EMSCHER 3.0

From grey to blue

Or, how the blue sky over the Ruhr region fell into the Emscher

The river Emscher is – similar to the river Ruhr – the symbol of one of the internationally most renowned industrial regions: the Ruhr area with its 5 million inhabitants and an important location of key industries such as steel, chemical and materials industry. The revitalisation of the Emscher over the last 20 years marks a new phase in the region`s history and is an impressive example of ecological and socio-economic transformation affecting all aspects of life along the river. What can we learn from the Emscher conversion for upcoming tasks in other infrastructure fields?

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VERLAG
KETTLER

EMSCHER 3.0

From grey to blue

Or, how the blue sky over the Ruhr region fell into the Emscher

Greeting from The State Premier North Rhine-Westphalia

Dear reader,

As a child of the Ruhr region, the Emscher is a part of home for me. The river impressively reflects the region's development. At the height of industrialisation, the surrounding industries and households used it as a reliable wastewater drain. From the early 19th century, rapid industrialisation and dynamic population growth severely damaged the Emscher's natural ecosystem, turning an idyllic river into an open wastewater canal. That was the price the Ruhr area paid for becoming the industrial heart of Germany and of Europe. But we learnt from this mistake. Dealing with the negative consequences of the former exploitation of the Emscher has made it possible to develop it into the 'new Emscher', making the region more attractive and drawing innovative and modern companies to it. Chimneys and pits no longer shape the face of the Emscher region; instead, creative ideas enterprises and service centres are increasingly relocating to this centre of excellent scientific research and innovative services. That is typical of the Ruhr region, which is still a favoured location for many world-ranking industrial enterprises. All this belongs together, and that's the way it should stay.

Just as this former coal-mining region has been transformed into a modern metropolitan area, the river's function and role have also changed. The vision of the 'blue Emscher in the green Emscher Valley' is becoming reality, step by step. Once a vital lifeline for industry in the Ruhr area, the river has now become a symbol and an element of structural change, helping to make the region a valuable living space in which quality of life has noticeably improved in recent years.

This success story has a long prior history. With its 'Emscher Future' Master Plan, the *Emschergenossenschaft* has tackled the revitalisation of the Emscher with creativity and power. The plan is a real 'labour of Hercules', involving as it does renaturation of the landscape and modernisation of the wastewater system. Over two billion Euros have been invested so far in modern canal infrastructure to eliminate wastewater from the river. By 2020, this sum will have doubled. The government of North Rhine-Westphalia is supporting this process to the best of its ability, investing no less than 400 million Euros.

The *Emscher Future* Master Plan is not just financially ambitious. Its goals include taking people along with it on the way to a 'blue Emscher'. It's not easy to turn concerned persons into active participants, but it is the right and necessary way and it is the task of politics, business and industry to help make it happen. It also involves lots of persuasion, which often means raising awareness of the wider issues. Not everyone is aware that wastewater systems and power grids are not only an indispensable basis for economic infrastructure, but a prerequisite for all our everyday comforts. The services we take for granted depend on complex technical systems, whose maintenance and continuing development will continue to pose major technological, material, personal and financial challenges in future.

The *Emschergenossenschaft* has repeatedly proven in the past that it is well able to cope with these challenges and the cooperative model has more than proven its worth. In an era of global crisis, its basic idea of linking economic and social goals is now more current and attractive than ever. No wonder then, that the United Nations declared 2012 the 'International Year of Cooperatives'. Cooperatives have repeatedly proven themselves to be among the most stable pillars of our social market economy and I am sure they will continue to play a major role in shaping central infrastructure projects and in the transition to alternative energies in future.

The Emscher conversion is a very good example of this. All along the Emscher, communities and companies are working together to transform their region, combining excellent technical know-how with high levels of regional identification and solidarity. This is the only way to successfully implement infrastructure projects, as this book clearly demonstrates.

I hope you enjoy reading it!

Hannelore Kraft
The State Premier North Rhine-Westphalia

Emscher 3.0 – on the way to ‘blue infrastructures’

Introduction

The Emscher — a river coursing through time in a region that has been in a constant, turbulent flow of change for decades. The history of this aquatic landscape reflects the history of its region as almost no other natural area in Germany does. At the height of industrialisation, the Emscher's original state was irreversibly altered. Many stretches of this once winding river became a heavily polluted concrete wastewater drain. The Emscher was an element of the regional, industrial infrastructure. Many industrial relics of the smoky old Ruhr area now lie idle. Instead of smoking chimneys, green landscapes predominate in many places. The Ruhr area is still Germany's industrial centre, but the most energy intensive production has now largely been outsourced to other parts of the world. This economic change has led to a new perception of nature. The Emscher is no longer regarded as just an instrument of industrial production, but is seen as a valuable living space that can contribute to upgrading the region and enhancing its quality of life.

This new perception has inspired the first comprehensive measures to ecologically revitalise the Emscher. The Emscher's original condition — *Emscher 1.0* — was lost forever in decades during which massive damage had been done to its ecosystem. The surface wastewater canal Emscher — *Emscher 2.0* — is now again becoming an ecologically valuable living space in the region — *Emscher 3.0*.

Revitalising the Emscher as a free space for the region's people has taken a huge effort. Beginning work in the 1990s, the *Emschergenossenschaft* (Emscher Cooperative) has been implementing a comprehensive Master Plan for this process since 2006. It firmly anchors the Emscher conversion as an essentially wastewater and water management infrastructure project linked with major structural-political impetus for the region, which will result in considerable economic, ecological and social progress. The *Emscher Future* Master Plan communicates the opportunities inherent in this project and the ways the people and authorities in the region can benefit from them. It is a collaborative project that seeks to involve people in the process and attract them to it. Residents' ideas and proposals are just as valuable as the expertise of the engineers bringing technical innovation to revitalising the Emscher.

This book describes how these various skills and ideas have been united in the process of the Emscher conversion and what experience has been gained along the way. The extent to which the Emscher conversion can serve as a good example of the sustainable development of a key industrial region and as a blueprint for other essential infrastructure modernisation is shown in detail. Comprehensive infrastructure upgrades will be necessary in coming decades, and not only in the Ruhr area. Significant examples include: the decentralised provision of renewable energy; the conversion of buildings to make them energy-efficient; the modernisation of traffic systems to create sustainable and flexible mobility concepts; and the adapting of industrial infrastructure to ongoing economic structural changes.

The Emscher conversion makes it clear that infrastructure is embedded in a complex system of ecological, social and economic needs and perspectives that must all be interlinked and taken into account. This view of infrastructure is directly linked with the idea of a *'blue economy'*, a concept involving protecting the Earth's ecosystems while at the same time creating jobs.[1] Given the diverse challenges, there is a great need for good examples of sustainable and collaborative infrastructure restructuring. The many public protests against large-scale infrastructure projects in recent years are further proof of this necessity, to which this book responds by contributing to a wider vision of sustainable infrastructure. In this context, the final chapter develops this vision of *'blue infrastructures'* in detail.

1 cf. Brüggemeier, Franz-Josef; Scheck, Hanna; Schepelmann, Philipp; Schneidewind, Uwe: 'Vom blauen Himmel zur Blue Economy: Elemente einer nachhaltigen Strukturpolitik für Nordrhein-Westfalen'. In, WISO direkt – Analysen und Konzepte zur Wirtschafts- und Sozialpolitik. June 2012. http://library.fes.de/pdf-files/wiso/09172.pdf (22.12.12). Pauli, Gunter A.: The Blue Economy. 10 Jahre. 100 Innovationen. 100 Millionen Jobs. Berlin 2012.

Who is this book for?

The revitalised Emscher is designed to create a new space for innovative enterprises, sustainable lifestyles and cultural development beyond the boundaries of political and administrative departments and economic sectors. The target group of this book is therefore a broad one: people who live in the Emscher Valley, who make political or business decisions, and whose interests are affected by the revitalising of the Emscher.

Decision makers in politics and administration in the Emscher region. This means the authorities usually involved in infrastructure projects, such as those in the areas of planning, business and industry, construction and the environment. Ways in which innovative planning and management models can contribute to the success of infrastructure projects will be described. There are also clear links with the policy areas of education, social affairs and culture, due to the Emscher conversion's noticeable effect on the population's quality of life and its significance in the region's history.

Regional business and industry stakeholders. The modernisation of wastewater infrastructure along the Emscher is helping to stimulate investment and advance innovation in the region. The Emscher conversion is therefore making a major contribution to increasing the Emscher Valley's attractiveness as a location for commercial and services companies.

Civil society. This includes the population of the Emscher region and of the rest of the Ruhr area, citizens' initiatives and other social groups. The book describes the many ways that civil society can be involved in and profit from a major infrastructure project like the Emscher conversion. People who know the region can make a major contribution to the success of such infrastructure projects. The people along the Emscher are not only being affected by its conversion, they are shaping it.

The various dimensions of the Emscher conversion

A collaborative project like the Emscher conversion has many and varied dimensions. The book describes them from various points of view, making it clear that an ambitious infrastructure project requires broad commitment and a range of different talents and areas of knowledge. This book outlines the Emscher conversion's many dimensions in individual chapters.

Technology and nature factored in together

In the past, the Emscher was systematically used as a wastewater canal; it was a 'natural' element of regional wastewater infrastructure. The Emscher's ecological condition deteriorated as a result. It was Germany's dirtiest river for decades. The Emscher conversion's guiding principle is to recreate the preconditions for natural development and meet the demands made on the riverbanks as a recreation area. New technical infrastructure in the form of underground wastewater canals is putting an end to the discharge of wastewater into the Emscher. Only when this has been achieved can the Emscher be ecologically upgraded. Taking the Emscher conversion as an example, the chapter titled 'Technology and nature factored in together'→ P.30, investigates the interaction between the modernisation of technical and *natural* infrastructure and depicts the charismatic power that the upgrading of ecosystems can have for a region.

Knowledge strengthens the region

Modernising central infrastructure is a major step on the way to establishing a resilient region. The word 'resilience' in this context refers to a region's ability to withstand and learn from economic, ecological and social crises. To achieve this state, technical and planning expertise from infrastructure projects must be combined

Something is being done here – building work on the Kleine Emscher in Duisburg near the Warburgstrasse Bridge

with knowledge from other economic and social areas. This requires innovative, often informal planning and management instruments that can overcome specialist and territorial boundaries. The *Emschergenossenschaft's Emscher Future* Master Plan is an important example of this. The chapter titled 'Knowledge strengthens the region' → P.66 describes the reasons why the networking of stakeholders and knowledge is so important to the Emscher conversion, as well as which instruments and processes are being and have been used to achieve it.

Innovation as an impetus for the region

The public often barely notices the renewal of fundamental infrastructure, such as wastewater systems, yet such technical innovation is vitally important to individuals' quality of life. The revitalisation of the Emscher and discharge of wastewater into underground canals frees up new spaces for innovation above ground, making the Emscher region more attractive to more people. Ecological, social and institutional innovation will be needed to develop these new spaces. This results in an initiation of dialogue and learning processes and the development of cultural and participatory projects that make use of many people's expertise for the region and ensure broad support for the conversion process. The Emscher conversion is based on a broad, multifaceted understanding of innovation. The chapter titled 'Innovation as an impetus for the region' → P.98 explains how this understanding can pave the way for a new regional culture of innovation.

Infrastructure conversion as an opportunity for improved improved quality of life

On many occasions — on a bike trip to work or on a walk with the dog — people are experiencing the swiftly improving state of the Emscher every day. The benefits resulting from the Emscher conversion, such as the channelling of wastewater into underground canals, are noticeably enhancing their quality of life. But what makes a region liveable and loveable? The chapter titled 'Infrastructure renewal as an opportunity for improved quality of life' → P.124 examines the term 'quality of life', investigating what specifically constitutes 'quality of life' in the Emscher region. To what extent has the Emscher conversion resulted in improvements in this area? Areas in which the process has shown only limited results so far will also not be glossed over.

Infrastructure conversion creates common goods

The modernisation of wastewater infrastructure and associated revitalisation of the Emscher are making the river a valuable space for leisure and relaxation in the region. People can now again experience the Emscher, which was once inaccessible to the public. This development is closely linked with the concept of 'common goods', the issue of who a resource belongs to and who can use it. Should it be a few, some people or the wider society? Creating common goods is an important element of the Emscher conversion. Countless projects and initiatives are making the Emscher system's transformation comprehensible to the population. They are also contributing to raising the profile of the Emscher Valley and making it a popular public space. Among the examples of such projects are community gardens, new leisure and recreation areas, bike paths along the Emscher and ambitious art projects. The connections between revitalising natural spaces, modernising technical infrastructure and creating common goods are revealed in this chapter → P.146 and many examples are presented.

Developing the future together. Changes to society by participation

Whether it's Stuttgart 21 or the expansion of the power grid, which will be urgently necessary for the transition to alternative energies,

it has repeatedly been shown recently that a lack of social acceptance can considerably hamper the implementation of ambitious infrastructure projects. People are increasingly fighting back against decisions that impact their immediate living environment being made 'over their heads'. This makes it more essential than ever to take people's opinions and suggestions seriously and take them into account in infrastructure projects, which will require new kinds of exchanges between populations and project planners. The Emscher conversion is a complex infrastructure project with long planning and construction phases. The chapter titled 'Developing the future together: Changes to society by participation → P.164 describes the ways in which the population has been included in the Emscher conversion and what the possibilities for ongoing participation are.

Emscher 3.0 as an impetus for `blue infrastructure` models

To what extent do the dimensions of the Emscher conversion as described deliver findings that could be valuable for other infrastructure projects in the Ruhr Valley urban area? What 'charismatic power' can the Emscher conversion give to the region as a whole? These questions are dealt with in the book's concluding chapter → P.188, which describes the dimensions, technical and non-technical, that are essential to the success of infrastructure projects. We will face similar challenges when it comes to the transition to alternative energies, creating a flexible traffic system and more efficiently using valuable resources. This chapter also summarises the experiences gained in the Emscher conversion, which have been described in preceding chapters, outlining individual theses. In this way, a new and comprehensive 'blue infrastructure' model will be developed that combines economic, ecological and social perspectives and demands.

From the neglected back yard to the showpiece front garden of a former mining area — the river changes with the region

Only those who know the Emscher's history can really understand the Emscher conversion and its challenges. It can be roughly divided into three phases: the 'original phase', the Emscher's natural state *(Emscher 1.0);* the industrialisation phase, in which the Emscher was used as a wastewater drain for local industry and households (*Emscher 2.0*); and the phase of ecological revitalisation, in which a diverse range of efforts have been and are being made to again make the river a valuable ecological free space in the region (*Emscher 3.0*). Within these three phases, further stages of transformation can be identified, which are described in detail below.

Emscher 1.0 — from the original phase until the mid-19th century

The Emscher originally meandered through a sparsely populated region, rising at its source in Holzwickede and snaking down to the Rhine through 109 kilometres of the region now known as the Ruhr area. Back then, the Ruhr region looked very different to the way it would come to look during and after industrialisation. Small villages and farms shaped the landscape. Even then though, the Emscher was regarded as an 'unpredictable' river because of its slight drop and winding course.[2] It frequently changed course and often flooded.

2 cf. Reicher, Christa; Kunzmann, Klaus R.; Polivka, Jan; Roost, Frank; Utku, Yasemin; Wegener, Michael (eds.): Schichten einer Region. Kartenstücke zur räumlichen Struktur des Ruhrgebiets, (Layers of a region) Berlin 2011, p.138.
Peters, Ralf: 100 Jahre Wasserwirtschaft im Revier: die Emschergenossenschaft 1899—1999. Bottrop 1999, p.8.

The old Emscher in the Landscape Park Duisburg Nord — new landscape on old industrial sites

Emscher 2.0 — A river as an instrument of industrialisation

Settlement and industrialisation phase — 1850 to 1906 From the 1870s, industrialisation also resulted in massive population growth in the region. The Emscher Valley's inhabitants became the witnesses to a gradual but profound transformation. In the catchment area along the Emscher between Dinslaken and Castrop-Rauxel, the number of inhabitants grew six fold between 1871 and 1905, from 90,000 to 590,000. Underground coal mining expanded and had a visible impact on the Emscher river system. Mine subsidence resulted in increasingly severe floods and more and more industrial wastewater and sewage from the population was discharged into the Emscher. The Emscher's once clear water became increasingly murky and the groundwater progressively more polluted. The result, especially during floods, was an increased risk of epidemics (malaria, typhoid, diphtheria, cholera etc.) in the whole Emscher area. This pollution also largely destroyed the Emscher ecosystem. By the end of the 19th century, the Emscher had become notorious as a 'water management disaster area' or 'cloaca maxima'.[3]

First hygienic conversion phase — 1906 to 1949 Hygienic conditions along the Emscher became increasingly untenable. Individual communities and industrial enterprises were overwhelmed by the resulting problems and it became clear that they would have to join forces to deal with them. On the 14th of December 1899, mining companies, industry and nearby cities and communities came together to form the *Emschergenossenschaft*. The founders had a shared goal, namely to ensure a hygienic discharge of wastewater from industry and the population into the Emscher. Large-scale mine subsidence at the time made it impossible to channel wastewater underground in the Emscher area. For this reason, the *Emschergenossenschaft* decided to channel the wastewater into an open, paved canal. From 1906 to 1920, the *Emschergenossenschaft* carried out a fundamental conversion of the Emscher system.

3 Peters 1999 (see Note.2), p.32 and 105.

The Emscher was straightened, made up to 3 metres deeper and lined with concrete. The once naturally meandering Emscher was forced into a 'concrete corset' and its many tributaries were altered in a similar way. Because mine subsidence repeatedly caused the river and the area around it to sink to ever greater depths, the Emscher's estuary had to be moved to the north twice (in 1920 and 1949) to keep it flowing into the Rhine. New dykes were also built to counteract mine subsidence and protect the region from flooding. This meant, however, that water in these tributaries had to be pumped up into the Emscher in many areas.

