UNIVERSITY OF TWENTE.

natuurlijk regge

Valuing the Benefits from Nature

How renaturalization projects, like the Visschebelt-Koemaste project near Hellendoorn, may benefit the regional economy.

BACHELORTHESIS

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MANAGEMENT SUMMARY

The Regge river runs through the western part of the region Twente. In the past century, the river has been canalized in order to facilitate shipping and agriculture. However, over the past few decades the view on water management has changed: the changing climate causes more extreme wet and dry periods. Change is therefore needed for the water systems in the Netherlands, water storage capacity is needed in order to prevent flooding in the future.

The Regge renaturalization projects aim to transform the Regge river into a dynamic and resilient water system, with room for water storage capacity. Also, the projects aim to redesign the Regge valley into nature area, that fits in the Ecological Main Structure, or EHS. The Visschebelt-Koemaste project is one of the Regge subprojects, located near Hellendoorn. The Waterboard Regge and Dinkel and Municipality Hellendoorn work together in order to raise water storage capacity, implement the objectives of EHS and improve recreation opportunities in the area. The costs of the project are estimated at 5 million euros.

This report aims to justify these investments made, by looking at the benefits that arise from them. The literature review has resulted in four different types of benefits for the project: natural, recreational, cultural-historical and regional business benefits. The report focuses on the benefits from nature, since it connects to the focus of the waterboard and municipality, and because benefits from nature have an influence on the other groups of benefits found.

Benefits from nature, or ecological benefits, are hard to measure, and there are many ways to do so. The benefits from nature for the Visschebelt-Koemaste project are reviewed by using a report on the general estimate of benefits for Natura-2000 areas, and by using the Total Economic Value (TEV) method. The TEV method has proven to be the most complete and useful method. For this method, the benefits from nature that arise in the Visschebelt-Koemaste project are subcategorized into use and non-use values. This has resulted in a list of both priced and non-priced values.

The benefits from nature found for the Visschebelt-Koemaste project are the following ones: shared use of land in the area (non-priced), increase in recreational activity (priced), improved residential joy (priced), preventing dehydration of land (non-priced), improving infrastructure (non-priced), improving biodiversity and fitting into the EHS (non-priced) and the existence value of nature (priced). The priced benefits of nature, using TEV, add up to a total value of €575.038,-, plus an annual value of €803.871,- per year. This is considered to be a minimum amount, since it does not include the non-priced effects, that may be of big importance as well.

With all the benefits from nature that come with the implementation of the plans, the Visschebelt-Koemaste project has showed that there are many ways in which a naturalization project can be of added value to society, and that the investments are definitely no waste of money. The tight cooperation between the municipality and waterboard in designing the Visschebelt-Koemaste project plan has helped to optimize those benefits, by using all opportunities to design an all-round new nature area.

Although it has proven to be hard to find a reliable ‘value of nature’, highlighting all areas in which benefits may arise, helps to justify the investments made in renaturalization projects. Understanding the fact that there are much more benefits from nature than one would think, will also help to convince the general public of the importance of similar projects.

It is therefore recommended that for future similar projects, the benefits that may arise from them are appreciated beforehand. Not linking the goals of renaturalization projects to the local economy can be a missed opportunity, since it will help to see the opportunities to create value and stimulate economic growth in a region.

Future research should focus on quantifying benefits. For the Visschebelt-Koemaste project, and most similar projects, benefits are usually not quantified, because it is too cost- and time consuming. However, quantifying the benefits can prove the added value of nature improvement and support this with figures and facts. It may also help to find out which nature types or activities are valued highest by the general public, and could therefore increase the success of similar future projects.

FOREWORD

In front of you is my report on benefits from nature for the Regge renaturalization projects near Hellendoorn. The report is the completion of the Bachelor curriculum of my study program Business Administration at the University of Twente.

This project attracted me, since it relates to several fields of my interest: the project has a geographical aspect, considering sustainable water management for the future. Apart from that, it is even more interesting to me since it takes place in my 'home region': the Twente area. It also fits in the light of my study field of Business Administration, since it deals with several actors considering the project as well: sustainable development, decision-making, and most of all: estimating the economic value of projects and the opportunities of nature preservation.

It has taken me quite a long time to truly start writing the report and probably even longer finishing it. There is so much information and research done on valuing nature projects, that it was hard to find the right way to go with the subject. But, after it being more than a year since I started my Bachelor report, this is the result. I can definitely say that I have learned a lot from the process, especially the fact that planning is key, and that I should push myself harder to just get to work. It has been a great learning experience.

The valuation of nature has proven to be an interesting subject to research, especially with it being linked to a physical project: the Visschebelt-Koemaste project. I feel that my study has proven to be a good basis, that has given me the proper research capabilities, which I will be able to use in the future.

I would not have been able to write this report without the help of some people. First of all, I want to thank Cheryl de Boer for being such a great mentor in the process. Whenever I was lost or panicking, she was always a great help getting me back on track, and always so positive that it really helped me being more self-confident. She definitely also had a lot of patience with me, since the period advising me with my thesis did probably last a bit longer than she expected.

Furthermore, I want to thank Ben Ordelmans with the Waterboard Regge and Dinkel, and Johan ten Dam with the Municipality Hellendoorn for their time. The interviews I had with them were very interesting, and gave me a lot more information on the projects, and on the decision-making process concerned with it. I also want to thank my second reader, Hans Bressers, for his time and comments.

Ellen Groothuis

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1. INTRODUCTION

In the following section, an introduction on the Regge renaturalization projects will be given, explaining the goals of the project, and how it consists of several subprojects, the Visschebelt and Koemaste projects being one (or two) of them.

1.1. The Regge River

The Regge is a river located in the western part of the Twente region, many smaller creeks and ditches flow into the Regge. Until 1848, the Regge River was a freely meandering river, following its natural course. The water of the river streamed in between the Schipbeek in the south of Diepenheim and the Overijsselse Vecht west of Ommen. During the 19th century, the first bends in the river were cut and the Regge got canalized (*Waterboard Regge and Dinkel, n.d.*). The main reason for this was to facilitate shipping and agriculture. By 1935, nearly all of the meanders had been removed from the river. The Regge was in this manner changed from a meandering river into a strongly modified water course that is confined by narrow shores with paths that allow dredging of the water (*De Boer & Bressers, 2010*).

1.2. The Regge Renaturalization Projects

However, over the past few decades, there has been a substantial transformation considering the view on water management. Especially in the Netherlands, a country with one quarter of the land area below sea level and three main rivers running through it, it has become more and more apparent that more room for water should be created. For the Regge basin, it is evident that climate change is producing increasingly irregular rains as well as heat waves or drought periods. To be able to reduce flooding in the future, and to improve the security of the area, the Regge renaturalization projects were initiated. Through these "Natural Regge" ("Natuurlijk Regge") projects the previously channelized Regge is being transformed into a dynamic and resilient river system (*WRD, 2010*). At the same time, the projects should improve recreational infrastructure and will help to create new nature. By constructing an ecological connector area or linkage zone, which connects natural reserves, the projects also aims to fit this new nature in the 'Ecological Main Structure' (Ecologische Hoofdstructuur), a national policy which aims to create a network of connected nature areas (*WRD, 2010*).

1.3. Subprojects

The renaturalization of the Regge consists of several smaller restoration projects. All along the Regge, over a length of fifty kilometers, different subprojects are planned or already finished. Starting with the estates of Diepenheim, in the south of Overijssel, running all the way up to the projects in Ommen, about twenty 'subprojects' are in place which should help to create the 'new', meandering river.

In this report, the projects Visschebelt and Koemaste near Hellendoorn will be reviewed in depth. Looking at figure 1.1. you can see that there are three projects planned near Hellendoorn. On the east side of the Regge, the project Kalvenhaar is situated. This project was realized during the years 2005 and 2006. For the project Kalvenhaar, two old river arms are reconnected, restoring the natural course of the river.

On the other side of the Regge, the projects Visschebelt and Koemaste are situated. These two projects are interconnected, but each have their own goals. The waterboard is mainly active in the south-east of the area, the area closest to the river: this is the Visschebelt

Figure 1.1: *Location of the Regge restoration projects near Hellendoorn*

project, restoring Regge meanders and raising water storage capacity. The municipality is mainly active in the north-west of the area: Koemaste. Subsidy requirements make it necessary to refer to them as two separate projects, but both the waterboard and the municipality emphasize the high level of interconnectivity, and in fact, the projects are seen as one. An example of this interconnectivity was given in march of 2012, when the Visschebelt project was finished and work on the river was done: the project was officially opened, and renamed into the Koemaste project, symbolizing the fact that the waterboard had finished its part of the project, and further measures are to be carried out by the municipality. For this reason, I will sometimes refer to the projects in this report as the Visschebelt-Koemaste project.

The section ‘detailed background’ of this report will explain more about the goals and situation of the two projects.

2. PURPOSE OF THIS REPORT

What is the value of nature? This report aims to find the benefits that arise from the Visschebelt and Koemaste projects, which are part of a larger project restoring the Regge river to the meandering river it traditionally was. This is necessary to prevent flooding in the future, but the projects have more positive side effects. What this report aims to achieve is showing the importance of the Visschebelt-Koemaste projects, not by merely explaining its significance for flood protection and nature restoration, but by valuing the extra benefits which may arise with implementation of the plans. This will help comparing the benefits to the investments in the Visschebelt-Koemaste projects, and will show whether or not these benefits justify the amount of costs made in projects.

Since the time frame for this report is too short to examine all the benefits of the Visschebelt and Koemaste projects, I have chosen to use one type of benefits to analyze: *natural benefits* (see: literature review). In this report I will show how these benefits may be valued and give examples for benefits in the Visschebelt and Koemaste projects. It will not be possible to truly put a number on the benefits of these projects, but show how they *could* be valued may be useful to acquire a more in-depth understanding of these sorts of issues.

3. PROBLEM STATEMENT & RESEARCH OBJECTIVES

3.1. Problem Statement

The Visschebelt-Koemaste project, as a part of the renaturalization of the Regge by the Waterboard Regge and Dinkel and Municipality Hellendoorn, is a relatively large-scaled project which costs a lot of time and money to complete. With the large scale of such projects come large investments. How can those costs be justified?

Usually, the benefits for restoration projects like these are believed to be great, otherwise plans like these would not be implemented. However, it is very rare that the benefits are valued. A main reason for this is that it is very hard to measure the monetary value of such projects. Moreover, the benefits which may arise from them are usually under-appreciated (*Vikolainen, Coenen and Lulofs, 2008*).

The under-appreciation of benefits is a problem, because it makes it even harder to prove the importance of nature restoration projects. Both the municipality and the waterboard use the opportunities of the plans to its fullest: by cooperating closely, they aim to not only prevent flooding, but also improving nature and landscape, recreational infrastructure and regional business opportunities. They *know* that these factors have value, but they have never proven its value by doing research. Mapping and valuing the side effects of the Visschebelt-Koemaste project could help in order to show the positive influence on regional economics, and with that, justifying the projects.

3.2. Research Objective

The objective of this report will be, in a more general sense: examining and giving an example of how nature can be valued. More specifically, the main objective is to understand what the benefits from nature (side effects) for the projects Visschebelt and Koemaste near Hellendoorn are, and what their value is. This value can then be used to compare to the costs of the projects, ultimately trying to justify the investments made.

The literature review section will give an insight on why nature benefits were chosen as point of interest in this research.

3.3. Research Question

Research Question:
"What are the benefits from nature for the Visschebelt-Koemaste project (as a part of the Regge renaturalization project) and can they help to justify the costs?"

This research thesis can be subdivided into the following subquestions:

- "How can the value of the benefits from nature for these kinds of projects be measured?"
- "In which areas do benefits from nature occur considering the renaturalization projects near Hellendoorn?"
- "What is the estimated value of the nature benefits of the Visschebelt-Koemaste project?"

4. DETAILED BACKGROUND

In this section, information and details on the Visschebelt and Koemaste projects will be given, in order to show the situation. The two projects will be explained, including their goals and costs. Furthermore, the role of the waterboard and municipality will be discussed.

Some information for this section was taken from existing articles and reports. In order to collect more specific data on the projects Koemaste and Visschebelt, I have had two interviews with persons directly involved in the projects: Mr. Ordelmans, who works as a project manager for the Waterboard Regge and Dinkel (WRD) , and Mr. ten Dam, municipal official for the Municipality Hellendoorn. Parts of the following information about the projects is taken from these interviews.

4.1. Project Visschebelt

On the left shore of the Regge river, near Hellendoorn, the project Visschebelt has been implemented. The Regge river was turned into a natural water system over a length of 1100 meters. The adjacent grounds are developed to accommodate temporary storage of water. Also, the implementation of the project on this side of the river, helps to optimize the use of the Kalvenhaar area on the other side of the river for water storage: water can flow over the cycling paths placed in the Visschebelt area, streaming into the Kalvenhaar area. These cycling paths are lowered, creating 'fords': a place where the water will flow over the paths during periods of high water. This should cause the water in the area at that moment to be divided over the Kalvenhaar and Visschebelt area, enabling the Kalvenhaar area to also accommodate room for water storage.

In addition to creating room for water storage, the project also aims to create new nature. The areas which will be used for water storage from now on, used to be mostly farmland. These grounds were acquired by the waterboard and the municipality, and are resold to 'Landschap Overijssel' (Landscape Overijssel), a provincial non-governmental organization which aims to protect the typical natural and cultural landscape of the province Overijssel.

