATIONS

The respondents of the survey are only a sample of the total population of people that visit the NBS. Since the population is unknown and hard to determine, it was not possible to draw conclusions about that or to determine if the sample gives a good representation of the population. Therefore, all conclusions are only based on the sample of the survey questions and this might cause errors in conclusions. For example, there is no data available of the situation on recreation before implementation of the NBSs. Data about people that visited the area before Room for the River, but not after is therefore not included in the results.

Another point is the division of survey results over the different NBSs. There were significantly more responses for Westervoort and Deventer than for the other four areas. This creates an overrepresentation in the results for those areas. A reason for the high number of respondents for Deventer is probably the fact that the survey was sent to all employees of TAUW that work in the office in Deventer. However, it is not known how people got to the survey. This is something that might be interesting to implement in further survey research.

For the other areas, the minimum desired amount of respondents of thirty was not reached, so no significant conclusion for those areas themselves could be drawn. However, they were included in the general results.

The accuracy and quality of the spatial data analysis were not always sufficient. It became clear during field visits, for example, that not all objects of street furniture were present on the map. As far as possible such errors were compensated in the spatial data analysis, based on observations during field visits, but it might be possible that important mistakes were missed.

6 CONCLUSIONS

This research aimed at assessing the impacts of the Nature Based Solutions on recreational activities. This was done by taking the Room for the River measures along the river IJssel as a case study. Two things were done for this assessment: a survey amongst recreators of the area and a data analysis in the program ArcMap.

The main result of the survey was that 42% of the respondents of the survey do visit the NBS more often after implementation of the Room for the River measures. However, it cannot be said that they travel longer to the NBS than before. Most respondents state that they have the same travel time (89%). The main activities that people do in the areas are walking (21%) and cycling (17%). An interesting result was that 38% of the respondents do not want to spend any money on maintenance of the areas. Based on the results of the river IJssel, there can be said that NBSs do attract people to recreate in the area.

The spatial data analysis showed that the area near Deventer scores the highest on the different criteria that were used. This means that this area should be the most attractive to people to visit and to recreate in. The area near Westervoort scored the lowest and should be the least attractive. However, these two results were not clearly visible in the results of the survey. While Deventer had the most respondents, Westervoort was a clear second. This means that there are relatively a lot of visitors to the area. There can be concluded that all NBSs do stimulate recreational activities to some extent, but there are large differences between the different NBSs.

When the survey results and the spatial data analysis are combined, it can be concluded that people value an NBS where there are more facilities to recreate more than an NBS where there are few of such facilities, based on the willingness to pay for maintenance of the area. An area with more facilities also attracts people that visit only once a week or once a month, instead of daily.

7 RECOMMENDATIONS

After this research, there is a clear insight into the characteristics of recreation in the NBSs along the river IJssel. Given the conclusions that people visit more often after implementation of the NBS, a recommendation for TAUW and other similar companies is to try and implement the concept of NBSs in other projects as opposed to 'hard' solutions, like heightening a dike. NBSs can support recreation, so if this is one of the goals of a project implementing an NBS might be valuable.

To improve this research, I recommend gathering more data, both survey responses and spatial data. Especially for the locations near Zwolle, Kampen, Zutphen and Veessen-Wapenveld more respondents will result in a more sound conclusion. The same goes for the spatial data, where some data was incomplete.

Further research on the subject that might support this research is for example similar research on different locations and to compare results. For example, the NBSs along the Rhine could be assessed similarly. When the results are similar, a more sound conclusion on recreation in NBSs can be drawn.

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APPENDIX A

As mentioned in Section 1.1.2, six different locations consisting of nine project areas along the IJssel river will be assessed in this research. At all nine project areas, some changes to the river profile have been made. What exactly has been done is explained in this section.

Dike relocation at Hondsbroeksche Pleij (Westervoort)

The dike is relocated more towards the hinterland, creating a wider floodplain for the river. In this new floodplain, there is a control system that can be opened and closed to regulate the water inflow into the IJssel.

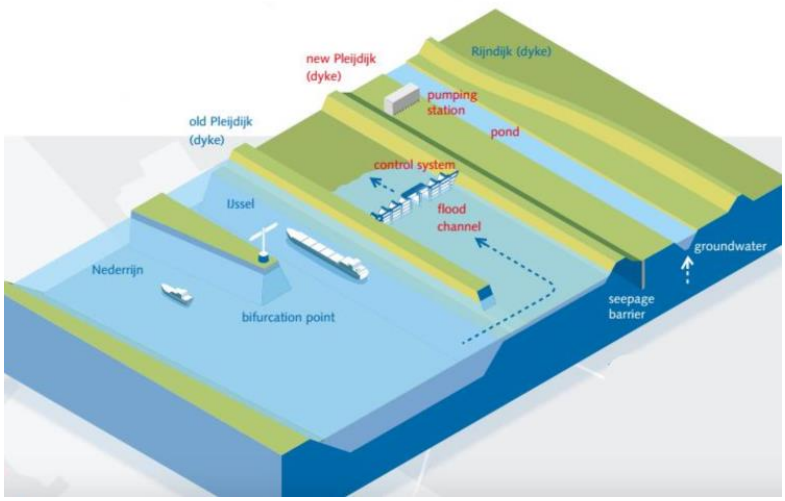


Figure 21: Schematic overview of the measure are Hondsbroeksche Pleij (Ruimte voor de Rivier, 2015)

Dike relocation at Cortenoever (Zutphen)

The dike is relocated more towards the hinterland, creating a wider floodplain for the river. On top of that, the old dike is lowered at certain points, which gives the river opportunities to flow into the newly created floodplain.

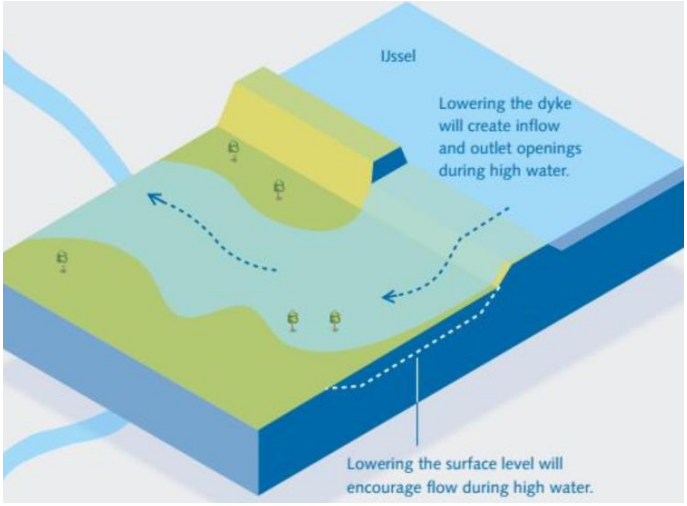


Figure 22: Schematic overview of the measure at Cortenoever (Ruimte voor de Rivier, 2015)

Dike relocation at Voorsterklei (Zutphen)

The dike is relocated more towards the hinterland, creating a wider floodplain for the river. On top of that, the old dike is lowered at certain points, which gives the river opportunities to flow into the newly created floodplain.

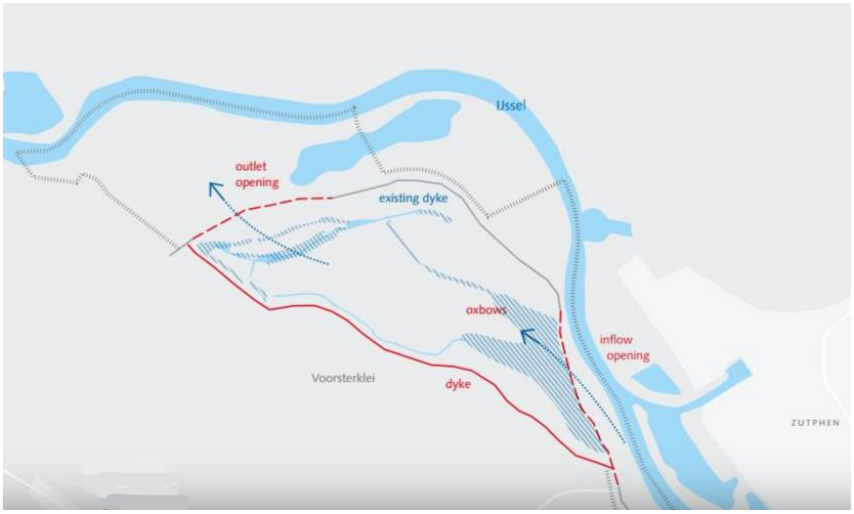


Figure 23: Schematic overview of the measure at Voorsterklei (Ruimte voor de Rivier, 2015)

Lowering floodplain at Bolwersplas, Worp and Ossenwaard (Deventer)

The floodplain is excavated, giving the river more space during high discharges. This is done by creating several side channels. Between the side channels there is a natural area and some paths and beaches for recreation.

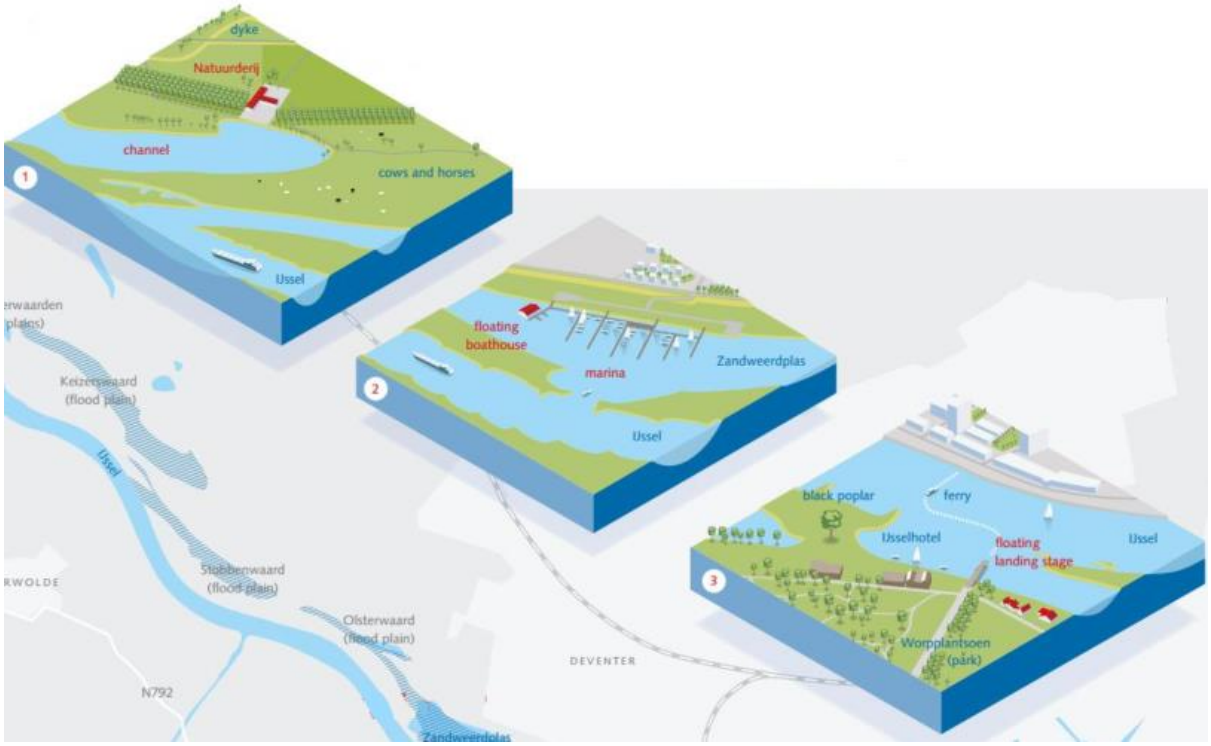


Figure 24: Schematic overview of the measure at Bolwersplas, Worp and Ossenwaard (Ruimte voor de Rivier, 2015)

Lowering floodplain at Keizers- en Stobbenwaarden en Olsterwaarden (Deventer)

The floodplain is excavated, giving the river more space during high discharges. This is done by creating several side channels. Between the side channels there is nature area.

Figure 25: Schematic overview of the measure at Keizerswaarden, Stobbenwaarden and Olsterwaarden (Gemeente Deventer, n.d.)

Hightide gully at Veessen-Wapenveld

An additional gully is created where water can flow in case of a high discharge. This is done by creating two longitudinal dikes. At Veesssen there is an inlet that is opened in times of high water levels. The outlet is near Wapenveld.

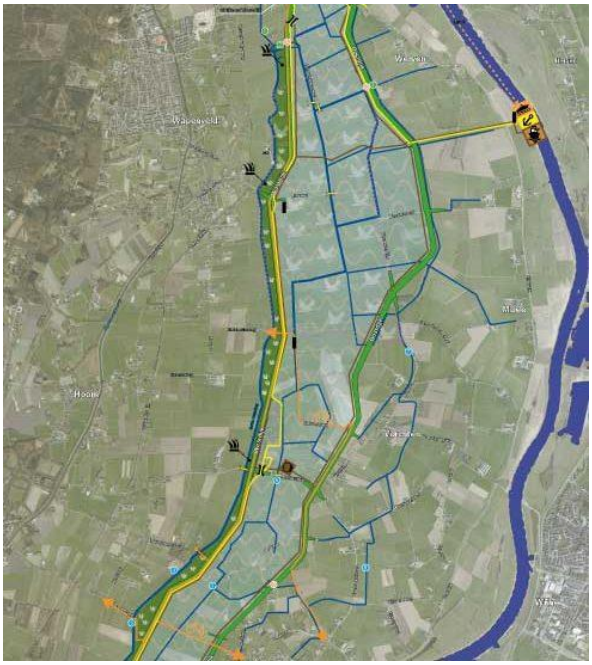


Figure 26: Schematic overview of the measure at Veessen-Wapenveld (KWT Waterbeheersing, n.d.)

Lowering floodplain at Scheller en Oldeneler warden (Zwolle)

The floodplain is excavated, giving the river more space during high discharges. This is done by creating several side channels. Between the side channels there is a natural area.