Modernisation phase 1950 to 1982

At the end of the 1950s, the heyday of coal mining in the Emscher region was gradually ending. Less and less coal was being brought up out of pits, so less and less wastewater from mining was being discharged into the canalized Emscher. Strong population growth in the region during this period, however, resulted in a considerable increase in amounts of domestic wastewater. In 1977, the *Emschergenossenschaft* started operating what was at the time Europe's biggest sewage treatment plant at the Emscher estuary in Dinslaken. The goal was not to contaminate the waters of the Rhine with inflows from the still very polluted Emscher. At the same time, there were repeated incidences of mine subsidence, increasing the areas that are still today and will in future have to be drained by pumping stations. The number of pumping stations grew from 40 to 92 between 1949 and 1985 and the pumps' output increased fivefold in that period, to 474,000 litres per second.[4]

4 Peters 1999 (see Note.2), p.197.

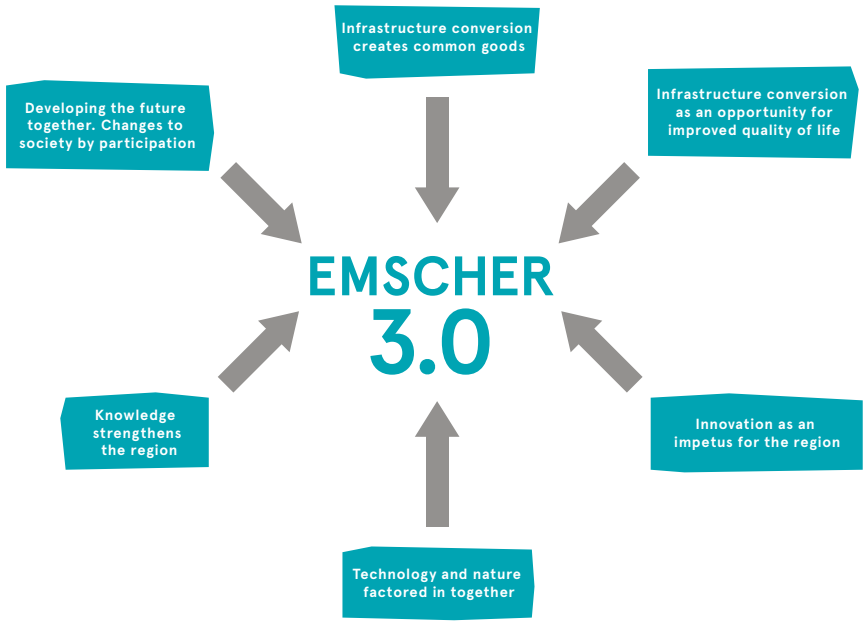
Emscher 3.0 — revitalising the Emscher

Phase of testing and studies on converting the Emscher system — 1981 to 1990 By 1974, many mines in the Emscher area had closed, so there were fewer mine subsidences. This also reduced the risks involved in channelling wastewater underground. At the same time, the population was becoming increasingly aware of environmental problems. Growing numbers of people in the Emscher Valley were concerned by the constant smell and the sight of open canals and felt that it was adversely affecting their quality of life. In 1981, the *Emschergenossenschaft* started its first renaturation project in the Emscher area. Polluted water that had been flowing into the Dellwiger Bach creek in Dortmund was rerouted into underground pipes. The creek's 'concrete corset' was removed and it was then fed by spring water and rainwater. Nature quickly reclaimed the cleaner waterway. This pilot project provided both a good example and encouragement to try other such schemes.

Second 'ecological' conversion phase — 1991 until today After initial hesitation and some small further conversion measures, the *Emschergenossenschaft* decided in 1991 to convert the entire Emscher system, channelling wastewater into underground canals. The Emscher conversion was to become a formative element of structural change in the region. The plan was to turn the Emscher, which until then had been an instrument and symbol of industrialisation and evidence of its impact, 'from the neglected back yard to the showpiece front garden' of this former coalmining area.

This ambitious plan was not going to succeed from one day to the next. Revitalising the Emscher is a task that will take generations. It is also much more than a massive technical project — it aims to transform many other areas of life and the economic activities of citizens in the Ruhr area and upgrade the region as a whole.

The most important — technical — part of this fundamental conversion is the construction or modernisation of four sewage treatment plants, which are now all operating (at Dortmund-Deusen, Bottrop, the Emscher estuary and Duisburg — Alte Emscher). 421 kilometres of underground wastewater canals will be built along the Emscher and its tributaries to carry wastewater from more than 2.2 million people as well as from business and industry. The project will involve a great deal of technical and financial effort and cost. It will cost a total of 4.5 billion Euros and is scheduled for completion by the end of 2020, by which time the bodies of water will have been ecologically upgraded.



This new technical infrastructure and the underground channelling of wastewater will allow a natural infrastructure to return along the Emscher's entire catchment area. The watercourses will be allowed to develop as naturally as possible along a 326-kilometre-stretch which is roughly the distance from Duisburg to the French city of Strasbourg.

The Emscher's ecological conversion will considerably improve quality of life in the cities along the river. The former *Köttelbecke* (a local term for an open sewer), in which mainly stinking wastewater has flowed for the past hundred and fifty years, will be transformed into a self-contained local recreation area with walkways, bike paths and public green spaces that will attract both people in the region and tourists. The revitalising of the Emscher will be accompanied by new cultural life along the river. In recent years, the *Emschergenossenschaft* has initiated many cultural projects in the Emscher Valley, many of which became part of the RUHR.2010 European Capital of Culture project and have been continued.

The ecological and cultural revival of the Emscher as a main water artery of the Ruhr area is also making a major contribution to a creative and sustainable management of structural change in the region. The New Emscher Valley is helping to economically upgrade the entire Ruhr area, which in recent years has become an attractive location for people and companies.

The vision of a New Emscher Valley involves much more than new and modern wastewater infrastructure. It requires an integrated vision of various political issues and innovative planning and organisation processes. It demands cooperation between many creative minds and a bundling of new ideas.

Technology and nature factored in together

When we talk about infrastructure, we usually mean technical infrastructure — roads, power lines, communications networks — or social infrastructure such as hospitals and schools. Large quantities of resources have been required to build up and maintain the dense, comprehensive network of canals, rainwater basins, pumping stations, and wastewater treatment plants that has grown to collect, discharge and treat our wastewater. Most of this extensive infrastructure network is hidden undergound.[1]

But not in the Emscher zone: here wastewater infrastructure is still a formative element of the landscape — you can see and smell the transport of wastewater. Yet the detriment to the location that open wastewater courses allegedly represent also harbour an opportunity. While creeks and streams were banished underground in other cities as part of what was at the time modern urban development and have since been returned to the surface at great cost and effort in renaturation measures in the past two decades, the Emscher system has always been the region's 'green backbone'.[2]

Only the modernisation of wastewater infrastructure in the context of increasing mine subsidence provided the opportunity to start revitalising surface bodies of water. New underground wastewater canals along the Emscher and its tributaries are giving the landscape back to people, animals and plants above ground. A gradual, collaborative expansion of technical and natural infrastructure is creating new, contiguous 'natural infrastructure'

1 Surveys by the Wuppertal Institute have shown that around 1.1 bill. tons of building materials have accumulated in wastewater infrastructure in Germany. cf. Bringezu, Stefan; Fekkak, Miriam; Steger, Sören: Materialbestand und Materialflüsse in Infrastrukturen: Endbericht des Arbeitspakets 2.3 des Projekts `Materialeffizienz und Ressourcenschonung´ (MaRess). Wuppertal, 2011.

2 cf. Kramer, Peter J.: Offenlegung von Stadtbächen weltweit. 2012. http://peter-juergen-kramer.de/de/gewaesserschutz-darmstadt/geschichtlicherhintergrund/offenlegung-von-stadtbaechen-weltweit.html (22.12.12). cf. Reicher, Christa; Kunzmann, Klaus R.; Polivka, Jan; Roost, Frank; Utku, Yasemin; Wegener, Michael (ed.): Schichten einer Region. Kartenstücke zur räumlichen Struktur des Ruhrgebiets. Berlin, 2011.

The return of nature?

The declared goal of renaturing the Emscher and its tributaries is to give people along the Emscher nature and free space right 'on their doorstep', and with it all the advantages that nature in the city can bring.

But what does 'nature' really mean in an industrialised and densely populated region like the Ruhr area, for which the term 'industrial cultural landscape' may well have been coined. Bodies of water, soil and flora and fauna here have been subordinated to the demands of industry for the past hundred and fifty years, and this has changed them in ways that often seem irreversible. The old Emscher, a severely polluted and concreted watercourse, became a notorious symbol of this kind of development, referred to locally as a *Köttelbecke* (a local term for an open sewer).[3]

Yet in the past twenty years, partly as a result of both structural change and the International Building Exhibition (IBA) Emscher Park, much has been achieved. The Ruhr area has become much greener. New features, such as the Emscher Landscape Park, greened former slagheaps and bike paths on old railway lines prove that urban and regional development and planning in the Ruhr area is increasingly centred on nature. The ways in which nature is reclaiming its place on old industrial wastelands are here for all to see, becoming 'industrial nature'. Nature is the central actor here, not engineering humans. The concurrence of decay and new life in nature has a special fascination for us. The Ruhr area's supposed weakness as a shrinking post-industrial region becomes its strength.

There has also been a change in the perception of nature in the city and its importance, which is becoming clear in cities' growing role as islands of biodiversity,[4] and new global movements such as Urban Gardening, which have also gained a foothold in the Ruhr area (e.g. *www.dortmunder-oase.de, www.natur-festival.de*).

3 cf. Frank, Susanne: Rückkehr der Natur. Die Neuerfindung von Natur und Landschaft in der Emscherzone. 2010. www.emscherplayer.de/main.yum?mainAction=magazin&id=49786 (09.01.13). cf. Reicher u. a. 2011 (see Note 2).

Nature returns to the Ruhr area –
wasteland at Phoenix West, Dortmund

It could be said that the Emscher conversion is happening at precisely the right time, emphasising the importance of nature in urban areas and at the same time acquiring a special legitimation due to changes in public perceptions.[5] Here in the Ruhr area particularly, with its specific industrial and settlement history, the terms 'nature-based waterways engineering' and 'return of nature' take on a new, innovative meaning.

What kind of nature are we willing and able to strive for?

The Emscher's natural hydro-geological condition was that of a sand and clay-dominated, widely ramified lowland river, which, with its tributaries, snaked through a sparsely populated marsh landscape without any appreciable drop. Its low flow velocity and the high level of the region's water table often caused the river to flood and change course. The Emscher area was traditionally a region of unfavourable living and working conditions, with swampy areas and catastrophic hygienic conditions. In the early 20th century, there were several malaria and typhoid epidemics in which hundreds of people died.

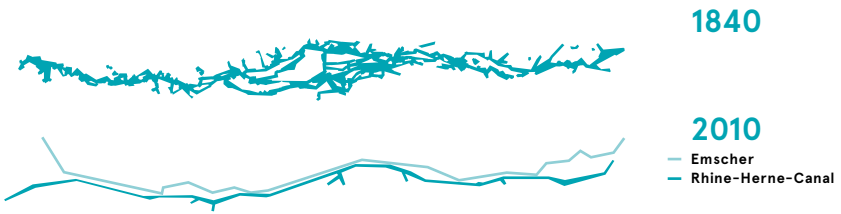
4 cf. Werner, Peter; Zahner, Rudolf: Biologische Vielfalt und Städte. Eine Übersicht und Bibliographie. BfN-Skripten 245. Bonn 2009. Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU): Nationale Strategie zur biologischen Vielfalt. Berlin, 2007.

5 cf. Uekötter, Frank: `Strukturwandel des Ökologischen. Die Emscher als post-ökologischer Fluss`. In: Goodbody, Axel; Wanning, Berbeli (Hg.): Wasser – Kultur – Ökologie. Beiträge zum Wandel im Umgang mit dem Wasser und zu seiner literarischen Imagination. Göttingen 2008, pp.125–146.

A hundred and fifty years of industrialisation and population growth have changed the face of the Emscher forever. To channel the swiftly growing quantities of wastewater from mining, industry and households as quickly as possible out of the Emscher region, the Emscher and its tributaries were dyked, straightened and lined with concrete. Originally, the Emscher was 109 kilometres long from its source to its estuary. River regulation has reduced its length to 80 kilometres. Large-scale mine subsidence has turned a third of the Emscher area into a polder landscape. Over a hundred pumping stations will have to pump the water out of these sunken areas forever, if the Emscher region is not to become a massive lake district. Creeks and streams also have to be deepened so that their waters can keep flowing, or they have been artificially raised and dyked upstream to protect the now lower-lying surrounding areas from floods.

In the middle of Europe's biggest conurbation, the Emscher system is a river basin that has been heavily influenced by human intervention. Its hydromorphology and hydrological cycle have been irreversibly impaired. The Emscher's old appearance, with flats up to 8 kilometres wide — the so-called Emscherbruch (Emscher marshes) — can no longer be reconstructed.

The Emscher then and now



Source: Reicher, Christa et al. (eds) *Layers of a region (Schichten einer Region. Kartenstücke zur räumlichen Struktur des Ruhrgebiets).* Berlin, 2011, based on geo — referenced data from the Emscher Future Master Plan.

A river without room

Renaturation of the Emscher and its tributaries can therefore not be about restoring its original natural condition. The landscape of past centuries cannot be recreated under today's conditions; apart from anything else, there's no room any more. Instead, these watercourses will have to exist as urban waterways in this changed environment. Industry and housing have spread out, onto the very banks of the Emscher in some areas. This is a major challenge for the ecological development of the waterways.

People will continue to make a diverse range of demands on the Emscher in future. The interests of nature conservation, flood protection and local recreation will not always be able to be accommodated without conflict. Sustainable changes to bodies of water that are compatible with all these uses must be made.

'The beauty of the Emscher can only be communicated if it is in fact beautiful and people can experience it. It seems essential to me that creeks and streams in our urban landscape are recognisable and usable as such. Nature must not everywhere be allowed to develop just as it likes [...].'

Prof. Dr. Christoph Zöpel independent journalist, honorary professor at Dortmund University, Minister of State (retired). Cited from, Deutsche Akademie für Städtebau und Landesplanung (DASL), Landesgruppe NRW; Emschergenossenschaft (ed.): Werkstatt Neues Emschertal. Weiterentwicklung des Masterplans Emscher — Zukunft. Dokumentation. Essen 2010, p.14.

Many watercourses can however still be developed into ecologically valuable areas and networked with each other. The *Emschergenossenschaft* plans to transform the Emscher into a contiguous aquatic habitat and a connected biotope of great significance for the region.

The goal is to create a 'blue Emscher', a functioning aquatic ecosystem with typical structures and vegetation. A river that was lost for more than a hundred years is coming back in a new guise.

An excursus on the EU Water Framework Directive. Why we cannot achieve 'good status' but still have 'good ecological potential'

The Water Framework Directive requires all EU member states to attain a 'good status' in terms of their groundwater, surface water and aquatic biological communities by 2015, or by 2027 at the latest. The goals for surface waters are 'good ecological status' and 'good chemical status'. Water status is assessed by comparing the body of water's state with a set of reference conditions characteristic of unimpaired or only slightly impaired waterways.

The Water Framework Directive acknowledges that special development goals must apply to substantially changed bodies of water. 80 percent of Germany's waterways will not achieve good ecological status by 2015, mainly due to hydromorphological impairment.

cf. Umweltbundesamt et. al. (pub.): Neue Strategien zur Renaturierung von Fließgewässern. (New strategies for renaturing waterways) Results of a workshop held in Frankfurt on March 15th and 16th, 2012. http://workshop2012.fliessgewaesserrenaturierung.de (21.12.12).

All the Emscher area's waterways are classified as substantially changed, apart from the upper reaches of the Hörder Bach, Schondelle, Deininghauser Bach, Ostbach, Dorneburger Mühlenbach and Handbach. They are regarded as having 'good ecological potential', so they are in a lower class that allows for greater impairment of the waterway. cf. *Emschergenossenschaft* (pub.): Flussgebietsplan Emscher. Essen, 2009.

How are nature and technology both factored into the Emscher conversion?

Turning the Emscher from an artificial, polluted waterway into a largely natural waterway requires countless technical and water management measures. The Emscher's whole drainage system must be completely restructured.

The technical basis of the New Emscher

Developing the Emscher Valley is essentially a water management project. The decentralisation of wastewater treatment in the early 1990s created the preconditions for the Emscher conversion. Four state-of-the-art, large-scale biological wastewater treatment plants have been treating the region's domestic and industrial wastewater since 2001. The focus is now on work underground, with underground wastewater canals being built along the waterways. Of the 421 kilometres of wastewater canal planned, 225 kilometres, including rainwater treatment plants, have now been completed. This technical infrastructure is the prerequisite for improving the ecology of the waterways.

The project's technical 'heart' is the Emscher wastewater canal between Dortmund and Dinslaken. An underground canal will transport wastewater from the Emscher region to the Bottrop and Dinslaken treatment plants. The new canal is over 51 kilometres long, at depths of up to 40 metres underground and is made up of 350,000 reinforced concrete pipes. To maintain the drop down to the Rhine, powerful pumping stations were built at several transition points. This means that no more wastewater will be discharged into the Emscher in future; it will be fed only by clean groundwater and rainwater. Only once the Emscher canal is built will the Emscher become 'blue' again.

New infrastructure in the Emscher region —
wastewater canal at the Kleine Emscher in Duisburg

`Public perception may focus on the aspect of renaturation, but 80 percent of the Emscher conversion is about modernising technical wastewater infrastructure.´

Dr. Jochen Stemplewski Chairman of the Emschergenossenschaft Board of Management. Cited from, www.emscherplayer.de/playMedia.yum?mediaID=44596 (10.01.12).

Not much will be seen of these technical facilities subsequently, they will mainly disappear under ground, but they will provide the basic preconditions for a 'blue Emscher'. Technology is an essential prerequisite for nature's return along the Emscher.

Waterflow management

In past decades, the Emscher was used mainly to quickly and completely drain all the area's wastewater. This caused extreme fluctuations in the amounts of water discharged, which the river's narrow channel and straight course exacerbated. After a downpour, up to 350 cubic metres of water a second would flow through the Emscher. During dry periods in contrast, just 11 cubic metres of water a second would trickle through this polluted waterway.

If the Emscher is to fulfil its ecological functions in future, outflows from converted watercourses must be allowed to develop more naturally. Only if high water flows are reduced and low water flows increased will plants and animals be able to settle in their new living space. At the same time, reliable flood protection must be ensured.

One of four large-scale modern wastewater treatment plants on the Emscher – digester tanks at the Emschermündung wastewater treatment plant at Dinslaken

Balancing the quantities of water in converted waterways is therefore a key requirement towards which all flood protection, rainwater and groundwater management measures must be oriented and on which all water management authorities must work together.

To increase low water flows, the *Emschergenossenschaft* is seeking to increase groundwater recharging in the river's entire catchment area. One way of supporting this is with natural, decentralised rainwater management measures. Instead of quickly and completely draining rainwater out of the catchment area through mixed wastewater canals, it should be filtered on site as far as possible so that it can replenish ecologically adequate low water flows in waterways and support greater groundwater recharge.

Natural rainwater management also has other advantages. Channelling less rain through canals reduces the effort and costs of complex conventional rainwater infrastructure and actively contributes to flood protection. Visibly flowing rainwater also enhances urban landscapes and improves urban microclimates.