In short, the project Visschebelt aims to achieve the following results:

- The implementation of a new natural Regge
- Using the areas Visschebelt and Kalvenhaar to store water during high water situations.
- Implement the objectives of the Ecological Main Structure by creating a natural planning area (20 hectares)

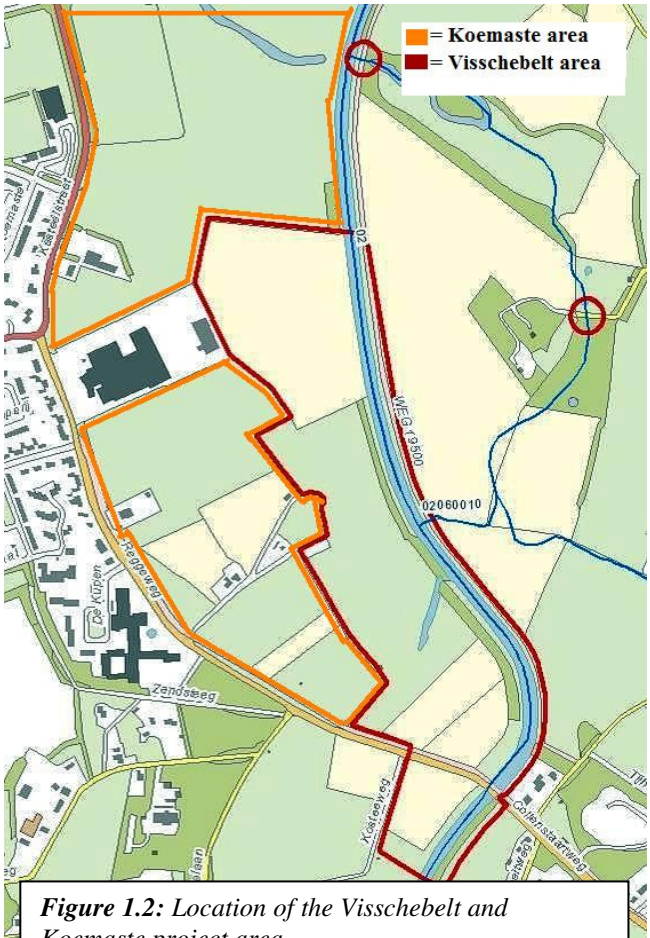


Figure 1.2: *Location of the Visschebelt and Koemaste project area.*

- Improve recreational route structures.

Work on the Visschebelt project started in January of 2011, after a one year period used to develop the plan and buying land (*J. ten Dam, interview, 2011*). The Visschebelt project was finished in march of 2012. A detailed map of the project area can be found in appendix 1.

4.2. Project Koemaste

The project 'area development Koemaste' is connected to the Visschebelt project. The Koemaste project basically covers the parts of the area and project that are carried out by the Municipality Hellendoorn (while the waterboard is concerned with the Visschebelt project). The size of the Koemaste area is 15 hectares, but some small parts overlap the Visschebelt area, like the cycling route, from which parts are based in the Visschebelt area. A detailed map of the Koemaste area can be found in appendix 2.

The plan for the Koemaste area aims to improve the quality and amenity of the area, by creating cycling-, walking- and bridle paths in the area, as well as a pier and a picnic area. The project also entails creating room for the 'north-south-connection' (Noordzuid-verbinding): a new road which will be constructed in 2014/2015. This road should drastically improve the infrastructure in Hellendoorn. To create room, the sports fields, located in the north of the area, have to be turned: from horizontally to vertically. The space that is 'won' by doing this, creates room to place the road behind the sports fields. The plan also includes a roundabout to be created in front of the Ola factory.

Work on the Koemaste project started in June of 2011, with construction of the cycling route through the area. The main reason that this part of the project has already been carried out, is that Landschap Overijssel, who supervises the nature in the area, wanted the cycling paths to be finished before the fences are put into the ground, in order to model the area properly. The project needs to be finished by the end of 2012 (this does not include the construction of the new road), since that is the time limit given to the municipality by investors.

4.3. Cooperation

As already explained in the introduction, cooperation is of very high importance for the projects. This is emphasized by Mr. Ordelmans from the waterboard, who explains that the projects are above all a cooperation project between the municipality, the waterboard, and Landschap Overijssel: the organization that is the current and future owner of the purchased grounds, and the 'grounds manager' of the nature area. The project Visschebelt-Koemaste is in fact a complete redevelopment of the Regge river valley up to the Reggeweg (*B. Ordelmans, interview, 2011).*

The municipality is concerned with the construction of the new road and recreational routes through the area, combined with a bridge. From the viewpoint of the waterboard, the emphasis lies on creating water buffering capacity, and thus changing the currently canalized Regge into the naturally meandering river it used to be. In order to do this, adjacent farmlands are bought and reformed into new nature areas. Landschap Overijssel manages this land, and is mainly involved for the nature goals of the projects.

Good cooperation is needed between the three parties, in order to form a whole: each party works in its own area and subprojects, but those separate areas should melt into one completed project area.

Through cooperation, all parties try to utilize the opportunities which come with redesigning the area: it is expected that it will not only create flood protection, increased

biodiversity and pass through EU regulations, but the cooperation will also create a more attractive area, for both recreating and residing. The municipality expects an increase in visitors of the area, but also an increase in businesses wanting to relocate to the area, and an increase in housing prices due to implementation of the plans (*J. ten Dam, interview, 2011*).

4.4. Change is needed

In the past, water management was above all aimed at draining water as soon as possible. The Regge valley used to be a very wet area, and draining was necessary to facilitate local farmers. Farmland is expensive, and therefore even for the grounds lower situated, production circumstances had to be as good as possible. Ben Ordelmans: "sometimes you would find cornfields on plots of land that are lying so low, they are not at all suited for the heavy machinery being used. But in practice, it happens all the time, simply because farmland is so expensive" (*B. Ordelmans, interview, 2011*).

The water system itself also needed changes. By canalizing a river, the water runoff speeds up a lot. That may not be a problem for the area, but it creates high peaks in discharged water further downstream. Due to climate changes, there are more periods of heavy rainfall during the year. The river can not cope with all the water anymore, and the greatest problems occur downstream: an example for the Regge river, as a tributary to the Vecht river, are the cities of Kampen and Zwolle located downstream, who had problems with flooding in 1998. Waterboards in the Netherlands had to start creating buffering capacity by creating more room for water in order to flatten out the high peaks in rainfall.

By 're-meandering' the river, the Visschebelt project slows down the speed of water draining. Besides that, the Regge will also become shallower, causing water to drain not by the depth of the river anymore, but by the width. The actual river bed is made smaller, but with room on both sides for the river to become wider during wet periods. This will cause the groundwater levels to stay more stable: they will not decline as much during summer anymore. Before, all the groundwater would flow towards the river during summer, since the canalized river is situated so deep. The new situation will thus also reduce the drying out of nature- and farmland.

A more natural and meandering river is created by the implementation of the Visschebelt project. However, it will not be fully natural, since the dams in the river will be maintained for now, they are needed to keep the river at a minimum water level during summer. Without the dams, the Regge river would become a fully natural water system, but for example recreational boats would not be able to sail on the river anymore (*B. Ordelmans, interview, 2011).*

4.5. New Nature and EHS

Both of the projects also aim to create new nature in light of the Ecological Main Structure, or EHS (Ecologische Hoofdstructuur). The EHS is a government's policy. The term was first used in 1990, but the target species and types of nature goals were not defined until 1995, and they were carried through in all provincial plans in 2000. The EHS aims to enlarge natural reserves and connect them to each other. By connecting them, plants and animals have the opportunity to spread throughout more areas (*Rijksoverheid, 2011*). The policy aims to create a larger, interconnected 'network of nature', which also connects with other areas within Europe. The policy is the basis for Dutch nature policy, and plays a large role in maintaining and reinforcing the biodiversity within the Netherlands.

In order to receive subsidies, Landschap Overijssel has to meet the requirements of certain nature objectives. For instance with stream valley grounds, a certain type of EHS is

expected, for example “wild, fauna-rich grassland”. Landschap Overijssel has to choose between several of these ‘maintenance packages’ and their subsidy is based on it.

Almost all of the land in both the Visschebelt and Koemaste area used to be farmland, and all of it is redeveloped into nature. With the help of old wooded banks, old meanders and old geographical maps, they have tried to reshape nature into what it looked like a long time ago (*J. ten Dam, interview, 2011*). The whole Visschebelt-Koemaste area will be part of the EHS.

It is expected that the new created nature will increase biodiversity. Many different species are expected to grow on lands that used to be cornfields. The nutrient-rich upper-layer of the ground, which has been fertilized for years, has been removed. This helps to grow back species that traditionally belong in the area, but were unable to grow in the fertilized ground. Furthermore, by creating ponds and puddles, species like the salamander are expected to return to the area.

There are also species that will disappear from the area, due to the new situation. Rare species may for example grow on the dry riverside wall, and disappear from the area due to the new situation. However, those species are actually not indigenous to the area and did not occur there traditionally, but settled in the area because of the conditions that developed there over time.

4.5. The project area and required land.

The Visschebelt-Koemaste area is about 30 hectares large (Koemaste is 15, Visschebelt is 20, but they overlap). Owner of the land in the area will be Landschap Overijssel (LO). The waterboard has the rights to store water on the land, without them requiring ownership to do so.

Before, almost all of the land was owned by farmers. The required plots were acquired through Dienst Landelijk Gebied (“rural area service”: a departmental agency of the Dutch Ministry of Economics, Agriculture and Innovation, DLG) which is acting upon instructions of the Province to buy the land. When the grounds are acquired, they are passed through to Landschap Overijssel free of charge. Half of the price is ultimately paid for by the Province, and the other half is paid for by the State. If Landchap Overijssel would ever seize to exist, the ownership of the landed property will automatically belong to the State.

A big part of preparing the implementation of the plans was to acquire all the land required to layout the EHS. The municipality (*J. ten Dam, interview, 2011*) mention that this process went easier than expected. There are different examples: one family was able to trade the ground they owned in the area for a plot of land located next to their house. Another farmer sold the plot he owned for a good price, and used the gains to move to Portugal to start a farm there. There were also a lot of small plots of land, ‘historically owned’ by people, that were not being used anymore. Those people also had the opportunity to sell those plots to the government for a decent price. Mr. Ordelmans from the waterboard (*interview, 2011*) adds that although some farmers were disappointed that farmland was changed into nature, this was unavoidable: the Visschebelt-Koemaste plan had to work with the decision made by the state to turn the area into EHS.

A great advantage of the land being owned by LO is that shared use becomes possible and is in fact strived after. In order to maintain the landscape, livestock needs to graze the area. So, LO established alliances with local farmers, who are allowed to let their cattle graze the grounds owned by LO. These alliances work both ways: the farmers are allowed to use more land than they own, free of charge, while LO significantly reduces the costs of maintenance (*J. ten Dam, interview, 2011*). Furthermore, the projects aim to improve agricultural land located in the region of the Visschebelt-Koemaste area, because the new

designed river will prevent dehydration of the land, as was mentioned before (*B. Ordelmans, interview, 2011).*

4.6. Costs

The costs of the Visschebelt project where initially estimated at 1 million euros. The buying of grounds is included in this amount, but the initial land purchased was subsequently resold to the central government, that is working on the realization of the EHS. Another plot of land was bought by the municipality, and was resold to DLG. The expenditures for the purchased lands are thus earned back, and no longer costs for the project as a whole.

From the 1 million euros of estimated costs for Visschebelt, the actual cost of work was estimated at half of total costs: 500 thousand euros. This amount is spent on the actual realization: the earth moving work. But during the groundwork activities polluted soil was found at a location that used to be a municipal outlet ditch. In the 1950's and -60's there were no strict rules or inspections on waste sorting or dumping. In fact, everything went through the municipal sewer. The location where the pollution was found used to be an open part of the sewer in that time period, draining the wasted water off into the Regge river. That entire part of the project area was therefore polluted with oil that had to be removed and thus a process of ground remediation for that area was started. The disposal of the polluted soil is expensive, leading to high unforeseen costs for the project: the soil remediation alone amounts to a total of about 500.000 euros (*B. Ordelmans, interview, 2011*). Because the waterboard is leading the project, they are responsible for these extra costs. These costs can not be recovered, but they are subsidized (*Waterschap Regge and Dinkel, 2012*).

So, the needed soil remediation was a big financial setback for the Visschebelt project. However, some costs were also somewhat lower than anticipated. Due to the financial crisis, more contractors were trying to get the contract for the project by outbidding each other. Therefore those costs were somewhat lower than anticipated beforehand.

The financing for the Visschebelt project comes from several parties. Part of it is financed by the waterboard who receives subsidies for it. It is also subsidized provincially, called Illustrating Rural Area (Illustrering Landelijk Gebied, or ILG): a fixed amount per realized kilometer of stream restoration, and a fixed amount per cubic meter of water storage capacity to be realized. In addition, half of the costs made for the project are paid for with European subsidies. But another financial break came in the form of more subsidies, causing the net costs to be lower than expected beforehand: by placing a part of the Visschebelt project under WAVE, it was possible to acquire WAVE-subsidy, the extra costs of remediating the polluted soil were also subsidized through WAVE. WAVE is an abbreviation for: "Water Adaptation is Valuable for Everybody", which is a cooperation project between six organizations from five different countries. Their goal is to develop all-round local area-plans, and carry out projects in which water management is combined with nature and agriculture, taking into account the effects of climate change. Besides that, WAVE focuses on exchanging knowledge and, with that, improving the communication of information to inhabitants of the regions, in order to increase public support (*WRD, 2012*). Because much more subsidies were realized than expected beforehand, the net costs of the project were 55% lower than planned. This is shown in Appendix 3.

However, although the net costs of the project may be lower than expected, the actual costs, without taking into account subsidies acquired, are much higher than expected. Appendix 3 shows that the definitive costs for the Visschebelt project amounted €1.816.762,- which does not include the construction of a bridge in the area, which has cost another €207.627,- (Note: the *estimate* of the costs is more than one million in appendix 3, but this amount alreadyis already includesd the polluted soil clean-up).

The costs for the Visschebelt project are thus almost twice as much as estimated beforehand: just over 2 million euros.

The costs for the Koemaste project are higher and are estimated at 3 million euros by the municipality Hellendoorn (*Gemeente Hellendoorn, 2010).* A full estimate of the expenditures can be found in appendix 3. Note however, that these expenditures do *not* include costs for the new road. The costs for the new road are much higher, partly due to the land that needs to be acquired: €10,2 million euros. But although the projects Visschebelt and Koemaste facilitate space for the new road, and it is fitted into the plans, it is not a true *part* of the plans, which is why also the costs of it are treated separately. While the Koemaste plan is expected to be finished by the end of 2012, construction of the road will not begin until 2014.

The Koemaste project is partly financed by the municipal revenue from selling Essent (an energy supplying company, (partly) owned by the government in the past). An amount of 1,5 million euros from this total was taken out of the money set aside for the new road (leaving 8,7 million euros left for the road, see appendix 3). The province has awarded a subsidy of the same amount, also 1,5 million euros, provided that the constructing activities take place between 2010 and 2012.

The costs for the Visschebelt-Koemaste project as a whole can therefore be estimated at 5 million euros, the 2 million for the Visschebelt project being definitive costs, since the project is already finished, and the 3 million euros for the Koemaste project still an estimation.

5. BENEFITS: A LITERATURE REVIEW

In this section, an overview will be given of literature dealing with the benefits of renaturalization projects. The literature used for this section is general information, covering *all* types of benefits which may occur. The different types of benefits are explained, with examples from the Visschebelt-Koemaste project: all general areas in which benefits are found are elaborated on. This section will ultimately explain why just one type of those benefits was chosen for valuation in this report.