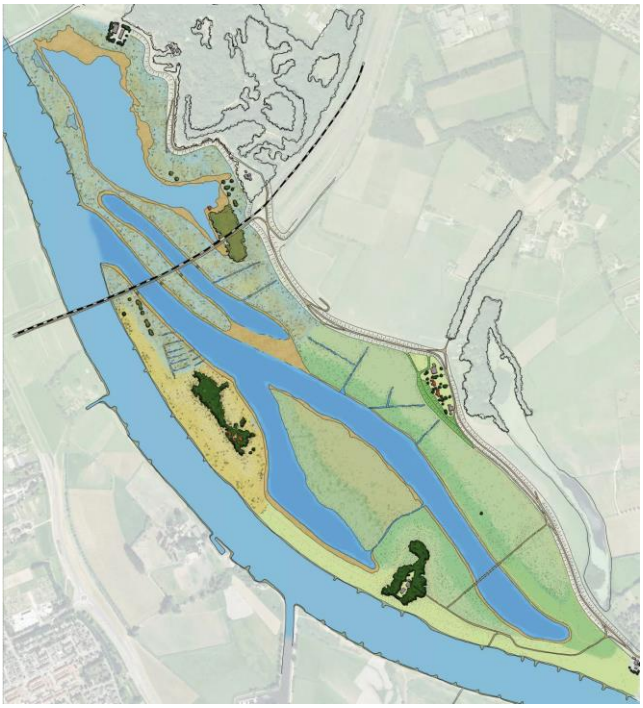


Figure 27: Schematic overview of the measure at Scheller and Oldeneler (BoschSlabbers, n.d.)

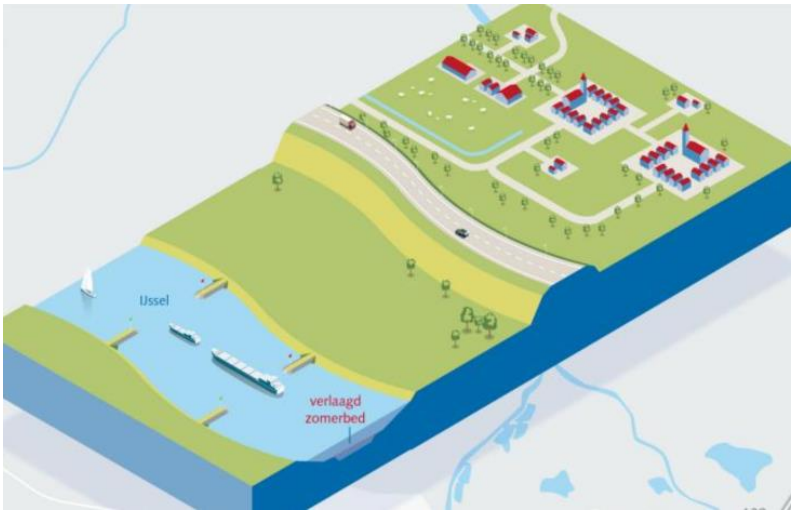
Dike relocation at Westenholte (Zwolle)

The dike is relocated more towards the hinterland, creating a wider floodplain for the river. In this floodplain, there are several channels. Through the hinterland, there are walking paths and cattle.

Figure 28: Schematic overview of the measure at Westenholte (Groot Salland Water Board, 2010)

Lowering floodplain at Beneden-IJssel (Kampen)

The riverbed is lowered, giving the water more space. This is the part of the river that flows along the city center. Next to that, an additional channel is dug that leads the water from the main stream into the Revemeer. This channel is separated from the IJssel by a lock.



Schematic overview of the measure at Beneden-IJssel (Ruimte voor de Rivier, 2021)

APPENDIX B

Table 7: Recreational activities and their category (Metin, Katirci, Yüce, & Saricam, 2017)

Basic Entertainments	
Auctions	Radio
Concerts	Sports having spectators (baseball, football, formula)
Dance shows	Telling stories
Offers (food etc)	Television
Exhibitions (For example: flower shows, auto fairs etc)	Theatre
Films/Cinema-shows	Internet (surfing)
Meetings (for an activity or as freely)	
Mental Activity, Relaxation, and Self-Awareness	
Academic classes (for example: psychology, philosophy)	Seminars
Personal development group lessons	Classes for developing skills (for example: cooking, design)
Meditation	Tai Chi
Museums	Travel/ Trip/ Visit (by walking)
Poet	Writing/reading
Yoga	Historical settlements
Conferences	Mud bath
Using water sources with warm minerals	Going to Turkish bath
Warm bath-tub bath	Sun bath
Listening to music	Watching sunrise/sunset
Massage	Sauna and steam room
Travel/ Trip / Visit (with a vehicle)	
Sports and exercises	
Aerobics	Boxing
Archery	Getting on a canoe
Car Race	Cricket
Badminton	Croquet
Getting on the balloon	Curling
Baseball	Diving
Basketball	Dog racing
Riding with bicycle	Fencing
Billiard	Football
Sledging	Field hokey
Bowling	Frisbee
Frisbee football	Rowing
Golf	Rugby
Gymnastics	Sailing with a sailboat
Handball	Shooting
Glider flight	Throwing discs
Riding	Skateboard
Playing with horses hole	Free diving
Ice hockey	Diving with snorkel
Rolling skating	Snow skiing
Jai Alai	Skiing with snow vehicle
Getting on Jet Ski	Walking on snow
Running	American Football
Judo	Softball (baseball that is placed on small fi-elds)
Karate	Squash
Skiing	Surfing
Kite surfing	Swimming
Lacrosse (a ball game like hockey)	Table tennis
Mountain cycling	Tennis
Paddle tennis (area with rectangular walls)	Athleticism
Platform tennis (a grounds having trees)	Volleyball
Paddleball (a special ball game)	Water ball
Parasailing	Water skiing
Polo cycling	Weight lifting
Rafting	Wind surfing
Skating	Wrestling
Yachting	Skiing with snowboard
Paragliding	Jumping with a parachute
Bungee jumping	Bungee jumping (from an air vehicle)
Air skating	Underwater rafting

Shooting with guns	Cross skiing
Orienteering	Walking while skiing
	Descending with rope
Music	
Attending concerts	Singing at the chorus
Attending music schools	Singing in a group that is not official
Going to night clubs	Listening to songs
Attending symphonies	Playing music instrument (with friends)
Composing music	Singing solo songs
Leading music groups	Whistling
Art	
Participating in art	Glass art
Caligraphy	Ice art
Ceramics	Metal art
Design	Mozaic art
Technical drawing	Oil painting
Paper folding art	Sculpture art
Photography art	Water colour paint
Sketching	Wood engraving art
Marble art	Stained-glass art
Dance	
Aerobic dance	Disco dance
Ballet	Folk dance
Hall dances	Jazz dance
Oriental dance	Modern dance
Ceili dance (Irish dance)	Square dance (A type of American folk dan-ce)
Clogging (dancing with wooden shoes)	Sofi dance (a mystic group dance)
Contra dance (a type of dance)	Step dance
Latin dances	
Hobbies	
Collecting antiques	Dealing with felt art
Cooking	Finger painting
Wattling	Arranging flowers
Cake decoration	Jewelry making
Candle production	Making kites
Making celebration cards	Tricot weaving
Carpentry	Leather handcrafts
Designing clothes	Making macrames
All kinds of collections (stamp, money, baby etc)	Metal handicrafts
Cooking	Model creation
Crocheting	Paper arts
Decoupage (a decorative technique)	Making paper-mache
Fabric painting	Looking after pet animals
Dealing with electronic tools	Making coverlets
Embroidering	Dealing with soaps
Tree arts	Making wall carpets
Apiculture	Raising bar yard fowls
Play/Video games	
Active games	Games with money base (like monopoly)
Table games for adults	Drama games
Art games	Double table games (chess)
Card games	Games based on estimations
Table games for children	Games with human interactions
Computer games	Paper-pencil games (like tictactoe)
Imaginative games	Puzzles
Domestic games	Spelling games (like scrabble)
Illusionism	Table sports (like table tennis)
Information games	Target games (like dart)
Memory games	Throwing games (like frisbee)
Team games	
Social Activities	
Art clubs	Participating in international clubs
Sportive clubs (like tennis)	Participating in investment clubs
Participating in meetings	Participating in groups for speaking foreign languages
Participating in unions	Participating in outdoor activities (like climbing)
Participating in fighting clubs	Participating in political groups
Participating in city clubs	Participating in professional organizations
Participating in clubs relating with handic-rafts (line sewing)	Participating in religious groups
Participating in cultural clubs (like music)	Taking part in chorus

Participating in dance clubs	Participating in social clubs
Participating in drama clubs	Participating in scouting clubs
Participating in educational groups (like historical)	Participating in veteran groups
Participating in family meetings	Visiting friends
Participating in public unions	Participating in water sport clubs (like swimming)
Participating in game clubs (like chess)	Participating in winter sport clubs (like ski-ing)
Participating in groups for adults	Participating in youth groups
Participating in hobby clubs	
Human Services	
Providing aid for disabled people	Providing aid for elders
Providing aid for homeless people	Human groups
Providing aid for sick people	International groups
Groups with certain aims	National groups
Protection and environmental science	Interpersonal support groups
Educational groups	Protection groups
Association providing funds	
Nature Activities/Open Air Recreation	
Walks made for investigating animals	Walking in the night time
Walking with back-packs	Picnic
Walking at the coast	Walks made for identifying plants
Investigating the birds	Walking near the river
Activities with camp fire	Climbing on the rocks
Camping	Diving with equipment
Fishing (fresh water)	Fishing (sea)
Garden works	Cave investigation
Collecting wild fruits and vegetables	Following the traces of animals
Climbing	Investigating the whales
Hunting	Discovering the wild life
Climbing on the mountain	Waling in the wild bushes
Walking in nature (with accommodation)	Collecting agricultural products
Collecting mushrooms	Collecting wild plants and flowers
Taking photos	Taking boat tours
Camping (with vehicles)	ATV experience
4wd Driving experience	Cross motor experience
Vehicle safari	Canyon passage
Nature walk (daily)	Climbing at the zenith
Climbing on ice	Activities for protecting the nature
Discovering underwater caves	Jet boat experience
Flying kites	Learning in nature
Driving motorcycle	Climbing on the tree
Paintball	Collecting sea products
Traveling with paramotor	Going on safari with camels
Training pet animals	Getting on boat (without engines)
Painting (nature)	
Hedonic Activities	
Drinking	Gambling
Using drugs	Sexual intercourse
Watching particulars with sexual content (striptease, porn images etc)	

Table 8: Features that are needed to practice the activities that were selected as possible activities in the NBSs

Selected activity	**Features that are needed for people to practice that activity**
Travel/trip/visit	Roads
Tai Chi	Field
Writing/reading	Bench/field
Watching sunset/sunrise	Vista
Getting on balloon	Field
Riding bicycle	(bicycle)roads
Sledging	Open landscape/paths
Frisbee football	Field
Riding	(horseriding) paths/field
Rolling skating	Asphalt paths/area
Getting on a canoe	Open water, marina/docking area
Frisbee	Field
Rowing	Open water, marina/docking area
Sailing with a sailboat	Open water, marina/docking area
Skateboard	Asphalt paths/area
Running	Paths
Yachting	Open water, marina/docking area

Orienteering	Paths
Swimming	Open water, beach
Water skiing	Open water
Wind surfing	Open water
Jumping with parachute	Field
Bungee jumping (from an air vehicle)	-
Listening to songs	-
Whistling	-
Photography art	-
Sketching	Benches/field
Looking after pet animals	-
Active games	Field/open landscape
Throwing games	Field
Sportive clubs	Sports accommodation
Participating in outdoor activities	Nature
Participating in scouting clubs	-
Participating in water sport clubs	Open water
Participating in youth clubs	-
Walks made for investigating animals	Paths/nature
Walking with back-packs	Paths
Painting	Benches/field
Investigating the birds	Nature
Activities with camp fire	Designated campfire places
Camping	Camping ground
Fishing (fresh water)	Open water
Walking in the night time	Paths
Collecting wild fruits and vegetables	Nature
Picnic	Field/benches
Hunting	Bush/forest
Walks made for identifying plants	Paths, nature
Walking in nature	Paths, nature
Collecting mushrooms	Nature
Taking photos	-
Walking near the river	Paths, river
Following the traces of animals	Nature
Nature walk	Paths, nature
Discovering the wild life	Nature
Walking in the wild bushes	Bush/forest
Collecting agricultural products	Agricultural grounds
Driving motorcycle	Asphalted paths/roads
Collecting wild plants and flowers	Nature
Taking boat tours	Open water, marina/docking area
Training pet animals	-
ATV experience	Sandy paths
Cross motor	Sandy paths/motor route
Activities for protecting nature	Nature
Learning in nature	Nature
Getting on a boat	Open water, marina/docking area

APPENDIX C

Survey IJssel – English

Westervoort, Zutphen, Deventer, Veessen-Wapenveld, Zwolle, Kampen

In the Netherlands, there is always a risk of flooding. Not only by the sea, but also by our rivers. Regularly, they have to process a lot of water and this needs to be drained safely. A solution is to give rivers more space, for example by making the river wider or deeper. This creates a more natural and safe river area.

In the Netherlands this has been done from 2006 to 2017 in the Room for the River project by Rijkswaterstaat in all large rivers in the Netherlands. One of those is the IJssel, that splits from the Neder-Rijn at Arnhem and flows to the Ketelmeer at Kampen. In and along the IJssel at different locations there have been adaptations to give the river more room in a natural way. This is why we call them *Nature Based Solutions (NBSs)*: there is a focus on nature to decrease flood risk, but also to tacke problems like climate change and pollution. Next to that, there have been created more recreational opportunities.

Now that all construction work is done, we want to know what the influence of these natural measures have on flood risk, recreation and nature. For the project RECONECT (http://www.reconect.eu/), TAUW and DTU (Danish Technical University) research how the locations near the IJssel influence the people that live close by and/or visit them.

In total there are measures taken at six locations along the IJssel, namely near Westervoort, Zutphen, Deventer, between Veessen and Wapenveld, and near Zwolle and Kampen, from which you need to choose one to answer the questions about. If you visit one or more of these locations, we would like to ask you to fill in the questionnaire. You will contribute to the knowledge about *Nature Based Solutions* and this helps us in this research, but also in future researches.

There are 4 main questions that each have some sub-questions and the survey takes about 15 minutes to fill in.

You have to be 18 years old or older to participate and it is on a voluntary basis. While doing the survey, you can stop at any moment by closing the browser.