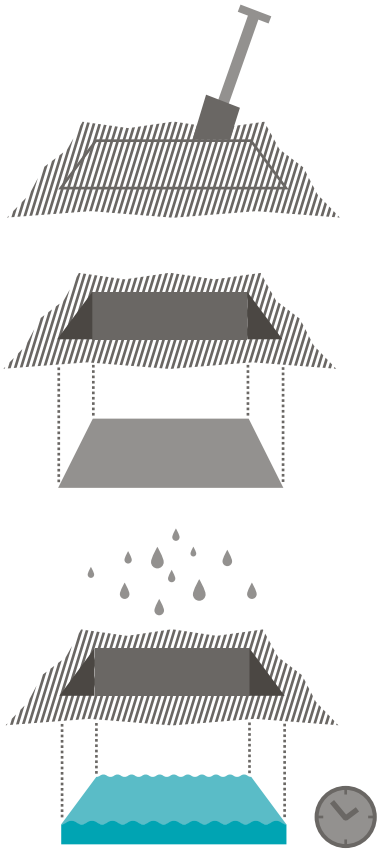
Flood protection will however continue to be the top priority along the Emscher in future. Pumping stations, dykes and flood retention basins remain essential in the Emscher area due to the irreversible topographical change caused by mining. A series of decentralised measures will be carried out in parallel to reduce high water flows. Watercourse widening, flood protection, water retention measures such as wetlands, and rainwater management measures for tributaries should reduce flooding along the Emscher by up to 20 percent. All flood protection measures will be actively and centrally managed to avoid overburdening from flood waves from the Emscher and its tributaries.

Only a total package of largely hidden technical and water management measures will create the preconditions for ecological waterways development. Technical and natural infrastructure in the Emscher region will always be interconnected and technical 'support' for the natural hydrological cycle will be necessary here in the long term because of the subsidence caused by mining.

Sustainable rainwater management

Establishing natural rainwater management is a major component of the Emscher conversion's success. With the 'Future Convention for Stormwater' [Zukunftsvereinbarung Regenwasser], all the cities in the Emscher region, the Ministry for the Environment and the *Emschergenossenschaft* have set themselves the goal of reducing inflows of rainwater and clean water into the general drains system by 15 percent within 15 years, from 2005 to 2020. Various measures by public and private property owners are contributing towards this with support from the funding programme of the *Emschergenossenschaft* and the German State North-Rhine Westphalia (Rainwater Route — Route des Regenwassers). Completed rainwater projects can be seen at www.emscherregen.de, as well as on-site in many areas.

Rainwater infiltration – ground test



This requires a 30×30 cm square, pit that is around 30 cm deep. The bottom must be perfectly level. The bottom is covered with a 1 to 2 centimetre-thick layer of fine gravel to prevent mud from accumulating. It is important that the test be carried out at the depth at which the filtration system will subsequently be built.

Because dry ground absorbs water more quickly than damp ground, the pit must be pre-soaked for about an hour. Only then will seepage beconsistent and practice-oriented resultsbe achieved. In this phase, the pitmust not be allowed to dry out during soaking!

Once the ground has been thoroughly soaked, measurements can be made. The pit is filled with water and the water level and time recorded. At the end of this measurement, the time and water level are again recorded. Three measurements shouldbe made consecutively.The pit can be refilled with water between two measurements as required.

Ground test, Emschergenossenschaft
Source: www.emscher-regen.de/service/download/EG_Anleitung_Bodentest.pdf

The ecological concept for the Emscher – developing and networking living spaces

Once underground wastewater canals are operating, steps can be taken towards ecologically developing the area along the Emscher, from its source to its estuary in the Rhine. There is no patent remedy for this. It is no longer possible to find out exactly how the Emscher's ecology looked before the major encroachments of the industrialisation phase. Almost no other river in Europe has been changed by people as much as the Emscher, and almost no other river is surrounded by such a densely populated urban landscape.[6] An individual concept has therefore had to be developed for each stretch of river to create as much space as possible for nature without neglecting the needs of the people along its banks. The more space the waterways and their wetlands can be given, the more 'naturally' they will develop with their own dynamic and the lower the cost and effort involved in maintaining them will be in future.

From a waterways ecology perspective, the ideal space for such development is the potential so-called migration space: the space the Emscher will need to optimally shape its course and wetlands, taking its various outflows and drops into account. Along the Emscher's middle and lower reaches in particular however, the space for such an extensive expansion of the river's profile is limited. Polluted sites, housing and pipe, cable and transport infrastructure all create what are in parts narrow boundaries, within which the Emscher will have to be integrated into the existing environment.

The *Emscher Future* Master Plan's ecological concept therefore seeks to optimally develop individual sections of the river and network them as far as possible.[7] Existing and new living spaces along the Emscher and its tributaries will be developed and networked so that a functioning ecosystem can develop. The goal is to restore the Emscher as a contiguous, ecologically functioning living space for all kinds of aquatic life.

6 Although there is a series of similar situations all over the world, especially in Asia and South America.

7 Emschergenossenschaft (pub.): Masterplan Emscher-Zukunft. Das Neue Emschertal. Essen, 2006.

Space for nature again –
the Alte Emscher in Duisburg

To do this, the river's profile will be widened and restructured as far as possible. So far, around 120 kilometres of the Emscher and its tributaries have been converted, so the New Emscher can now be experienced from Holzwickede to Dortmund-Deusen and all the way into Duisburg.

Creating a biotope network – the New Emscher Valley

Since the river cannot be provided with optimum space for development along its entire length, it is vital to network potential 'ecological hot spots'. Only a network of high quality biotope structures will restore the river's overall ecological functioning. This is where the 'ripple effect' comes into play.[8]

Where the Emscher can be widened, self-contained focal ecological areas will be able to form. Wetlands and biotopes will create extensive, damp habitats, in which animals will find spaces to feed, rest and reproduce ('original ripple'). Widened wetlands around creek estuaries will link the Emscher with the previously converted tributaries flowing into it. Existing structures and living

8 cf. Deutscher Rat für Landespflege (DRL): Verbesserung der biologischen Vielfalt in Fließgewässern und ihren Auen. Schriftenreihe des DRL, Bd.1082, Bonn 2009.

Jähnig, Sonja; Hering, Daniel; Sommerhäuser, Mario (eds.): Fließgewässer – Renaturierung heute und morgen. EU-Wasserrahmenrichtlinie, Maßnahmen und Effizienzkontrolle. Limnologie Aktuell, Bd.1013. Stuttgart, 2011.

Umweltbundesamt (UBA); Planungsbüro Koenzen; Universität Duisburg-Essen; Senckenberg Forschungsinstitut und Naturmuseum (pub.): Neue Strategien zur Renaturierung von Fließgewässern. Ergebnisse des Workshops in Frankfurt am 15. und 16.März 2012. http://workshop2012.fliessgewaesserrenaturierung.de (22.12.12).

Excursus: What does ecological functionality mean?

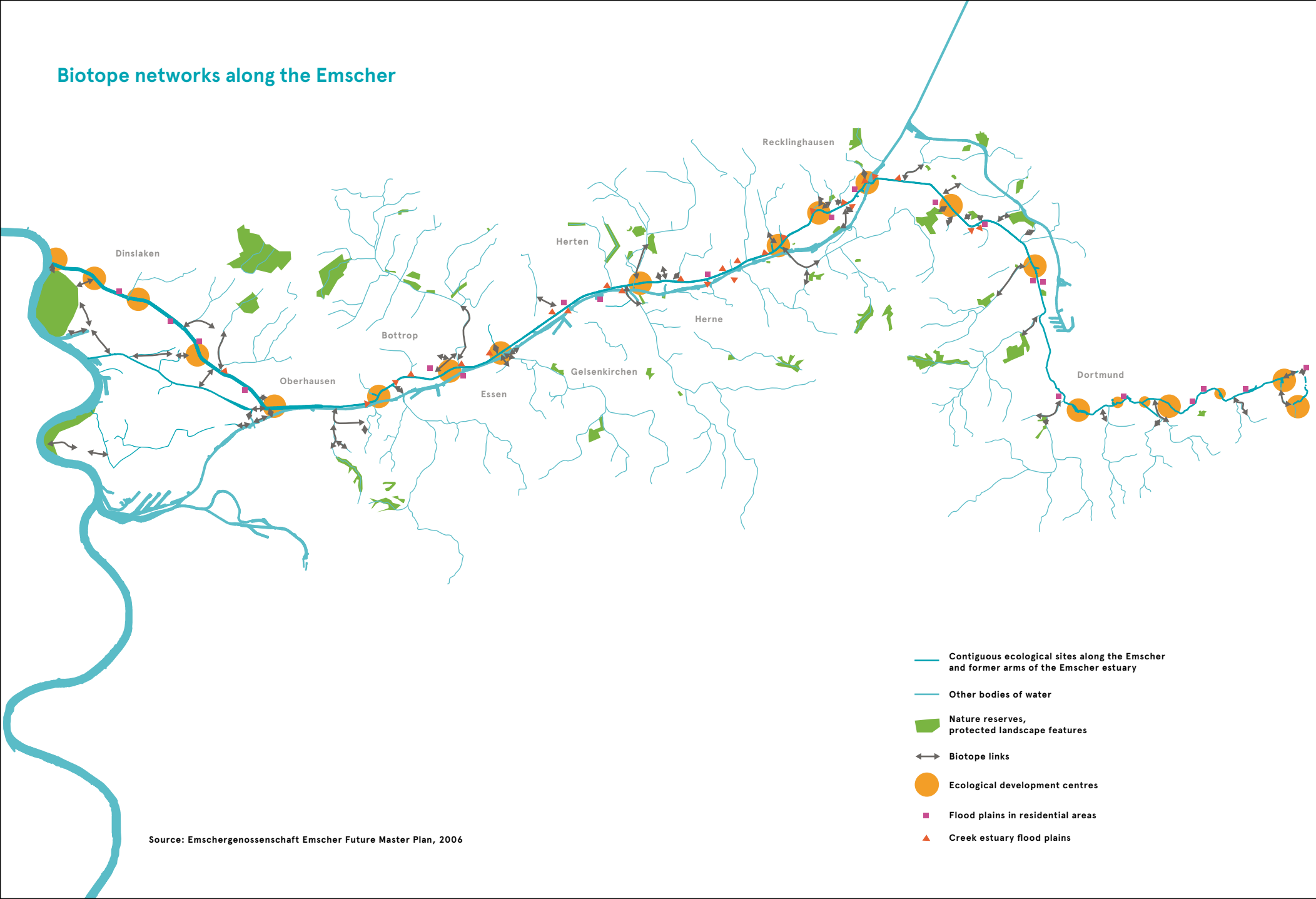
A body of water is ecologically functioning when it performs the basic functions of an ecosystem appropriate to its natural area, i.e., it provides a typical local ecological community with a suitable habitat and the materials and food cycles it needs. Ecologically functioning bodies of water influence the landscape and population's quality of life beyond the boundaries of the local ecosystem.

spaces beyond the dykes with special biotope qualities will also be incorporated into the overall system. The Emscher Landscape Park's green spaces for example, are already well networked and contain some valuable wetlands. These supplementary wetland habitats will be connected to the converted Emscher as far as possible and used for the colonisation of flora and fauna along the Emscher.[9]

Upgrading individual areas will create ecological 'niches' and 'stepping stones' in the Emscher's catchment area, which will be quickly reclaimed by pioneering species and 'ripple out' to neighbouring sections of the Emscher. Other, more demanding species can then follow. Linking the Emscher with the existing valuable living spaces in its surroundings will create an interconnected series of biotopes, which will enable flora and fauna to swiftly and stably re-colonise areas all along the Emscher.

9 cf. Emschergenossenschaft 2006 (See Note 7).

Biotope networks along the Emscher



Source: Emschergenossenschaft Emscher Future Master Plan, 2006

Only the interaction of ecologically complementary and supporting living spaces in a contiguous wider biotope network will ensure the ecological functionality of these watercourses. The more comprehensive and intensive these interactions are, the more stable (resilient) the system as a whole will be.

Planning with nature

All these measures are however only the 'initial configuration', not the final state. The Emscher conversion has constructively incorporated the river's own dynamic in planning its development to make measures as sustainable and cost-efficient as possible. Once the excavators have left the site, the ecological development of the watercourses can begin.

Ecosystem services

Ecosystem services are defined as the benefits people derive from ecosystems, such as ensuring supplies of food and water, providing protection from floods, droughts, desertification and disease, the formation of productive soils and regulation of nutrient cycles, and the provision of cultural possibilities, leisure facilities and opportunities to enjoy nature.

Based on the volume of methods of the Millennium Ecosystem Assessment, Millennium Ecosystem Assessment (MA). Overview of the Millennium Ecosystem Assessment, 2005. www.millenniumassessment.org/en/About.aspx#.Box 1, p.3 (10.01.13).

Why is it important to factor in both nature and technology?

An integrated perspective on nature and technology shows that the Emscher can be perceived as far more than just an ecosystem. Ecosystems are worth protecting in themselves, but they also provide people, and not only those in the immediate environment, with very valuable services.

This view of the (economic) benefits of ecosystems, or 'ecosystem services', has become increasingly important in recent years. In the Millennium Ecosystem Assessment project, over 1,300 scientists attempted to describe and evaluate ecosystems all over the globe and estimate the utility of nature.[10] In 1997, a group of scientists estimated the value of the world's ecosystems at 33 trillion dollars.[11]

The figures may be open to dispute — a thirsty person will evaluate water very differently from someone whose cellar has just flooded — but they indicate nature's huge productive power. In terms of the Emscher conversion, this means that it is a highly profitable investment in an ecosystem from which we will profit in a range of different ways.

So what are the benefits exactly, apart from the obvious one of clean water? An assessment system has been developed especially for river systems, which identifies three different kinds of benefit.[12] There are the benefits directly connected with water (e.g., water supply, use of a river as a transport system or for fishing). A further,

10 Millennium Ecosystem Assessment (MA). Overview of the Millennium Ecosystem Assessment. 2005. www.millenniumassessment.org/en/About.aspx# (22.12.12).

11 Costanza, R.; d'Arge, R.; de Groot, R.; Farber, S.; Grasso, M.; Hannon, B.; Limburg, K.; Naeem, S.; O'Neill, R.; Paruelo, J.; Raskin, R.; Sutton, P.; van den Belt, M.: 'The Value of the World's Ecosystem Services and Natural Capital'. In: Nature 387. 1997, p.253–260

12 Vgl. www.nap.edu/openbook.php?record_id=11773&page=151 (22.12.12).

indirect benefit is the contribution of river systems to flood protection and their positive effects on microclimates, and then there are the long-term existential services of active ecosystems: their contribution to biological diversity and a vibrant gene pool, which are essential to our long-term survival.

What does the region gain from the Emscher conversion?

Restoring the ecological functioning of an entire river landscape opens up a wealth of urban development and open space potential, which the *Emscher Future* Master Plan, for example, shows.

'Former 'no-go areas' hidden behind fences and signs prohibiting entry are now becoming more and more attractive recreational areas and intact ecosystems. The Ruhr area as a location is gaining more quality of life and economic competitive quality.'

Dr.Jochen Stemplewski Chairman of the Emschergenossenschaft Board of Management. Cited in, Reicher, Christa, et.al. (ed.): *Schichten einer Region. Kartenstücke zur räumlichen Struktur des Ruhrgebiets.* Berlin 2011, p.9.

From 'no-go area' to place of learning – 'Bachpaten', or stream sponsors, from two schools collect water samples and measure flow velocity in the Ostbach stream together

Renaturation of waterways fundamentally contributes to maintaining and promoting biodiversity. Studies have proven that flora and fauna can successfully reclaim renatured bodies of water. Well over four hundred different kinds of stream invertebrates can now be found in the Emscher area's waterways, most of them insects. Some of these creatures are endangered species and are on the 'Red List' of the Land North Rhine-Westphalia and the Federal Republic of Germany.[13]

Renatured bodies of water also provide a series of regulatory services. Wetlands filter pollutants out of the air and help improve urban climates. The new bodies of water and their green environments are also an asset to urban climates. Like urban parks, they function during hot summer months as a huge natural air conditioning system for the region, alleviating the expected consequences of climate change. Widening waterways and creating additional floodplains within dykes, as well as the natural rainwater management already implemented, will lower both high water flows and the costs of expensive technical flood protection.

Cultural achievements are now an especially striking feature of the Emscher catchment area. Local recreation space is a rare and precious asset in industrial regions. Former 'no-go areas' with signs prohibiting entry have now become areas featuring bodies of water for the whole population to enjoy. In green spaces along the waterways, around 120 kilometres of bike and walking paths invite visitors to stroll and cycle by. Natural waterways and visible flowing rainwater enhance the urban landscape. May we all think about what we individually would have been prepared to pay for a renaturised Emscher or in what ways we benefit from an excursion to the Emscher in terms of leisure activities, health and well-being. As well as being a recreational asset, the converted Emscher is also adding new educational value. Along its ecologically improved waterways, schools are joining 'Bach (creek) Partnerships', and the 'Emscher Kids' are passing on what they have learned to other children and adolescents. Children and young people are learning about positive models in their immediate surroundings and the importance of an intact environment at an early age.[14] Art and culture can also help people see the whole Emscher zone in a different way and identify with the region. Identification with the Emscher plays a vital role in regional development in the long term. People moving to or from the region, paying taxes and bringing their skills to the area will be not only, but at least partly, influenced by the presence, or absence, of intact nature.