This literature review is also needed as background information, which explains the limitation of the research questions, and with that, the benefits to be valued.

5.1. Benefits are hard to value

Measuring the benefits of ecological development projects is very hard, as is the case in the renaturation project for the Regge. Projects like this cost a lot of time and money, but the benefits that arise from it are usually under-appreciated (*Vikolainen et al., 2008*). A main reason for this may be that it is very hard to measure the value of such projects, especially a monetary value.

To be able to measure the value, you should put a price on the services that the river provides, the so-called "ecosystem services". Ecosystem services that a river can provide to humans are services such as water supply (for municipal, industrial and agricultural use), improvement of nature, fish habitat and recreation. Uses like fish habitat or recreation are not priced, which makes it hard to value them (*Loomis, Kent, Strange, Fausch and Covich et al., 2000*).

Apart from this problem, that it is hard to value the services provided, there is also another problem in deciding upon the economic value: avoided costs. In the case of the Regge river, renaturation is mainly necessary to prevent flooding in the future. This means that the project will not bring in money right away, but the costs that are made in the project may prevent even bigger costs from flooding in the future. These future costs are hard or probably even impossible to measure.

5.2. What are benefits?

The KDI project "Benefits of Water Management" ("Baten van waterbeheer", *Vikolainen et al., 2008*), focuses on increasing the visibility of profits on expenses for water management for regional economics. Their vision and definition of benefits is based on the Societal Cost-Benefit Analysis (SCBA), which will be explained in depth in the theoretical framework.

The report uses the term "benefits" as defined by Coenen (*1992*): all the positive effects of a policy instrument. There is a difference between the *intended effects* and the non-intended, or *side effects*. In the report by Vikolainen et al (*2008*), the definition of benefits is further narrowed to: "the positive side effects of a policy instrument" (*p. 2*). Because there is a focus on the *surplus value* of water projects for regional economics, the intended main effect (with its goal directly concerning water) is left out of consideration (Vikolainen et al. mention that it is 'expected to come up to the expectations of the policy makers'). Coenen (*1992*) adds that the side benefits (and costs) may also increase or decrease the legitimacy of the policy.

Also, it is important to see the difference between 'traditional' benefits (business economics) and the benefits of government projects. The benefits of government activities can

be defined as their contribution to social welfare. These benefits can therefore be determined as *social benefits*.

In the case study 'baten van waterbeheer', benefits are thus considered to be "the expected side effects of the policy instrument, that are taken into account before starting the project. These side effects offer a positive contribution to the social welfare, which can be valued in money" (*Vikolainen et al., 2008*).

This approach is also useful when looking at the Visschebelt and Koemaste projects. Their main goal is flood protection, but there are several positive side effects, that may provide value, such as positive effects on nature and recreation. The surplus value of the projects can thus be defined by looking at these non-intended side effects. But the question is: are these effects truly non-intended in the Visschebelt and Koemaste projects? Creating new nature and therefore more opportunities for recreational use are foreseen by the municipality and waterboard, and are also important goals of the projects, together with flood protection. Vikolainen et al. (*2008*) use the term *expected side effects:* the effects are expected, but are still considered to be side effects. The approach by Vikolainen et al. may thus be useful to truly look at those benefits that are not measured or valued by the municipality or waterboard, especially since there has been little research on how the costs of the projects relate to their benefits. Showing the *extra* benefits of the projects may help to justify the high costs of the projects.

5.3. Subcategories of Benefits

The gains of these benefits can be reviewed in the short term. Increased volume in the service industry, caused by the construction of new nature, should be noticeable by viewing the increasing revenues made by recreational businesses. Another category of benefits are those that do not have a direct surplus value, but can be indirectly important to regional economics. An example is new technology that is developed during water projects. Other types of benefits may be of a sustainable nature. These benefits may be avoided costs thanks to the (re)use of intermediate products, such as water or mud, or revenue from fabricated products, such as biomass (*Vikolainen et al., 2008*).

This means that benefits of water management projects can be subdivided into different subcategories. This approach of benefits could help a water management project in an early stage of decision-making, to not only take into account the water quantity- and quality goals, but also the goals that are derived from the expected side effects. This is known as 'multi-objective decision making' (*Chankong & Haimes, 1983*). According to this concept, a set of defined objectives is considered as a hierarchy, with the main objective on top, and more specific and operational objectives on the bottom.

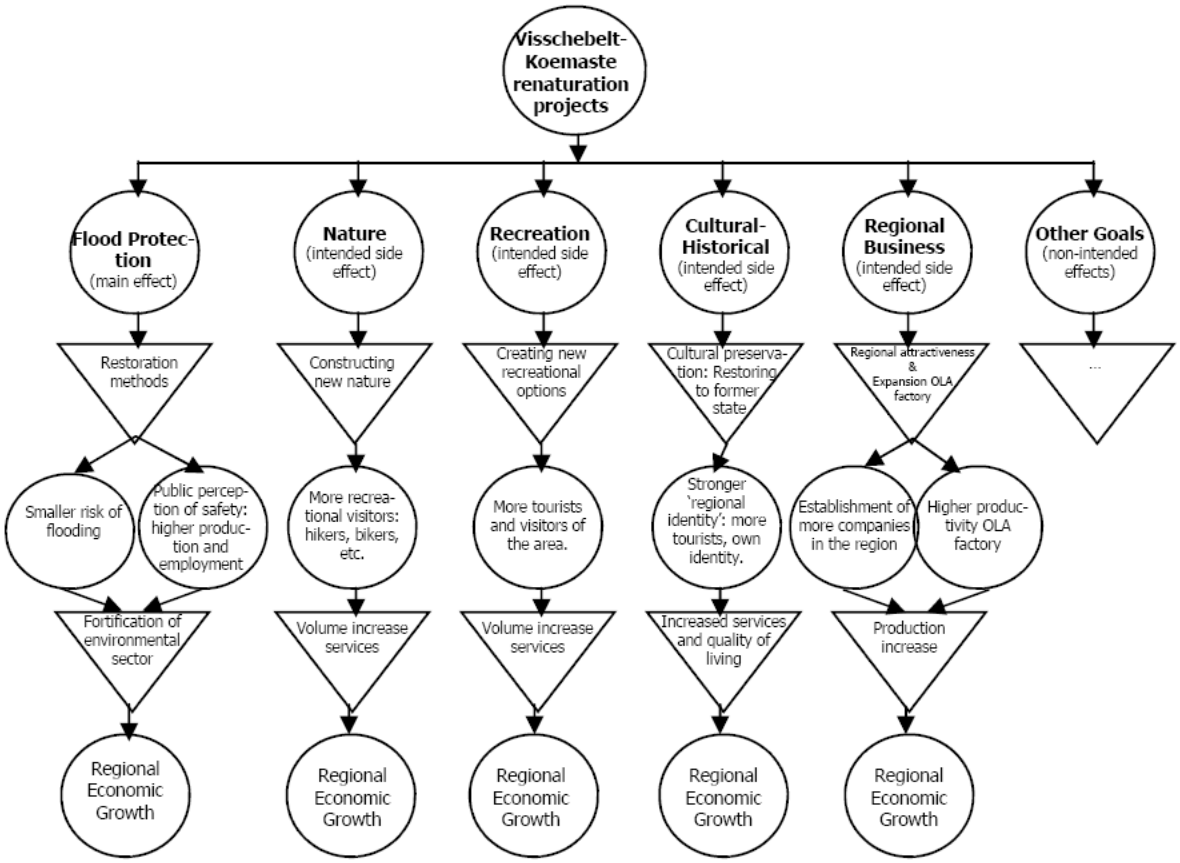
5.4. The side effects of the Visschebelt-Koemaste project

The intended effect of the Visschebelt and Koemaste projects is to prevent flooding throughout the whole Regge area, by fulfilling the goals set by the waterboard regarding water retention capacity. Non-intended (positive) effects, or positive side effects are thus the ones that may be called *benefits*. The main side effects which I have found concerning the Koemaste-Visschedijk project are the following: *natural benefits, recreational benefits, cultural-historical benefits* and *regional business benefits.*

Following the example given by Vikolainen et al. (*2008*), these benefits are displayed in a simplistic process model (figure 5.1), showing the main effect and intended side effects of the projects. All of the effects are assumed to be *intended*, since the municipality and

waterboard have several plans in those four areas, as will be explained for all four types of benefits.

Figure 5.1: Process model on the areas in which benefits may occur for the Visschebelt-Koemaste project



- 5.4.1. Benefits from Nature

Natural benefits are the benefits considering the value of nature in the area. One very important side effect of the Regge restoration projects near Hellendoorn, is the beneficial contribution to landscape and nature in the region. Not only will the new meandering and resilient form of the river be more natural than it used to be before canalizing, the project itself also aims at contributing to the EHS, which is an interconnected network of existing nature areas and nature areas yet to be realized. This should also help the preservation and fortification of the biodiversity: a rich variety of different plants and animals (*Waterschap Regge en Dinkel, 2010*).

Furthermore, the improved nature in the area may be a direct cause for a rise in recreational visitors and tourists. Apart from that, a region with a lot of nature can attract businesses or people wanting to buy a house in the area.

The benefits of nature will be further elaborated on in the rest of the report, since its focus of research will be those benefits from nature.

- 5.4.2. Recreational benefits

Recreational benefits consider the added value of recreation, like an increase of recreational visitors. Apart from natural benefits, the projects near Hellendoorn should also benefit recreational activity on and near the river. According to the Waterboard Regge and

Dinkel (*2010*), another objective of the project is to have water call the attention of the citizens more than before. Joint recreational use of the river should encourage everybody to enjoy the river to its full extent. In order to meet the recreational demand of citizens, several initiatives are, or will be, implemented. The recreational infrastructure will be strengthened by the construction of cycling, walking, and bridle paths. A pier for fishing and a parking lot for visitors have already been established near the Kalvenhaar area. In the Visschebelt area informational signs, brochures and media expressions will be used to inform the public about the unique aspects of the project and the landscape. The Ola factory is planning on creating an 'open factory', and part of their plan is to create a visitor centre for the Koemaste-Visschebelt area in collaboration with Landschap Overijssel. Near the factory, a mooring space is created for the 'Enterse zomp'. This typical regional type of boat is already being used to sail the Regge river, but can now also be moored at the site, which creates room for more boats.

- 5.4.3. Cultural-Historical Benefits

The example of the 'Enterse zomp' is also an example of a *cultural-historical benefit.* Not just nature is an important factor in the landscape, but also the cultural historical characters define a landscape: they can be an expression of how humans influenced the landscape in the past (*Antrop, M. & van Damme, S., 1995*). Elements in the landscape that are of cultural historical value, can be named heritage. Another example of cultural historical heritage in the Visschebelt and Koemaste area is the Easter fire: an Easter fire is a typical tradition for the Twente region, in which the Municipality Hellendoorn is situated. Hellendoorn used to have its own Easter fire, but due to new districts and more building construction, there was no proper location for the fire anymore. In the Visschebelt and Koemaste projects, a new location for the Easter fire is created, near the bridge between Hellendoorn and the town of Hulsen, which makes it also possible for inhabitants of both towns to easily visit the fire. This is an example of a cultural historical benefit.

In short, the cultural-historical approach aims at the protection of cultural heritage. This can be by means of protection of the landscape, but also by reuse or revaluation, as is the case in the Regge area, where the old situation of a meandering river is re-created. The preservation of regional/local characteristics is crucial in order to maintain the cultural-historical value of a region (*Antrop, M. & van Damme, S., 1995*).

- 5.4.4. Regional Business Benefits

Regional business benefits may show how the projects help local business to create more value or higher production. A fine example for the Visschebelt and Koemaste projects is the Ola factory (Ben and Jerry's) that is located in Hellendoorn. Instead of moving to an industrial zone, Ola is allowed by the Municipality Hellendoorn to expand their existing factory, at the same time fitting it into the plans for the Koemaste area. Ola pays compensation to the municipality in order to do so, and has come to an agreement to pay for restoration of nature and large trees near their ice-making plant. They even have plans to build a new visitor centre near their factory, in which there will also be room for an information centre about the Regge and its renaturation projects (although, at this point, it is unsure if those plans will be carried out in the near future, "*Bouw bezoekerscentrum Ola…", March 9, 2012*). In return, Ola is able to expand their production at the current location. Apart from higher production, this is also a positive influence on employment in the Hellendoorn region (*J. ten Dam, interview, 2011*).

Besides this example, the projects will of course also help recreational entrepreneurs in the area. Examples may be the owner of the 'Enterse Zomp' boats, the activity center located next to the river, or the exploiters in the food and beverage industry in the area.

Another benefit, which can be found in the process model (figure 5.1), is that the Hellendoorn area may become an even more popular settlement area for both residents and businesses. Not only will the natural environment improve by the projects, which may increase housing prices for example, but the urban infrastructure is also improved by making room for the new road (north-south-route) and paths that will be located in the area.

5.5. Choosing Benefits from Nature as point of focus

Since there is so much information to find, and so much research has been done about all these four types of benefits, it is decided to focus on one type of benefit in this report, and give a more in-depth analysis on that type of benefit. The focus in this report will be on the *benefits from nature* for the Visschebelt and Koemaste projects. The reason that this type of benefits is chosen, is that it also seems to be the focus of the municipality and waterboard: the Ecological Main Structure EHS is EU policy, and has to be filled out by the projects. The municipality and waterboard have designed the rest of the plans to fit within this policy. Also, the 'value of nature' is a concept worth interpreting, considering the many different studies done about the subject. Besides that, it has an influence on the other groups of benefits found: recreation is improved (and with that, regional business), because there is more nature to enjoy, and restoring the old meandering river is not only of importance to nature, but also restores part of the cultural historical identity of the area. The benefits seem to be overlapping, or influencing one another on different points. This is why the natural 'side benefit' seems to be the most important one to examine.

6. THEORETICAL FRAMEWORK & RESEARCH METHODS

In this section, theories which can be used to value benefits from nature, will be discussed more in-depth. It will try to explain why some theories are useful for the results and analysis and why others may be left out of consideration.

6.1. Relevant Research Methods

6.1.1. SCBA

One way to analyze the costs and benefits of a certain project is the 'Maatschappelijke Kosten Baten Analyse' (MKBA), or in English: Social Cost-Benefit Analysis (SCBA). The SCBA is a type of analysis that takes into consideration all present and future societal pros and cons of a project by expressing these values in money as much as possible. If the pros (benefits) are larger than the cons (costs), a project is socially justified: SCBA can show whether an investment in a certain project is the right choice or not. It may also show which project alternative is the best choice. By giving this information the SCBA supports political decision-making. It helps to prevent that inefficient economic choices are made, or thus that in some cases tax-money is being 'wasted' *(Nederland Boven Water, 2008*).