All of your answers will be processed in accordance to the General Data Protection Regulation (GDPR). Your name will not be published in any reports or articles, unless you give permission in the second to last question. Your answers will not be shared with third parties, but statistical information from the survey will be sent to relevant parties within TAUW and DTU.

EXPERIENCE OF FLOOD RISK

Below we ask you some questions about flood risk in general

1.1) To which extent do agree or disagree with the following statement:

I am worried about the risk of flooding in my residential area

Completely **disagree** □1 □2 □3 □4 □5 □6 □7 Completely **agree**

1.2) Have you ever experienced a flooding by a river or rainfall?

- o Yes
- o No

1.3) Do you know anyone who has experienced a flooding by a river or rainfall?

- o Yes
- o No

CONNECTION TO THE NBS AREA

The other questions are about one o the areas near Westervoort, Zutphen, Deventer, Veessen-Wapenveld, Zwolle of Kampen, see also the map below. First, we describe shortly the project.

Figure 29: Map of the six different projec locations along the IJssel river

Room for the River

The Room for the River project resulted from the high river water levels in the Dutch rivers in 1993 and 1995. The was a high risk of flooding and this was the direct reason for the project. In general, the idea of Room for the River was to give the rivers more space. This has been done by taking different measures to the river area, as described below and in the figure:

1. Relocating dikes towards the hinterland to make floodplains wider
2. Lowering floodplains to let them flood more often
3. Creating side-channels and gullies that flood in cases of high water levels
4. Remove objects like buildings out of the floodplains so ensure a better flow
5. Lowering the main river bed

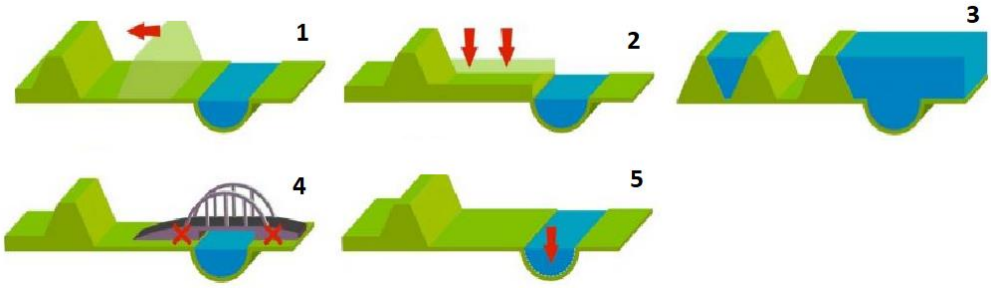


Figure 30: Overview of the different measures that were taken in the Room for the River project

Another goal of Room for the River was to make the area more attractive to people. In the IJssel, this has been done by creating a more natural river area, more nature, and more recreational opportunities, like facilitating hiking and cycling paths, bird watching huts, ferries, beaches and boat rentals.

Pleas indicate for which area you are going to answer the questions. This can be the area that you know the best or that you think is the most interesting.

- Westervoort
- Deventer
- Zwolle
- Kampen
- Zutphen
- Veessen-Wapenveld

Description of the areas

Westervoort

Near Westervoort, Velp and Arnhem the area Hondsbroeksche Pleij is located. Here, the IJssel splits from the Neder-Rijn. The dike has been relocated towards the hinterland, creating wider floodplains and there is a side-channel. Next to that there is an inlet system that regulates the amount of water that flows into the IJssel. In the new area there are hiking and cycling paths created.

Below a map of the area near Westervoort is shown. The project area is marked in yellow.

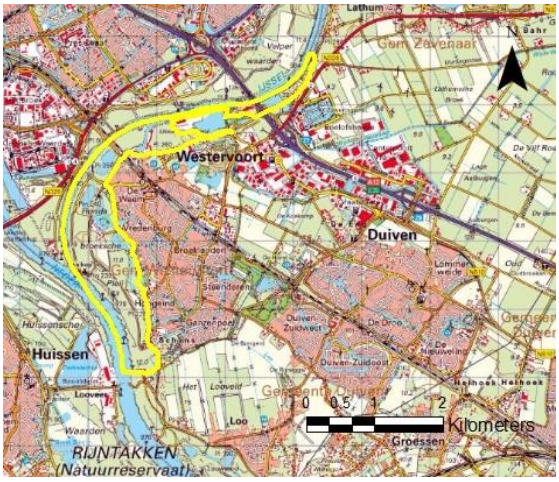


Figure 31: Map of the project area near Westervoort. The project area is marked in yellow

Deventer

Near Deventer there are several locations where the river bed has changed. The floodplains are lowered near Worp, Ossenwaard, Keizerswaarden and Olsterwaarden. There is also a new lake created, Bolwerksplas. In the floodplains there are extra gullies that flood in cases of high water levels in the river. There are also new hiking and cycling paths in the floodplains.

Below a map of the areas near Deventer is shown. The project areas are marked in yellow.

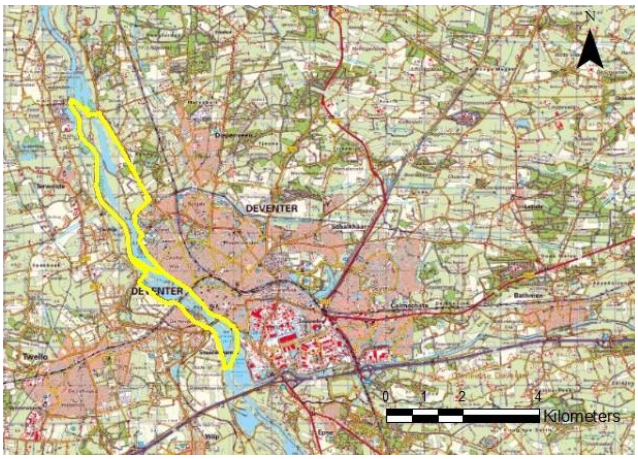


Figure 32: Map of the project areas near Deventer. The project areas are marked in yellow

Zwolle

Near Zwolle two locations have been adapted in the Room for the River project. The first project is called Scheller and Oldener Buitenwaarden and is located on the south side of Zwolle. The second area is Westenholte and is located on the northwest side of the city. At the Scheller and Oldener Buitenwaarden the floodplains are lowered and there are additional channels dug to give the river more space. At Westenholte the floodplains are made wider by relocating the dikes towards the hinterland. This creates a more natural river area. In both areas there are new hiking and cycling paths created.

Below a map of the areas near Zwolle is shown. The project areas are marked in yellow.

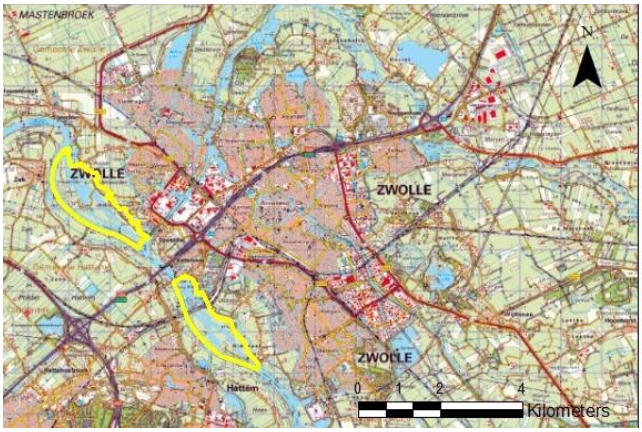


Figure 33: Map of the project areas near Zwolle. The project areas are marked in yellow

Kampen

Near Kampen, the IJssel flows into the Ketelmeer. In this last part of the river the river bed is lowered. Also, a new channel is dug, the Reevediep, that runs from the IJssel to the Drontermeer. On the southwest side of Kampen there is a new hiking path through the floodplains, which are more natural than before.

Below a map of the area near Kampen is shown. The project area is marked in yellow.

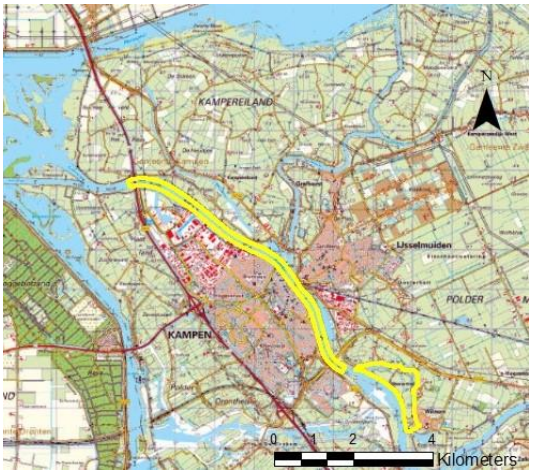


Figure 34: Map of the project area near Kampen. The project area is marked in yellow

Zutphen

Close to Zutphen, there are two locations that were part of the Room for the River project. The first area is called Cortenoever and is located south of Zutphen. The second area is called Voorsterklei and is located north of the city. At both locations, an additional dike is constructed more towards the hinterland to give the river more space. The original dike is lowered to ensure that the water can flow into and out of the new floodplain. In this new floodplains new hiking and cycling paths are created.

Below a map of the areas near Zutphen is shown. The project areas are marked in yellow.

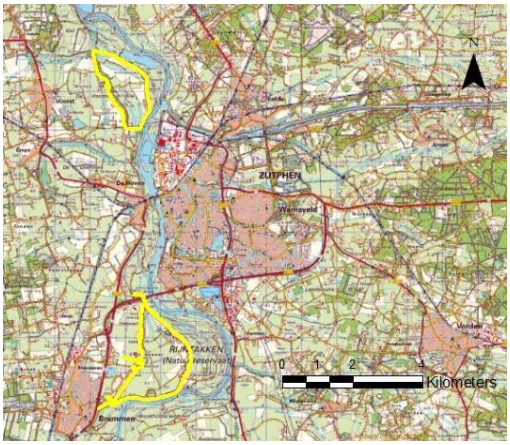


Figure 35: Map of the project areas near Zutphen. The project areas are marked in yellow

Veessen-Wapenveld

On the westside of te IJssel, between Veessen and Wapenveld, a hightide gully is cerated. This gully is enclosed by two dikes and has an inlet near Veessen and an outlet near Wapenveld. When the water level in the river is high, the water can flow into the gully. When this is not the case, the gully is dry and people can hike and cycle through the gully and on the dikes.

Below a map of the area between Veessen and Wapenveld is shown. The project area is marked in yellow.

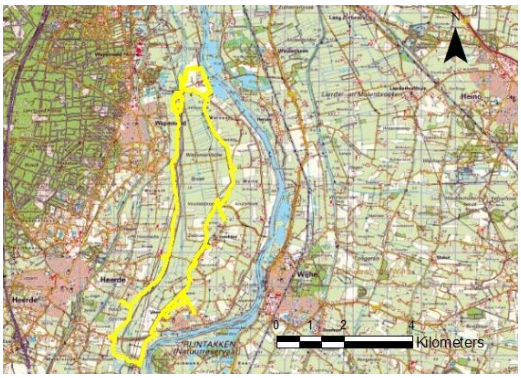


Figure 36: Map of the project area Between Veessen and Wapenveld. The project area is marked in yellow

1.4) How far away from your home is the project area near *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* ? *Choose the best approximation*

- Less than 1 km
- 1 to 5 km
- 6 to 10 km
- 11 to 50 km
- More than 50 km

1.5) How often do you spend time in, or travel through the project area near *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* ? *Only choose the best option*

- Daily
- Weekly
- Monthly
- Yearly
- Never – why? _____ (*go to Q2.1)*

1.6) Did you visit the project area near *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* before the Room for the River project was finished, so before (2007 (Westervoort) / 2013 (Deventer) / 2012 (Zwolle) / 2015 (Kampen / 2012 (Zutphen) / 2017 (Veessen-Wapenveld))?

- Yes *(go to Q1.6b)*
- No *(go to Q1.7)*
- I don't know *(go to Q1.7)*

1.6b) Do you visit the project area near *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* more often now compared to before the Room for the River project was finished, so before (2007 (Westervoort) / 2013 (Deventer) / 2012 (Zwolle) / 2015 (Kampen / 2012 (Zutphen) / 2017 (Veessen-Wapenveld))?

- o A lot more often
- o A little more often
- o About as often
- o A little less often
- o A lot less often

1.7) How long does it take you to travel to the project area near *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* from your home?

- o Shorter than 30 mins
- o 30 mins to 1 hour
- o 1 to 2 hours
- o Longer than 2 hours

1.7b) Do you have to travel longer (both in time as in distance) to the project area *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* compared to before the Room for the River project was finished, so before (2007 (Westervoort) / 2013 (Deventer) / 2012 (Zwolle) / 2015 (Kampen / 2012 (Zutphen) / 2017 (Veessen-Wapenveld))? Only if answer to Q1.6 is yes

- o A lot longer
- o A little long
- o About as long
- o A little less long
- o A lot less long

1.8) How long on average do you stay in the project area near *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* per visit?

- o Shorter than 30 mins
- o 30 mins to 1 hour
- o 1 to 2 hours
- o 2 to 3 hours
- o Half a day
- o A day
- o Two days/a weekend
- o More than two days at a time

1.8b) Do you visit the project area near *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* more often now compared to before the Room for the River project was finished, so before (2007 (Westervoort) / 2013 (Deventer) / 2012 (Zwolle) / 2015 (Kampen / 2012 (Zutphen) / 2017 (Veessen-Wapenveld))? Only if answer to Q1.6 is yes

- o A lot more often
- o A little more often
- o About as often
- o A little less often
- o A lot less often

1.9) What are your main reasons for visiting the project area near *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld*? *More than one option can be selected*

- ☐ Relax/ spend time in nature
- ☐ Social activities with family and/or friends
- ☐ Sports
- ☐ Travel through the area
- ☐ Other _____

PEOPLE/PLACE RELATION

We want to ask how important the following aspects are for you, regardless of how often you visit the area.

YOUR OPINION ON FLOOD RISK

2.1) to which extent do you agree or disagree to the following statement:

I am worried about the possible consequences of flooding of my property.

Completely **disagree** □1 □2 □3 □4 □5 □6 □7 Completely **agree**

Fill in why by selecting all relevant options

- ☐ Economic reasons (for example damage costs, decreased value of property, etc.)
- ☐ Health reasons
- ☐ Decreased feeling of safety
- ☐ I don't know
- ☐ I am not worried about this
- ☐ Other _____

2.2) to which extent do you agree or disagree to the following statement:

I am worried about the possible consequences of public space (for example schools, streets, parks, etc.)