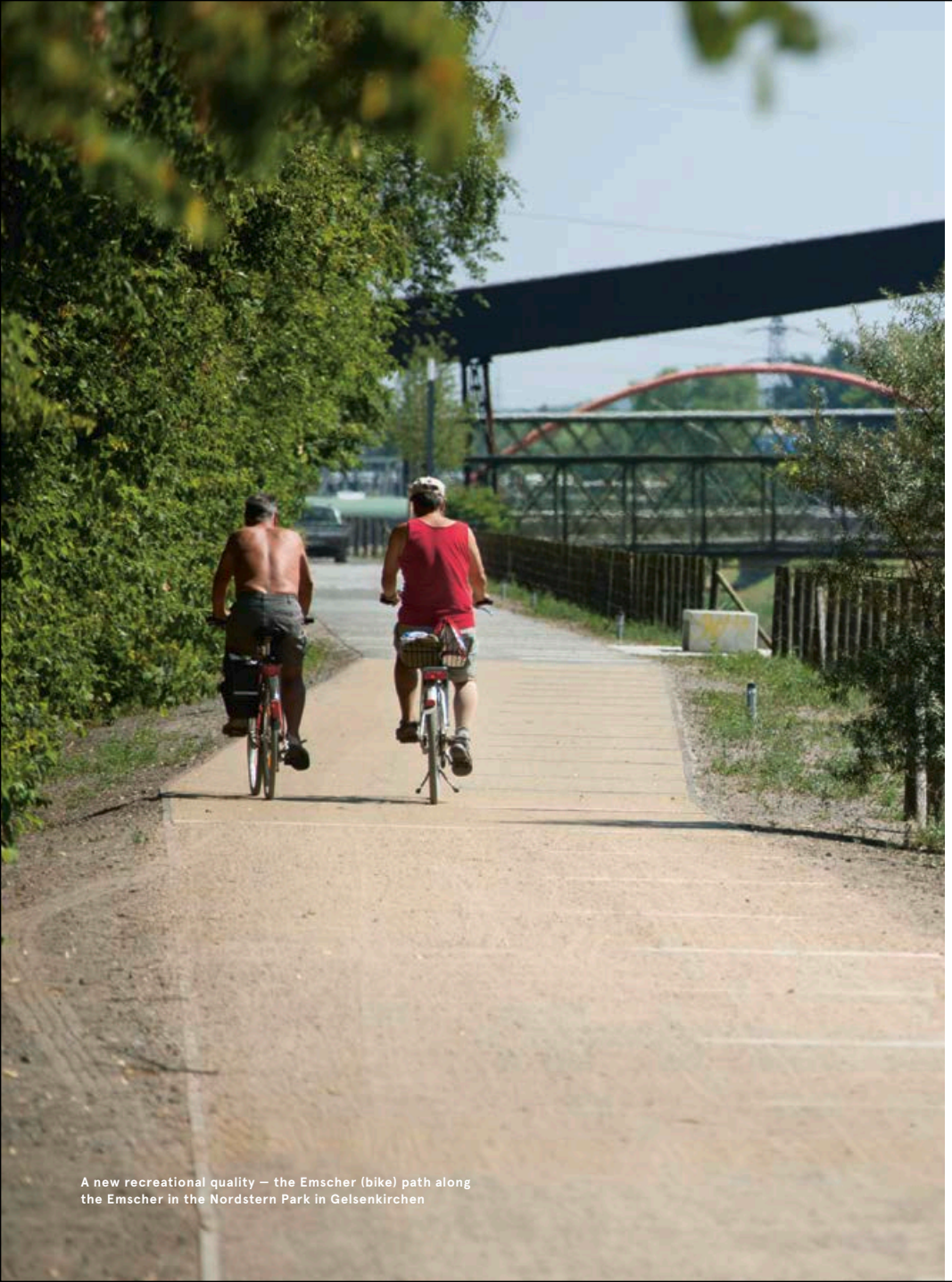
It is hard to estimate the financial value of the ecosystem services provided by the Emscher conversion, especially in terms of educational, leisure and recreational values. The economic services of the Emscher conversion will be easier to assess when, for example, properties along the Emscher increase in value or when the conversion, which will take 30 years in all, creates jobs. Current studies commissioned by the *Emschergenossenschaft* are attempting to identify and measure the profits the Emscher conversion is generating for the region.[15]

The Emscher conversion's potential benefits for the region will only be revealed once building work has been completed and the waterways begin to develop with their own dynamic, once the noise, dirt and re-routing due to the building sites are a thing of the past, once the renaturised Emscher and its tributaries can be experienced all along their lengths. This applies to the purely ecological improvements in and on the waterways and to the overall quality of life in the Emscher zone. Ultimately, the success of the Emscher conversion will also be measured in terms of broader social change in the region.

13 13 cf. Emschergenossenschaft (pub.): Flussgebietsplan Emscher. Essen, 2009. Jähnig et.al. 2011 (see Note 8).

14 cf. Zucchi, Herbert: `Revitalisierung von Fließgewässern aus der Sicht der Umweltbildung`. In: Bundesamt für Naturschutz (pub.): Angewandte Landschaftsökologie. Bonn 2000, H.37, p.239–251.

15 cf. Sommerhäuser, Mario: Was ist uns die Natur wert? Ökosystemleistungen und die wirtschaftliche Bedeutung biologischer Vielfalt. 2012. www.emscherplayer.de/main.yum?mainAction=magazin&id=83783 (22.12.12).



A new recreational quality – the Emscher (bike) path along the Emscher in the Nordstern Park in Gelsenkirchen

Experiences: What does all this mean for the sustainable transformation of industrial societies?

With the Emscher conversion, the *Emschergenossenschaft* has seized an outstanding opportunity to link a retroactive wastewater infrastructure modernisation with modern urban development and waterways development concepts. The current situation, namely more nature in urban areas and higher ecological waterways development standards, ties in well with its goals. The Emscher conversion has put nature and landscape at the centre of the transformation of a region that until two decades ago would never have been associated with those words. In the middle of Europe's biggest industrial and urban area, the *Emschergenossenschaft's* conversion of the Emscher has created a 'specifically post-industrial perception of nature that no longer regards city and nature, technology and art, industry and landscape as fundamental contradictions, but amalgamates all of these in a variety of ways'.[16] This can be seen as an opportunity for all the Ruhr area's cities to follow and further develop the ideal of a 'green' urban region.

The question may be raised of whether the Emscher system's ecological conversion from a 'coal-mining region cesspit' to a 'peri-urban river meadow landscape' justifies the enormous structural and financial cost and effort involved in carrying it out. After all, the area's altered topography means that this `natural river system will depend on supplementary technical infrastructure systems for the long term.

16 Frank 2010 (see Note 3).

The ecological success of renaturation will only be revealed in coming decades. There is now already 'new life in the Emscher', but it takes a long time for stable and sophisticated ecological communities to become established in former polluted waterways — usually at least ten years after the completion of renaturation measures.[17] The Emscher conversion's many wider positive effects on the entire region are however already visible and measureable now and are making a major contribution to increasing sustainability in the Emscher Valley.

What can the Emscher conversion teach us about sustainable transformation in industrial societies? Overall conditions in the Emscher zone mean that results achieved here are not really transferrable to other regions, or could only be transferred with difficulty. However, it is shown that in principle issues of ecological improvement can be incorporated into large infrastructure project planning, as is already customary for some aspects of environmental protection and climate change mitigation (a kind of 'nature mainstreaming'). This is especially true of transport infrastructure, such as traffic routes, which can be developed — via skilful adaptive planning — as networks that leave room for contiguous habitat corridors. To justify and communicate successfully the value of what are often very expensive renaturation measures, it is well worth documenting and communicating all the benefits that developing the ecological ecosystem will bring.

17 cf. Emschergenossenschaft 2009 (see Note 13).
Jähnig et.al. 2011 (see Note 8).

Theses for a new infrastructure model

1 — **Regions and their infrastructure must be 'resilient'. In times of economic, social and ecological crisis, they need to be very robust and adaptable, so knowledge from various actors must be integrated and new management models developed.**

2 — **Statutory planning instruments should be supplemented by informal regional planning instruments such as Master Plans. These utilize the expertise of many actors and go beyond territorial boundaries to emphasise the real spatial dimension of planned infrastructure projects.**

3 — **Informal planning instruments and processes live from the desire of those involved in them to create change. Cooperatives are of vital importance here, gathering various actors 'under one roof' with a shared goal of responsibly creating added value in the long term.**

Thinking ahead …

If regions are to be made stable in the face of the economic, social and ecological challenges of today and tomorrow, cooperative ventures, networks and planning processes that range beyond the borders of departments, specialist disciplines and industries will be required. New paths can, however, only be taken if stakeholders in politics, business and industry and society are prepared to think 'out of the box' and get involved by contributing their own experiences and ideas.

There are countless examples of new cooperative ventures and alliances that have been set up to achieve shared goals. One of the important topics here is cooperation between cities and surrounding rural communities in achieving a transition to 100 percent renewable energies. Cooperative ventures are key in achieving such goals, because while urban areas need large amounts of energy, nearby rural areas offer potential for generating renewable energy.

One such city-country-cooperation is the 'Metropolregion E' in Lower Saxony, which covers Hanover, Braunschweig, Göttingen and Wolfsburg. Its goal is the complete conversion of energy supplies in the region to renewable energies by the middle of this century. Experts from business and industry, science and research, and the Land and local authorities are cooperating to reach this goal.

Another example of regional forms of cooperation designed to increase renewable energy use is the growing number of energy cooperatives. Around three hundred new renewable energies cooperatives have been founded in the past five years alone in Germany. In photovoltaic cooperatives, citizens can contribute small financial amounts to set up photovoltaic projects together with local authority decision makers, public institutions and regional banks. The organisational form of the cooperative helps to bundle the commitment of representatives from industry and business, politics and society.

Further reading:

www.metropolregion.de/pages/themen/energie/index.html – DGRV, Agentur für Erneuerbare Energien, 2011: Energiegenossenschaften – Bürger, Kommunen und lokale Wirtschaft in guter Gesellschaft. www.kommunal-erneuerbar.de/fileadmin/content/PDF/Energiegenossenschaften_web_normal.pdf *und Stadtentwicklung. Technische und soziale Infrastrukturen – Herausforderungen und Handlungsoptionen für Infrastruktur- und Stadtplanung.* Hg. vom Deutschen Institut für Urbanistik und der Wüstenrot Stiftung, Edition Difu, Bd.10, Berlin 2010

Knowledge strengthens the region

The importance of regions

While the preceding chapter focused largely on infrastructure and described the interfaces between nature and technology, what follows will concentrate more on the spatial dimensions of infrastructure conversion.

Developments such as climate change, demographic shifts and the transformation of economic structures put considerable pressure on societies to adapt. This affects a various range of administrative levels. So, it is the Federal Government's task, for example, to identify primary climate protection goals and define economic policy guidelines. It is the task of the Länder (states), town authorities and county districts, in turn, to develop concepts with which these primary goals can be implemented across their various areas.

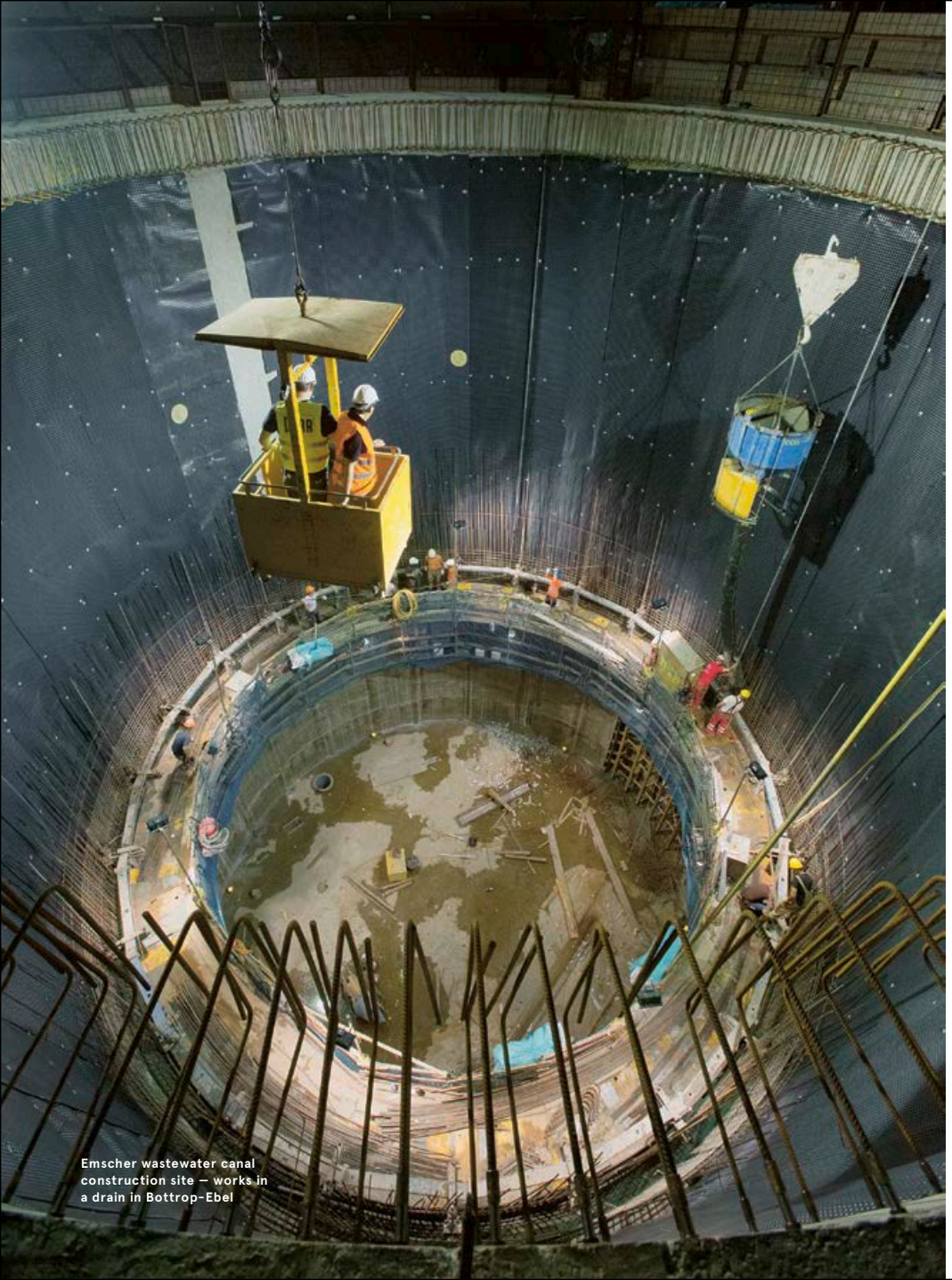
This makes the regions, as the administrative level between town authorities and county districts on the one hand and Länder on the other hand, especially important. The regions may be defined by natural landscape, geographic, historic, social and economic connections that result in political integration. This means that many imminent transformation processes will not be able to be dealt with on the clearly defined territory of a single county, but will be joint tasks covering areas beyond municipal boundaries. Regions often have to confront challenges involving a specific connecting feature. Such a feature might be a river, like the Emscher, or a socio-economic feature, such as the settlement of certain kinds of industry which define an area.

Precisely these specific connecting features also provide major opportunities for solving future tasks. Local authorities will only be able to manage infrastructure challenges such as the transition to renewable energies or the planning of transport routes collectively and through close cooperation between city, Länder and Federal authorities. This cooperation can also result in new identifications and connections. The Emscher conversion is a good example of how important regional cooperation is in adapting a whole region to future challenges. The Emscher connects an area ranging from Holzwickede to the east and Dinslaken to the west, large parts of which are still characterised by structural change. The conversion of the Emscher system in all its facets can provide vital impetus for improving quality of life, economy and society in this regional space, even beyond the classic administrative boundaries.

Regional opportunities and scope for action are especially advantageous in making the economy and society more sustainable. Indeed, the actors required to implement alternative models are often concentrated in regions. People, politicians and companies interact directly at this level. Concrete changes can be initiated in close cooperation with regional planners. It is one of the legally mandated tasks of regional planners to reconcile issues of social justice, protection of life's natural basis and economic development prospects with each other in the long term.[1] In the regions, the conditions for sustainable development can be shaped by regional actors from the areas of planning, politics, business and industry and civil society. Visions for regions can only be developed within such close connections. How do people in the region want to live? How can the process be steered in the desired direction?

One major goal of the *Emschergenossenschaft* is to create a sustainable balance between the demands of humanity and nature. The Emscher conversion mission statement describes this in terms of the interaction of ecological upgrading and quality of life, the coexistence of nature, technology and new economic potential. The *Emschergenossenschaft* has been campaigning to connect issues around water, wastewater and energy, and not just since the beginning of the transition to renewable energies. No potential energy — be it in the form of electricity or heat — should be left unused. At the Bottrop sewage treatment plant, for example, the digest-

1 cf. Akademie für Raumforschung und Landesplanung (pub.): Strategische Regionalplanung. Positionspapier aus der ARL Nr.84. Hannover 2011. http://shop.arlnet.de/media/direct/pdf/pospaper_84.pdf (14.01.13).



Emscher wastewater canal construction site – works in a drain in Bottrop-Ebel

er gas the plant produces is used to generate electricity, heat the plant and fuel its vehicles, effectively advancing a regional, decentralised transition to renewable energies.

So if the regions are to play a vital role in upcoming transformation processes, they will have to be robust and secure in the face of economic, social and ecological crises. The word 'resilience' is often used in this context. Resilience can be accurately defined as what a 'roly-poly toy' does. If you push it, it falls over, but it can upright itself on its own. This is exactly what resilient regions must do. In combination with growing pressure to adapt, external events such as the financial and economic crisis and climate change will impact regions. Well-placed, resilient regions are able to mobilise their own forces, 'pick themselves up' and overcome crises.

How can regions achieve the highest possible degree of resilience? Two central ways of achieving more resilience are described below: first, the need to connect actors in the region and increase their shared knowledge. In the case of the Emscher conversion, the development of the *Emscher Future* Master Plan and knowledge integration instruments and processes within the *Emschergenossenschaft* itself, have served and are serving this purpose. Second is the question of which organisational structures will be better able to solve problems in future. In the context of both the integration of knowledge and the question of appropriate organisational structures, it is a matter of developing new management models that can be used to manage complex future tasks cooperatively. In discussions on this topic the term 'governance structures' is used to denote new forms of policy making, which will be described in detail in the concluding section of this chapter.

Knowledge, knowledge integration and learning processes

The Emscher conversion is a process of increasing regional resilience by making a major contribution to improving quality of life in the region, and with it the quality of the location, and because the conversion has stabilised the region's hydrologic balance, which was coming under growing pressure from increasing climatic and demographic change.[2] Cultural, urban development and ecological impetus are thus central goals of the New Emscher Valley.

Such multi-dimensional planning and design processes require not only water management and technological expertise; they must incorporate wider theoretical and practical knowledge, from the area of urban development for example.

This chapter deals with the questions of which kinds of knowledge are required to do this, of how this knowledge can be integrated and increased, and of how these integration and learning processes can be organised within the Emscher conversion.

'Knowledge' involves all the skills and abilities we use to solve problems.[3] It is initially based on objective data and information. When knowledge is used, turned into concrete actions or lack of action, it is always connected with people.

Experts — practitioners working in various fields as well as politicians — are very differently affected by future challenges. They can each contribute a different kind of knowledge of existing conditions, worthwhile goals and possible developments.

2 cf. Lucas, Rainer: Gefährdungen von Ökosystemleistungen durch den Klimawandel – Analyserahmen, Konzeptentwicklung und erste Handlungsorientierungen für die regionale Wirtschaft. Dynaklim Publikation Nr. 15, Nov. 2011.

3 cf. Probst, Gilbert; Raub, Steffen; Romhardt, Kai: Wissen managen. Wiesbaden 1997.

In the area of water management and the related infrastructure it might, for example, be technical and ecological expertise. After underground mining ended, it became possible to channel wastewater underground. The *Emschergenossenschaft*, as part of the International Building Exhibition (IBA) Emscher Park, then formulated the goal of converting the Emscher. Achieving this goal was and is still connected with a constant process of learning, and the generating of new knowledge. The technological challenges of the construction and subsequent maintenance and upkeep of the Emscher wastewater canal show this clearly. The canal had to be laid at depths of 8 to 40 metres along its 51 — kilometre length. Because the completed canal will always be full of water, people will not be able to check for and repair cracks and other damage to it; robotic systems will have to be used to do that. The *Emschergenossenschaft* has acquired the expertise to do this from the Fraunhofer Institute for Factory Operation and Automation, which has developed a special robotic monitoring system to perform this task.