First of all, an SCBA answers the question if and how a project contributes to social welfare. In the case of joint area-development projects, the financial gains are not always sufficient to win back all the costs of the investment. But favorable effects on nature, landscape and the environment may still justify the investment from the perspective of society and thus are taken into account in the SCBA. Second, an SCBA gives insight in the burden sharing among several parties: some may profit from the project, while others may suffer more or less. Also, an SCBA can be used to map insecurities and minimalize risks, that are often a consequence of the long term of environmental projects (*Nederland boven Water, 2008*).

SCBA can therefore be a valuable method for adding up the total costs and benefits of a project. The example figure (process model) in the literature review shows how Vikolainen et al. (*2008*) suggest that benefits in these kinds of projects may be categorized. For the projects Visschebelt and Koemaste, the costs are known, but all these categories of benefits (the pros) are not valued. Since this report only focuses on the benefits from nature, the full SCBA will not be used, but the method can be used as a background to show where more specific theories result from.

6.1.2. The Paretian Approach

In practice, it is not easy to provide a complete inventory of all of the side effects of a project. When estimating the effects, it is important to look at what changes will occur in the policy field, caused by the used policy instruments. These effects than have to be defined as either costs or benefits. The *Paretian approach* ("Paretiaanse benadering") uses market prices to do this, stating that supply and demand reflects the societal costs and benefits. In fact, in projects like these this is not always the case, because there can be market disruptions (the costs of a good are not adequately processed in the pricing of the good), the existence of external effects (the benefits of a good are not solely for the demanders, and the costs are not solely paid for by the suppliers of the good), and the existence of imponderable goods (goods

that are not traded on the market and therefore do not have a price) (*Mol and Blommestein, 1991)*. "Avoided costs" are one example of such an imponderable good or concept.

The problems with estimating and valuing the benefits of non-priced public goods are also underlined by Reinhard & Folmer (*2009*): "The ecological functions of floodplains, fluvial wetlands and intertidal salt marshes, such as the provision of wildlife habitat and nutrient assimilation, and spatial (landscape) quality and diversity are difficult to translate into economic terms. Although various economic methods and techniques have been developed over the past decades to value non-priced public goods in monetary terms, few studies exist in the Netherlands that have estimated the non-priced public benefits of floodplain restoration compared with traditional dike strengthening" (*Reinhard & Folmer, 2009, p. 93).*

The use of this Paretian method, or therefore any other method that is based on supply and demand or market prices, seems therefore undesirable. There is simply not enough information available to value those benefits properly. This brings us one step further: to dual analysis.

6.1.3. Dual analysis

On the environmental costs and benefits of water projects, Merrett (*1997*) mentions *dual analysis*. Dual analysis is based on SCBA, but since the focus of interest of a true SCBA is on the net changes in gross domestic product (GDP), the full method is barely used in practice: most of the environmental impacts of projects do not have a clear effect on GDP. "In this situation many economists regard these environmental and distributive outcomes as priceless, above price, beyond price. Thus, it can be argued that effects beyond price should be handled separately and differently from effects that are priced and which appear in the SCBA calculation" (*Merrett, 1997, p.164*). This is why the second part of his *dual analysis,* alongside SCBA, is EIA: Environmental Impact Assessment. Such an assessment is complex, but main features that are mentioned are: it is carried out by professionals, it is multidimensional in the environmental issues it addresses and it combines textual appraisal as well as the quantitative measures, for example the changes in biological oxygen demand of a river. Positive side effects that are non-priced are than not left out of the analysis, but handled separately.

Merrett (*1997*) notes that no simple, quantifiable procedure exists to provide an answer to dual analysis choices; for example EIA and net present value use different information and are hard to compare to each other. Besides, non-priced effects may be such important outcomes of a project, that the measured value of real output becomes a secondary issue. For water management projects, like redesigning river basins, where many projects are approved in which the 'outputs' are not marketed and thus are financed from the public purse, the total of public finance implications of such projects should be constantly reviewed (*Merrett, 1997).*

An example of how to make such a cost-benefit analysis that includes the wider socioeconomic impacts of flood control, is the EIA that was carried out for a floodplain restoration project in the Lower River Delta in 2000[1]. In this area, the river system is influenced by the tides. High water levels in 1993, 1995 and 1998 caused a high threat of flooding, resulting in thousands of people being evacuated. Existing dike defenses were strengthened, but in order to prevent flooding in the future, further measures were needed:

[1] *Note: the original research mentioned, uses "NAMWARiB" (national accounting matrix including water accounts for river basins) in order to find economic data for river basin districts. Unfortunately, NAMWARiB only presents information about the four main river basins in the Netherlands: Rhine, Meuse, Scheldt and Ems. Since the Regge is not taken into account, this information cannot be used for this particular research. Although the Regge flows into the Vecht, which flows into the Rhine, it is not considered part of the Rhine-delta.*

alternative land use changes and floodplain restoration (*Reinhard & Folmer, 2009*). The next table, taken from this assessment, shows the effects:

TABLE 6.1: *Expected impacts of alternative flood protection measures such as land use changes and floodplain restoration compared with traditional dike strengthening*

Priced effects	*Non-priced effects*	*Redistribution effects*
Direct	**Direct**	Income losses in agriculture and industry as a result of relocation.
Investment costs	Change in discharge capacity, surface water and groundwater levels	
Damage costs (avoided)	Public perception of safety	
Market revenues from sand extraction	Public perception of dislocation of inhabitants and farmers	
Indirect	Biodiversity conservation	
Business interruption		
Increased recreation		
Change in water infrastructure and effects on commercial and recreational shipping		

The total economic costs of the set of alternative flood protection measures were estimated at about 5.5 billion euros, while the total costs of dike strengthening to achieve the same level of safety are approximately 800 million euros. The most important reason for this much higher level of costs are the changes in land use that are necessary. In an area so densely populated and with a complex network infrastructure, this would substantially be affected by these changes. The direct investment costs are paid for by the government, but a large share of the cost would also be bourn by farmers, industries and local residents, who will have to be compensated by the government for loss of their land, including farms, houses and industrial estates.

The direct beneficiaries are inhabitants, farmers and industries that are able to stay in the area. Their properties and businesses are protected by the new measures. Furthermore, third parties benefiting from the measures can be sand and grit exploitation companies, or dredging companies for example. Another positive effect is on nature and landscape: the area may become more attractive for recreational visitors (*Reinhard & Folmer, 2009*).

This table used above, which shows the direct and indirect effects of flood protection measures, may be also applicable to the Regge case. Although it is almost impossible to put a financial value on all effects, the mere showing them in a table can already be a big help into showing the results of such measures, including all non-priced effects. A table for the Visschebelt and Koemaste projects will probably look very similar to table 6.1.

6.1.4. Total Economic Value (TEV)

In addition to Reinhard and Folmer, who use the terms direct/indirect and priced/non-priced effects, Turner, Bateman and Adger (*2001*) use a similar terminology: direct/indirect and use/non-use value. According to Turner et al. (*2001*), a key to valuing change in an ecosystem function is establishing the link between that function and some service flow valued by people.

An overview of the values under TEV:

Total Economic Value

- Use Value
    - *Direct Use Value*
        - Consumptive Use Value

        - Non-Consumptive Use Value (Aesthetic/Educational Use Value and Distant Use Value)
    - *Indirect Use Value*
    - *(Option Value)*
- Non-use Value
    - *Existence Value*
    - *Bequest Value*
    - *Philanthropic Value*

In order to be able to show the value of an ecosystem (of nature), Turner et al. (*2001*) propose an instrumental (usage-based) approach, which combines various components of value that add up into a Total Economic Value (TEV). This TEV consists of various components, which can be first of all classified into two groups: use values and non-use values.

Use values can be divided into direct use value and indirect use value, based on the interaction with the resource. *Indirect use value* is value derived from services provided by the ecosystem (in this case, the Regge river). Examples are providing cleaner water, or the prevention of flooding. *Direct use value* involves interaction with the ecosystem itself and may be consumptive (for example fishing) or non-consumptive (educational for example). Distant use value is also a type of non-consumptive use value, an example is deriving value from the ecosystem through media such as television or magazines. With this type of value it is questionable whether or not it is concerned a use value and to what extent it can be attributed to the ecosystem, according to the authors, which is why it will be left out of consideration. Some authors also explicitly name *option value* in their description of Total Economic Value. Option value shows the amount that people may be willing to pay to have the *option* to visit the nature area in the future. Option value is in the overview grouped under 'use values', but it can be discussed whether it is a true use value, and is therefore sometimes categorized separately from use or non-use values (*Turner et al., 2001).*

Non-use value is the value attributed to a resource for the mere fact of existence of that resource and the knowledge that it is maintained. It can be subdivided into three components which may somewhat overlap. *Existence value* is the value attached to an ecosystem, by the simple satisfaction of knowing that a feature of the environment will be maintained. *Bequest value* is the value of knowing that a resource will be passed on to future generations, and *philanthropic value* expresses the satisfaction of a resource being available for others in the present society (*Turner et al., 2001*).

Ruijgrok, Brouwer and Verbruggen (*2004*) use the same method of use and non-use values in order to explain the total economic value. However, they also further elaborate on the economic value of nature. According to them, nature has three different types of value: the social-economic, financial, and ecologic/intrinsic value. Financial values show the tangible profits or income. These values are established within markets and are thus called market prices. The financial value of nature can therefore for example be extra revenue from renting boats, or from restaurants in the area. The financial value is a part of the economic value. Economic values do not include only those revenues, but also other prosperity flows retracted from the market, like the joy of recreation or clean air. The intrinsic value does not relate to human prosperity or income, but is about the wellbeing of plants and animals. It is not a part of the economic value of nature (which does not mean that the intrinsic value is not important) (*Ruijgrok et al, 2004, p. 10-11*).

6.1.5. Willingness-to-pay, and similar methods

These different authors and theories have made clear that the main problem in finding the value of ecological systems is valuing nature effects themselves. One important theory method that is sometimes used to value them, and worth mentioning here, is the *willingness-to-pay method* (WTP) (*Loomis et al., 2000*): Respondents are asked in a survey how high they value a natural resource, and what they would be willing to pay in order for that resource to be preserved. For example, they can be asked how much (extra) tax they would be willing to pay on a yearly basis in order for their environment to be preserved. By processing this data, researchers may put a value on the resource, based on the amounts given by the respondents.

Since this method is very extensive and requires an in-depth review of data, its implementation would be too time-consuming to include in this research for the Visschebelt and Koemaste projects, which is why I left it out of consideration. Nevertheless, it has proven to be a fairly useful way of valuing ecological services, so perhaps it may be useful to waterboards for researching opportunities in the future.

Other valuation methods exist, that are somewhat similar to the WTP method, or interpretations of that method, in the sense that they use fictional circumstances in order to find the value which people put on nature. Examples are the Travel Cost Method (TCM), which measures the travel costs people would be willing to make in order to visit a specific nature area, and the Contingent Valuation Method (CVM), which is based on social surveys and asks individuals how they would value certain changes in an artificial market: how do they value specific changes in nature (*Ruijgrok et al., 2006; Bergstrom, Stoll, Titre and Wright, 1990; Rouwendal and Weijschede-van der Straaten, 2011*). The Hedonic Pricing Method (HPM) is yet another way of valuing: it measures the value of nature by looking at the value of houses in the area, assuming that nature areas have a positive influence on housing prices (*Ruijgrok et al., 2006*).

6.1.6. Benefit transfer

There are however other ways to use data found from methods like willingness-to-pay in a more general sense: Reinhard & Folmer (*2009*) mention *benefit transfer* as a cost-effective alternative to value benefits. This idea is supported by Hitzhusen, Ayalasomayajula and Lowder et al. (*2007*), who mention benefit transfer as an increasingly used method of valuing non-priced benefits for policy decisions. Ruijgrok et al. (*2006*) state that in practice, methods like TCM, CVM or HPM generally make use of data from previous studies by using benefit transfer, since carrying out an original valuation research is usually too costly and time-consuming.

Benefit transfer is the process of transferring data from existing studies (study site) to a new study (policy side) which differs from the previous work. Naturally, this process causes some problems. The benefits valued at the study site have to be identical to the benefits to which they are transferred, the site and population characteristics should also be similar, preferably identical. Since this is almost impossible, benefit transfer may give an inaccurate estimation of benefits (*Ruijgrok et al., 2006*). But benefit transfer also has many advantages: many studies have to manage with limited time and money, which make it hard, if not impossible, to collect enough primary data. Benefit transfer allows studies to be conducted at lower costs and within a shorter time period (*Hitzhusen et al., 2007*). This method will partly be used in this report in order to find some ‘results’: figures taken from other reports or researches will serve as an example, or suggested value, for benefits found in the Visschebelt and Koemaste projects.

6.2. Methods to be used

This section has showed some methods and tools which can be helpful to value the benefits from nature for the Visschebelt-Koemaste project. The last method mentioned, benefit transfer, is an important one, since it is not possible to carry out a full WTP- or similar valuation within the given timeframe for this report. The results section will therefore start with a description of research done in the past for nature areas in the Netherlands. This will explain how benefits from nature are valued for similar projects, and seeing whether these results can be translated to the Visschebelt and Koemaste project.

Furthermore, this review of methods has shown that is important to subcategorize benefits, in order to value them separately and add them up. To categorize the benefits from nature, the results section will further focus on the Total Economic Value (TEV) method proposed by Turner et al. (*2001*). This will help to subdivide the different benefits into categories. Categories that are not priced, will be included into this method by using parts of the 'dual analysis' method: non-priced benefits will be mentioned, and their importance explained without valuing them in monetary values. Including them into the TEV (but without economic value) will show that although they are not valued, they are nevertheless important.

The values that can be priced, will be priced by using benefit transfer: results from other research done in the past will be translated to the Visschebelt-Koemaste project. Methods like hedonic pricing will be applied to the Regge case, by making assumptions of the impact of the projects on, for example, housing prices. Further assumptions on a growth in recreational visitors are used to show how the TEV method can explain benefits from nature.

7. RESULTS

In this chapter, the natural benefits of the Visschebelt and Koemaste projects will be outlined. First, the benefits of the project area will be valued by using data provided by Kuik, Brander and Schaafsma (*2006*). They wrote a report on the general estimate of benefits from a hectare of nature. The data in their report is processed using benefit transfer: the report uses data found for many different Natura 2000 projects and nature areas.