Completely **disagree** □1 □2 □3 □4 □5 □6 □7 Completely **agree**

Fill in why by selecting all relevant options

- ☐ Economic reasons (for example damage costs, decreased value of property, etc.)
- ☐ Health reasons
- ☐ Decreased feeling of safety
- ☐ I don't know
- ☐ I am not worried about this
- ☐ Other _____

YOUR VIEW ON GREEN AREAS

2.1) to which extent do you agree or disagree to the following statement:

Green space is important to me.

Completely **disagree** □1 □2 □3 □4 □5 □6 □7 Completely **agree**

Fill in why by selecting all relevant options

- ☐ I like to have green areas and/or to travel through green areas
- ☐ It good for physical health
- ☐ I like to do things with friends and/or family in green areas
- ☐ I don't know
- ☐ I do not think this is important
- ☐ Other _____

2.4) to which extent do you agree or disagree to the following statement:

I think it is important that green areas have recreation facilities (such as canoeing, swimming, boating, sporting, cycling, hiking, etc.)

Completely **disagree** □1 □2 □3 □4 □5 □6 □7 Completely **agree**

Select all recreational activities that you do in the area.

*Choose one or more from the list * only if answer to Q1.5 is not never*

- ☐ Hiking
- ☐ Running
- ☐ Cycling
- ☐ Horseback riding
- ☐ Roller skating
- ☐ Swimming
- ☐ Canoeing/rowing
- ☐ Sailing/boating
- ☐ (kite)surfing
- ☐ Picnicking
- ☐ Animal observation
- ☐ Camping
- ☐ Photographing
- ☐ Other, namely: _____

2.5) to which extent do you agree or disagree to the following statement:

Green areas should have good nature with a high biodiversity (a lot of different plants and animals).

Completely **disagree** □1 □2 □3 □4 □5 □6 □7 Completely **agree**

Fill in why by selecting all relevant options

- ☐ It is good for nature and biodiversity
- ☐ A healthier environment is good for people
- ☐ A vacation in nature is more interesting to visit
- ☐ I don't know
- ☐ I don't think this is important
- ☐ Other _____

2.5) to which extent do you agree or disagree to the following statement:

It is important that there are "room-for-nature" areas that have limited access for people within green areas.

Completely **disagree** □1 □2 □3 □4 □5 □6 □7 Completely **agree**

Fill in why by selecting all relevant options

- ☐ I like to have a closed area where nature is not disturbed
- ☐ The "room-for-nature" will contribute to nature and biodiversity
- ☐ Nature itself has a value and there should be areas that are not disturbed by people
- ☐ I don't know
- ☐ I don't think this is important
- ☐ Other _____

HELP US GIVE THE PROJECT A VALUE

The main goal of the Room for the River project was to give rivers more space in times of high water levels. Like described before, this has been done by creating and lowering floodplains, relocating dikes and digging extra channels and gullies.

[recap changes in area]

Keeping this in mind, we would like to introduce the following hypothetical situation.

3.1) To support the maintenance of the project area, a monthly fee could be introduced. Which of the following best represents your maximum voluntary contribution?

- o 0 €
- o 1 €
- o 2 €
- o 4 €
- o 8 €
- o 16 €
- o 32 €
- o 65 €
- o Other amount _____

HOW MUCH IS EXTRA NATURE WORTH

There is expected that the project contributes to improving the quality of nature and to creating new nature areas, which helps increase biodiversity and habitat restauration.

Please answer the next question, keeping this in mind.

3.2) Which of the following best represents your maximum voluntary contribution, additional to the amount that you chose in the previous question?

- o +0 €
- o +0.5 €
- o +1 €
- o +2 €
- o +4 €
- o +8 €
- o +16 €
- o +32 €
- o +65 €

- Other amount _____

3.3) What is the main reason that you do not want to spend any money on this project? Only if both answers are 0 €:

Choose only one option

- I cannot afford to lose extra money each month
- This should be paid by the government
- I do not have enough information
- I do not think this is an important project
- I already pay (water board)taxes for this
- Other____

SOCIO-DEMOGRAPHIC CHARACTERISTICS

Lastly we would like some information about yourself

4.1) What is your postal code?

If the answer to Q1.8 is 'two days/a weekend' or 'more than two days':

Because you mentioned that you stay in the area for two days or longer, we would like to ask you where you stay for the night. _____

4.2) What is your age?

18-25 | 26-35 | 36-45 | 46-55 | 56-65 | 66-75 | Ouder dan 75

4.3) What is your gender?

Woman | man | Oter | Prefer not to say

4.4) For how long have you been living in Overijssel or Gelderland?

- 0 years / I do not live in these provinces
- 1-3 years
- 4-6 years
- 7-10 years
- Longer than 10 years

4.5) How many people live in your household? _____

4.6) How many of that people are 18 or older? _____

4.7) What is your average monthly income? Mean: before tax €5200,00

- Less than half the mean
- Between half the mean and the mean
- Approximately the mean
- Between the mean and twice the mean
- More than twice the mean
- Prefer not to say

To get to know even more about what peoples opinion is and what they do when they visit one or more of the areas, we would like to ask you some additional questions via email or phone.

This is not a mandatory question

4.8) If you agree on answering some extra questions after this survey, please fill in your email address or phone number: _____

4.9) Do you have any questions and/or additional remarks?

This is not a mandatory question

_____

Thank you very much for your time and contribution to this project! We appreciate that you took the time to answer the questions.

If you want to know more about the RECONECT project, look on this website: http://www.reconect.eu/

Enquête IJssel – Nederlands

Westervoort, Zutphen, Deventer, Veessen-Wapenveld, Zwolle, Kampen

In Nederland is altijd risico op overstromingen, niet alleen door de zee, maar ook door onze rivieren. Regelmatig krijgen die veel water te verwerken, en dit moet veilig worden afgevoerd. Een oplossing is om de rivieren meer ruimte te geven, door bijvoorbeeld de rivier breder of dieper te maken. Dit zorgt voor een natuurlijker en veiliger riviergebied.

In Nederland is dit van 2006 tot 2017 gedaan vanuit het Ruimte voor de Rivier project van Rijkswaterstaat in alle grote rivieren in Nederland. Eén hiervan is de IJssel, die bij Arnhem aftakt van de Neder-Rijn en uitmondt in het Ketelmeer bij Kampen. In en om de IJssel zijn op verschillende plekken aanpassingen gedaan om de rivier meer ruimte te geven op een natuurlijke manier. Dit is waarom we ze *Nature Based Solutions (NBSs)* noemen: er is meer nagedacht over natuur om overstromingsrisico te verminderen, maar ook om problemen zoals klimaatverandering en milieuvervuiling op te lossen. Daarnaast zijn er meer recreatiemogelijkheden gemaakt in het gebied.

Nu alle werkzaamheden zijn afgerond willen we een duidelijker beeld scheppen wat voor een invloed deze natuurlijkere aanpassingen hebben op overstromingsrisico, recreatie en natuur. Via het project RECONECT (http://www.reconect.eu/) onderzoekt TAUW in samenwerking met DTU (Deense Technische Universiteit) hoe de locaties langs de IJssel mensen beïnvloeden die er vlakbij wonen en/of ze bezoeken.

In totaal zijn er op zeven verschillende plekken langs de IJssel aanpassingen gedaan, namelijk bij Westervoort, Zutphen, Deventer, tussen Veessen en Wapenveld, en bij Zwolle en Kampen, waarvan u er één kiest om de vragen over te beantwoorden. Als u wel eens bij één of meer van deze plekken komt willen we u vragen de enquête in te vullen. Daarmee draagt u bij aan de kennisontwikkeling van *Nature Based Solutions* en dit helpt ons bij dit onderzoek, maar ook bij volgende onderzoeken.

Er zijn 4 hoofdvragen, met elk een aantal sub-vragen en de enquête duurt ongeveer 15 minuten om in te vullen.

U moet 18 jaar oud zijn of ouder om mee te kunnen doen en het is op vrijwillige basis. Tijdens het invullen kunt u op elk moment stoppen door uw browser af te sluiten.

Al uw antwoorden worden anoniem verwerkt in overeenstemming met de General Data Protection Regulation (GDPR). Uw naam zal niet terugkomen in verslagen of artikelen die gepubliceerd worden naar aanleiding van deze enquête, tenzij u daar toestemming voor geeft in de laatste vraag. Uw antwoorden worden niet doorgegeven aan derden, maar statistische informatie uit de enquête wordt doorgegeven aan relevante betrokken partijen binnen TAUW en DTU.

BELEVING VAN OVERSTROMINGSRISICO

Hieronder volgen een aantal vragen over uw opvattingen over overstromingsrisico in het algemeen

1.1) In welke mate bent u het eens of oneens met de volgende stelling:

Ik ben bezorgd over het risico op overstroming in mijn woonplaats

Volledig **oneens** □1 □2 □3 □4 □5 □6 □7 Volledig **eens**

1.1) Heeft u ooit een overstroming meegemaakt?
- o Ja
- o Nee

1.2) Kent u iemand die een overstroming heeft meegemaakt?
- o Ja
- o Nee

VERBAND MET HET NBS GEBIED

De rest van de vragen gaan over uw ervaringen met één van de gebieden bij Westervoort, Zutphen, Deventer, Veessen-Wapenveld, Zwolle of Kampen, zie de kaart hieronder. Eerst omschrijven we kort het project.

[Kaart met alle locaties]

Ruimte voor de Rivier

Het Ruimte voor de Rivier project is opgezet naar aanleiding van de hoge rivierwaterstanden in de Nederlandse rivieren in 1993 en 1995. Er was een hoog risico op overstromingen en dit was de directe aanleiding voor het project. In het algemeen was het idee van Ruimte voor de Rivier om de rivieren meer ruimte te geven. Dit is gedaan door verschillende aanpassingen te doen aan het rivierlandschap, zoals hieronder beschreven staat en in de afbeelding te zien is:

1. Dijken verplaatsen van de rivier af, zodat de uiterwaarden groter worden

2. De uiterwaarden uitgraven, waardoor ze vaker overstromen
3. Zijkanalen en geulen maken die overstromen wanneer het water in de rivier hoog staat
4. Objecten zoals gebouwen uit de uiterwaarden weghalen, zodat de rivier beter doorstroomt
5. Verlagen van de hoofdgeul zodat daar meer water door kan stromen

[plaatje RvdR aanpassingen]

Een ander doel van Ruimte voor de Rivier was om het landschap aantrekkelijker te maken voor mensen. In de IJssel is dit gedaan door het rivierverloop natuurlijker te maken, door meer natuur te maken en te zorgen voor meer recreatiemogelijkheden, zoals wandel- en fietspaden, vogelspothutten, veerboten, strandjes en botenverhuur te faciliteren in het gebied.

Geef alstublieft aan voor welk gebied u de enquête gaat invullen. Dat kan het gebied zijn dat u het beste kent of het gebied dat u het interessantst vindt.

- Westervoort
- Deventer
- Zwolle
- Kampen
- Zutphen
- Veessen-Wapenveld

Omschrijving van de locaties

Westervoort

Bij Westervoort, Velp en Arnhem ligt het gebied de Hondsbroeksche Pleij aan de IJssel. Hier vertakt de IJssel van de Nederrijn. De dijk is in dit gebied verplaatst richting het achterland, waardoor wijdere uiterwaarden en een hoogwaterkanaal zijn gemaakt. Daarnaast is er een inlaatsysteem gemaakt dat de hoeveelheid water dat de IJssel instroomt reguleert. In het nieuwe gebied zijn wandel- en fietspaden gemaakt.

Een kaart van het gebied bij Westervoort is hieronder te zien. Het projectgebied is aangeduid in het geel.

[Kaart Westervoort]

Deventer

Vlakbij Deventer liggen meerdere locaties waar de rivierbedding is aangepast. De uiterwaarden zijn verlaagd bij Worp, Ossenwaard, Keizerswaarden en Olsterwaarden. Er is ook een nieuw meertje gemaakt, de Bolwersplas. In de uiterwaarden zijn extra geulen gegraven die volstromen wanneer de rivierwaterstanden hoog zijn. Er zijn ook nieuwe wandel- en fietspaden gemaakt in de uiterwaarden.

Een kaart van de gebieden bij Deventer is hieronder te zien. De projectgebieden zijn aangeduid in het geel.

[Kaart Deventer]

Zwolle

Bij Zwolle zijn twee locaties die aangepast zijn tijdens het Ruimte voor de Rivier project. Het eerste gebied heet de Scheller en Oldener Buitenwaarden en ligt aan de zuidkant van Zwolle. Het tweede gebied is Westenholte en ligt ten noordwesten van de stad. Bij de Scheller en Oldener Buitenwaarden zijn de uiterwaarden verlaagd, zijn er nieuwe kanalen gegraven die de rivier meer ruimte geven. Bij Westenholte zijn de uiterwaarden breder gemaakt door de dijken te verplaatsen richting het achterland. Dit maakt de rivier natuurlijker. In beide nieuwe gebieden zijn wandel- en fietspaden aangelegd.

Een kaart van de gebieden bij Zwolle is hieronder te zien. De projectgebieden zijn aangeduid in het geel.

[Kaart Zwolle]

Kampen

Bij Kampen mondt de IJssel uit in het Ketelmeer. In dit laatste deel van de rivier is de bedding verlaagd. Daarnaast is er een extra kanaal gegraven, het Reevediep, dat van de IJssel naar het Drontermeer loopt. Ten zuidwesten van Kampen is een wandelpad door de uiterwaarden gemaakt en de uiterwaarden zijn natuurlijker gemaakt.

Een kaart van de gebieden bij Kampen is hieronder te zien. De projectgebieden zijn aangeduid in het geel.

[Kaart Kampen]

Zutphen

Vlakbij Zutphen zijn twee plekken die deel waren van het Ruimte voor de Rivier project. Het eerste gebied heet Cortenoever en ligt ten zuiden van Zutphen. Het tweede gebied heet Voorsterklei en ligt ten noorden van de stad. Bij beide locaties is een nieuwe dijk gemaakt verder

richting het achterland om de rivier meer ruimte te geven. Daarnaast is de originele dijk verlaagd zodat het water in en uit de nieuwe uiterwaard kan stromen. In deze nieuwe uiterwaard zijn nieuwe wandel- en fietspaden aangelegd.