As well as water management, other economic areas and social aspects must be taken into account in creating a resilient region. This requires knowledge different to that needed for the technical modernisation of wastewater systems. The issue here concerns how the Ruhr area will position itself as a business location, for which companies the area will be and ought to be attractive, and how social structures in Ruhr area cities will change. Measures to develop a resilient region must be derived from prognoses of these factors.

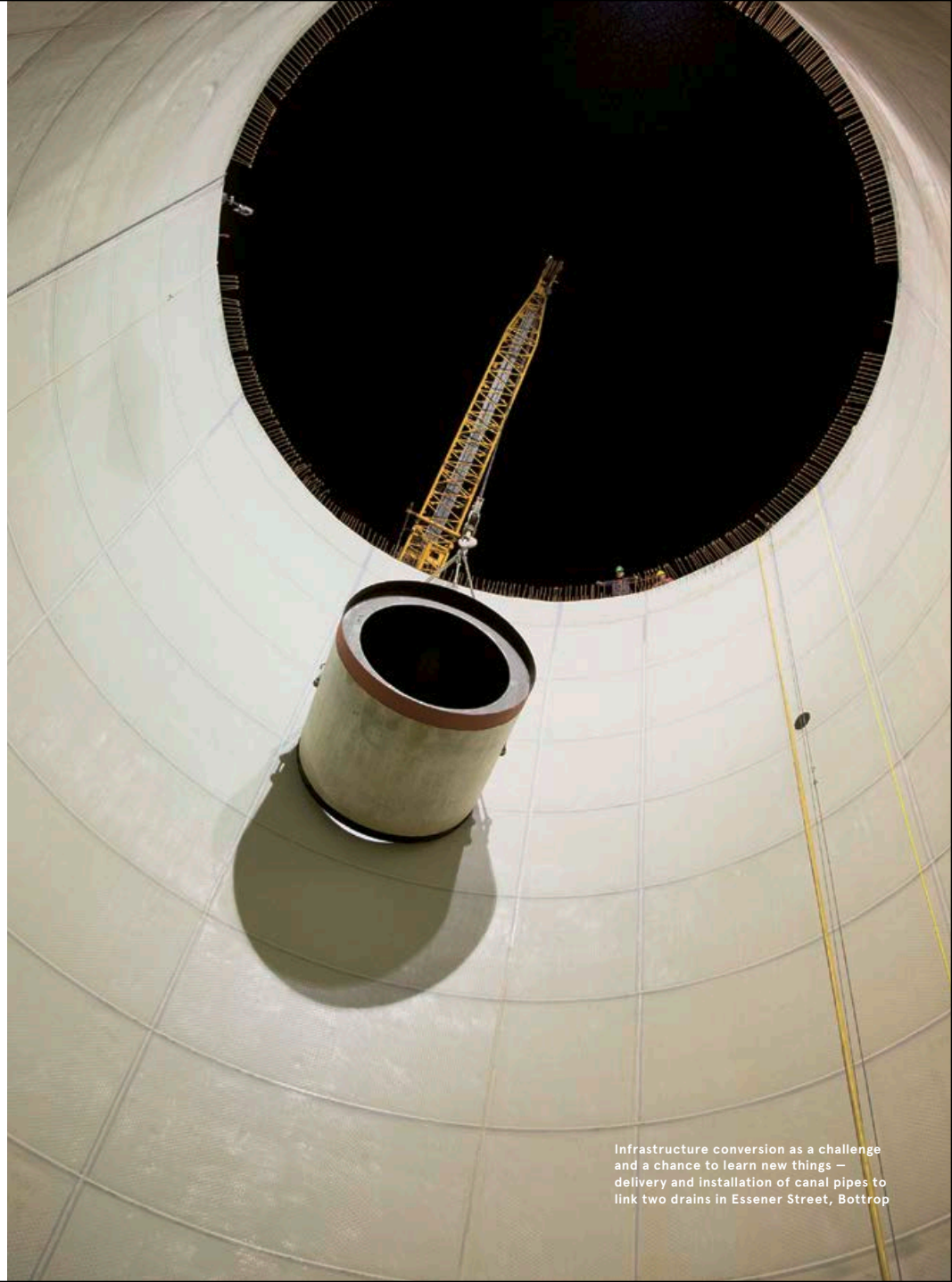
If an entire region like the Ruhr area is to be resilient in the face of future challenges and crises and to develop sustainably, various areas of knowledge must be integrated; they should not be regarded as separate from each other. This is an active process, one requiring planning and design, in the course of which participants are always acquiring new knowledge. Such integration is important to the pro-

ject's overall capacity and in implementing solutions,[4] especially in complex processes like the Emscher conversion, but also in the whole region's economic, social and ecological development.

Among the important steps towards any such integration of knowledge are achieving a shared understanding of the challenges and problems, and jointly formulating goals, as well as connecting the actors involved. Knowledge integration is especially effective when it is shaped and managed through specific instruments such as mission statements.

One example of such a networking of actors is the New Emscher Valley Working Group (Arbeitsgemeinschaft Neues Emschertal). The goal of this cooperation between the *Emschergenossenschaft* and Ruhr Regional Association (Regionalverband Ruhr) is to create an attractive urban, cultural and aquatic landscape as a green centre of the Ruhr metropolitan area together with all partners — members, citizens, local authorities, politicians and companies. A cooperation agreement defines the important areas of this cooperation: urban and regional development, landscape design and development, culture and land management and maintenance, construction projects and communication. The following sections will describe one of the central bases of this Working Group, the *Emscher Future* Master Plan, in detail.

4 cf. Kröger, Melanie; Rückert-John, Jana; Schäfer, Martina: Wissensintegration im nachhaltigen Landmanagement. Inter- und transdisziplinäre Problembeschreibung im Projektverbund ELaN. ELaN Discussion Paper. 2012.



Infrastructure conversion as a challenge and a chance to learn new things — delivery and installation of canal pipes to link two drains in Essener Street, Bottrop

What is interesting is that research is being carried out at the universities in the Ruhr area on how it can deal with impending threats, such as climate change, and regain a balance by its own means. […] That's the most interesting thing I've learnt. You don't always have to wait for funding programmes and help from outside; you can learn a lot about organising your region to ensure that it can survive in the long term.

Dr.Wolfgang Roters former Chairman of the Akademie für Städtebau und Landesplanung NRW.
Cited in www.emscherplayer.de/playMedia.yum?mediaID=49146 (27.11.12).

The Emscher Future Master Plan as an expression of new governance structures for integrating knowledge

One milestone in improving knowledge integration in the Emscher region was the drafting of the *Emscher Future* Master Plan, published in 2006. Regional Master Plans are an expression of the increasing significance of informal planning and cooperation among local councils seeking to incorporate more external knowledge and explicitly target learning processes in planning. Many local authorities have recognised that they can more efficiently manage long — term tasks, such as those around infrastructure, together with their neighbours.

In contrast to instruments such as regional Land Use Plans, regional Master Plans aim less at securing a legal basis of planning than at planning adapted to current regional conditions. Formal plans are based on selected information sources with standardised assessment procedures. In complex projects such as the Emscher conversion, informal planning makes it possible to pursue new avenues in information acquisition and processing, and in the generation of knowledge. In the Ruhr area, the IBA Emscher Park is still regarded as the initiator of informal regional planning. Informal instruments provide 'space for creativity and flexibility in terms of content in the planning process'. At the same time, they make it possible to define planning areas in a way that focuses on their problems.[5] Master Plans, with no formal mandate or legal force, become important when they develop convincing, holistic concepts. Only a will to find a solution that is shared by all the participants will yield enough creative power to transform an entire region. 'Regional planning exercises a management function not by giving actors goals in accordance with the principle of top — down, but when the actors themselves jointly develop regional planning goals in a constant dialogue and so make use of possible management frameworks.'[6]

From the outset, the very complex Emscher conversion project faced the challenge that it did not affect just one municipality. Since various administrative borders pass through the Emscher region, the interests of many different authorities had to be coordinated, namely the North Rhine-Westphalia Ministry for Climate Protection, the local governments of Arnsberg, Düsseldorf and Munster, the then state environmental agencies of Duisburg, Herten, Hagen and Lippstadt, lower-level water and environmental authorities, and various other local public works, environmental and urban planning authorities.

5 **Gerdes, F., u.a.: Neue Möglichkeiten der Regionalplanung, Der Regionale Masterplan im Ruhrgebiet. TU Dortmund, Fakultät Raumplanung. 2005. https://eldorado.tu-dortmund.de/bitstream/2003/22153/1/Endbericht%20F01.pdf (11.10.12).**

6 **Gerdes u. a. 2005 (see Note 5).**

Nature, second hand – the open Emscher at Lake Phoenix in Dortmund-Hörde

In the Ruhr area in particular, the many planning authority levels and administrative entities have for a long time made efficient regional planning more difficult. To these were added representatives from other specialist planning authorities with their own interests, such as the 'Landesbetrieb Straßen.NRW' road construction agency, the Wasserschifffahrtsverwaltung Duisburg (Duisburg waterways and shipping authority) and economic and business development stakeholders. The Master Plan was made concrete in an intensive dialogue with the whole region over a year and a half and coordinated with them until solutions were found that would be workable for all partners. All political committees then agreed to it.

One major instrument in continuously integrating the know-how of experts and people working in various fields into the Master Plan's development has been the Emscher Dialogue, which the *Emschergenossenschaft* has regularly organised since 2001. In impulse workshops and small discussion fora, the expertise of planners, environmental agencies, companies in the Emscher Valley and representatives from city marketing departments has been used in discussions of individual aspects of the plan.

Further knowledge and additional expertise was incorporated into the process by the Werkstatt Neues Emschertal (New Emscher Valley Workshop), in which planning partners and experts from other disciplines such as architecture, development planning, landscape architecture, and from housing cooperatives were involved. The workshop consisted of a series of workshops and competitions dealing with specific key topics.

Scientific knowledge has also been integrated for example, in a cooperative project with the department of Environmental Economics and Controlling at the University of Duisburg-Essen, which has investigated and calculated the Emscher conversion's effects on the regional economy. One of the project's main findings is that about 3,400 additional jobs will be created in North Rhine-Westphalia annually.

A further vital component of knowledge management was the SAUL 'Sustainable and Accessible Urban Landscapes' research project, which aimed to develop regional parks along waterways together with partners from London, Amsterdam and other European urban regions. This European exchange paved the way for development of the *Emscher Future* Master Plan and other pilot projects, such as the design of bridges over the Emscher. One of the core messages of the project was that partnerships with other regions can create learning processes, transferable knowledge and mutual understanding. Such partnerships could be used to develop shared goals all over Europe.[7]

The Phoenix See (Lake Phoenix) in Dortmund was created as part of just such a European research project, the 'Urban Water' project. It focused on innovative planning methods for sustainably developing and rehabilitating urban water systems, which were put into practice at showcase locations.

7 www.saulproject.net/whatissaul.jsp. (11.10.12).
Image Phoenix See planning map

The Master Plan shows the importance of comprehensive coordination and knowledge integration, which have created a vital basis for planning and implementing the Emscher conversion. There were a range of very different aspects, some extending beyond the Emscher but all of them interconnected, that had to be planned and their interaction taken into account from the outset. For this reason, the Master Plan includes eight fundamental theses[8] for implementing the infrastructure project:

1. Flood protection remains the highest priority
2. Ecological potential will be fully utilised
3. Leisure and recreational facilities with high amenity quality
4. Quality of life and new economic potential
5. Pride in local history in a new design context
6. Clear, linear design elements emphasise continuity
7. A recognisable material and symbolic language ensures a distinctive look
8. An outstanding attraction, object of identification and economic platform

Highly specialised knowledge is required to implement the Master Plan's fundamental theses, including expertise in technical aspects of water retention, on scientific questions of biosphere development, on the importance of water for quality of life and on the functions of a distinctive appearance. It is clear that a single specialist planning department would not be able to develop such a comprehensive concept.

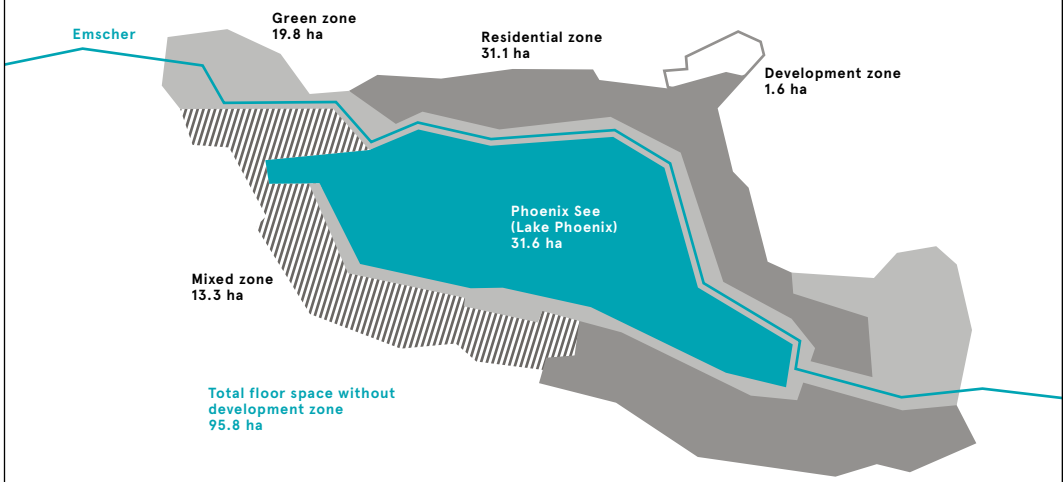
The cooperative development process of the Master Plan has resulted in a better understanding of other agencies' 'special languages' and an awareness of the concerns of planners in other areas. Structures have been developed that extend well beyond the Master Plan itself and are now making a decisive contribution to the Emscher region's capacity for innovation.

8 Emschergenossenschaft (pub.): Masterplan Emscher-Zukunft. Das Neue Emschertal. Essen 2006, p.A26—A29.

We are convinced that our organisations will be judged based on the social change we achieve with our big projects and believe that only close collaboration among a wide range of different disciplines makes it possible to accomplish anything.

Ralf Schumacher Emschergenossenschaft Emscher Future Division. Cited in, Emschergenossenschaft (pub.): Werkstatt Neues Emschertal. Weiterentwicklung des Masterplans Emscher – Zukunft. Dokumentation. Essen 2010, p.5. www.emscherplayer.de/media/content/publication/000/021/000021359.pdf (14.01.13).

Phoenixsee (Lake Phoenix) land utilization



At the same time, it is clear that a Master Plan's success depends on coordinating the interests of various stakeholders to reach a shared goal, because different key objectives can cause conflict. The widening of the Emscher and its changed planting increase the river's ecological potential, but could also result in interaction between flood waves, because the drains will function differently. Planning various free spaces, areas used mainly for housing or set aside for nature and landscape, makes a range of different demands on the same spaces that will have to be reconciled. A project involving more than four billion Euros will always involve disputes on how the money should be spent.

Solutions were found to all these issues and accepted by all parties involved in the Emscher conversion. The development of the Master Plan and the experience gained in dealing with such conflict in particular, are elements of successful governance that will contribute to structural change along the Emscher in future.

The conversion of the Emscher system will reshape the entire region — the New Emscher Valley. It is all the more important, then, that a shared vision of the New Emscher Valley supported by all participants can also fall back on binding, effective long — term guidelines. The central instrument for this is the 'Emscher Future' Master Plan, the 'script' that gives 'stage directions' for the great Emscher conversion project.

Dr.Ottilie Scholz Lord Mayor of Bochum and Chairwoman of the Cooperative Board of the Emschergenossenschaft. Cited in, Emschergenossenschaft (pub.): Masterplan Emscher — Zukunft. Das Neue Emschertal. Essen 2006, p.7.

Knowledge integration in the *Emschergenossenschaft*

Within the *Emschergenossenschaft,* which in its specialist divisions deploys a range of different experts and specialists working in various fields, its mission statement serves as an important instrument of knowledge integration and knowledge management. The *Emschergenossenschaft*'s wide-ranging mission statement puts water management expertise into a broader context, formulating a far more comprehensive remit than is immediately apparent from its core business.

The fact that the *Emschergenossenschaft's* clients are also its members helps it to view various problems in an integrated way. Members such as local authorities, industry and business participate actively in setting goals and making decisions.

The *Emschergenossenschaft's* mission statement states that its planning and activity is focused on ensuring the wellbeing of people living in the region and protection of the environment. All the measures the *Emschergenossenschaft* take 'are aimed at maintaining and further developing the beneficial effects of water for the overall ecosystem, (urban) landscape and people'.[9]

The *Emschergenossenschaft* sees its tasks not only as providing infrastructure and water management services, but also as actively helping to shape the region. Using the expertise and experience it has at its disposal, it seeks to influence 'public dialogue, political decision — making, and with them structural change in the Emscher and Lippe areas'.[10]

The *Emschergenossenschaft's* self-understanding as a cooperative, i.e.a corporation under public law, helps it continually to integrate expert and practical knowledge into overarching contexts.

Such an integrated view cannot be taken for granted, but is the result of a continuous learning process, also within the Emscher genossenschaft.

9 **EG/LV (no year): Mission statement. Emschergenossenschaft/Lippeverband. www.eglv.de/fileadmin/EmscherGenossenschaft/2.2_Ueber_uns/2.2.4_Unser_Anspruch/Leitbild.pdf (18.12.2012).**

10 **See Note 9.**

When the *Emscher Future* Master Plan was published as a comprehensive, long — term planning concept in 2006, one stipulated requirement was to integrate water management, ecological, urban development and design aspects into an overall plan. This also has meant taking the various perspectives and experiences of experts into account and integrating them.

As a service provider and participant in shaping structural change, the *Emschergenossenschaft* seeks to harness the structural policy impetus of this infrastructure project to achieve specific and substantial economic, ecological and social progress in the region. Both the inclusion of different points of view and the Master Plan's very heterogeneous target structure make this planning and development process a complex management challenge.

Five years after the introduction of the *Emscher Future* Master Plan, it was time, for the purposes of 'setting a course', to reflect on what had been achieved and on how the goals of the conversion could be pursued further. Given the complexity of the sphere of activity, one core task was to establish strategic formative variables for continuing and implementing the Master Plan. These formative variables were designed to make effective and economic management of such a complex process possible.