However, the report by Kuik et al. (*2006*) is not sufficient to give a full overview of all the types of nature benefits. They have found benefits in some areas, but not all. And since their research does not relate enough to the Visschebelt-Koemaste project, in order to truly compare the found benefits, the Total Economic Value (TEV) principle, as was mentioned by Turner et al. (*2001*) will also be used. At the end of the section, the two different values can then be compared.

The TEV can be used to group the benefits found for the Visschebelt-Koemaste project, and since the method is mentioned by almost all authors on the valuation of nature environment, it might be the most relevant method to use. By applying TEV, some information can be given on each type of benefit, and how great or small their economic impact is expected to be.

Some of the benefits may be priced, or some estimate about their value may be given. This is done by making assumptions on what will happen in the future. Note that this makes the estimates more or less fictional: they are an *assumption* of what their minimal value could be. Also, some benefits were found unsuitable to value. For those benefits, a description will be given of their importance and in the ways they may or may not have a positive effect.

7.1. Natura 2000: A general estimate of the benefits of nature areas.

In 2006, Kuik, Brander and Schaafsma wrote a report on 'the general estimate of benefits of Natura 2000 areas'. In this report, they give a rough estimate of the benefits of certain types of nature within Natura 2000 areas. "Natura 2000" is a policy which focuses on the preservation and development of nature reserves in Europe: European regulations establish that member states protect certain animal species and their habitat, in order to maintain the biodiversity (*Rijksoverheid, 2012*). All nature areas that are part of Natura 2000 are also part of the Ecological Main Structure or EHS.

Although the river valley of the Regge near Hellendoorn itself has not been classified as a Natura 2000 area, the nearby nature reserves 'Sallandse Heuvelrug' and 'Wierdense Veld' actually are a part of the Natura 2000 policy. Also, for writing the report, the researchers combined benefits they found in multiple studies; some of those studies are based on *all* nature within the Netherlands (not just Natura 2000 areas), and are used in calculating the mean values of different types of nature and their ecological functions. Therefore, this report by Kuik et al. may give a useful interpretation of the valuing of benefits for nature types in the Netherlands, and may be useful for the Visschebelt and Koemaste projects, even though they are not a part of the Natura 2000 policy.

For the valuation of rivers Kuik et al. (*2006*) have used a research by Kind (*2002*), on the costs and benefits of river-widening measures. Kind states in his report (*2002)* that in the cost-benefit analysis as carried out, the main goal is to *estimate* the magnitude of social effects

of river-widening measures, without necessarily pursuing a high level of accuracy. This being said, Kuik et al. (*2006*) did manage to process the data provided by Kind (*2002*), using the hedonic pricing method (pricing based on the value of houses) and benefits transfer, in order to valuate river areas. The value of rivers and adjacent land is estimated at € 4,709 per hectare per year, with a standard error of € 602.

Although the Regge is considered to be a *river,* the Visschebelt and Koemaste area is also referred to by the municipality and waterboard as *stream valley area*. Kuik et al. (*2006*) have estimated a different value for stream valley areas (combined with hill country). In estimating the benefits per hectare for stream valley areas, the researchers have combined data from three studies to find a benefits estimate of € 4,399 per hectare per year for stream valley areas, with a standard error of € 1,953.

These two values combined gives an average amount of benefits of € 4.554 per hectare per year ((4399 + 4709)/2). The standard error of this number can then be calculated by extracting the square root of both numbers squared (*Howitt & Cramer, 2007, p. 148*):

$$\sqrt{(602^2 + 1953^2)} \approx 2044$$

However, it cannot simply be stated that the added value of a hectare of nature in the Visschebelt and Koemaste area is worth 4.554 euros, since nature also fulfills a regulation function which is not included: the capacity of nature to regulate ecological processes that, indirectly, make life on earth possible (indirect use value). The value of this regulation function is not taken into account by Kind (*2002*), since there is no structural research done on its value yet. Therefore, there is a chance that this estimated value is a *minimum amount*, since the regulation function of a river (Kind's research was only used in order to find the value of rivers, so not for the stream valley areas) could be a significant part of the total value of nature (*Kind, 2002, p. 51*).

Furthermore, Kuik et al. (*2006*) use results on different functions of nature in order to calculate the value of nature. The five different functions valued in the report are:

- Raw materials (direct consumptive use values)
- Recreation and Tourism (direct non-consumptive use value)
- Living Environment (direct non-consumptive use value)
- Environmental Features (indirect use value)
- Non-use Value (non-use value)

For the benefits of rivers, the environmental features and raw materials are not valued, and for stream valley areas, the living environment and environmental features are not valued. This means that part of the value for these types of nature is missing, and the actual value could therefore be higher.

Since the report is somewhat dated (it was written in 2006), it can also be assumed that some inflation has taken place, and that the current values are somewhat higher than the price level in 2006. This, plus the fact that not all values are taken into account, shows that the amounts found by Kuik et al. (*2006*) are a *minimum amount:* the actual value of a hectare of nature is expected to be higher.

On the other hand, the hectares of land in the Visschebelt and Koemaste areas had of course also a value in their previous function (mostly agricultural). Kuik et al (*2006*) emphasize that, for the Natura 2000 areas, the benefits can not directly be compared to the costs of the measures. It is unknown to what extent the nature benefits increase by the implementation of the Natura 2000-measures, or to what extent the nature benefits would decrease if the measures are not carried out. This is probably true as well for the Visschebelt

and Koemaste projects: the improvement of nature has its benefits, but it is not completely known how they compare to the old situation.

Taking these remarks into consideration, we may still *assume* that the average benefits of the new nature in the Regge valley near Hellendoorn amount to at least € 4.554 per hectare per year, with a standard error of € 2.044.

Since 30 hectares of new nature have been created within the Visschebelt-Koemaste area (20 ha in the Visschebelt area, and another 10 (assumed, since parts overlap) in the Koemaste area), it is assumed that the benefits of this new nature will amount to **€ 136.620,-** per year. With the standard error taken into account, this amount may vary from anywhere between € 75.300,- per year and € 197.940,- per year.

7.2. The benefits of nature measured by TEV

The theoretical framework mentions TEV as a way to show all different values of an ecosystem. This is why this method will be used in this section in order to explain what the different functions of nature are, using this method, and how their value can be estimated. This section is subdivided for the different types of values. First, an overview will be given of different use values, with examples of these values for the Visschebelt-Koemaste project. Then an overview of non-use values follows.

7.2.1. Use values

Use values are subdivided into direct and indirect use values. Direct use value can be the value of products or goods from the area (consumptive), or activities in the area which may exploit the area without material consumption of its products (non-consumptive). Indirect use values represent the value of factors that may be of big importance, like flood protection for example, but are harder to value due to their indirect nature: they may influence other factors or prevent costs, but indirectly.

7.2.1.1. Direct Use Value

Direct Use Value: Consumptive Use Value

Consumptive use value refers to activities in which the resource is ‘consumable’. The direct use relates to goods like wood, fish or water.

Loss of agricultural land

From the Visschebelt and Koemaste projects, no increase in goods produced in the area is expected. On the contrary: if anything, a loss of agricultural product can be expected due to the loss of farmland (agricultural grounds in the project area are purchased by the government and handed over to Landschap Overijssel in order to create new nature).

But, that loss of agricultural land might not be a true loss. The loss of farmland does have another side to it: most plots were not very suitable for farming to begin with. The Municipality Hellendoorn explains that the Regge valley is a very wet area, and the farmland in the area was sometimes located on grounds way too low. The water management in the area used to focus on draining the water as much as possible, to keep production circumstances for agriculture as optimal as possible, also because land is already expensive enough: it had to be

kept profitable. By starting the Visschebelt and Koemaste projects farmers had the opportunity to sell their land for a good price, or trade it for other plots of land owned by the government. This land they received in return is usually much more suitable for farming. The avoidance of desiccation is considered an indirect use value which is explained later on.

It can be concluded that although there is loss of farming land in the area, the owners have received a good price for it, or better plots of land elsewhere, since most of the land in the area was not suitable for farming. This seems a good solution, and no true value is lost. We assume that there is no effect, or no benefits from direct use values on this point. The loss of farmland may be compensated by an improved quality of farmland elsewhere. It is therefore assumed, that there is no effect, or no benefits.

Shared use of the land

As explained in the detailed background section, the new nature in the Visschebelt-Koemaste area is maintained through alliances between Landschap Overijssel and local farmers. The plots of land in the area are not owned by farmers anymore, but by LO. Maintenance of the land is done by letting cattle of local farmers graze the area. This way of cooperating creates value both ways: costs of maintenance are lowered, because LO has local farmers do it for free, and at the same time, local farmers are able to use land that they do not own: their costs are lower, because they do not pay rent over plots they do not own.

The shared land usage is assumed to have a positive effect, since both parties will benefit from the alliances made.

Overall, it is unknown what the costs are for loss of agricultural plots (since the land used to be farmland before the projects were implemented). It could be well possible that the positive benefits for agriculture (which are not priced), like the improved quality of farmland elsewhere, are less than the costs created by loss of farmland (which is also not priced). That effect is therefore assumed to be non-existent.

There is, however, prove for a positive effect created by the shared use of land (increasing production), which is therefore assumed to be a non-priced consumptive use value, and a benefit from nature.

Direct Use Value: Non-Consumptive Use Value

Non-consumptive use values may refer to activities which exploit the resource for recreational and amusing purposes, so without ‘material consumption’. For the Visschebelt-Koemaste project, examples are recreational value (the value of an increase in recreational activities in the area due to implementation of the plans) or an increase in housing prices, because the joy of living in the area may rise due to the improved nature area in the new situation.

Recreational value

The municipality and waterboard expect an increase in recreational activity within the area from implementing the projects. Initiatives like the cycling-/hiking routes, bridle paths, Enterse Zomp and the Ola open factory are included in the Visschebelt-Koemaste plans in order to stimulate tourists to visit Hellendoorn. And although the focus of this report is on benefits from *nature*, the growth in recreational activity is directly linked to the improving nature and landscape in the Visschebelt and Koemaste area.

Appendix 4 shows some figures concerning tourism in the municipality Hellendoorn (*Gemeente Hellendoorn, 2010, 2011*). The Municipality Hellendoorn wishes to present themselves as an attractive and active municipality, which is worth a visit: the location of the town Hellendoorn makes it attractive. Hellendoorn is located between the Sallandse Heuvelrug (a national park) on the one side, and the Regge valley on the other side. Johan ten Dam, from the Municipality Hellendoorn mentions: "We have a beautiful ridge on the one side (Sallandse Heuvelrug), and then there is the Regge river. In the past, we were all positioned with our back to the river, because it used to be "that stinky ditch", where the dye for textile and dead animals were dumped. So everybody saw the national park as a plus, and the river as a negative. Now our municipality will have two 'plusses' in the future, and thus our recreational attractiveness grows, since we can offer tourists a broader product" (*J. ten Dam, interview, 2011*). This more positive image of the area should also help the municipality to compete with Ommen, a neighboring municipality also focusing on nature and recreation.

It may not possible to use the figures of the Municipality to value the benefits from recreation for the Visschebelt and Koemaste projects because (1) there is only information on the amount of visitors, or employees in the recreational sector for the whole region (much larger than just Hellendoorn itself), and there are not values in euros and (2) the figures comprise *all* recreation throughout the municipality, it is not possible to filter out the 'input' created by the Regge projects.

So, the value of nature measured by the increase in recreational activity is not measured. However, if one *would* want to measure the value, Ruijgrok et al. (*2004*) mention two possible valuation methods for measuring 'recreational joy' as a direct use value: the 'travel cost method' (TCM) and the 'conditional contingent valuation method' (CVM). TCM bases the valuation of changes in nature of a specific area on the travel costs which people are willing to make to visit that specific area. CVM values changes in nature based on the public experience and appreciation of these changes. Individuals are asked about their experience and willingness to pay for a specific change in nature. It is therefore a social survey method, which may take up a lot of time in order to collect enough reliable data.

There are, however, some figures known about tourism and recreation in the region of Salland. The Municipality Hellendoorn is a part of this region.

- Over 2007, 2008 and 2009, an average of 67 % of the vacationers in Salland went hiking (strolling) during their stay: a figure above the national average of 60 %.
- The "Sallands Tourism Agency" promotes the region with the slogan "Salland – Cycling Land" (Salland - Fietsland), and the region has over 400 kilometers of cycling paths marked with signs. Over 2007, 2008 and 2009, an average of 29 % of the vacationers in the region went for a cycling tour.
- 24 % of the Dutch vacationers visiting Salland, typifies their holiday as 'aimed at nature'.
- In the municipality Hellendoorn, the recreational and touristic sector accounts for 7,6 % of all employment (2009): the highest percentage in Salland. In 2009, this amounted to a total of 1.060 jobs.
- On average, visitors of Salland on a touristic, domestic holiday spent €24,90 per person per day between 2007 and 2009. This is below the national average of 29 euro.
- An estimate of 48 million leisure activities are experienced in Salland per year. Within the province Overijssel, people spend an average of €10,35 on such an activity. This means that in Salland about 500 million euros per year are spent on leisure activities, lasting one hour or longer.

(Source: Gelders Overijssels Bureau voor Toerisme, 2010)

This information on tourism and recreation in the Salland region shows that visitors visit the area specific for its nature, and its cycling and hiking opportunities. The projects Visschebelt and Koemaste fit very well into this picture with their new cycling- and hiking-routes, right through a landscape designed with improved nature. This is consistent with the wishes of recreational visitors of the region. Then again, it should also be noticed these figures describe an area (the Salland region) much bigger than Hellendoorn alone, and include for instance the Sallandse Heuvelrug (a national park), the city of Deventer, and the amusement park located near Hellendoorn.

Nevertheless, some information on tourists and recreational visitors for the town and municipality Hellendoorn can be used to find out which part (roughly) of all visitors of Salland are specifically visiting the Hellendoorn area:

The absolute amount of jobs in the leisure sector in Salland amounted 5,540 in 2009. Since 1.060 of those jobs are located in the municipality Hellendoorn, it is assumed that the municipality Hellendoorn accounts for **19,1 percent** of the touristic/recreational industry in Salland.