Een kaart van de gebieden bij Zutphen is hieronder te zien. De projectgebieden zijn aangeduid in het geel.

[Kaart Zutphen]

Veessen – Wapenveld

Ten westen van de IJssel, van Veessen tot Wapenveld, is een hoogwatergeul gemaakt. Deze geul is omsloten door twee dijken en heeft een inlaat bij Veessen en een uitlaat bij Wapenveld. Als het water in de rivier hoog staat kan het water de geul in stromen. Als dit niet het geval is staat de geul droog en kunnen mensen wandelen en fietsen door de geul en over de dijken.

Een kaart van de gebied tussen Veessen en Wapenveld is hieronder te zien. Het projectgebied is aangeduid in het geel.

[Kaart Veessen – Wapenveld]

1.4) Hoe ver weg is het projectgebied bij *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* van uw woonplaats*? Kies de beste benadering*

- Minder dan 1 km
- 1 tot 5 km
- 6 tot 10 km
- 11 tot 50 km
- Meer dan 50 km

1.5) Hoe vaak brengt u tijd door in, of reist u door het projectgebied bij *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* ? ***Kies alleen de beste optie***

- Dagelijks
- Wekelijks
- Maandelijks
- Jaarlijks
- Nooit – waarom? _____ *(ga naar vraag 2.1)*

1.6) Kwam u al bij het projectgebied bij *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* voordat het Ruimte voor de Rivier project is uitgevoerd, dus voor (2007 (Westervoort) / 2013 (Deventer) / 2012 (Zwolle) / 2015 (Kampen / 2012 (Zutphen) / 2017 (Veessen-Wapenveld))?

- Ja *(ga naar vraag 1.6b)*
- Nee (*ga naar vraag 1.7)*
- Weet ik niet

1.6b) Gaat u vaker naar het projectgebied bij *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* vergeleken met voordat het Ruimte voor de River project is uitgevoerd, dus voor (2007 (Westervoort) / 2013 (Deventer) / 2012 (Zwolle) / 2015 (Kampen / 2012 (Zutphen) / 2017 (Veessen-Wapenveld))?

- Veel vaker
- Iets vaker
- Ongeveer even vaak
- Iets minder vaak
- Veel minder vaak

1.7) Hoe lang duurt het ongeveer voor u om naar het projectgebied bij *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* te reizen vanaf uw woonplaats?

- Korter dan 30 min
- 30 min tot 1 uur
- 1 tot 2 uur
- Langer dan 2 uur

1.7b) Moet u nu langer reizen (zowel in tijd als in afstand) naar het projectgebied bij *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* vergeleken met voordat het Ruimte voor de Rivier project is uitgevoerd, dus voor (2007 (Westervoort) / 2013 (Deventer) / 2012 (Zwolle) / 2015 (Kampen / 2012 (Zutphen) / 2017 (Veessen-Wapenveld))? *Alleen als antwoord op Q1.6 ja is*

- Veel langer
- Een beetje langer
- Ongeveer even lang
- Een beetje korter
- Veel korter

1.8) Hoe lang bent u gemiddeld in het projectgebied bij *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* per bezoek?

- o Korter dan 30 min
- o 30 min tot 1 uur
- o 1 tot 2 uur
- o Langer dan 2 uur
- o 2 tot 3 uur
- o Een halve dag
- o Een hele dag
- o Twee dagen/een weekend
- o Meer dan twee opeenvolgende dagen

1.8b) Gaat u vaker naar het projectgebied bij *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* vergeleken met voordat het Ruimte voor de Rivier project is uitgevoerd, dus voor (2007 (Westervoort) / 2013 (Deventer) / 2012 (Zwolle) / 2015 (Kampen / 2012 (Zutphen) / 2017 (Veessen-Wapenveld))? *Alleen als antwoord op Q1.6 ja is*

- o Veel vaker
- o Iets vaker
- o Ongeveer even vaak
- o Iets minder vaak
- o Veel minder vaak

1.9) Wat zijn uw voornaamste redenen om het projectgebied bij *Westervoort / Deventer / Zwolle / Kampen / Zutphen / Veessen-Wapenveld* te bezoeken? *Meerdere opties kunnen worden aangevinkt*

- ☐ Ontspannen/tijd doorbrengen in de natuur
- ☐ Sociale activiteiten met familie en/of vrienden
- ☐ Sporten
- ☐ Erdoorheen reizen
- ☐ Anders _____

MENSEN/PLAATS RELATIE

We willen vragen hoe belangrijk de volgende aspecten zijn voor u, ongeacht hoe vaak u het betreffende gebied bezoekt.

UW MENING OVER OVERSTROMINGSRISICO

2.1) In welke mate bent u het eens of oneens met de volgende stelling:

Ik ben bezorgd over de mogelijke gevolgen van overstromingen van mijn huis en tuin.

1 betekent “volledig oneens” en 7 betekent “volledig eens”

Volledig **oneens** □1 □2 □3 □4 □5 □6 □7 Volledig **eens**

Vul in waarom door alle relevante opties aan te vinken

- ☐ Economische redenen (bijvoorbeeld kosten van beschadigingen, verminderde waarde van eigendommen, etc.)
- ☐ Gezondheidsredenen
- ☐ Verminderd gevoel van veiligheid
- ☐ Weet ik niet
- ☐ Ik ben hier niet bezorgd over
- ☐ Anders _____

2.2) In welke mate bent u het eens of oneens met de volgende stelling:

Ik ben bezorgd over de mogelijke gevolgen van overstromingen van openbare ruimte (bijvoorbeeld scholen, straten, parken, etc.)?

1 betekent “volledig oneens” en 7 betekent “volledig eens”

Volledig **oneens** □1 □2 □3 □4 □5 □6 □7 Volledig **eens**

Vul in waarom door alle relevante opties aan te vinken

- ☐ Economische redenen (bijvoorbeeld kosten van beschadigingen, verminderde waarde van eigendommen, etc.)
- ☐ Gezondheidsredenen
- ☐ Verminderd gevoel van veiligheid
- ☐ Weet ik niet
- ☐ Ik ben hier niet bezorgd over
- ☐ Anders _____

UW MENING OVER GROENE PLEKKEN

2.3) In welke mate bent u het eens of oneens met de volgende stelling:

Groene plekken zijn belangrijk voor mij.

1 betekent “volledig oneens” en 7 betekent “volledig eens”

Volledig **oneens** □1 □2 □3 □4 □5 □6 □7 Volledig **eens**

Vul in waarom door alle relevante opties aan te vinken

- ☐ Ik vind het leuk om groen te zien en/of door groene gebieden te reizen
- ☐ Het goed voor fysieke gezondheid
- ☐ Ik vind het leuk om dingen te doen in groene plekken met familie en/of vrienden
- ☐ Weet ik niet
- ☐ Ik vind dit niet belangrijk
- ☐ Anders _____

2.4) In welke mate bent u het eens of oneens met de volgende stelling:

Het is voor mij belangrijk dat groene plekken recreatie-faciliteiten hebben (bijvoorbeeld kanoën, zwemmen, varen, sporten, fietsen, wandelen, etc.).

1 betekent “volledig oneens” en 7 betekent “volledig eens”

Volledig **oneens** □1 □2 □3 □4 □5 □6 □7 Volledig **eens**

Vink de recreatieactiviteiten aan die u doet in het gebied. *Kies één of meerdere opties van de lijst * alleen als het antwoord op Q1.5 niet nooit is*

- ☐ Wandelen
- ☐ Hardlopen
- ☐ Fietsen
- ☐ Paardrijden
- ☐ Skeeleren/rolschaatsen
- ☐ Zwemmen
- ☐ Kanoën/roeien
- ☐ Varen/zeilen
- ☐ (kite)surfen
- ☐ Picknicken
- ☐ Dieren observeren
- ☐ Kamperen
- ☐ Fotograferen
- ☐ Anders, namelijk:_____

2.5) In welke mate bent u het eens of oneens met de volgende stelling:

Groene plekken moeten goede natuur hebben met een hoge biodiversiteit (veel verschillende planten en dieren).

1 betekent “volledig oneens” en 7 betekent “volledig eens”

Volledig **oneens** □1 □2 □3 □4 □5 □6 □7 Volledig **eens**

Vul in waarom door alle relevante opties aan te vinken

- ☐ Het is goed voor de natuur en biodiversiteit
- ☐ Een gezondere omgeving is goed voor mensen
- ☐ Variatie in de natuur maakt het gebied interessanter om heen te gaan
- ☐ Weet ik niet
- ☐ Ik vind dit niet belangrijk
- ☐ Anders _____

2.6) In welke mate bent u het eens of oneens met de volgende stelling:

Het is belangrijk dat er “ruimte-voor-natuur” gebieden met beperkte toegang voor mensen zijn in groene plekken.

1 betekent “volledig oneens” en 7 betekent “volledig eens”

Volledig **oneens** □1 □2 □3 □4 □5 □6 □7 Volledig **eens**

Vul in waarom door alle relevante opties aan te vinken

- ☐ Ik vind het fijn om een afgesloten gebied te hebben waar natuur niet gestoord wordt
- ☐ De “ruimte voor natuur” gebieden zullen bijdragen aan natuur/biodiversiteit
- ☐ Natuur zelf heeft een waarde en er moeten gebieden zijn die niet door mensen worden aangetast
- ☐ Weet ik niet
- ☐ Ik vind dit niet belangrijk
- ☐ Anders _____

HELP ONS EEN WAARDE TE HANGEN AAN HET PROJECT

Het hoofddoel van het Ruimte voor de Rivier project was om rivieren meer ruimte te geven in tijden van hoogwater. Zoals eerder beschreven is dit gedaan door uiterwaarden te creëren en te verlagen, dijken te verleggen en extra kanalen en geulen te graven.

[recap wat er veranderd is in het gebied, is verschillend per gebied]

Met dit in het achterhoofd willen we graag de volgende hypothetische situatie aan u uitleggen.

3.1) Om het onderhoud van het projectgebied van het betreffende gebied en de nieuwe eigenschappen, kan een maandelijkse bijdrage worden geïntroduceerd. Welke van de volgende bedragen representeert het best uw maximale vrijwillige bijdrage?

Welke van de volgende bedragen representeert het best uw maximale vrijwillige bijdrage, vanuit uw maandelijks inkomen?

- 0 €
- 1 €
- 2 €
- 4 €
- 8 €
- 16 €
- 32 €
- 65 €
- Ander bedrag _____

HOEVEEL IS EXTRA NATUUR WAARD

De verwachting is dat het project een belangrijke bijdrage levert aan het verbeteren van de kwaliteit van bestaande natuur en het creëren van nieuwe natuurgebieden, waardoor de biodiversiteit en habitatrestauratie wordt bevorderd.

Beantwoord nu alstublieft de volgende vraag, terwijl u dit in uw achterhoofd houdt.

3.2) Welke van de volgende bedragen representeert het best uw maximale vrijwillige bijdrage, als toevoeging op het bedrag dat u eerder heeft gekozen?

- +0 €
- +0.5 €
- +1 €
- +2 €
- +4 €
- +8 €
- +16 €
- +32 €
- +65 €
- Ander bedrag _____

3.3) Wat is de voornaamste reden dat u geen geld wil uitgeven aan dit project? Alleen als beide antwoorden 0 € zijn: *Kies één van de volgende opties*

- Ik kan niet elke maand extra geld missen
- Dit zou moeten worden betaald door de overheid
- Ik heb niet genoeg informatie
- Ik vind dit niet een belangrijk project
- Ik betaal al (waterschaps)belasting hiervoor
- Anders _____

SOCIO-DEMOGRAFISCHE EIGENSCHAPPEN

Als laatste willen we graag wat informatie over uzelf.

4.1) Wat is uw postcode?_____

Als antwoord op Q1.8 'Twee dagen/een weekend' of 'Meer dan twee opeenvolgende dagen' is:

Omdat u heeft aangegeven dat u twee dagen of langer in het gebied verblijft, willen we vragen wat uw overnachtingslocatie is. _____

4.2) Hoe oud bent u?

18-25 | 26-35 | 36-45 | 46-55 | 56-65 | 66-75 | Ouder dan 75

4.3) Wat is uw geslacht?

Vrouw | Man | Anders | Zeg ik liever niet

4.4) Hoe lang woont u al in de provincie Overijssel of Gelderland?

- 0 jaar / ik woon niet in deze provincie
- 1-3 jaar
- 4-6 jaar

- 7-10 jaar
- Meer dan 10 jaar

4.5) Hoeveel mensen wonen in uw huishouden? _____

4.6) Hoeveel van die personen zijn 18 jaar of ouder? _____

4.7) Wat is ongeveer het maandelijkse inkomen van uw **huishouden**? Modaal: bruto €5200,00

- Minder dan de helft van modaal
- Tussen de helft van modaal en modaal
- Ongeveer modaal
- Tussen modaal en twee keer modaal
- Meer dan twee keer modaal
- Zeg ik liever niet

Om nog meer te weten te komen over wat mensen vinden en wat ze doen als ze één of meer van de gebieden bezoeken, willen we u graag via email of telefoon een aantal extra vragen stellen.

Dit is niet een verplichte vraag

4.8) Als u bereid bent om een aantal extra vragen te beantwoorden na deze enquête, vul dan hieronder uw emailadres of telefoonnummer in: _____

4.9) Heeft u nog vragen en/of toevoegingen?

Dit is niet een verplichte vraag

_____

Hartelijk bedankt voor uw tijd en medewerking aan dit project! We waarderen het dat u de tijd heeft genomen om deze vragen te beantwoorden.