The iterative evaluation and reflection process was a period of an intensive exchange of experience and knowledge within the *Emschergenossenschaft* and with external experts. It was divided into three phases: survey, evaluation and development.[11]

In the first phase, each in-house specialist department of the *Emschergenossenschaft* reflected on the knowledge and experience it could contribute to continuing the Master Plan, in the form of interim reports. Scientific institutes were also commissioned by the *Emschergenossenschaft* to investigate the region's different social structures[12] and tourism potential.[13] Evaluations, in the form of site inspections, workshops and surveys, were also carried out to assess perceptions of the conversion and the accompanying cultural and educational projects from various perspectives.

The second phase evaluated the effects of this complex conversion project. It focused on the interactions between core business activities (water management, waterways ecology, infrastructure upgrading etc.), accompanying projects (cultural, educational, dialogue) and regional development (economy, ecology, social aspects). Assumptions about these networks were first visually represented using a system dynamics approach.[14] The chart on pages 88/89 shows the Emscher conversion's anticipated effects on the region's future sustainability. The Master Plan's activity levels mentioned above are shown as coloured areas. The central circle in the middle represents the 'motor' of the overall system. The networking and regional significance of its goals can be easily seen. The sub — systems identified and analysed are shown in the chart as grey circles.

A total of 16 sub-systems, each with an average of 30 influencing factors, were investigated. The systems were analysed using the system-theoretical method of networked thinking. Using this method enabled the *Emschergenossenschaft's* specialist departments and external experts to identify and assess interactions, which allowed findings from the investigations and practical experience from the conversion process to be reflected on systematically. It was very revealing to find out how strong interactions between individual specialist divisions of the *Emschergenossenschaft* are.

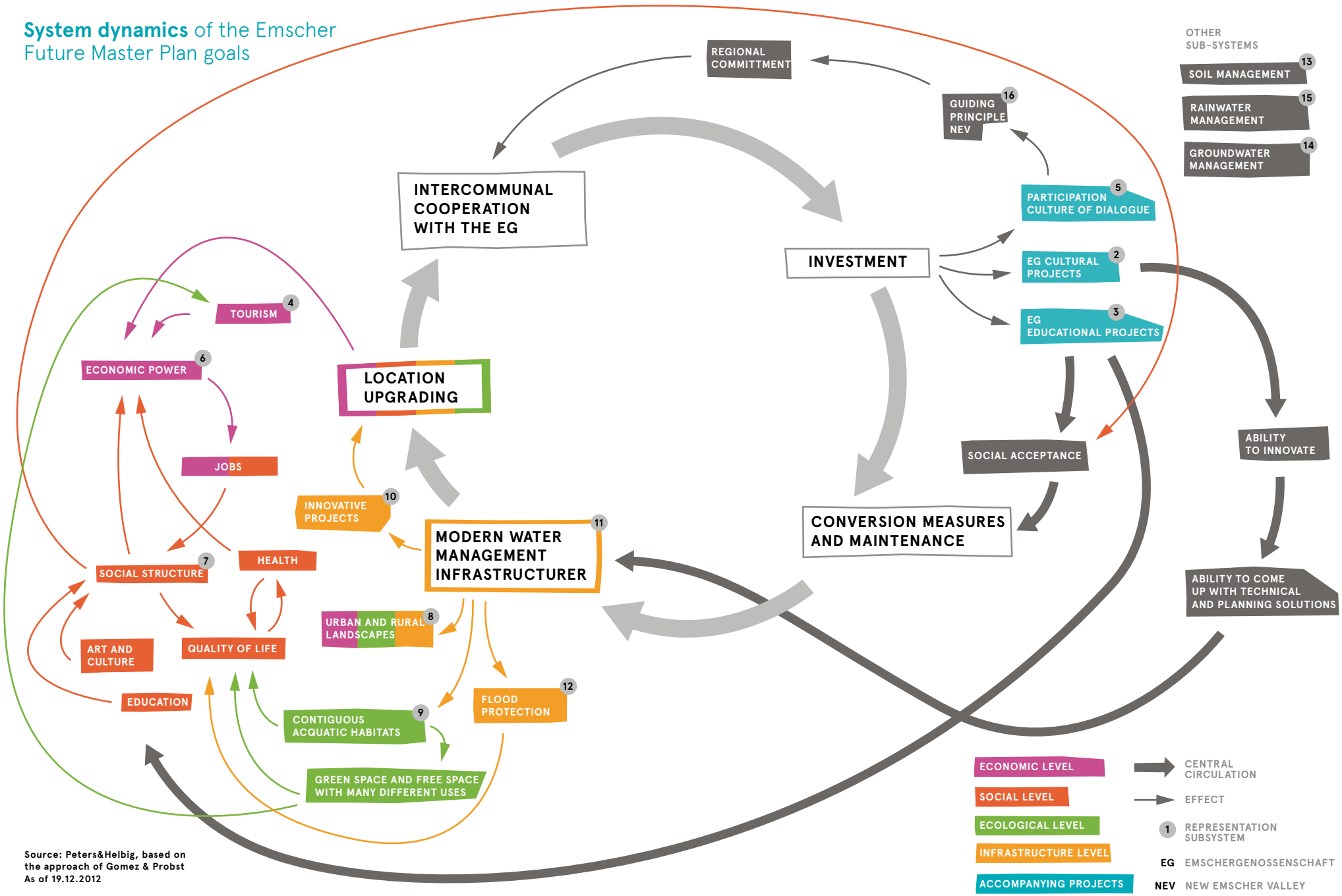
11 The Emschergenossenschaft commissioned management consultants Peters & Helbig to develop and monitor this process.

12 cf. Amonn, Jan, u.a.: Sozialraumanalyse Emscherregion. ZEFIR Forschungsbericht. Ruhr-Universität Bochum, Zentrum für interdisziplinäre Regionalforschung, 2011.

13 cf. Frohne, Julia; Pauen, Werner: Studie der International School of Management zum Tourismuspotenzial des Emschergebietes, commissioned by the Emschergenossenschaft –‚'Emscher Future' Division, 2011.

14 cf. Gomez, Peter; Probst, Gilbert: Die Praxis des ganzheitlichen Problemlösens. Vernetzt denken. Unternehmerisch handeln. Persönlich überzeugen. Bern, Stuttgart, Wien, 1995.

System dynamics of the Emscher Future Master Plan goals



Source: Peters&Helbig, based on the approach of Gomez & Probst
As of 19.12.2012

The third phase was about making strategic use of the findings gained on the interaction of influencing factors. The controlling qualities of the factors were known, which means investigations had been carried out on how actively they function in the system and how strongly they are influenced. This made it possible to identify the central leverage in the system that would make it possible to economically and responsibly achieve the Master Plan goals. These 22 strategic formative variables are divided into 'internal variables', which the *Emschergenossenschaft* itself can shape (e.g. 'participation'), and 'external influential factors', which have a major influence on the goals, but which cannot be directly controlled (e. g. 'legally-binding regulations'). In the *Emschergenossenschaft*, these formative variables provide a strategic orientation for the specialist divisions, which review and present their individual contributions. In this way, the formative variables form a basis for the strategic continuation and implementation of the Emscher Future Master Plan.

The iterative process of 'setting course' and systematic reflection on findings in further developing the Master Plan open up the possibility of using the Master Plan in a more targeted way as an instrument of knowledge integration and as a learning platform in the region in future. The continuation of the Emscher Dialogue in 2013 will provide an opportunity to reflect on further findings about the conversion's effects in the region and systematically evaluate the Master Plan's strategic management.

New governance structures

The description of the *Emscher Future* Master Plan and related knowledge management in the *Emschergenossenschaft* has identified the central management tools. The following section will go into more detail on why the intelligent management of such a conversion process is so important to a robust, resilient region. It will also explain why a cooperative is an organisational form that can be especially effective in meeting the demands involved.

By governance structures is meant new forms of economic and political management. The word 'governance' derives from the Latin word gubernare, which can be translated as 'guide', 'drive' or 'take the helm'. The word originally referred to the steering of a ship. Renaturing the Emscher is also in a sense about steering a figurative 'ship', an entire region, in a certain direction and keeping it on course.

'Regional governance' refers to management tasks extending beyond the boundaries of local authorities, districts or specialist disciplines. Such tasks deliberately range beyond these boundaries and can increase a region's stability in the face of ecological, economic and social crises — they improve a region's resilience.

Strategies for dealing with economic change and ecological challenges are being researched in the Emscher region. The *Emschergenossenschaft*, as a central actor in the region, is involved in this research and is required to coordinate its activities with a range of other stakeholders. Only in this way does it become clear that the Emscher conversion includes an innovative governance model: the management of complex connections. The *Emscher Future* Master Plan is an innovative method of getting relevant actors and local administrations 'on board' and 'sailing past' conventional processes and plans. With the *Emscher Future* Master Plan, the *Emschergenossenschaft* has created a central platform from which visions of the region's future around the topic of water can be negotiated.

The Emscher's course makes cooperation between the major actors possible, so experimental and innovative projects can be initiated beyond local authority and administrative boundaries. The wide range of social and technical solutions involved has meant that the *Emschergenossenschaft* was predestined to observe, reflect on and manage regional self — organisation. Its conversion is a complex development process that challenges all involved actors to keep constantly learning.

The *Emschergenossenschaft* is advancing and accelerating processes of change beyond waterways and in society as a whole. It improves regional stability by linking economic and technology policy with infrastructure development and manages the Emscher conversion as a shared regional and overall societal task.

Cooperatives often manage these kinds of infrastructure projects. Railways, electricity grids and waterways-cooperatives, with their many different stakeholders participating in an investment, are particularly suited to dealing with the long periods over which such infrastructure projects are amortized. Infrastructure can only be provided in a socially just and responsible way if its costs are shared. The Emscher conversion validates this principle. The members of the *Emschergenossenschaft* are the cities, local communities and districts in the Emscher area, mine owners in the region and commercial and industrial enterprises. The *Emschergenossenschaft*, as a managing stakeholder, combines business and technical expertise with its members' regional structures. As a cooperative, it is at the same time a commercial enterprise and a social and cultural association. Its work serves the common good, not the increase and maximisation of capital; instead, it seeks to provide integrated system services.

Cooperatives may be an old model, yet they are especially appropriate for finding solutions to current problems and dealing with the challenges faced by resilient regions. This is especially clear in the context of challenges represented by ecological crises such as global warming or the scarcity of natural resources like oil. The cooperative principle allows for responsible business management that focuses on creating long-term values, which is essential in managing such crises.

It is important that the cooperative does not follow a narrow economic logic. In contrast to the situation in private companies, its special organisational form means that it has an inherent interest in saving resources. Members of a cooperative are quickly made aware of the consequences of waste and mismanagement. Services on the one hand and demand on the other hand are very directly related. The various stakeholders rely on each other; they cannot damage each other because the rest of the collective would immediately be affected. The cooperative principle creates the preconditions for sustainable management, such as, for example, a more sustainable river-system management.

It cannot be denied that the capacity of intelligent management, focused on a resilient region, is limited. Despite the cooperation of the many stakeholders in the Emscher conversion, the renatured Emscher will not be returned to its original, natural condition, although an increase in biodiversity will strengthen the region's overall diversity. Species extinction, flooding and torrential rains, which are expected to be more frequent and devastating in future due to climate change, may not hit this region quite as hard.

Emscher Dialogue 2006 in Oberhausen: the then environment minister of North Rhine-Westphalia, Eckhard Uhlenberg, speaks to 400 participants

Theses for a new infrastructure model

1 — Infrastructure is embedded in a regional environment, so it must be adapted to the demographic, economic and social conditions in the region. In this sense, the Emscher conversion can serve as an example for other infrastructure projects.

2 — Modernising infrastructure demands not only technological innovation; it is part of an overall process that also requires ecological, social and institutional innovation. This in turn involves cooperation between many different actors and the linking of a diverse range of innovations.

3 — Treating infrastructure as part of an integral system has created a new culture of innovation in the Ruhr metropolis. In coming decades, infrastructure will have to be constantly adapted to dynamically changing conditions, both locally and globally.

Thinking ahead…

In achieving profound systemic change, social innovations are becoming increasingly essential, such as changes in consumer behaviour, for example. Such non-technological developments should be taken into account to a far greater extent in planning and decision-making.

Especially when the environment and sustainable development are concerned, apart from technological changes, innovative approaches to consumer behaviour and new business models are trialled that are necessary for sustainable development. One good example is the connection between car-sharing models and electric mobility. If 'green electricity' is used and can be intelligently integrated with bus, railway, taxi and bike and pedestrian traffic, electric mobility can be a sustainable alternative to motorised individual transport. The *Emschergenossenschaft's* decentralised rainwater projects also show that house and property owners and business operators can make a major contribution to natural rainwater management independently of the drainage system, by implementing various measures such as green roofs, rainwater use or unsealing ground. Such measures can also help them save money in the medium to long term.

Recommendations for further reading

Information from the Emschergenossenschaft on decentralised rainwater management: www.emscher-regen.de
Canzler, Weert; Knie, Andreas: Einfach aufladen. Mit Elektromobilität in eine saubere Zukunft, Munich, 2011
www.eglv.de/fileadmin/EmscherGenossenschaft/2.2_Ueber_uns/2.2.4_Unser_Anspruch/Leitbild.pdf

Innovation as an impetus for the region

The most important fundamentals of a successful and sustainable infrastructure conversion have been described above, with a focus on holistic planning and appropriate structures and tools. In the following chapter the question of how processes of renewal are initiated and how they progress will be dealt with in detail. This insight is a vital precondition for transferring experiences from the Emscher conversion to other projects.

Everyone is talking nowadays about innovation. It is regarded as a key factor in international competitiveness and social progress. Social transformation and innovation are closely connected and are also vitally important to the success and charismatic power of the Emscher conversion.

Researchers have not yet conclusively defined the concept of innovation. There is a tendency in everyday language to declare any change and every modification of a product as an innovation — not a tendency we want to follow. The characteristics of implementation, novelty and sudden transformation are central to a substantial concept of innovation.[1] From an application — oriented point of view, three kinds of innovation can be identified.

Process innovation, which enables the use of new technologies that initiate learning and more cost — effective processes and thus enhance efficiency.

Behavioural or social innovation, which paves the way for behaviours oriented towards and focused on strategies, and make synergies and effective cooperation possible and create new forms of awareness.

Product or service innovation, which brings about greater differentiation and use benefits, as long as it is experienced as market performance innovation.

1 cf. Fichter, Klaus: Grundlagen des Innovationsmanagements. Oldenburg 2009, p.14 f.

The spectrum of possible innovations will be described below, and the Emscher conversion used as the prime example. At issue here in particular, is to work out what is fundamentally new and to highlight an innovative approach to integrated, regional infrastructure development.

Innovative action in new structures

The fact that certain preconditions must first be created for innovative action is often overlooked. This was also the case in the Emscher region. In the beginning, political decisions were what provided the impetus and direction, and succeeded in creating a broad political consensus among all participants on the basic direction the innovation was to take. On this basis, sufficient resources were provided and new structures and systems built up. A sustainable basis was first created to make innovation and transformation in water management possible.

The subsequent process put particular demands on participating actors: creativity, targeted activity, cooperative learning and active communication were all required to meet the high demands of a paradigm shift.

Innovation as a creative process

Joseph Alois Schumpeter (1883-1950) based his theory of innovation around 'the creative entrepreneur',[2] whose drive and inventiveness bring new products and services in demand onto the market. Innovation is seen as a process of 'creative destruction', as the old has to make way for the new, and old structures and routines are overcome. Innovation became a key concept in the modern economy.

2 The translation into German of Schumpeter's two-volume work `Business Cycles', first published in the USA in 1939, introduced the word "innovation" into economic studies in Germany. The book contains a chapter on `A theory of innovation´. Schumpeter, Joseph A.: Konjunkturzyklen. 2 vol. Göttingen 1961.

Innovation as a goal-oriented process

In discussions on sustainable development in particular, the question of the right direction is raised to make sure that resources and energy are used efficiently.[3] According to Fichter and Paech, 'sustainability innovations' target the solving of problems at technical, organisational, institutional or social levels.[4] This can help preserve vulnerable natural assets and create global and transferable ways of doing business and consumption levels in the long term.

Innovation as a cooperative learning process

At the beginning of the innovation process, individual creative initiators are especially important. As implementation of an idea progresses, the circle of those involved expands. Innovation becomes a social and interactive process that many people support and implement. Companies take their customers' suggestions into consideration, in the regional and local contexts, networks develop between state agencies, science and research, and related industries.[5] Regional innovative capacity is based on knowledge exchange and cooperative learning processes (see the 'Knowledge strengthens the region' chapter).

3 cf. Gleich, Arnim von: 'Innovationsfähigkeit und Richtungssicherheit. Voraussetzungen für die ökologische Modernisierung der bundesrepublikanischen Stoffwirtschaft'. In: Arnim von Gleich; Simone Leinkauf,, and Stefan Zundel (eds), Surfen auf der Modernisierungswelle? Ziele, Blockaden, Bedingungen ökologischer Innovation, Marburg, 1997.

4 Fichter, Klaus: Interpreneurship. Nachhaltigkeitsinnovationen in interaktiven Perspektiven eines vernetzenden Unternehmertums. Marburg, 2005, p.134 f. Paech, Nico: Nachhaltiges Wirtschaften jenseits von Innovationsorientierung und Wachstum, Marburg, 2005.

5 cf. Porter, Michael P.: 'Location, Competition and Economic Development: Local Clusters in a Global Economy'. In: Economic Development Quarterly 14, Nr.1, 02/2000, pp.15–34.

Innovation as a participative communication process

Ground-breaking innovation such as the Emscher conversion needs a social consensus, so it is vital to promote new ideas and take as many people as possible down the new path, both in and outside the organisation, and create a climate that fosters an openness towards the new.[6] The implementation and acceptance of innovation is centrally connected with an active and participative communication policy.

These essential features of innovation processes have all been incorporated into the Emscher conversion. One creative impetus was the Bundesgartenschau (national garden show) in Dortmund in 1991, during which the Emscher was cleared of wastewater and converted along a modest two — kilometre stretch for the first time. The International Building Exhibition (IBA) gave this process further impetus in projects planned and structurally and technically implemented by the *Emschergenossenschaft*.

During this process, the *Emschergenossenschaft* also reformed its organisational structures. In the 1990s it appointed an IBA representative, as local and district authorities do. A separate 'Emscher Future' division was set up in 2003 to link water management, ecology and urban development. It created the Emscher Future Master Plan and coordinates the Emscher Dialogue with all participants (see the 'Knowledge strengthens the region' chapter).

The Emscher Future Master Plan is characterised by a holistic and visionary approach. The Emscher will become a new lifeline for the Ruhr area. With this vision, the concept of innovation changes: it is no longer about building water technology structures; it's about developing guidelines oriented towards creating an ecologically intact river landscape and new, creative and free spaces. Cultural development, innovative management and sustainable ways of life will be connected in a new way.