Now, let's assume that the projects Visschebelt-Koemaste will increase recreational activity in the municipality Hellendoorn by *at least* 0,5 percent (in comparison with 2009) over the years to come. The following figures can then be calculated:

Activity	*Situation in 2009 (Salland – Hellendoorn)*	*Calculation of the increased value*	*Expected Added Value after implementing plans*	
			Priced	Unknown
- Leisure activities (lasting one hour or longer) (visitors for a day, not staying in the region)	48 million leisure activities in all Salland per year, Thus: 9.168.000 in the municipality Hellendoorn (48 million x 19.1%)	An increase of a half percent, would mean 45.840 extra leisure activities per year, with an average spending of €10,35 per activity.	€ 474.444,- per year	
- Visitors on a touristic, domestic holiday.	Spending an average of 48 million euros per year during their stay in all Salland. Thus: € 9.168.000,- in the municipality Hellendoorn.	An increase of a half percent. 0,5 % of €9.168.000,-	€ 45.840,- per year.	
- Visitors with a fixed pitch (on a campsite for example)	Spending an average of 3,4 million euros per year during their stay in all Salland. Thus: € 649.400,- in the municipality Hellendoorn.	An increase of a half percent 0,5 % of €649.400,-	€ 3.247,- per year.	
- Foreign tourists on holiday.	*The amount of visitors and spending is unknown for Salland.*			*Unknown.*
- Employment in the recreational/touristic sector	1.060 jobs in the municipality Hellendoorn.	An increase of one a half percent would mean 5 extra jobs. 5 x €32.500 (modal income per year)	€ 162.500,- per year.	
		Total Added Value	**€ 686.031,- per year**	

For the calculations made in the table above, it should be mentioned that the amount of leisure activities do not overlap with the numbers for visitors on a touristic, domestic holiday. The report by the 'Gelders-Overijssels bureau voor Toerisme' specifically mentions that the numbers under 'leisure activities' concern leisure activities undertaken by Dutch persons, but that it concerns visitors for just a day, and "activities by holiday-makers are not taken into account" (*Gelders Overijssels Bureau voor Toerisme, 2010, p.8).*

Another fact that should be noted, is that the number found from an increase in employment should not simply be added to the amounts found for an increase in visitors. That is because it can be assumed that the salaries paid to these 'new employees' are earned through the increase in visitors already accounted for, which means they are (partly) double counted. However, there are a few reasons that it was chosen to add them anyway. First of all, it can be assumed that the salaries earned by those employees will largely be spend within the region, thus an important part of that money will flow to other businesses and residents of Hellendoorn. Also, since foreign tourists are not taken into account, it can also be assumed that part of the rise in employment is due to a rise in foreign visitors, that are not accounted for in the calculation. Finally, new activities will be carried out in the Visschebelt-Koemaste area: sailing the Enterse Zomp or managing the visitor centre that is planned in the area, will cause an increase in jobs, whether the number of visitors rises or not. These are the reasons that the increase in employment is taken into account together with the rest of the numbers found.

Looking at the numbers in the table above, it may be concluded that, assuming an increase in recreational and tourist activity of 0,5 percent, the projects Visschebelt and Koemaste will bring in an extra €162.500,- per year by creating extra jobs. Another extra €474.444,- per year is earned by an increase in leisure activities. The project will also create an extra value of € 49.087,- per year due to increased income spending from visitors of the area. This sums up to a total extra value of **€ 686.031,-** per year.

If the growth of 0,5 percent is real (it is a realistic percentage, although only assumed), this amount would be a minimum amount, since there are no figures available on foreign tourists visiting the area, apart from the fact that they are there. The amount they spend should be added to the total amount per year that is already calculated here.

Residential Joy: Value from improved living environment.

An attractive environment is expected to have a positive influence on people and businesses desiring to settle in the region. The Municipality Hellendoorn expects that the prices of houses will rise because the natural environment improves (*J. ten Dam, interview, 2011*). Ruijgrok et al. (*2004*) acknowledge that a green and tranquil environment usually has a positive influence on the value of houses. It can thus be concluded that a part of the value of nature can be found in the price of houses.

This value can be measured with the hedonic pricing method, which measures the willingness-to-pay for nature in the direct living environment, derived from the higher price which residents have paid for their house. A downside to this method is that there is a lot of data needed in order to rule out all other factors that are of any influence on housing prices. For the Netherlands, an important example of such a factor is government intervention. The government regulates construction of housing by assigning construction permits (or not) and assigning subsidies for private housing. This means that the housing market is not a free market, and the prices may give a distorted picture. The method may also underestimate the value of nature, because people who live further away from the nature area, are not taking into

account in the valuation, but usually they do visit the area regularly and appreciate it as an added value to their residential joy.

Wijnen, Hofsink, Bos and van der Hamsvoort (*2002*) claim that different research studies have shown that houses that are located in a nature- and/or water-rich environment, are worth 5 to 12 % more than houses that are not. Based on these reports, it can be assumed that the Visschebelt and Koemaste projects have lead to an increase in the prices of houses in the area, which would mean that the financial position of home owners has improved. These gains can be considered as a benefit which residents derive from the improvement of nature, and a rise in housing prices can thus be considered a monetarized value of the increase in residential joy by neighbors of the projects.

Research done by the Municipality Hellendoorn in 2007 states that the price of houses in the municipality are relatively higher than in surrounding municipalities. This is partly caused by the touristic sites in the area, which make it a popular municipality to reside in. The average value of houses in Hellendoorn in 2006 was € 217,000,-. Only 4 municipalities had a higher average value back then. The difference is mainly caused by the higher prices of 'luxury building plots' in the area, which are at the top of the market. Looking at the mean of housing prices, the differences are not as great: the higher average price is caused by more luxury houses in the Municipality Hellendoorn (*Gemeente Hellendoorn, 2007*).

More recent numbers show a new trend. The crisis has caused the prices of houses to drop significantly over the past few years, and this is also true for the Municipality Hellendoorn. This means that home-owners who sell their house these days, may not make an extra profit (caused by the improved nature or not), but have to sell their houses for less. Still, we assume that the drop in housing prices is relatively lower for Hellendoorn, compared to other areas, due to the implementation of the Visschebelt-Koemaste plan. Therefore, an 'increase' in housing prices is accounted for, but this can also be interpreted as an avoided cost: a smaller decline in housing prices than expected.

In order to make a calculation on the value of nature based on housing prices, it is assumed that part of the housing prices in Hellendoorn shows the value which residents put on near-by nature areas. However, before the projects Visschebelt and Koemaste, the area was already an agricultural, partly nature, area. So we can not merely assume that the large numbers which Wijnen et al. (*2002*) mention (up to 12%) are applicable to this situation. Wijnen et al. propose a 'double HPM' to be applied, if for example, the housing prices in 2008 were seven percent higher than comparable houses in other regions, and in 2012 ten percent higher (after carrying out the project), it may be assumed that the project itself has had an added value of the difference of 3% for home-owners in the region.

The first problem that is encountered, is that the projects are not finished yet (Visschebelt is finished for the largest part, Koemaste is not). This means that there can not be made a conclusion on the extra value of houses yet. However, there are very recent numbers (July 2012) on the prices of houses in the region. These prices (asking prices) are given for the whole municipality Hellendoorn, so specific prices for Hellendoorn itself, or neighbors of the projects can not be filtered out. The next figures are therefore based on information on *all* housing prices in the municipality.

Looking at Appendix 5, the amount of houses in the municipality Hellendoorn was 14,278 in 2011. Of those houses, 76 percent is private owned, which means the municipality counts 10,851 private owned houses.

In 2011, the municipality Hellendoorn counted 35,796 inhabitants, with 6,142 of them living in the town Hellendoorn (*Gemeente Hellendoorn, 2012*). We may therefore assume that Hellendoorn counts **1862** private owned houses ((6142/35796)*10851).

The average asking price for houses located in the municipality was € 308.828,- in July of 2012 (*HuizenZoeker, 2012*).

Now, lets assume that the added value of the improved nature, and with it recreation opportunities that the Visschebelt and Koemaste projects will create, will cause the prices of houses to rise (relatively) with *at least* 0,1 percent. This percentage was chosen, because prices are expected to rise, but probably not with the minimum of five percent which Wijnen et al. mention, since the area was already considered 'nature' before. Also, the calculation is made for *all* private owned houses in Hellendoorn, while some of the prices may not be affected by the projects, because they are located too far from the project site (while others may be closer, and may be affected more). Besides that, part from of the added value in the research done by Wijnet et al. (*2002*) comes from residents wanting to visit the area (travel cost method), and the extra benefit from recreational activities (including visits) has already been (partly) valued.

The added value of nature, expressed as a part of the housing prices, would then be 1862 x 308828 x 0.001 ≈ € **575.038,-**.

Note that, as was mentioned before, not *all* prices of houses in Hellendoorn may rise. It can be expected that houses located very close to the Visschebelt-Koemaste area will rise more than others. Since it is unknown how many houses are located at for example walking distance of the area, it is unknown how this affects the outcome of this calculation. But to give an example: 166 houses located closer, that will rise relatively 1%, give the same outcome as the calculation given above. Since the amount valued is an *example* of how to value nature using the hedonic pricing method, we assume that the amount found (€ 575.038,-) is a realistic value.

7.2.1.2. Indirect Use Value

Indirect use value usually represents services provided by nature, like water levels or clean air. They consider the regulation function of nature, and have an indirect influence on other factors, which may or may not cause them to create value. An example for this category could be the costs of flooding in the future that are avoided. Flood protection can be considered the main goal of the Visschebelt-Koemaste project, and is therefore (as explained in the Literature Review) not a part of the *surplus value* of the project, and left out of consideration in looking at the side benefits. Nevertheless, it is one of the most specific example of an indirect use value.

Preventing dehydration of the land

Because the 'new' Regge is not as deep as it used to be, dehydration in the adjacent areas is prevented. Ground water will always flow in the river; in the old situation the river was deeper and therefore intercepted much more ground water, also in periods of drought. In the new situation, the ground water level will not drop as low during summer as it used to. This is a positive effect for the regional nature and agriculture which reaches beyond the areas of Visschebelt and Koemaste alone.

Since it is unknown how great the impact of dehydration is or used to be in the area, and since it would cover more than the project area itself, the prevention of dehydration is not priced as a benefit. However, it is assumed to have a *positive effect*, also for agricultural productivity in adjacent lands. .

Improving Biodiversity and EHS

Setting up the Ecological Main Structure (EHS) can be considered an indirect use value as well, since it influences other factors and values as well. However, the EHS is not a 'service nature provides', and therefore its grouping as an indirect use value could be discussed.

'Biodiversity' can be considered a non-priced effect, since: how would you measure an abstract concept like 'biodiversity'? Improved biodiversity can be appreciated as a cause for an improved and higher-valued living environment, as a cause of a more attractive recreational area, or because of its non-use value: the mere existence and inherent value of a large biodiversity and its preservation for future generations is considered important.

Because biodiversity has an impact on different effects of nature, which can be considered benefits, the concept is not valued separately. Part of its value is already measured, by its positive effect on recreation and living environment, and a significant part of its value is also considered a non-use value, since biodiversity can be appreciated for its mere existence. It is therefore assumed that the value of improved biodiversity is largely covered, as being part of the values found for other types of benefits from nature.

Improving Infrastructure: the new road

Part of the Koemaste project is also to create room for the new north-south connection road, which should drastically improve the infrastructure, making it easier and faster for traffic to pass.

The value of this benefit could be measured by for example calculating the time that is won by traffic passing the road, compared to the old situation, and defining the value of travel time. However, this might be hard to carry out, since work on the new road will not be started until 2014. Even more importantly, the road itself is not considered to be part of the Visschebelt-Koemaste project. But since the project does take into account extra room for these plans, and uses cooperation in order to redesign the whole area, it is assumed that there is a positive effect: the road is fit into all the plans and design of the area, making sure that important preparations are made to prevent slowing the process. The ultimate outcome and result of improved infrastructure is made possible partly due to its inclusion in the plans, which is why a (non-priced) positive effect is expected.

7.2.2. Non-use Value

The three different types of non-use values of nature (existence, bequest, and philanthropic value) are hard to value separately. Nature is valued for its mere existence, for its preservation for future generations, or for others in the society to enjoy it. All these three different values are hard to measure and non-priced.

To nevertheless be able to find some example of a non-use value to be included in the Total Economic Value, we look back at the research done by Kuik et al. (*2006*), also used in the first part of this results section. Although some functions of nature are under-appreciated (or not found) in that report (see: section 7.1.), they did find non-use values for almost all different types of nature.

The benefit from the non-use value of rivers is estimated at € 3.104 per hectare per year. For stream valley areas, the estimated benefit from the non-use value of stream valley areas is € 6.768 per hectare per year. Since the Visschebelt-Koemaste area is considered as

well a river area as a stream valley (as mentioned before) the average non-use value is expected to be €4.936 per hectare per year. The standard error for this non-use value is €1.008,-.

This amount per hectare per year seems extremely high, since it is even higher than the *total* value per hectare found earlier in this section. Kuik et al. (*2006*) explain this by stating that some studies they have used in their benefit-transfer method did not follow the same typology of nature functions as they did themselves. Those studies were only used for estimating the benefits of nature *types* (like 'stream valley' or 'river'), but were not used for the average benefits of nature *functions* (like 'living environment' or 'non-use value'), which is why the average benefits of nature types cannot be directly deduced from the estimated value of nature functions. So in practice, the totals can differ.

Although this may be true, the incongruity of this figure with the figure at the beginning of this chapter is striking. Nevertheless, we assume a non-use value of the improved nature of somewhere between € 3.928 and € 5.944 per hectare per year. To be sure, the low-end estimate will be used in calculating the total value for the projects.

For the Visschebelt-Koemaste area, which stretches about 30 hectares, the *assumed* benefits from the non-use value of nature are therefore estimated at **€ 117.840,- per year.**

7.2.3. The value of the projects using TEV

Since now all use- and non-use values are estimated, the TEV can be filled out. However, it has to be noted once again that the values found for each type of benefit are partly *fictional* values. Although the values may be realistic and can give a good example of the benefits from side-effects of the Visschebelt-Koemaste project (and are low estimates), they can not be fully supported with evidence.

Type of value	**TOTAL ECONOMIC VALUE**	
	Priced Effects	Non-priced effects
Direct consumptive use value		Loss of farmland: Agricultural plots situated in the area before are exchanged for land in more suitable areas. - *No effect.* Shared usage of land. - *Positive effect.*
	-	
Direct non-consumptive use value	Recreational Use Value: **€ 686.031,- per year** Value of improved residential environment: € **575.038,-**.	
Indirect use value		Preventing dehydration: - *positive effect* Improving Biodiversity (EHS): - *positive effect*, but valued and

		priced within other use/non-use values Improving infrastructure: the new road - *positive effect*,
Non-use value	**€ 117.840,- per year**	
<u>Total Value (priced)</u>	**€ 575.038,- Plus: € 803.871,- per year**	

From these calculations, using TEV, it is found that the Total Economic Value of the nature benefits for the projects is estimated at a one-time benefit of € 575.038,-, and an annual benefit of € 803.871,- per year. The first value is considered to be a one-time value, since it symbolizes the increase in housing prices from improved surroundings, which is expected to be a single occurrence.