Als u meer wil weten over het RECONECT project kunt u op deze website kijken: http://www.reconect.eu/

APPENDIX D

Contact list online

Table 9: Complete contact list of the online distribution of the survey

Algemeen	
Name	**Type of organisation**
Liefhebbers van Ijssel	Public Facebook group
Kampen	Public Facebook group
Wandelen en fietsen in Overijssel	Public Facebook group
Wandelen Zutphen	Public Facebook group
Wandelen westervoort	Public Facebook group
Wapenveld parel van de Veluwe	Public Facebook group
Zwolle	Public Facebook group
Zutphen actief	Public Facebook group
Natuur Deventer	Public Facebook group
Wandelen Zwolle	Public Facebook group
Deventer	Public Facebook group
Westervoort	
Name	**Type of organisation**
Visit Arnhem	Tourist information
Rheden Nieuws	Local newspaper
Westervoort Post	Local newspaper
Wijkvereniging Presikhaaf	Community center
B&B de Grote Byvanck	Bed and Breakfast
Waterscouting Miguel Pro	Scouting club
Scouting St. Joris	Scouting club
Manege Ten Bosch	Horseback riding club
Sportbedrijf Rheden	Sports center
Hotel Gieling Duiven	Hotel
Zutphen	
Name	**Type of organisation**
VVV Zutphen	Tourist information
Stal Hooghelbergen	Horseback riding club
Aerofitt Zutphen	Sports club
Krant Brummen	Local newspaper
Wijkteam de zuidwijken Zutphen	Community center
Krant Voorst	Local newspaper
B&B 't Hekkert	Bed and Breakfast
nieuws Zutphen	Local newspaper
Ruïne De Nijenbeek	Interesting building
Dorpshuis Voorst	Community center
Kerk Voorst	Church
Deventer	
Name	**Type of organisation**
VVV Deventer	Tourist information
Wijkkrant Deventer	Local newspaper
Zeeverkenners Deventer	Scouting club
Buurtvereniging Wijk 16	Community center
Wijkvereniging de IJssel	Community center
Wijk- en speeltuinvereniging de Zandweerd	Community center
Deventer post	Local newspaper
Het Deventer Nieuws	Local newspaper
Wijk- en speeltuinvereniging de Zwolsewijk	Community center
Deventer Kano Vereniging	Sports club
Roei en Zeilvereniging Daventria	Sports club
Sportclub Deventer	Sports club
DVV Sallandia	Sports club
B&B Landgoed Matanze	Bed and Breakfast
Hotel Gaia	Hotel
't Nieuwe Diekhuus restaurant	Restaurant
Veessen-Wapenveld	
Name	**Type of organisation**
Hotel Ijsselzicht	Hotel
voetbalvereniging VEVO	Sports club
Nieuwsblad de Schaapskooi	Local newspaper
Kerk Vorchten	Church
Modelvliegclub Noordoost-Veluwe	Hobby aeroplane club
B&B de Rolders	Bed and Breakfast

Kerk de Brug	Church
Voetbalvereniging WZC	Sports club
Zwolle	
Name	**Type of organisation**
B&B Zuiderzee	Bed and Breakfast
B&B het Kleine Veer	Bed and Breakfast
Biologische Tuinersvereniging Oldeneel	Gardening club
De Ridderhof restaurant	Restaurant
Plaza de Haven	Restaurant
Wijkvereniging WVF	Community center
Restaurant de Oase	Restaurant
Theehuis Zalkerveer	Cafe
IJsvereniging WVF	Sports club
Vereniging dorpsbelangen Zalk	Community center
Sportvereniging Zalk	Sports club
Mercure hotel Zwolle	Hotel
Krant Hattem	Local newspaper
Nieuws Zwolle	Local newspaper
Kampen	
Name	**Type of organisation**
VVV Kampen	Tourist intormation
Hanze Kiosk Kampen Zuid	Tourist information
KHC-Kampen Voetbalclub	Sports club
Kerk Oosterwolde/Noordeinde	Church
Camping/B&B Edelveen	Camping ground and Bed and Breakfast
Hervormde kerk Kampen	Church
Dorpshuis Zalk	Community center
Restaurant Bastaard	Restaurant
Bovenkerk Kampen	Church
Wijkvereniging binnenstad Kampen	Community center
Wijkvereniging Wilsum	Community center
Watersportvereniging de Riette	Sports club
Wijkvereniging het Onderdijks Kampen	Community center

Contact list visiting in person

Table 10: Complete contact list of the locations for the on-site distribution of the survey.

Westervoort	
Naam	**Adres**
Jumbo Westervoort	Shop
Lidl Westervoort	Shop
Landwinkel Ijsseloord	Shop
Informatiebord	Information point
Zutphen	
Cortenoever:	
Naam	**Adres**
Camping de Hank	Camping ground
Vakantiepark Bronsbergen Zutphen	Camping ground
Theetuin Vierakker	Horeca
Jumbo Brummen	Shop
Albert Heijn Zutphen	Shop
Voorster klei:	
Naam	**Adres**
Pannenkoekenhuis Voorst	Horeca
Coop Voorst	Shop
Camping de Adelaar	Camping ground
Vogelhut	Bird watching hut
Deventer	
Naam	**Adres**
Bolwerksmolen	Other
Meadow op het Deventer stadsstrand	Horeca
Stadscamping Deventer	Camping ground
Lidl Pieter de Hooghstraat	Shop
Minicamping de Polmate	Camping ground
Recreatiecentrum de Scherpenhof	Other
Camping Zuidvelde	Camping ground
Vogelhut	Bird watching hut
Veessen-Wapenveld	
Naam	**Adres**

Camping de Ijsselhoeve	Camping ground
camperplaats kozakkenhaven	Camping ground
camping de Tesseplekke	Camping ground
Infopunt de Nijensteen	Information point
Camping het Oever	Camping ground
Pannenkoekenhuis ‘t Mussennest	Horeca
Camping ‘t Klooster	Camping ground
Vogelhut	Bird watching hut
Zwolle	
Naam	**Adres**
Vadesto bootverhuur en outdoor activiteiten	Other
Ijsseldelta marina	Marina
Restaurant het Engelse Werk	Horeca
Restaurant en infopunt de Vreugdehoeve	Information point
Albert Heijn Zwolle Ittersum	Shop
Albert Heijn Hattem	Shop
Jumbo Zwolle Westenholte	Shop
Vogelhut	Bird watching hut
Kampen	
Naam	**Adres**
Albert Heijn Kampen	Shop
Cafe 't Ponton	Horeca
Seveningen Camping	Caming ground
Café IJsselzicht	Horeca
Jumbo Kampen	Shop
Plus Ijsselmuiden	Shop
Vogelhut	Bird watching hut

APPENDIX E

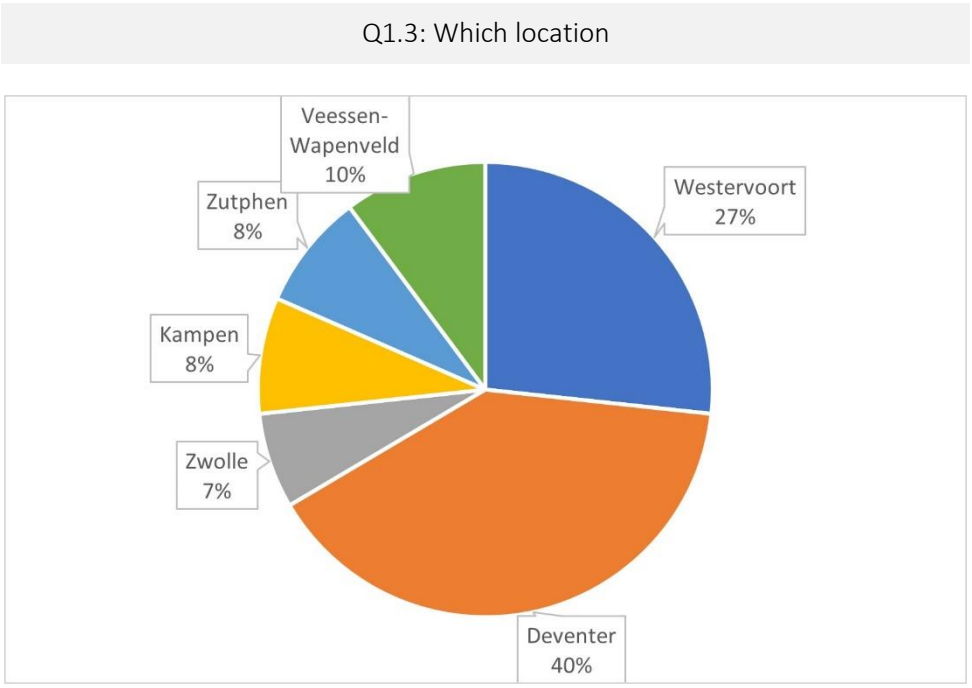


Figure 37: Overview of the results of Q1.3 of the survey: the division of respondents per location in percentage

Table 11: Overview of the results of Q1.3 of the survey: the division of repondents per location in number of respondents

Location	Number of respondents
Westervoort	55
Deventer	82
Zwolle	14
Kampen	17
Zutphen	17
Veessen-Wapenveld	21
Total	206

Q 1.4: Distance from NBS

Table 12: Overview of the results of question 1.4 of the survey: distance from NBS

Distance from NBS	Westervoort	Deventer	Zwolle	Kampen	Zutphen	Veessen-Wapenveld	Row total (percentage of respondents)
<1 km	32,69%	58,02%	35,71%	41,18%	23,53%	52,38%	45,05%
1-5 km	51,92%	22,22%	50,00%	47,06%	41,18%	28,57%	36,14%
6-10 km	11,54%	3,70%	7,14%	0,00%	17,65%	14,29%	7,92%
11-50 km	3,85%	9,88%	0,00%	5,88%	5,88%	0,00%	5,94%
>50 km	0,00%	6,17%	7,14%	5,88%	11,76%	4,76%	4,46%
Column total (number of respondents)	52	81	14	17	17	21	202

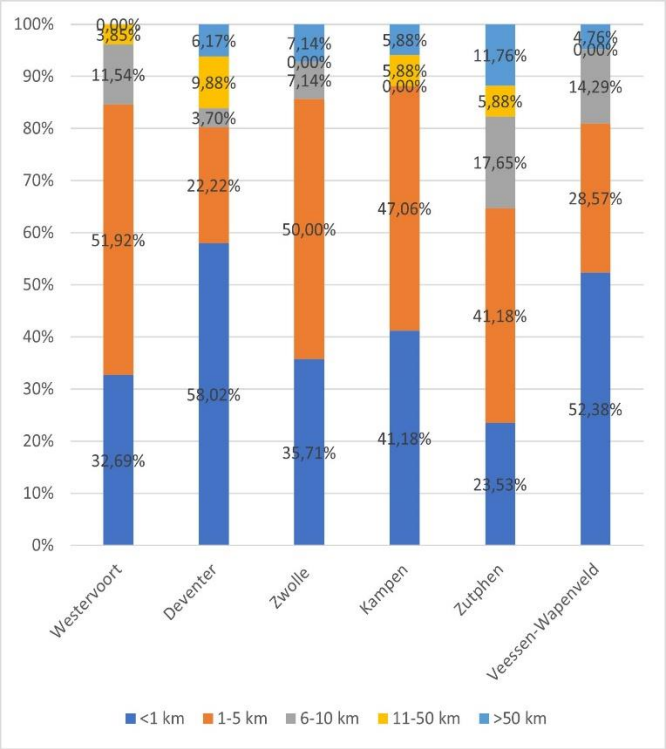


Figure 38: Visualization of the results of Q1.4 of the survey: distance to the NBS

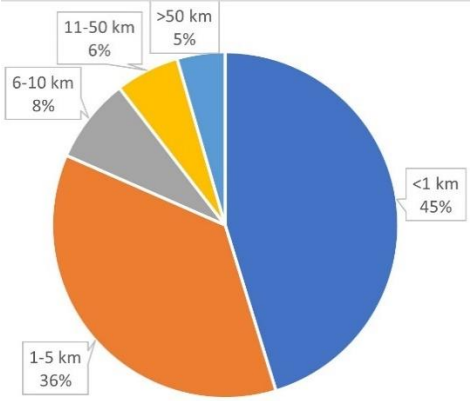


Figure 39: Result of Q1.4 of the survey for all NBSs combined: distance from home to the NBS

Q1.5: Frequency of visiting

Table 13: Overview of the results of question 1.5 of the survey: frequency of visiting

Frequency visiting	Westervoort	Deventer	Zwolle	Kampen	Zutphen	Veessen-Wapenveld	Row total (percentage of respondents)
Daily	71,15%	36,25%	14,29%	35,29%	29,41%	52,38%	44,78%
Weekly	21,15%	27,50%	42,86%	41,18%	41,18%	28,57%	29,35%
Monthly	5,77%	25,00%	21,43%	17,65%	11,76%	9,52%	16,42%
Yearly	0,00%	11,25%	21,43%	5,88%	5,88%	4,76%	7,46%
Never	1,92%	0,00%	0,00%	0,00%	11,76%	4,76%	1,99%
Column total (number of respondents)	52	80	14	17	17	21	201

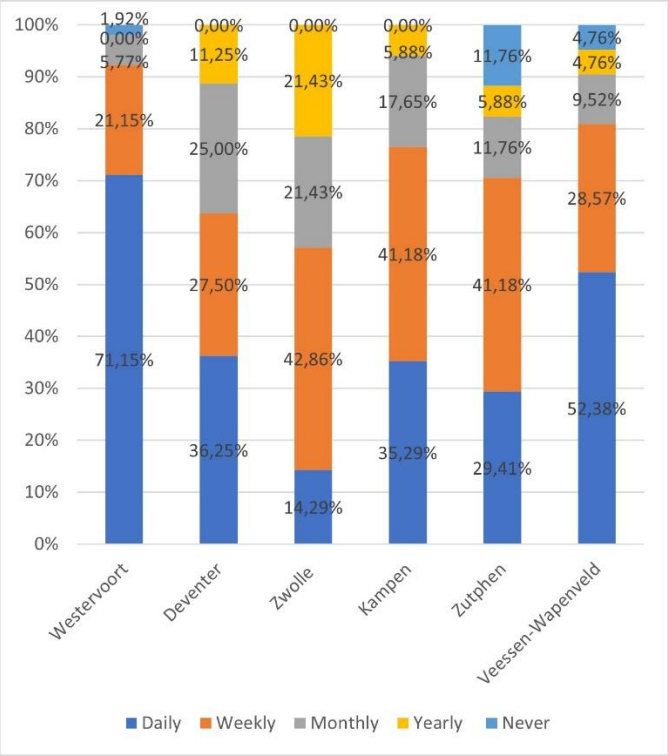


Figure 40: Result of Q1.5 of the survey for all NBSs combined: frequency of visiting the NBS

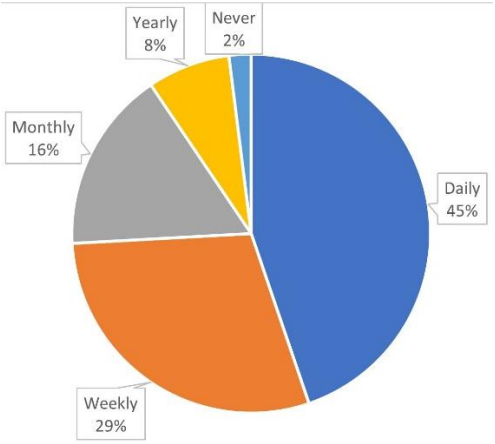


Figure 41: Result of Q1.5 of the survey for all NBSs combined: frequency of visiting the NBS

Q1.6: did people visit the NBS before implementation of RftR?