6 cf. Groys, Boris: Über das Neue, Frankfurt am Main, 1999.

This integrative approach can only be implemented together with other regional stakeholders. Relationships of trust have grown between water management, regional planning and urban development authorities and many creative professionals in the Ruhr metropolis. To the left and right of the Emscher a specific innovation environment has developed, in which it is possible to exchange different points of view and ideas and discuss the design of the ongoing process.

These new perspectives were put up for discussion in countless citizens' fora, diverse suggestions were recorded, and the results have been transferred step by step into binding plans. New Internet information platforms have been created and numerous new communication approaches trialled (e.g. the EMSCHERplayer). Open, transparent communication structures and participatory competence are fundamental features of the success of Emscher innovation. The Emscher system's conversion is supported by a broad social consensus. According to a survey by the research institute 'com.X', about 80 percent of the population supports the Emscher conversion.[7]

Creativity, an assured direction, cooperation and participation are the essential features of this multi-dimensional innovation process. The synthesis of these features leads to new social, cultural and institutional practices, and is supported and made concrete by countless decentralised projects. Cooperative forms of innovation also characterise the ways of working on the decades — long regional Ruhr metropolis projects. The many projects to upgrade the Emscher river area have become a trademark of the Ruhr metropolis.

7 cf. com.X Institut für Kommunikations-Analyse & Evaluation: Die Emscher und das Projekt Emscher-Umbau: Repräsentative Telefonbefragung in Städten entlang des Emscherverlaufs. Unveröffentlichte Evaluationsergebnisse, Bochum, 2003. com. X Institut für Kommunikations-Analyse & Evaluation: Wahrnehmung umgebauter Gewässer. Studie im Auftrag der Emschergenossenschaft. Unveröffentlichte Evaluationsergebnisse, Bochum, 2011.

Innovation for the Emscher conversion — modern technologies like this tunelling machine are helping to achieve the shared vision of the 'Emscher Future'.

Opening up new space for innovation

Innovation means change, and on a regional scale this means changing economic structures in particular. From a micro — perspective, innovation leads to a new concept of the tasks of organisations. Water management has special requirements. Water is supplied through an infrastructure system that is tied to a certain space, has a long lifespan and depends on natural ecosystem conditions. Its technical preconditions mean that drinking water supplies and wastewater disposal are not easy to change and adapt to new spatial and social conditions.[8]

The example of the *Emschergenossenschaft* makes this clear. On the one hand its core water management tasks must be carried out carefully and reliably, and on the other it needs to open up new areas of innovation and dare to experiment. The challenges this involves will be outlined below.

The *Emschergenossenschaft* describes its core tasks thus: 'The most important tasks of the *Emschergenossenschaft* are wastewater treatment, securing drainage, flood protection and waterways maintenance. [...] We operate five large wastewater treatment plants, 107 pumping stations and 341 kilometres of waterways, of which 229 kilometres are closed wastewater canals.'[9]

The Emscher conversion's scale and investment volumes (4.5 billion Euros) are unique in the Federal Republic of Germany. But is laying wastewater pipes underground really new? What is special about this large — scale project?

The answer is relatively simple: channelling wastewater into an underground canal creates new spaces for innovation above ground. The basic ecological functions of waterways are strengthened and incorporated into the urban development of the Ruhr metropolis, and the river landscape is opened up for culture and recreation. This makes the Emscher conversion more than the technical 'backbone' of economic development; it is in the best sense a sustainable contribution to the urban development of the Ruhr metropolis, with many new ecological, social and urban development facets. Integrating related areas of innovation and infrastructure design, linking waterways ecology with sustainable urban development is really new and a major challenge for all participants.

The chapter titled 'Knowledge strengthens the Region' describes the ways in which knowledge from many disciplines is needed to enhance quality of life for people in the region. The water management of tomorrow will be a catalyst for the 'good life' in the Ruhr metropolis and a vital partner in all the issues facing the region in future and in efforts to maintain the natural basics of life for coming generations.

The *Emschergenossenschaft* has redefined its regional self-image in the light of these new cross-sectoral tasks. It regards itself as part of the region, a part that wants actively to help shape structural change.

We are actively contributing to forming the Emscher/Lippe region by setting new water management standards as part of wider structural change, setting landscape planning priorities and providing the necessary infrastructure. As part of these activities, we are in contact and open dialogue with those promoting our region's development. We want to use our know-how and experience to influence public dialogue, political decision-making and structural change in the Emscher/Lippe area.[10]

The *Emschergenossenschaft* regards itself as a learning organisation that actively interacts with other actors involved in shaping the region for the future.

8 cf. Naumann, Mathias; Wissen, Markus: Neue Räume der Wasserwirtschaft. Untersuchungen zur Trinkwasserver- und Abwasserentsorgung in den Regionen München, Hannover und Frankfurt (Oder). NetWORKS-Paper 21. Edited by Forschungsverbund netWORKS, Deutsches Institut für Urbanistik, Berlin 2006, p.5f.

9 www.eglv.de/emschergenossenschaft/ueber-uns/aufgaben.html (05.01.12).

10 www.eglv.de/fileadmin/EmscherGenossenschaft/2.2_Ueber_uns/2.2.4_Unser_Anspruch/Leitbild.pdf. (05.01.12).

At the same time, it emphasises how essential its own qualified staff is in securing success in this way. The *Emschergenossenschaft* also initiates and supports many research projects by providing data and expertise and implementing measures.

Examples from the catalogue of innovations

The following examples from the diverse catalogue of innovations demonstrates the approach that has been pursued by the *Emschergenossenschaft*. The river's ecological conversion is based on new structures and technical processes. New space for nature to develop is being created along rivers and creeks, while areas are being unsealed and rainwater and polluted water is being separated in urban areas. This is all connected with urban development innovations and cultural initiatives, and many new sites of learning are being created to communicate these changes.

The ecological conversion of the Emscher system

The strategy for the Emscher system's ecological conversion consists of three central areas of innovation, which we will outline below.

The innovation area of system conversion New, decentralised wastewater treatment plants and pumping stations have been or are currently being built along the Emscher so that wastewater can be locally treated. Wastewater will be channelled into an underground canal, which is scheduled to start operating at the end of 2017. Of the 421 kilometres of the new wastewater canals to be built, 225 had been completed by 2012. The challenge is a unique one, because also sub-systems upstream are being re-built. Not only are existing technical wastewater systems being upgraded and adapted to increased demands, but, taking existing urban drainage structures into account, mainly new systems are being built to ensure that the Emscher's waters can be managed as naturally as possible. With its 865 square — kilometre catchment area and wide range of tasks, the Emscher conversion project is Europe's biggest water management measure.

The innovation area of the renaturation of rivers and creeks Once wastewater has disappeared from open canals, renaturation of the river and creek system can begin. Around 120 kilometres of creeks, the upper reaches of the Emscher in Holzwickede and Dortmund and the Alte Emscher and Kleine Emscher in Duisburg have been converted to a near-natural state. The New Emscher Valley waterways are very popular and the region's recreational value has also risen enormously. With the return of clean water, long-lost types of plants and animals are also returning. Nature is being given a new chance to develop biodiversity and a large number of species. The new waterways with their floodplains are also a balancing factor for urban climates and the water supply cycle.

The innovation area of separating rainwater and polluted water Wastewater and clean water is being separated as part of broader natural rainwater management. In a heavily urbanised region like the Ruhr area, the ground is largely sealed, so large quantities of rain usually flow directly into drains and are then transported together with polluted water to treatment plants. Wastewater canals are designed to do this and rebuilding them involves additional cost. Rainwater drained in this way also does not go towards recharging groundwater and supplying bodies of water with surface water. The goal is therefore to separate precious rainwater from the drainage system and treat it differently where it falls (e. g. by filtering it through soil, diverting it into new bodies of water and/or by reducing inflows).

This reduces the financial costs of draining urban areas. Careful estimates have forecast a potential saving of around 70 million Euros for the structures the *Emschergenossenschaft* is building, plus another 200 million Euros for refurbishing urban canal networks.[11]

11 Becker, M.; Raasch U.: Erfahrungen zur naturnahen Regenwasserbewirtschaftung in der Emscherregion, Essen, 2000. Zusätzliche Informationen unter www.emscher-regen.de.

The integrated strategy has three main benefits. From an ecological perspective for example, separating rainwater and polluted water supports the recharging of groundwater. From a cultural point of view, the population can again experience the Emscher's aquatic landscape and be made aware of sustainable water use. From an economic perspective, there are benefits for the *Emschergenossenschaft* itself as well as for the population. Separating polluted water and rainwater means that wastewater canals and treatment plants can be smaller and property owners who unseal parts of their land do not have to pay the water treatment levy.

Water as a new reference point for spatial development

The conversion of the Emscher system has many links with urban development through its integrated consideration of waterways, housing and infrastructure. The particular challenge here is to develop a forward-looking concept for the region from Dinslaken/Duisburg to Holzwickede and reshape the Emscher as a connecting, central element. One precondition of this is that people can again access the Emscher and its tributaries. This new access and the new paths mean the river landscape can again be used and experienced.

The 'New ways to water' (Neue Wege zum Wasser) project in Essen is working towards this goal. Stretches of waterways along the Berne, Borbecker Mühlenbach, Stoppenberger Bach, Katernberger Bach and Pausmühlenbach have been made accessible again with new pedestrian and bike paths. Around 120 kilometres of paths along waterways between attractive places in the Emscher area have been laid and connections between river areas created. The waterside route between the Emscher at the Berne estuary in Bottrop-Ebel and the Ruhr in Essen-Werden is one of the routes connecting the New Emscher Valley and the Ruhr Valley.

In the converted river region, islands of landscape and green spaces have been united and new areas with particular recreational value created. One outstanding example of this is the Phoenix See (Lake Phoenix) in Dortmund.

Although the New Emscher Valley is still a big building site, it is already apparent that already-completed projects have had many positive influences on the urban environment. Many leisure and recreational opportunities that make city life more attractive have been created. Living by the water or in a greened area has been made possible with the developing of additional spaces; people can walk along local lakes and water meadows and or access them by means of environmentally-friendly transport. The many green areas near cities have become a 'trademark' of an improved quality of housing and living, increasing the area's overall attractiveness as a location for business and industry.

The Emscher region as a 'learning laboratory' for other regions

The Emscher region is well on its way to the future and the *Emschergenossenschaft* and Ruhr Regional Association (Regionalverband Ruhr) are showing the way with their Master Plans. One of the central visions is already taking shape. From Hamm to Duisburg a 'learning laboratory' has been created in which many actors, ranging from engineers through to residents, have discussed and contributed ideas for designing and using the new river landscape and infrastructures. The Emscher conversion wastewater technology project has in this way also become a collective project embedded in a broad canon of social and cultural projects. The region along the Emscher is not only being ecologically revitalised, a culture of ideas and coexistence is also evolving that has helped to make the Emscher conversion widely supported by the population. Other regions in Germany and Europe that have to deal with major infrastructure projects will be able to benefit from the experiences here. The challenge is to use the dynamism of such modernising processes positively for each region and transfer it individually to each one.

Taking the Emscher conversion as an example, four factors that make it possible to design and implement infrastructure projects as regional 'learning laboratories' can be identified.

New residential, recreational and *Erlebnisraum*
in the Ruhr area – the Phoenix See in Dortmund-Hörde

The Phoenix See Entwicklungsgesellschaft, a subsidiary of DSW21 (Dortmunder Stadtwerke AG), developed Lake Phoenix (Phoenix See) in cooperation with the *Emschergenossenschaft* and the city of Dortmund to be a starting point for multifunctional urban development.
The lake is at the centre of a new recreation and services area to the south-east of Dortmund. With a 24 hectare expanse of water, it is bigger than Hamburg's Binnenalster lake. Excavation work on the lake began in 2005 and the official date for its filling to start was 1 October, 2010.
Lake Phoenix, with its ambitious ecological and aesthetic design, is making an outstanding contribution to quality of life in Dortmund. The 'Quartiere am See' urban development integrates housing, work and recreation. A top address is being developed for innovative companies on around 110 hectares. Phoenix West has been under development for years as location for microtechnology/nanotechnology, production technology and information technology, and offers space for services and leisure industries. Under the lead management of NRW-Urban (formerly LEG), an innovative utilization concept for Phoenix West is gradually being implemented here.

First: Current fundamental modifications of infrastructure systems are closely connected with the factors of demographic change and economic structural change. The goals of public services must be adapted to these new framework conditions. Existing water management infrastructure is not only being technically modernised; it is also being adapted to changed social needs. The *Emschergenossenschaft* is responding to these changes not only quantitatively, but also qualitatively, with changed output and services. In this context, the intense regionalisation of water management in the Ruhr metropolis turns out to be a strength. Regional differences and particularities are taken into account and existing economic and political relationships are built on during implementation. This regional approach and the related possibilities of mobilising endogenous factors in the innovation strategy will also be transferrable to the energy and waste management industries.[12]

Second: The regional location of infrastructure providers and their entrepreneurial investment activities facilitate specific solutions for the region. The Emscher Valley's development, for example, is closely linked with the Ruhr area's polycentric structure and the idea of strengthening connecting axes between centres. This also overcomes the usual separation of infrastructure planning from land — use planning, which is paradigmatic for regional development in other regions and countries.

Third: The Emscher conversion is contributing to the ecological modernisation of the area as a business and industry location. Its measures improve the location's quality and enhance the entire area's attractiveness to companies and the population. At the same time, many new capacities that also increase the region's economic and innovative power have been achieved in the conversion process. New technologies have been developed, trialled and implemented.

12 Lucas, Rainer: 'Räumliche Bewusstlosigkeit. Metropolenkonzepte und die Folgen'. In: Der Kritische Agrarbericht 2011, Munich, 2011, p.164–168. Naumann, Matthias; Moss, Timothy: Neukonfiguration regionaler Infrastrukturen. Chancen und Risiken neuer Kopplungen zwischen Energie- und Abwasserinfrastruktursystemen. Leibniz-Zentrum für Agrarlandschaftsforschung, Müncheberg, 2012. (ELaN Discussion Paper).

The Emschergenossenschaft *has been investigating the topic of hydrogen for several years. At our large treatment plant in Bottrop we are running a research project funded by the EU and Land NRW. [...] We channel the hydrogen produced through a pipeline into a school centre in Bottrop. [...] The* Emschergenossenschaft *is one of the founding members of the h2 — netzwerkes — ruhr.*

Dr. Emanuel Grün Chairman of Water Management and Technical Services, Emschergenossenschaft / Lippeverband. Cited from www.emscherplayer.de/playMedia.yum?mediaID=74865.

New approaches to shared use of the river landscape have been created in the Dialogue (see the chapters titled 'Infrastructure conversion creates common goods' and 'Developing the future together. Changes to society by participation'). The *Emschergenossenschaft* is thus a major initiator of ecological and social infrastructure design that will supply services to improve quality of life, which also makes it one of the 'engines' of regional economic development. Such proactive entrepreneurship in a public authority is a model for success in other regions or areas of infrastructure, such as in renovating buildings, for example, which will be necessary in coming decades with Germany's transition to renewable energies. It should not only be used to optimise energy flows but also to make working and living in buildings and urban areas more pleasant, by creating recreational spaces for example or taking ideas for 'greening' buildings into consideration.

Fourth: If an expanded range of tasks is perceived as part of infrastructure provision for the purposes of sustainable development, this will also have consequences for regional governance and policy — making at higher levels (see the chapter 'The Emscher 3.0 — on the way to "blue infrastructure"'). It dispenses with a purely sectoral management approach and replaces it with a multi — dimensional approach to transformation.[13] In practice, committees and management bodies can be formed that offer a range of different qualifications and interact with each other in a lively way. This multilateral process management is also an important innovation, which could provide lessons for the further organisation of the transition to renewable energies.

A culture of innovation – collaborative lateral thinking

Continuing the generation and use of innovation is an important 'engine' of a region's ongoing economic and social development. Innovation does not however simply emerge and is not an end in itself. It is instead necessary to clearly define the strategy and goal that innovation serves. A study of the world's 25 most innovative companies shows how important it is to integrate creativity into a system of clear structures, responsibilities and processes. They should not confine it, but create space for visions and ideas. Such a framework is a precondition for developing a culture of innovation.[14]

Many people can now immediately experience a culture of innovation in the Emscher landscape, for example, through a different way of dealing with water or thanks to the value of clean water and intact ecosystems. The many small steps and projects

13 **Lucas, Rainer; Schneidewind, Uwe: 'Governancestrukturen und Unternehmensstrategien im Klimawandel — vom Leitbild zum Handeln'. In: Karczmarzyk, Andre; Pfriem, Reinhard (pub.): Klimaanpassungsstrategien von Unternehmen. Theorie der Unternehmung, Bd.1051, Marburg, 2011, p.123—144.**

14 **cf. Onpulson: Ohne Innovationskultur gibt es keine Innovation, 2010. www.onpulson.de/themen/2627/ohne-innovationskultur-gibt-es-keine-innovation (19.12.12).**

Learning from each other – participants in the 'Gemeinsam für das Neue Emschertal' Forum during the visit to the Hahnenbach in Gladbeck-Brauck in September 2011

provide various forms of impetus to changes in perception. This also entails a change in culture: from a culture of damage limitation to a culture of positively appropriating and designing landscapes and the element of water.

This change of culture entails a fundamental ecological consensus that certainly guides the Emscher conversion. It must also prove its worth in everyday life. Social benefits and economic costs also come into play here. Many actors in a process will also have many views and interests. The results are evaluated differently and there may be a range of different opinions on the steps that should follow. Such discussions must be channelled so that a culture of innovation can emerge and continue. Every culture of innovation also needs a culture of discourse that allows for difference, makes participation and collaborative design possible, and yields new forms of interaction. The many workshops and fora held on the Emscher conversion have yielded such a culture of discourse, in which shared solutions have been sought, despite differing points of view. They have resulted in relationships of trust growing between actors that positively impact other areas. The collaborative achievement that is the Emscher conversion is not yet complete; however, we can already see a cultural basis for cooperation that will enable other key future tasks to be successfully managed in this decade.

Further achievements of the conversion include a greater integration of water management into a wider green economy, the development of the Emscher region as a place of learning, and the various experiments designed to create sustainable urban ways of life. Openness towards change taking place in the world and the diversity 'on our own doorstep' has become a key factor in sustainably and innovatively developing the Ruhr metropolis. Infrastructure conversion has not only set the course for the use of energy and resources in the region; it is also determining what kind of quality the Ruhr metropolis can achieve as a place to live, work and do business.