Apart from these priced benefits, there are also benefits from nature found which have value, but are not priced (showed in the right-hand column of the table). For example: the new nature area fits into the EHS, and improves biodiversity. This fact is not valued in monetary terms, but is actually one of the main goals of the projects. EU regulations require these changes, making them more or less mandatory. So while there is no monetary value for it, it is clear that its value for society is high: otherwise the EU would not turn it into policy. This is true for all the non-priced effects in the above table: the positive effects have value, but how high this value is, is uncertain or impossible to value.

This means that it can be concluded that, under this TEV method, the benefits amount to a value of **€ 575.038,-** and an annual benefit of **€ 803.871,- per year**, *plus* the value created by the **non-priced** positive effects.

7.3. The two methods compared

Now, after the benefits from nature have been accounted according to both methods, the difference between the two numbers is evident. The general estimate of the value of a hectare of nature reported by Kuik et al. (*2006*) is with its value of € 136.620,- a lot lower than the value calculated with the TEV method.

7.3.1. An explanation for the difference in values found

The difference is remarkable, since the nature functions valued in the Natura 2000 report are largely the same functions that are calculated in the TEV method. So what causes the difference?

One reason for the amount not matching up may be mentioned before: Kuik et al. (*2006*) did not value *all* the nature functions for rivers and stream valley areas. The amount that they calculated can therefore be considered incomplete. Furthermore, the concluding remarks in their report state that they "assume that the commercial benefits from nature are underrepresented in the existing literature on benefits" and that "it is recommended to thoroughly think about the different types of nature functions once more, and it should be examined which ones may be underexposed in the report" (*Kuik et al., 2006, p. 17*).

Apart from this, it should be mentioned that Kuik et al. (*2006*) have used data for benefit transfer that is found for much larger nature areas, usually up to thousands hectares of

nature. This is of course a very different situation from the Visschebelt-Koemaste project, which only counts 30 hectares. These hectares are furthermore located on the edge of the town, and a hectare of new nature located so close to the community may be considered to have a much larger value then, for example, one hectare of nature located in an area that is thousands of hectares large. The plans near Hellendoorn may therefore have larger benefits than estimated in the Natura 2000 report.

Another reason that the TEV carried out may result to a higher value in this case, is that the Visschebelt-Koemaste project entails more than just improving nature. Through the cooperation between the waterboard and municipality, the opportunities of nature are exploited to its fullest, by including paths, bridges and boats and by redesigning the area in an optimal way. This causes the area to be not merely 'nature', but more than that. The extra opportunities that the projects create are reflected more in the TEV method, than by using the Natura 2000 projects for benefits transfer, because they are not as specific.

7.3.2. The most complete method

Under the TEV method, a realistic assumption is made about the amount with which values may rise due to implementation of the projects. The data used is specific data for the town or municipality Hellendoorn, and the TEV therefore seems to be a more reliable calculation. All side benefits that are known are mentioned, and the ones that can be priced, are priced. Still, it is unknown whether, for example, housing prices will truly rise with at least 0,1 percent due to the projects.

Also, the TEV method is used in this case to include the non-priced effects. They are not valued using TEV, but are mentioned as part of the total added value. This is necessary, because the monetary value may be unknown, but this does not meant that the non-priced effect are less important than the effects that can be priced. This means that the TEV carried out in this section can be considered more complete than the benefit transfer from the Natura 2000 report.

It can thus be concluded that the differences between the two values found is caused by Kuik et al. (*2006*) underestimating the benefits or not valuing all nature functions, and by the TEV taking into account more specific regional data. Therefore, the TEV may be more suitable as an example of how to value the Visschebelt-Koemaste project, since it uses more specific and recent data for the area.

8. ANALYSIS & CONCLUSION

8.1. Analysis

In this section, a short analysis of the results will show in what way the projects are of value for the Hellendoorn region, and how they add up compared to the costs of the project. The significance of these results will be explained.

8.1.1. Costs and benefits compared

The costs of the Visschebelt and Koemaste projects are discussed in the Detailed Background section of this report, and amount to a total of 5 million euros. This is a large amount of money to spent, when the financial gains from the projects are unknown.

The calculations carried out in the results section have proven that the projects have significant added value for the Hellendoorn area. According to the value derived from the Natura 2000 report, the projects can be valued at €136.620,- per year. This would mean that the project will earn its investments back within 37 years, which is a relatively long time, considering that a lot of factors and opinions may also change over time. Looking at the standard errors, according to this method the project will, at the best, win itself back within 25 years (based on €197.940,- per year).

But, since the results section has concluded that the TEV is considered a better and more specific method for the Visschebelt and Koemaste projects, it is especially important to see how the outcome of this method compares to the costs.

Based on an initial extra value of € 575.038,- and then an annual benefit of € 803.871,- per year, it can be assumed that the project has earned back its investments within 5,5 years.

For both these methods, the true total value will even be higher, since non-priced effects may be as important, but not included in the calculation of benefits that *are* valued in money. The true payback time of the projects will therefore be shorter than the ones calculated here.

These comparisons show that the payback-time is relatively short, looking at the TEV method. However, from the view of the waterboard and municipality, payback-time is not truly an important evaluation method for the Visschebelt-Koemaste project. Due to EU regulations and laws, the projects had to be carried out no matter the outcome of extra benefits. In other words: the projects do not *need* to be a commercial success.

Payback-time is, however, a great help to show that the investments made in the project are legitimate, and to make the added value of the projects for the Hellendoorn region tangible for the general public.

8.1.2. Significance of the Results

The results have shown that there *are* important benefits from nature for the Visschebelt-Koemaste project, and that they actually do have significant value for society. The explanation of these benefits from nature has value for future projects.

Highlighting the value of nature proves that not only will the projects provide flood protection in the future, they will also increase the economic value of the region. The

improvement of nature has shown to have impact on multiple important subcategories of benefits. In the future, this knowledge may help waterboards to better design such projects, taking the opportunities into account and utilize them to their fullest. Communicating the added value of such projects may therefore also improve the public's perception and interest for similar plans, increasing public support and visibility.

8.2. Conclusion

This section will start with trying to give an answer to the subquestions formulated, in order to give an overview of the information found on valuing benefits from nature, summarizing the main findings of this report. Finally, the main research question will be answered, providing a final conclusion that can be drawn from the results of this report.

8.2.1. Answering the Sub-questions

- "How can the value of the benefits from nature for these kinds of projects be measured?"
- "In which areas do benefits from nature occur considering the renaturalization projects near Hellendoorn?"
- "What is the estimated value of the benefits from nature for the Visschebelt-Koemaste project?"

8.2.1.1. Valuing Benefits

In this paragraph, the first subquestion "*How can the value of the benefits from nature for these kinds of projects be measured?*" will be discussed. The literature review section has shown that benefits are hard to value, since it is hard to monetarize them. Benefits are defined as "all the positive side effects of a policy instrument": by leaving the intended main effect out of consideration, the surplus value of projects can be defined.

The literature review section and theoretical framework have shown that it is important to subcategorize values. For this report, benefits from nature are chosen as point of focus, since the projects emphasize their importance, and since nature influences other types of benefits.

In order to categorize and value the benefits from nature, the Total Economic Value method is used. This method subdivides the values into (direct/indirect) use and non-use values. Adding up the amounts found for each type of benefit, will provide the total economic value of the measures. The method is used, but with adding room to also mention non-monetary values: they are not priced, but this does not mean that they are not important. The method of 'dual analysis' supports this way of valuing by emphasizing that non-priced effects may be essential in giving a complete overview of all benefits.

Specific methods that are usually based on measuring by looking at the willingness-to-pay are an example of how benefits from nature are valued. In fact, these methods are in many cases the only way to find a reliable value of nature. However, these methods are usually too costly and time-consuming to carry out for each individual renaturalization project. This is why benefits transfer is used a lot.

Benefit transfer is mentioned as a cost-effective way to use results found in other similar reports in order to value benefits. This method has been used in order to find results: what values did other similar types of research find, and how can they be translated to the Visschebelt-Koemaste project? An example is the report by Kuik et al. (*2006*) that has been

used in the results section as a way to describe how benefits of nature are valued, and how these values could be applicable for the Visschebelt-Koemaste project.

8.2.1.2. Benefits found

In this section, the second sub-question "*In which areas do benefits from nature occur, considering the renaturalization projects near Hellendoorn?* " will be answered. The literature review section has already given an overview of *all* categories of benefits found for the Visschebelt-Koemaste project. Benefits from nature are the ones that this report has focused on. Those benefits are discussed and valued in the results section.

The benefits from nature found for the Visschebelt-Koemaste project are:

- Shared use of land in the area (non-priced)
- Increase in recreational activity
    - More tourists visiting the area for holiday.
    - More leisure activities by recreational visitors.
    - More jobs in the recreational sector.
- Improved residential joy: an increase in housing prices
- Preventing dehydration of the land (non-priced)
- Improving infrastructure: creating room for the new road (non-priced)
- Improving biodiversity and fitting into the Ecologic Main Structure EHS (non-priced)
- Non-use value (existence value)

The results section has shown that there are may different benefits from nature for the Visschebelt-Koemaste project. This is valuable information, since it shows that renaturalization projects like the Visschebelt-Koemaste project may have more value for society and regional economics than expected. Local governments can use this information in the future to exploit all opportunities that may rise from such projects. Knowledge of the benefits will also help to raise public support for similar projects.

8.2.1.3. The value of benefits from nature.

This section will give an answer to the last subquestion: "*What is the estimated value of the benefits from nature for the Visschebelt-Koemaste project?"*. This value was estimated by combining the TEV method with dual analysis and benefits transfer.

The first estimation of the benefits from nature is made using benefits transfer alone, and is based on research done by Kuik et al. (*2006*). Using this method, the value of benefits amounts to € 136.620,- per year. With the standard error taken into account, this amount may vary from anywhere between € 75.300,- per year and € 197.940,- per year.

The TEV-method was used to categorize the different benefits from nature that are found for the Visschebelt-Koemaste project. This method has helped to show which different benefits from nature there are. The total value of these benefits is estimated at a one-time benefit of € 575.038,-, and an annual benefit of € 803.871,- per year.

The reason for the large difference between the two numbers found for both calculations, may be that Kuik et al. (*2006*) did not include as many factors or benefits in their research as the TEV-method does in this case. Also, the TEV-method has used data that is much more specific for the Hellendoorn region and may therefore also be considered more reliable.

The values found for these two methods are furthermore considered to be *minimal* values. Non-priced effects are not represented in the figures. However, the fact that these benefits are not priced, does not mean that they do not have value. The best example for this is the increase in biodiversity: adding new hectares of nature to the EHS is hard to value, but the fact that it is EU-policy shows that it definitely has priority and that it is valued by a large part of society. The extra value of non-priced benefits to the value already calculated can therefore be significant and should not be under-estimated.

8.2.2. Final Conclusion

The main question that this report has tried to answer is "*What are the benefits from nature for the Visschebelt-Koemaste project (as a part of the Regge renaturalization project) and can they help to justify the costs?"*.

In order to answer this question, this report has given examples of how nature is valued and in which different ways nature can be a benefit to regional economies.

The Visschebelt-Koemaste project has showed that there are many ways in which a naturalization project can be of added value. Improving nature causes benefits like an increase in recreation, increased housing prices, improved biodiversity, a higher existence value, better infrastructure and improved usage of land, on top of its most important goal: providing flood protection in the future. The cooperation between several parties for the Visschebelt-Koemaste project (especially the municipality and waterboard) has helped to optimize these benefits, since the plans already aim at designing an all-round nature area, with recreational opportunities and an optimal fit with the EHS.

The most important value found for the set of benefits from nature is derived from using the TEV-method to add up different types of benefits. This has estimated the value of benefits from nature for the Visschebelt-Koemaste project at a one-time amount of €575.038,- and an annual benefit of € 803.871,- per year. To calculate this figure, fictional but realistic figures have been used to estimate the values that could be priced. And although this figure is but a rough estimate, it does show that the added value of renaturalization is significant and should not be underestimated.

It can be concluded that valuing the benefits from nature does help to justify the costs. The general public, investors, or inhabitants of the region will see that renaturalization projects are no waste of money, and that there are many positive side effects which will affect them as well. This helps to increase public support. In this case, the waterboard or municipality do not *need* to justify the expenses made in the projects, since they have to be carried out either way, but understanding the fact that there are much more benefits from the Visschebelt-Koemaste project than one would think, will help to also convince the general public of its importance.

The report has proven that although it may be hard to find a reliable 'value of nature', it is important to highlight all the areas in which benefits could occur. It is evident that the waterboard and municipality have turned the projects into a success due to good cooperation, utilizing opportunities that arise in the Hellendoorn area. The investments made in the Visschebelt-Koemaste project have not gone to waste, and have helped to strengthen the regional economy, while at the same time protecting many inhabitants from flooding in the future.

8.3. Recommendations and opportunities for further research

It is evident that projects, such as the Visschebelt and Koemaste projects, can stimulate regional economic growth. However, within the plans for the projects, the economic benefits of the projects are barely appreciated. The goals are related to water and nature, and this is not being linked to the local economy. This is a missed opportunity, since knowing the benefits which arise from the plans, causes opportunities to create value and stimulate growth within the area.

There are several ways to quantify the benefits, for example the willingness-to-pay method. For the Visschebelt and Koemaste projects, and actually true for most similar projects, no concrete figures are calculated. Although quantifying the benefits will be costly and will take a lot of time, it may be very helpful to show the benefits of such projects. This will then also be helpful to other, similar future projects, since benefits of nature improvement will then be proved and supported by figures and facts. More recent research with specific figures can then help, perhaps through ways of benefit transfer, to increase the success of new renaturalization projects.

This problem of quantifying the benefits is also one of the weaknesses of this report. Even more so, because *benefit transfer* is being used. However, the reports that are used in order to find the data needed to apply benefit transfer are based on that same method themselves, creating some sort of 'double benefit transfer'. An example is the report by Kuik et al. (*2006*) on the benefits of Natura 2000 areas. This report is used to determine (part of) the existence value for the Visschebelt and Koemaste projects. From the report: "Although it should be possible, in practice, to estimate the monetary benefits (willingness-to-pay of individuals and businesses) of the measures in the Natura-2000 areas, it is practically impossible, because of the limited timeframe and the, yet, incomplete quantification of nature benefits in economically relevant units" (*Kuik et al., 2006, p.1*). For this reason, Kuik et al. have used existing studies and benefit transfer to calculate their results. Using benefit transfer on data achieved through benefit transfer itself, affects the reliability of the results.