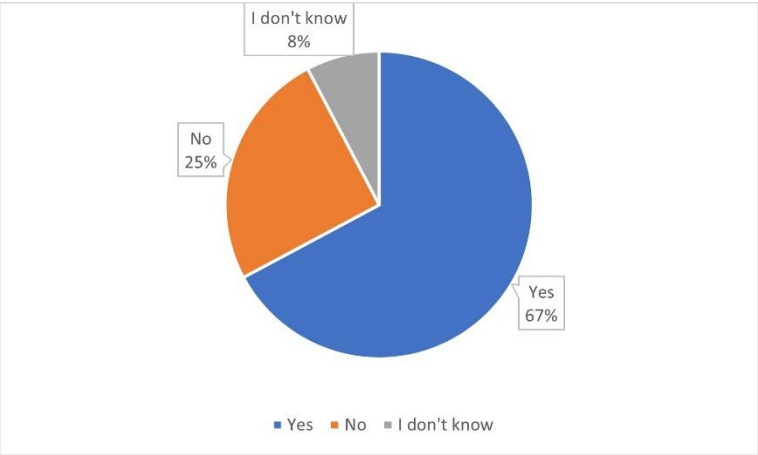


Figure 42: Overview of Q1.6 of the survey for all NBSs combined: did people visit the NBS before RftR

Q1.6b: change in visiting frequency

Table 14: Overview of the results of Q1.6b of the survey: change in the frequency of visiting the NBS

Change in frequency of visiting	Westervoort	Deventer	Zwolle	Kampen	Zutphen	Veessen-Wapenveld	Row total (percentage of respondents)
A lot more often	21,74%	8,20%	0,00%	45,45%	0,00%	28,57%	14,50%
A little more often	26,09%	31,15%	20,00%	27,27%	25,00%	21,43%	27,48%
About as often	52,17%	47,54%	70,00%	27,27%	75,00%	50,00%	51,15%
A little less often	0,00%	4,92%	0,00%	0,00%	0,00%	0,00%	2,29%
A lot less often	0,00%	8,20%	10,00%	0,00%	0,00%	0,00%	4,58%
Column total (number of respondents)	23	61	10	11	12	14	131

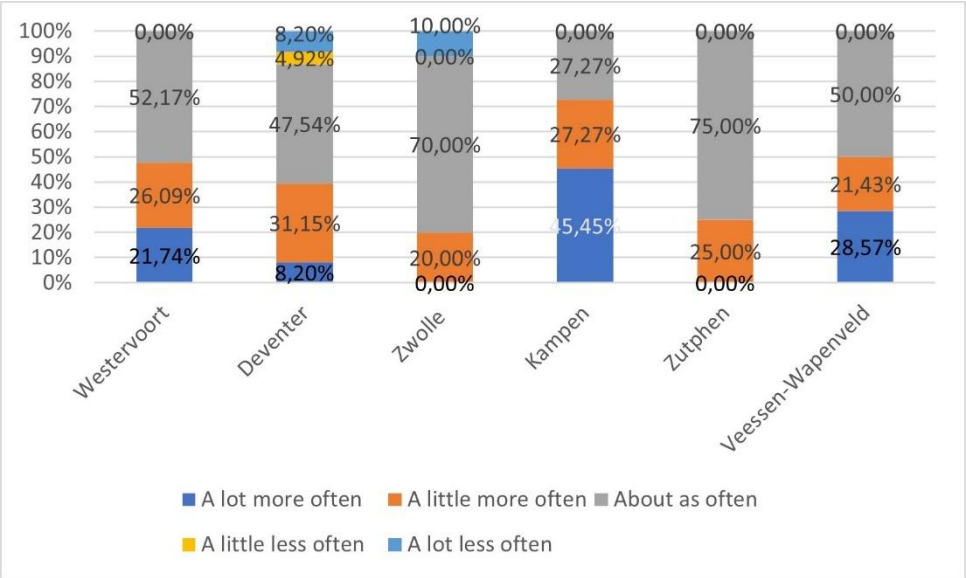


Figure 43: Overview of the results of Q1.6b of the survey for all locations: change in frequency of visiting the NBS

Q1.7: Travel time

Table 15: Overview of the results of Q1.7 of the survey: travel time from home to the NBS

Travel time	Westervoort	Deventer	Zwolle	Kampen	Zutphen	Veessen-Wapenveld	Row total (percentage of respondents)
<30 min	96,08%	85,00%	92,31%	87,50%	93,33%	95,00%	90,26%
30 min - 1 hour	3,92%	11,25%	0,00%	6,25%	6,67%	0,00%	6,67%
1 - 2 hours	0,00%	2,50%	7,69%	6,25%	0,00%	5,00%	2,56%
>2 hours	0,00%	1,25%	0,00%	0,00%	0,00%	0,00%	0,51%
Column total (number of respondents)	51	80	13	16	15	20	195

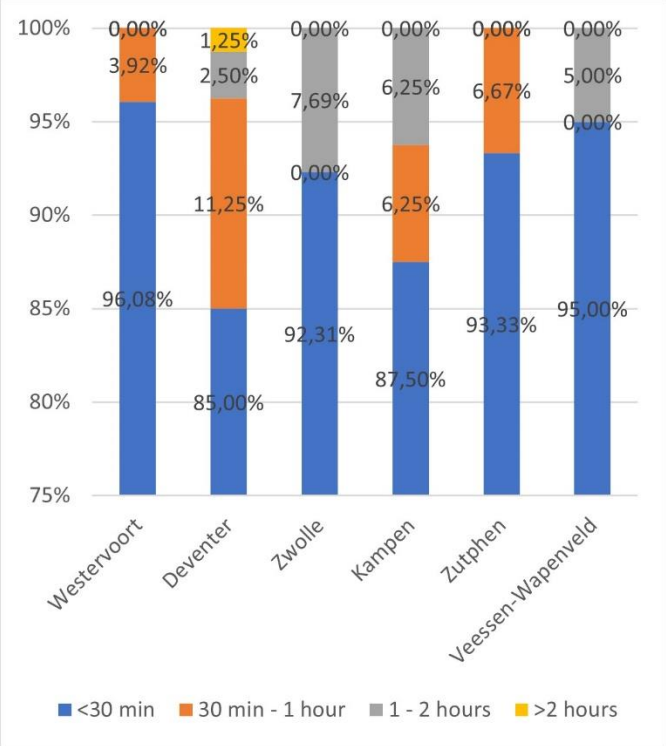


Figure 44: Overview of the results of question 1.7 of the survey for all locations: travel time

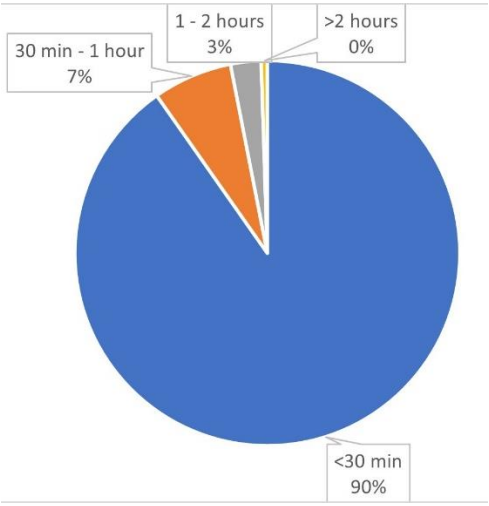


Figure 45: Result of Q1.7 of the survey for all NBSs combined: travel time to the NBS

Q1.7b: Change in travel time

Table 16: Overview of the results of Q1.7b of the survey: change in travel time from home to the NBS

Change in travel time	Westervoort	Deventer	Zwolle	Kampen	Zutphen	Veessen-Wapenveld	Row total (percentage of respondents)
A lot longer	0,00%	1,64%	0,00%	0,00%	0,00%	0,00%	0,75%
A little longer	4,35%	6,56%	0,00%	0,00%	0,00%	7,14%	5,26%
About as long	95,65%	86,89%	90,00%	90,91%	91,67%	92,86%	89,47%
A little shorter	0,00%	4,92%	10,00%	9,09%	8,33%	0,00%	4,51%
A lot shorter	0,00%		0,00%	0,00%	0,00%	0,00%	0,00%
Column total (number of respondents)	24	61	10	11	12	15	133

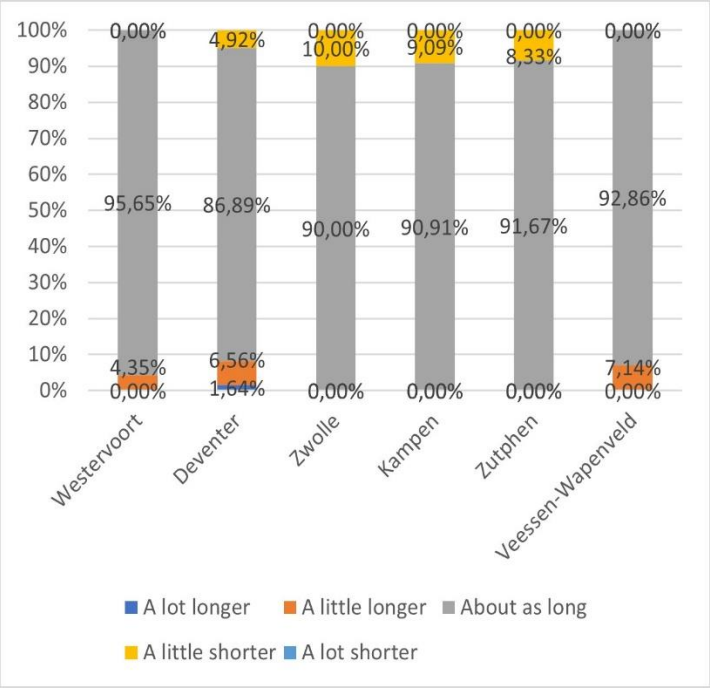


Figure 46: Overview of the results of question 1.7b of the survey for all locations combined: change in travel time and travel distance

Q1.8: Duration of stay

Table 17: Overview of the results of Q1.8 of the survey: duration of stay in the NBS

Duration of stay	Westervoort	Deventer	Zwolle	Kampen	Zutphen	Veessen-Wapenveld	Row total (percentage of respondents)
<30 mins	11,76%	16,46%	15,38%	25,00%	33,33%	20,00%	17,53%
30 mins – 1 hour	37,25%	41,77%	46,15%	31,25%	20,00%	45,00%	38,66%
1 – 2 hours	13,73%	27,85%	23,08%	31,25%	26,67%	10,00%	22,16%
2 – 3 hours	25,49%	7,59%	7,69%	0,00%	6,67%	0,00%	10,82%
A half day	3,92%	1,27%	0,00%	6,25%	6,67%	0,00%	2,58%
A day	3,92%	3,80%	0,00%	0,00%	0,00%	20,00%	4,64%
2 days/weekend	0,00%	1,27%	0,00%	6,25%	0,00%	0,00%	1,03%
> 2 days	3,92%	0,00%	7,69%	0,00%	6,67%	5,00%	2,58%
Column total (number of respondents)	51	79	13	16	15	20	194

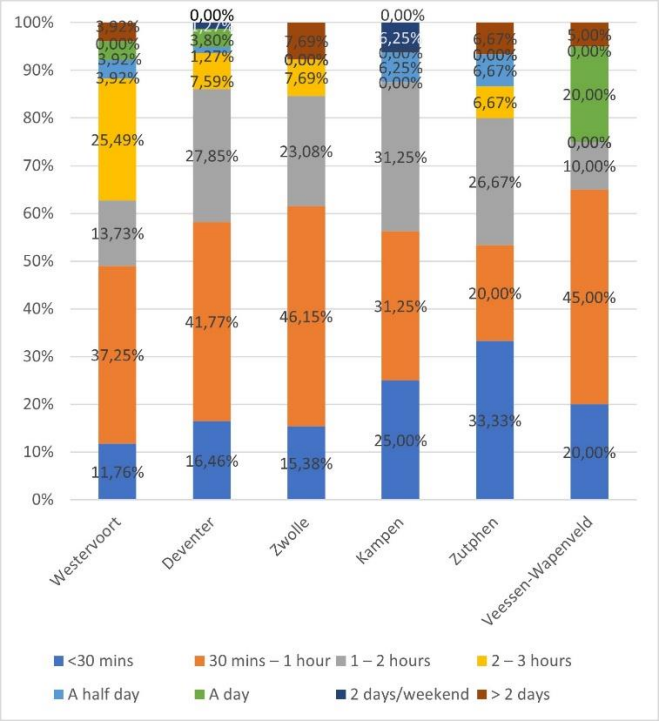


Figure 47: Overview of the results of question 1.8 of the survey for all locations combined: duration of stay in the NBS

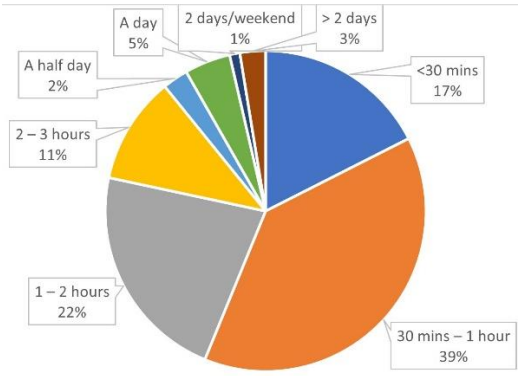


Figure 48: Result of Q1.8of the survey for all NBSs combined: duration of stay in the NBS

Q2.4b: type of activity

Table 18: Overview of the results of question 2.4b of the survey: type of activity