Organizations like the waterboard should therefore consider doing more specific research themselves, in order to prove the added value of their projects. At this point in time, articles on specific data from willingness-to-pay methods for separate smaller projects are almost non-existent, while the information gathered from such studies can be very useful. Not only to justify the decisions made in project planning, but also to find out which nature types or activities people in a project region value most. This will optimize future renaturalization plans by fitting the needs of all parties, including the general public.

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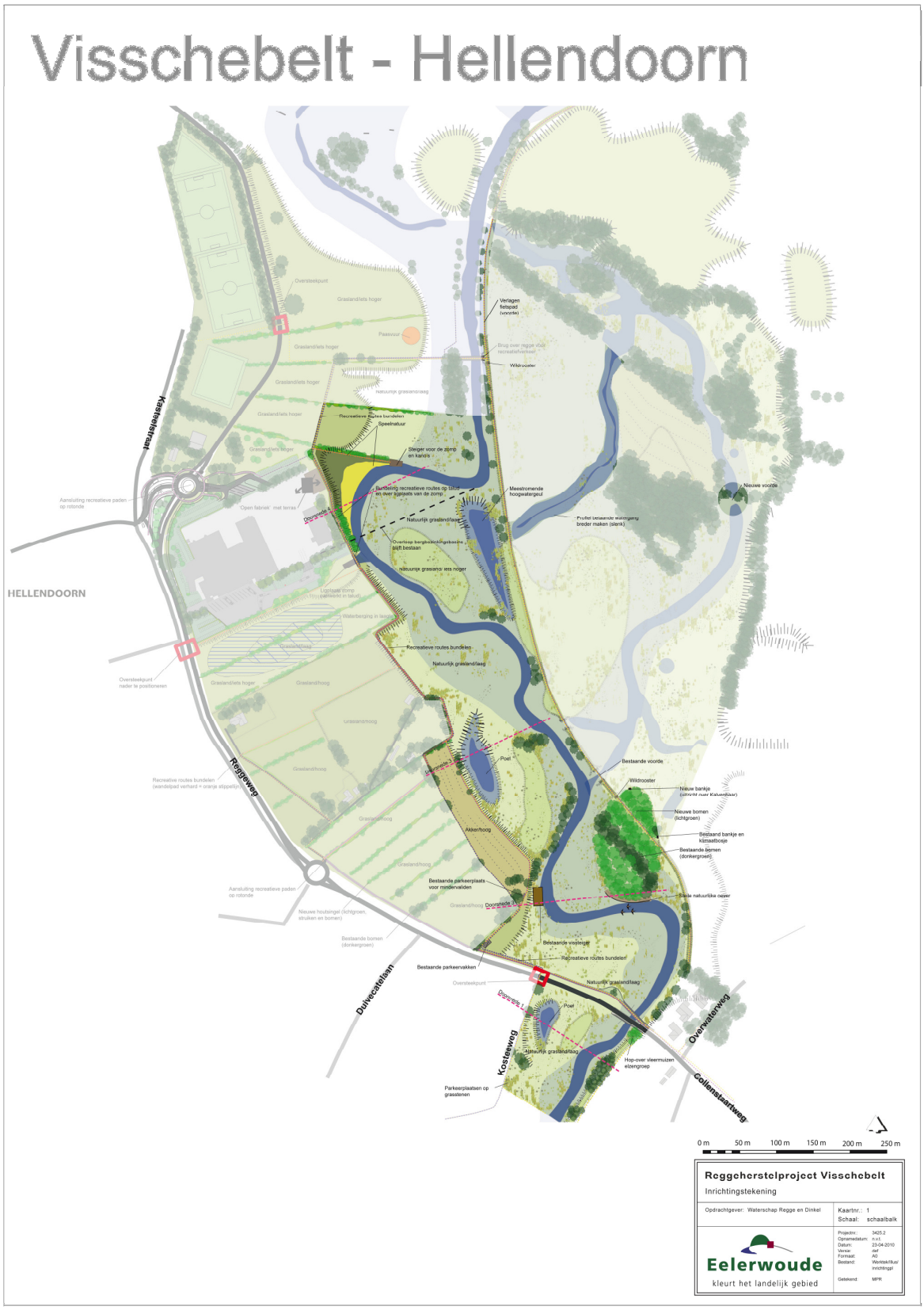
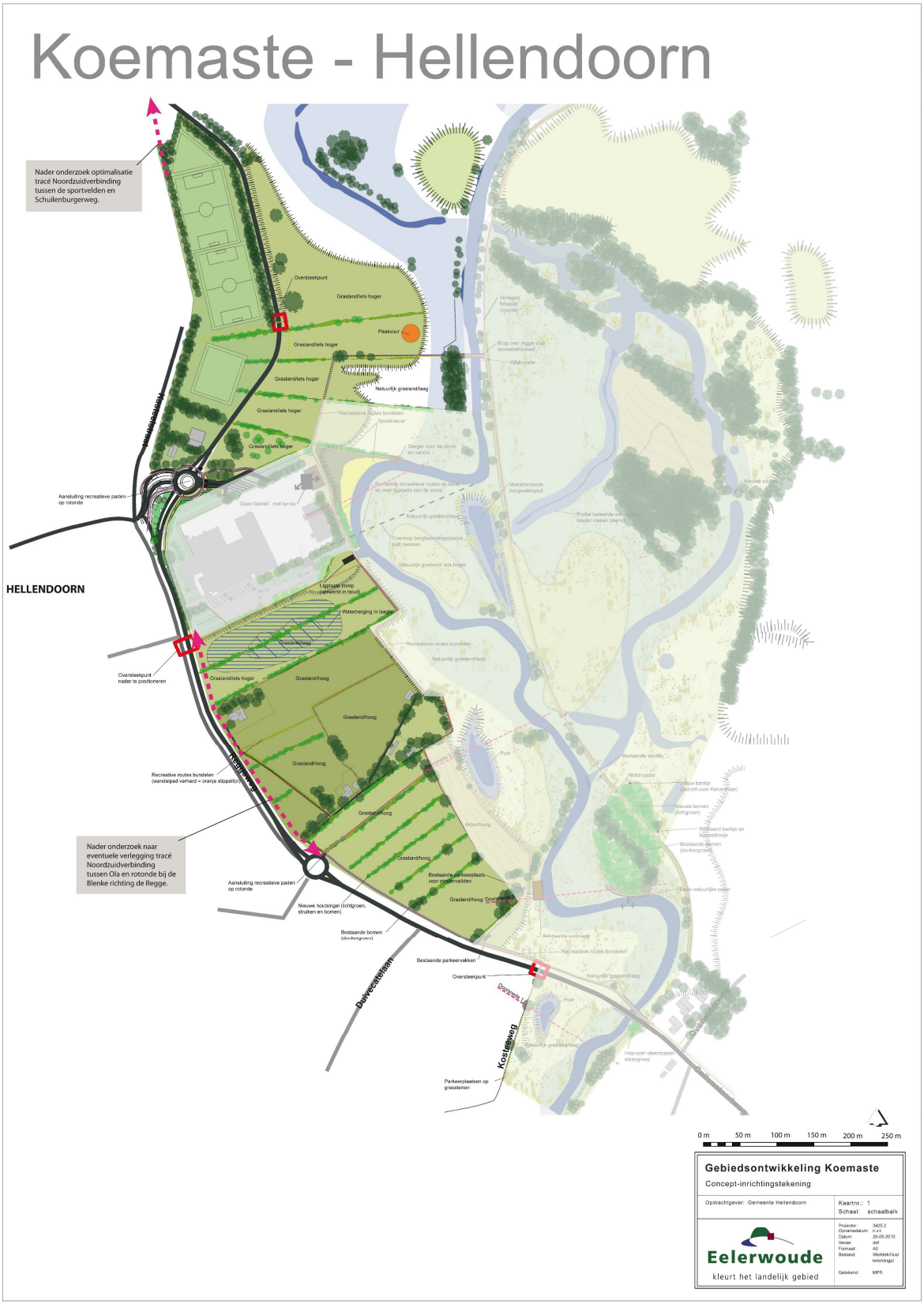
SUPPLEMENTS

APPENDIX 1: Map of the Visschebelt project Area.



APPENDIX 2: Map of the Koemaste project area



APPENDIX 3: Costs of the projects

Costs of the Koemaste project

Source: Gemeente Hellendoorn: Nota Burgemeester en Wethouders, 14 dec. 2010. ***Kredietaanvraag Gebiedsontwikkeling de Koemaste (vervolgnota).***

Grondverwerving verbonden aan onderstaande Onderdelen inclusief eventuele planschade	€	850.000
Aanpassing **sport**velden	€	1.000.000
Recreatie & natuur		
Recreatieve routestructuren zuidelijk van de Ola	€	150.000
Landschapsinrichting nabij Ola	€	150.000
Aanleg fietsbrug over Regge	€	100.000
Natuurbelevingspunten	€	50.000
Natuur en landschapsinrichting, waterinfiltratie (1,5 hectare)	€	100.000
Infrastructurele aanpassingen		
Verleggen kabels en leidingen, herstel/verplaatsing veldschuur 19+ herinrichting erf	€	450.000
Aanvullend		
Diversen zoals: ontruimingsmaatregelen, sloop, tijdelijke maatregelen sport etc.	€	50.000
Onderzoeken, procedures en vergunningen	€	100.000
Totaal	€	3.000.000

Financiële consequenties:
Het totale investeringsbedrag voor de Koemaste is samengesteld uit de gemeentelijke opbrengst uit de verkoop van Essent, te weten € 1,5 miljoen. Ditzelfde bedrag wordt ook door de provincie als een subsidie beschikbaar gesteld uit het programma Investeren in Overijssel. Zoals aangegeven is dit programma gekoppeld aan de middelen die zijn vrijgekomen bij verkoop van Essentgelden, waardoor er in totaal € 3 miljoen voor de Koemaste beschikbaar is.

Administratief is onze € 1,5 miljoen van Essent in de financieringsreserve gestort en zetten we € 1,5 miljoen uit de reserve strategische projecten in voor het project Koemaste. In de strategische projecten is geld gereserveerd voor de aanleg van de Noordzuidverbinding vanaf 2014. Voor de trajectdelen Hellendoorn en Hulsen is een bedrag geraamd van € 10,2 miljoen. Voorgesteld wordt om een deel van dit budget, te weten onze bijdrage in de Koemaste van € 1,5 miljoen, naar voren te halen waardoor er nog een bedrag van € 8,7 miljoen overblijft voor beide trajectdelen.

Costs of the Visschebelt Project

Source: *Voorstel besluit commissie watersysteem*. Waterschap Regge en Dinkel, 16 mei 2012, agendapunt 6.

		A	B	C	D	E = (D-B)
Projectnr	projectnaam	raming van kostenen inkomsten in plan van aanpak	werkelijke kosten en inkomsten	% tov plan van aanpak	versterkt krediet	verschil realisatie en verstrekt krediet
0254630	Verbetering Almelose Aa	€ 464.091	€ 322.578	70%	€ 440.000	-€ 117.422
0263170	Sanering Almelose Aa	€ 150.000	€ 116.250	78%	€ 150.000	-€ 33.750
	Opbrengsten Almelose Aa	-€ 46.600	-€ 51.600	111%	-€ 47.000	-€ 4.600
0254650	Visschebelt brug	€ 210.000	€ 207.627	99%	€ 210.000	-€ 2.373
0254651	Visschebelt WAVE	€ 1.625.000	€ 1.816.762	112%	€ 1.625.000	€ 191.762
	Opbrengsten Visschebelt	-€ 796.000	-€ 1.446.379	182%	-€ 1.398.000	-€ 48.379

APPENDIX 4: Tourism in the Municipality Hellendoorn

"The tourism sector is an important and developing sector with a lot of opportunities. The unique conditions and rich variety of nature, landscape and cultural history, makes Hellendoorn an attractive municipality for tourists, but the qualities and opportunities within the area can still be extended strongly" (Gemeente Hellendoorn, begroting 2011).

Figure 2.1: Recreation and Tourism, municipal budget 2011 (Gemeente Hellendoorn, 2011)

Kerngegevens	Werkelijk 2009	Prognose 2010	Prognose 2011
Recreatie en toerisme:			
Aantal overnachtingen in de gemeente	412.185	410.000	420.000
Aantal arbeidsplaatsen in de sector recreatie en toerisme 1)		1.225	1.225
Economische zaken:			
Aantal arbeidsplaatsen in de gemeente	13.604	13.500	13.600
Aantal bedrijven	2.038	1.900	2.040
Aantal hectare bedrijventerrein in de gemeente 2)	123	160	149

1) Inclusief overnachtingsaccommodaties, dagrecreatie en restaurants.
2) Netto hectare

Figure 2.2: Recreation and Tourism, from municipal budget 2012 (Gemeente Hellendoorn, 2012)

Kerngegevens	Werkelijk 2010	Prognose 2011	Prognose 2012
Recreatie en toerisme:			
Aantal overnachtingen in de gemeente	412.000	420.000	420.000
Aantal arbeidsplaatsen in de sector recreatie en toerisme 1)	1.159	1.225	1.225
Aantal arbeidsplaatsen in de gemeente	13.543	13.600	13.600
Aantal bedrijven		2.040	2.035
Aantal hectare bedrijventerrein in de gemeente 2)	123	149	149

1) Inclusief overnachtingsaccommodaties, dagrecreatie en restaurants.
2) Netto hectare

APPENDIX 5: Living and Housing in the Municipality Hellendoorn

(Source: Municipality Hellendoorn: *Gemeenterekening 2011.* April, 2012)

Kerngegevens	Werkelijk 2010	Prognose 2011	Werkelijk 2011	
Aantal woningen	14.128	14.328	14.278	
Totaal aantal aanvragen om omgevingsvergunning	nvt	500	575	
Aantal aanvragen binnen geldende termijnen afgehandeld	97%	100%	95%	
Aantal te bouwen woningen	126	259	66	
Aantal sloopvergunningen	63	60	95	
Kengetallen			**Norm**	**Behaald**
Aantal eindcontroles per bouwvergunningaanvraag			1	1
Aantal koopwoningen als percentage van de totale woningvoorraad			70%	76%