Type of activity	Westervoort	Deventer	Zwolle	Kampen	Zutphen	Veessen-Wapenveld	Row total (percentage)
Walking	20,67%	24,20%	21,57%	14,08%	20,00%	19,75%	21,30%
Running	7,33%	6,41%	3,92%	7,04%	2,67%	6,17%	6,06%
Cycling	16,67%	15,66%	17,65%	21,13%	18,67%	19,75%	17,35%
Horseback riding	18,00%	0,71%	0,00%	0,00%	2,67%	2,47%	4,65%
Skating	2,00%	2,14%	1,96%	4,23%	0,00%	1,23%	1,97%
Swimming	8,00%	9,96%	9,80%	11,27%	9,33%	3,70%	8,89%
Canoeing/rowing	1,33%	6,76%	7,84%	2,82%	6,67%	8,64%	5,50%
Sailing	1,33%	2,85%	0,00%	8,45%	6,67%	1,23%	3,10%
(kite)surfing	0,00%	1,07%	0,00%	1,41%	2,67%	1,23%	0,99%
Picnicking	4,67%	9,61%	9,80%	7,04%	9,33%	9,88%	8,32%
Animal observation	9,33%	7,47%	13,73%	8,45%	6,67%	12,35%	8,89%
Camping	1,33%	4,27%	5,88%	2,82%	5,33%	3,70%	3,67%
Photography	8,00%	7,12%	5,88%	8,45%	6,67%	8,64%	7,48%
Other	1,33%	1,78%	1,96%	2,82%	2,67%	1,23%	1,83%
Column total (number of respondents)	150	281	51	71	75	81	709

Q3.1: Willingness to pay

Table 19: Overview of the results of question 3.1 of the survey: willingness to pay

WTP	Westervoort	Deventer	Zwolle	Kampen	Zutphen	Veessen-Wapenveld	Row total (percentage of respondents)
€ 0	52,50%	23,61%	33,33%	50,00%	56,25%	38,89%	37,93%
€ 1	5,00%	8,33%	0,00%	0,00%	0,00%	0,00%	4,60%
€ 2	12,50%	13,89%	8,33%	12,50%	0,00%	22,22%	12,64%
€ 4	10,00%	20,83%	41,67%	31,25%	12,50%	27,78%	20,69%
€ 8	15,00%	15,28%	8,33%	0,00%	12,50%	5,56%	12,07%
€ 16	2,50%	5,56%	0,00%	6,25%	0,00%	0,00%	3,45%
€ 32	0,00%	2,78%	0,00%	0,00%	6,25%	0,00%	1,72%
€ 64	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Other	2,50%	9,72%	8,33%	0,00%	12,50%	5,56%	6,90%
Column total (number of respondents)	40	72	12	16	16	18	174

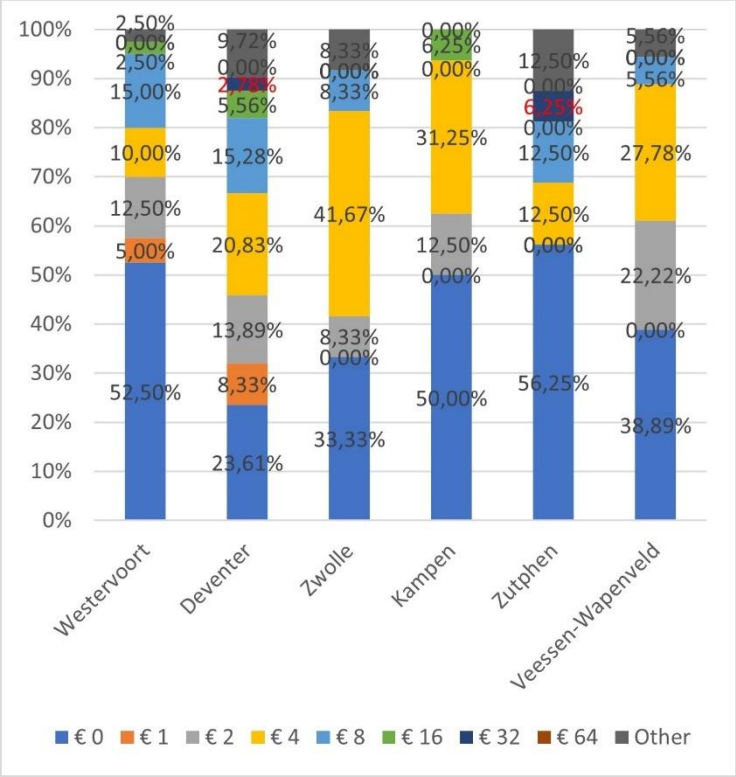


Figure 49: Overview of the results of Q3.1 of the survey: willingness to pay for maintenance of the NBS

Q4.2: Age

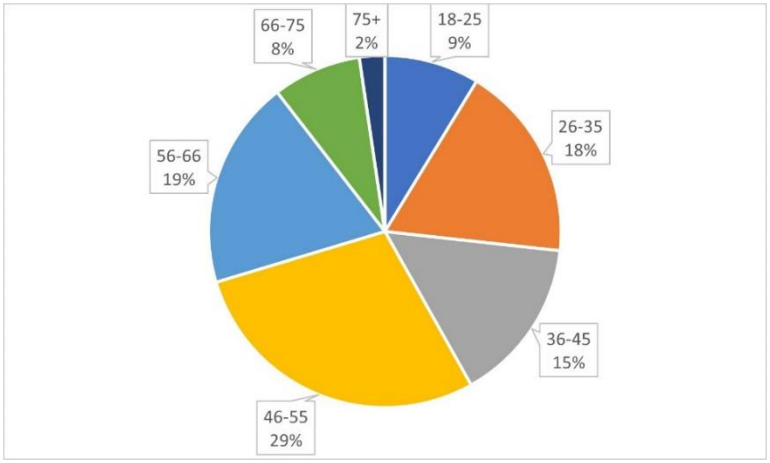


Figure 50: Overview of Q4.2: age

Q4.3: Gender

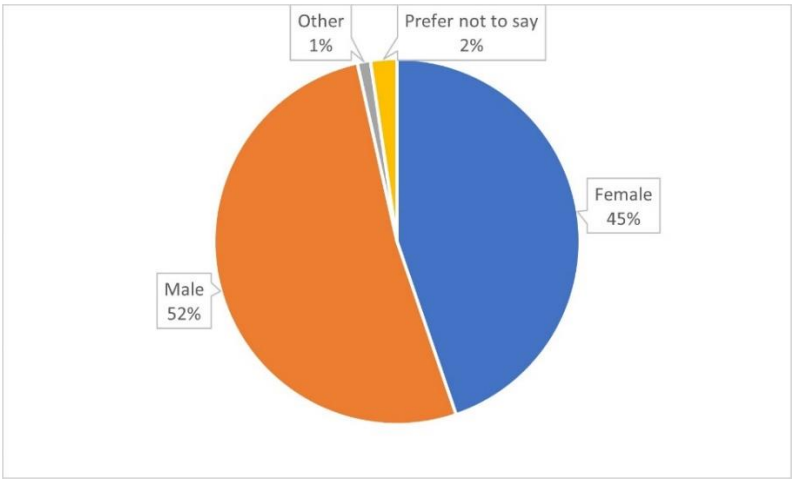


Figure 51: Overview of Q3.3: gender

Q4.4: hometown

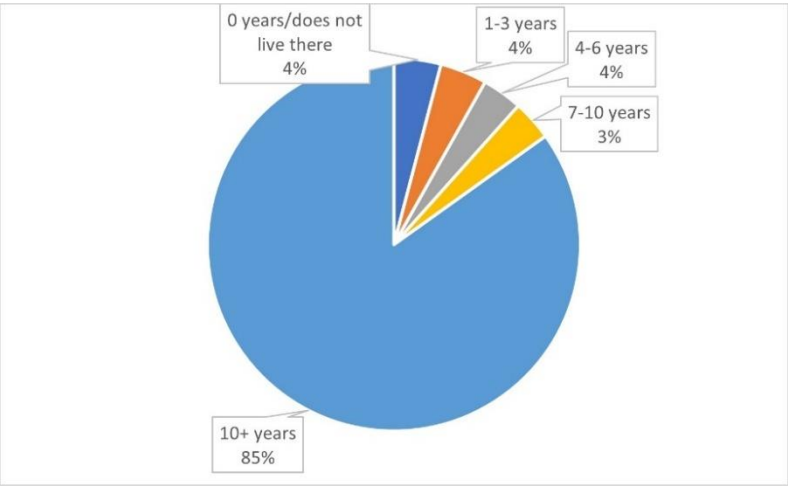


Figure 52: Overview of Q4.4: hometown

APPENDIX F

WESTERVOORT

The area near Westervoort is not very accessible for people. It is mostly used as fields for cattle and there are some ponds. Two cycling paths cross the length of the area and some smaller walking paths that cross the width of the area, between the two cycling paths. Along all paths, there are some benches and signs that give information about the area. There are no locations to swim or sail in the river at this location nor are there any bird-watching huts.

Table 20: Numerical results of the indicators for the NBS near Westervoort, including some comments

Indicator	**Numerical value**	**Short explanation**
Walking and cycling paths	11.7 km	Two paths on the dike along the IJssel over the entire stretch of the project area.
Street furniture	7	The data is not complete and that there are some more benches.
Open water swimming locations	1	Probably not directly related to the NBS.
Surface area green spaces	3.0 km^2	
Boat docking stages	0	
Bird watching huts	0	

ZUTPHEN

The areas near Zutphen are mostly used as agricultural ground for cattle. However, there are a lot of cycling and walking paths through the area. There are no water bodies in the area.

Table 21: Numerical results of the indicators for the NBS near Zutphen, including some comments

Indicator	**Numerical value**	**Short explanation**
Walking and cycling paths	15.7 km	Lots of paths that run through the area.
Street furniture	4	
Open water swimming locations	0	No opportunities: no large water areas.
Surface area green spaces	5.1 km^2	Sum of the two areas near Zutphen.
Boat docking stages	0	No opportunities: no large water areas.
Bird watching huts	1	

DEVENTER

The area lies close to the city and this gives a lot of recreation opportunities. The new area is mostly used for nature, there are two bird watching huts. There are of plenty paths and benches along the river. There is a marina and a ferry crossing the river and several beaches.

Table 22: Numerical results of the indicators for the NBS near Deventer, including some comments

Indicator	**Numerical value**	**Short explanation**
Walking and cycling paths	17.5 km	Roads along each side of the river.
Street furniture	141	Lots of street furniture on the quay near the city center.
Open water swimming locations	0	Not realistic: there are several small beaches along the river.

Surface area green spaces	4.7 km^2	Sum of the two areas near Deventer.
Boat docking stages	4	There is a marina in the area.
Bird watching huts	2	

VEESSEN-WAPENVELD

The area between Veessen and Wapenveld is the largest of the six NBSs. It is mostly used for cattle, but there are cycling paths on both dikes and through the area which are also used for hiking. Along these paths, there are some resting areas. In the area, there are no water bodies, so there are no opportunities to swim and/or sail.

Table 23: Numerical results of the indicators for the NBS between Veessen and Wapenveld, including some comments

Indicator	**Numerical value**	**Short explanation**
Walking and cycling paths	19.0 km	Lots of paths on the dikes, but also through the gully.
Street furniture	0	This is not really realistic, there are some benches and maps on the dikes.
Open water swimming locations	0	No opportunities: no large water bodies.
Surface area green spaces	8.7 km^2	Largest area.
Boat docking stages	0	No opportunities: no large water bodies.
Bird watching huts	1	

ZWOLLE

There is a lot of room for nature in the new areas near Zwolle. On the dikes there are paths and also through the area there are walking and cycling paths. There are a lot of information signs in the area and several benches. There are no opportunities for swimming, but there are two marinas in the area.

Table 24: Numerical results of the indicators for the NBS near Zwolle, including some comments

Indicator	**Numerical value**	**Short explanation**
Walking and cycling paths	14.3 km	Some walking paths and cycling paths use the same road. They are not counted twice.
Street furniture	6	
Open water swimming locations	0	
Surface area green spaces	2.3 km^2	Sum of the two areas near Zwolle.
Boat docking stages	0	Not realistic: there are two marinas in the area.
Bird watching huts	2	

KAMPEN

The area near Kampen is not very accessible for visitors, because the river is quite narrow. This also results in a small area. However, there are some beaches along the IJssel and some paths along the river. On the quay, there are lots of benches, street lights and other street furniture.

Table 25: Numerical results of the indicators for the NBS near Kampen, including some comments

Indicator	**Numerical value**	**Short explanation**
Walking and cycling paths	8.5 km	Not a lot of paths along the river, mostly on the quay.

Street furniture	65	Lots of street furniture on the quay near the city center.
Open water swimming locations	0	Not realistic: there are at least three beaches along the Ijssel, according to Google Maps.
Surface area green spaces	2.3 km^2	
Boat docking stages	7	There is a marina in the area
Bird watching huts	1	

FINAL PERFORMANCE MATRIX

The final performance matrix is based on the numerical values of the indicators that are used. First, the values from the GIS data were used, but when this was not correct, a qualitative assessment based on the field visits was done. This resulted in the following performance matrix (the numerical value of the GIS data is shown in brackets).

Table 26: Performance matrix of the multi-criteria analysis. In the brackets is the GIS value.

	Walking and cycling paths	Street furniture	Surface area of green spaces	Boat landing stages	Open water swimming locations	Bird watching huts	**Final score**
Westervoort	2 (11.7 km)	3 (7)	2 (3.0 km^2)	1 (0)	3 (1)	1 (0)	**12**
Zutphen	3 (15.7 km)	3 (4)	4 (5.1 km^2)	1 (0)	1 (0)	3 (1)	**15**
Deventer	4 (17.5 km)	5 (141)	3 (4.7 km^2)	4 (4)	5 (0)	5 (2)	**26**
Veessen-Wapenveld	5 (19.0 km)	1(0)	5 (8.7 km^2)	1 (0)	1 (0)	3 (1)	**16**
Zwolle	3 (14.3 km)	3 (6)	1 (2.3 km^2)	1 (0)	1 (0)	5 (2)	**14**
Kampen	1 (8.5 km)	4 (65)	1 (2.3 km^2)	5 (7)	4 (0)	3 (1)	**18**