Theses for a new infrastructure model

1 — **Infrastructure is embedded in a regional environment, so it must be adapted to the demographic, economic and social conditions in the region. In this sense, the Emscher conversion can serve as an example for other infrastructure projects.**

2 — **Modernising infrastructure demands not only technological innovation; it is part of an overall process that also requires ecological, social and institutional innovation. This in turn involves cooperation between many different actors and the linking of a diverse range of innovations.**

3 — **Treating infrastructure as part of an integral system has created a new culture of innovation in the Ruhr metropolis. In coming decades, infrastructure will have to be constantly adapted to dynamically changing conditions, both locally and globally.**

Thinking ahead…

In achieving profound systemic change, social innovations are becoming increasingly essential, such as changes in consumer behaviour, for example. Such non-technological developments should be taken into account to a far greater extent in planning and decision-making.

Especially when the environment and sustainable development are concerned, apart from technological changes, innovative approaches to consumer behaviour and new business models are trialled that are necessary for sustainable development. One good example is the connection between car-sharing models and electric mobility. If 'green electricity' is used and can be intelligently integrated with bus, railway, taxi and bike and pedestrian traffic, electric mobility can be a sustainable alternative to motorised individual transport. The *Emschergenossenschaft's* decentralised rainwater projects also show that house and property owners and business operators can make a major contribution to natural rainwater management independently of the drainage system, by implementing various measures such as green roofs, rain-water use or unsealing ground. Such measures can also help them save money in the medium to long term.

Recommendations for further reading

Information from the Emschergenossenschaft on decentralised rainwater management: www.emscher-regen.de

Canzler, Weert; Knie, Andreas: Einfach aufladen. Mit Elektromobilität in eine saubere Zukunft, Munich, 2011

www.eglv.de/fileadmin/EmscherGenossenschaft/2.2_Ueber_uns/2.2.4_Unser_Anspruch/Leitbild.pdf

Infrastructure conversion as an opportunity for improved quality of life

Quality of life in the Ruhr area and along the Emscher river has improved considerably over the past decades, as anyone living in this area would surely agree. But what is quality of life, and how can it be measured? Has life alongside the Ruhr and Emscher really improved and how has the conversion of the Emscher river influenced it? The next chapter deals with these questions.

Prosperity and quality of life – What do they mean and how do they relate?

Most people would probably give similar replies to these questions.

Prosperity means to have lots of money.
To be very prosperous means high quality of life because I can afford anything I like.
All desires can be fulfilled.
I am happy.

Is that really so? Does physical, material prosperity really account for the quality of our life? Gradually, other things relevant to our life and well-being quickly come to mind. We want to be healthy, as illnesses considerably impact our quality of life. We want a good job. Not just for the money, but also because work gives us a feeling of being needed. Work gives us satisfaction and raises our self-confidence. We strive to live in a social community with our family and friends because it gives us a feeling of security. We want an intact environment where we can recover from day-to-day stress and to enable subsequent generations to have an enjoyable life.

Of increasing importance is the much-quoted work-life-balance, i.e., a healthy balance between work and leisure time where we can pursue our hobbies and spend time with our family and friends. Thus, the equation prosperity = quality of life does not cover all factors, as is depicted in detail by the images on the following pages. Many people are raising questions about the direct link between

economic prosperity and rising quality of life. Awareness for the diverse factors that influence our life has matured, as is shown in the second illustration.

As a consequence, opinions in politics and society slowly are changing. So far, the so-called gross domestic product, i.e., the sum of all goods produced by a country during one year, was the only reliable metric to describe the (economic = liveable) condition of an economy. Thus, the more goods that were produced, the better. Permanent growth was the only desired development. This, however, neglects many of the relevant factors that influence our quality of life. For instance, it does not reflect the ecological outcome of an economic development that focuses exclusively on growth. It is also not possible to derive how many hours we have to work for such economic success and how much available leisure time we still have. The GDP also does not provide any details on the healthiness of a country's population.

The *Statistisches Bundesamt* (German Federal Office of Statistics) uses specific metrics to describe sustainable development in Germany, which covers issues of ecology, education and, of course, economics. Other indicators that highlight the inequalities in our society are also used, however, such as the difference in income between women and men that also gives testimony to the quality of life in Germany.

The situation in Germany has improved markedly in many areas during the past years. This applies to education, for instance: the number of school dropouts and people without a vocational or academic qualification has dropped noticeably and the number of employed people is rising. Looking at the work-life-balance, Germany shows quite positive figures. An international comparison shows that, annual working hours are far lower than in other countries while, coincidentally, the time Germans spend with their friends and family and for leisure activities is above the average.[1]

1 OECD Better Life Index, www.oecdbetterlifeindex.org.

In terms of quality of life, it is also essential how safe people feel. According to the *Statistisches Bundesamt*, in 2012 the crime rate in Germany has dropped significantly over the past years. The analyses also show that Germans (compared on an international scale) feel safe on their streets, particularly at night.[2]

In many cases it has been pointed out that an intact environment is highly relevant to the quality of life of many people (cf. illustration on page 132). Improvements are visible here, too: the share of renewable energies is rising continuously, greenhouse gas emissions have been reduced considerably, and it was possible to at least stop more ground from being sealed-off, although the extent of this varies by region.[3] At the same time, however, the anticipated positive effect concerning certain ecological aspects has not yet shown any yield. The diversity of species in Germany is declining, the introduction of nitrogen into the soil using fertilizer has not yet reached the desired threshold and the same goes for pollution of the air with harmful substances.

Noticeably, quality of life in Germany is also very high in social terms as compared to other countries. There are also factors here, however, where there has been no positive development. The conclusion may thus be drawn that the perception of quality of life varies substantially. An example of this can be found in income differences between men and women. As the illustration on page 133 shows, the fact that women earn on average 20 percent less than men has not changed in recent years. In general, the gap between the very poor and the very rich is growing considerably. Current discussions also reveal that our social security systems will become more and more overburdened in the coming decades, and there is still the threat that old-age poverty will rise considerably. Economic wealth will presumably be distributed more and more unevenly.

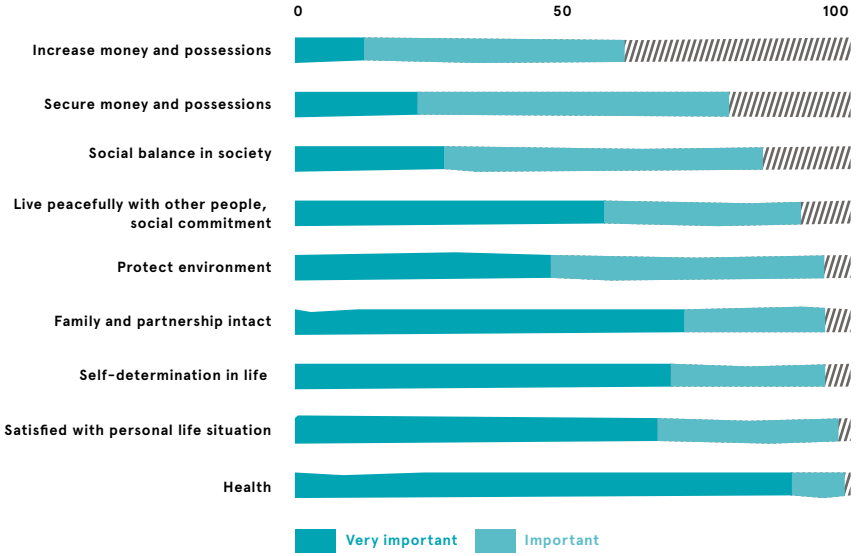
2 OECD Better Life Index, www.oecdbetterlifeindex.org.

3 Statistisches Bundesamt: Nachhaltige Entwicklung in Deutschland. Daten zum Indikatorenbericht 2012 (Sustainable Development in Germany. Details on the Indicator Report).

Rise in quality of life with higher economic growth

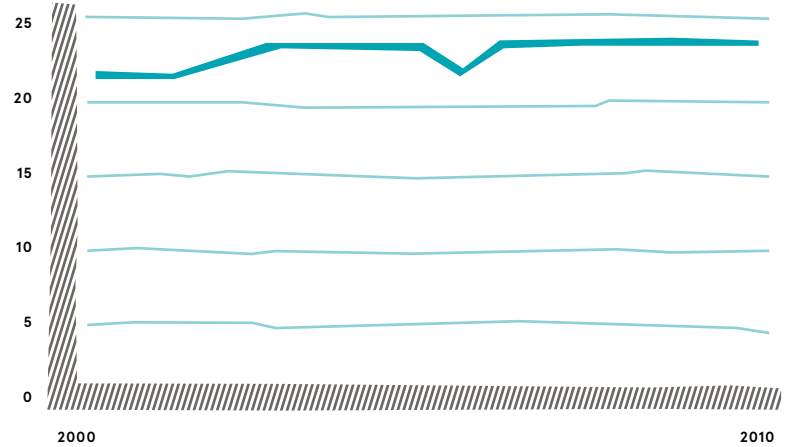
Data: Bertelsmann Stiftung, Kein Wachstum um jeden Preis (No growth at any cost). Survey conducted by TNS Emnid on behalf of Bertelsmann Stiftung in July 2012 (own depiction)

Importance of various aspects for personal quality of life (in per cent)



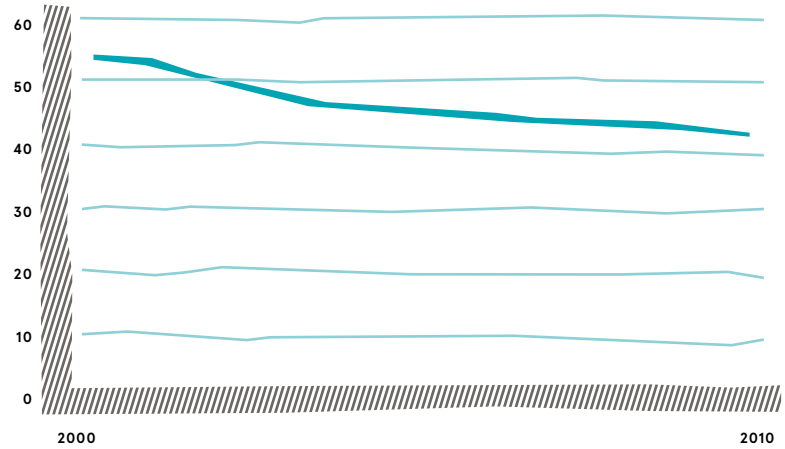
Data: Bertelsmann Stiftung, Kein Wachstum um jeden Preis (No growth at any cost). Survey conducted by TNS Emnid on behalf of Bertelsmann Stiftung in July 2012 (own depiction)

Additional income of men compared to women (in per cent)



Data: Statistisches Bundesamt, Nachhaltige Entwicklung in Deutschland. Daten zum Indikatorenbericht 2012 (Sustainable Development in Germany. Details of the 2012 Indicator Report) (own depiction)

Air pollution (1990 = 100)



Data: Statistisches Bundesamt, Nachhaltige Entwicklung in Deutschland. Daten zum Indikatorenbericht 2012 (Sustainable Development in Germany. Details of the 2012 Indicator Report) (own depiction)

In summary, we can see that we have a comparably high quality of life in Germany. Quality of life cannot be measured exclusively in economic data, as there are very different influencing factors that determine how we perceive our life. Over recent years there have been considerable improvements in some areas, although not all population groups have benefitted equally from these improvements.

How has quality of life changed in the Ruhr area?

Quality of life used to be evaluated quite differently compared to today. In the mid-19th century, when the prospering mining industry brought jobs and wealth, it entailed a rise in quality of life. The goods and services produced along the industrial Emscher river stimulated consumption. In the heyday of the industrial era, the Ruhr area was one of Germany's economic strongholds. Rising incomes resulted in higher quality of life, although there were also negative outcomes: surfaces were sealed off, the air was full of pollutants and untreated industrial effluents and growing cities polluted the rivers. The consequences for the eco-system were clearly visible: quality of life in the Ruhr area declined rapidly. The utilization of the Emscher river to drain effluents from industry, mines and households is a prime example of the damage caused to the eco-systems: the river landscape as a living environment for the people of the region was lost. Steps were not taken until the 1980s to improve the situation. The quote below illustrates how drastic the situation was to change in the Ruhr area in order for it to continue to be a sustainable metropolitan region.

Many decisions to take up residence are made depending on whether a region is interesting in terms of urban planning, culture and landscapes as well as its offer of leisure activities. This is why companies tend to settle in Munich or Cologne. They say their managers and families like it there due to the diverse cultural offers and other attractions. The Ruhr area, however, is not considered an attractive region in this context. For a long time subsidies for the industry were channelled into hard location factors, such as traffic infrastructure, good locations or a high labour surplus. One of the greatest deficits of the Ruhr area was to neglect the city landscape and scenery. It would be fair to say that 20 years ago the Ruhr area was an accumulation of faceless towns that are only slowly being polished up now. Quality of life has only recently been discovered as a factor for regional economic policy. The conversion of the Emscher is one exemplary project

of many. Think of the inner harbour in Duisburg or the Phoenix Lake in Dortmund. Suddenly, quality of life has become an important characteristic to make a region attractive. I think this is one of the great challenges of economic subsidising, urban planning and culture policies in this region.

Prof. Dr. Gerhard Bosch Director of the Institute of Work and Qualification at the University of Duisburg. Quote from: www.emscherplayer.de/playMedia.yum?mediaID=45309 (Jan 15, 2012).

The face of the Ruhr area has changed dramatically over the past twenty to thirty years. The area is now far from being a dirty, forbidding coal pit. As a result of an urbanistic, architectural and cultural change of mind, the region has been upgraded considerably and, consequently, quality of life has improved. This process of transformation was confirmed by its nomination as the European Capital of Culture in 2010. Of course, this does not mean that the structural transformation is complete. Many ecological and social problems still prevail.

Frank Goosen says: 'On mild summer evenings I enjoy the view of my city while standing on the railway bridge at Lohring in Bochum. I can see the Mercedes tower at the station, the Fiege brewery, the new high-rise tower of the municipal services (which looks a bit like the monolith from "2001"), the steeples of the Propstei and Christus churches, and to the far right I can even see the pit shaft tower of the mining museum. And then I say to myself: Well, it's not a beauty, is it'.

Frank Goosen author and cabaret artist, assistant chairman of the supervisory board of VfL Bochum. Quoted from.: Goosen, Frank: Geschichten von zuhause. Frankfurt/M. 2010.

Not pretty, maybe, but still a home to be proud of in a way. That is what is so characteristic about the Ruhr area: the people are aware of its weaknesses and of the fact that the Ruhr area is not flawless, but is faults are accepted as part of their home and have even become liveable in a way. Such self-confidence can unleash the energy required to actually solve problems. Remodelling the river has raised hopes for a better quality of life and new prosperity, which can be assessed in economic terms, as redesigning the river region will upgrade the entire region, thus making it more attractive for business. Highly qualified workplaces will develop: 3,400 jobs per year are linked to the conversion of the Emscher system. The allocated investments amount to EUR 4.5 million in total.[4] Moreover, attractive quarters that enable new forms of living and working will also be developed.

But new prosperity in the context of the initially described multifaceted quality of life will also develop along the Emscher.

4 Cf. Emschergenossenschaft (Hg.): Masterplan Emscher-Zukunft. Das Neue Emschertal (Emscher Future Master Plan. The new Emscher valley.) Essen 2006, P.8.

Cycle routes, footpaths and even horse trails are being developed on abandoned railway tracks, industrial wasteland and along rivers.

The furnaces, pit shafts, digesters and water towers are fascinating monuments that embody the spirit of the past industrial era similar to the cathedrals from the Medieval ages or antique Greek cities. Since the 1980s the arts and culture have inherited the industrial legacy in the Ruhr area. Converting the water system will be the next stage for more quality space to be developed.

From flood protection to a multifunctional recreational waters

The Phoenix See (Lake Phoenix) in Dortmund is such an example as it serves to hold back floodwater and is also used for leisure and urban development purposes. The zones around the banks of the renatured Emscher river, along the lake and its further course serve as a sustainable and especially as a family-friendly addition and improvement to the living environment (cf. Chapter 'Innovation as an Impetus for the Region')

From effluent drainage to an adventure playground

The *Emschergenossenschaft* has developed a water adventure route along the *Hahnenbach* stream. Hikers, cyclists, school groups and animals now can directly access the water.

From rural roads to recreational routes

The *Emscherweg* (Emscher Route) between Holzwickede and Dinslaken is now a tourist cycle route open to the public that lets you explore the region either by foot or bike. It covers a total length of 102 km.[5]

5 Cf. Allgemeiner Deutscher Fahrrad-Club (Hg.): Deutschland per Rad entdecken. (Discovering Germany by Bike) Bremen 2013, p.61.

From a commercial region to town gardens

New open spaces are being converted into intercultural gardens, for instance. They include urban gardens created by the residents, and people with immigrant backgrounds who have become residents of the Emscher zone are helping actively to improve the quality of life. Just such a garden has been created on the site of the former town garden centre of Oberhausen and was supported by the *Emschergenossenschaft*. It is a venue for events, a place where plants are cultivated and thus a site of urban development and communal education. Since 2011, artist Tobias Rehberger has been building the *Slinky Springs to Fame* bridge as a transition point between the *Kaisergarten* and *Emscher Insel* ('Emscher Island'). In conjunction with the *EmscherErlebnis* project, the *Kaisergarten* closes the gap between the various historical and ecological aspects and the future of the Emscher system. As a historic public park it also serves as a place for leisure and recreation activities for the town of Oberhausen and beyond.

These examples indicate that the conversion of the Emscher offers potential for a better quality of life; however, it is not possible to exploit such potential on its own. This is also confirmed by a recent analysis of the social environment of the Emscher region.[6] In essence, it shows that for the towns along the Emscher the demographic development, social structure, education, health and life situation of the non-German population is not uniform. Some towns are experiencing considerable problems due to their ageing populations, high numbers of school dropouts and poor health. This refers to the life expectancy and proportion of overweight school pupils. Quality of life in the Emscher region, then, is not developing evenly. Considerable differences exist between the towns, and polarisation within them is heightening, as can be seen from the fact that the gap

6 ZEFIR – Ruhr-Universität Bochum, Zentrum für interdisziplinäre Regionalforschung: Sozialraumanalyse Emscherregion. (Bochum Ruhr University, Centre of interdisciplinary urban research: Analysis of the social setting of the Emscher region) ZEFIR Research Report. 2011, available at: www.ruhr-uni-bochum.de/zefir/publikationen/index.html (15.01.12).

Art and a crossing point – the 'Slinky Springs to Fame' footbridge across the Rhine Herne Canal by artist Tobias Rehberger

between wealthy and poor households is growing continuously in all towns. The structural problems of the Emscher region have not been solved yet, but maybe the conversion of the Emscher river can help.

What discoveries from the conversion of the Emscher can be applied to the conversion of other infrastructure areas?

It remains to be seen what we can learn from the conversion of the Emscher for the transformation process in other infrastructure areas. Many large tasks will be tackled here in the years to come, above all the national energy transition.

Over coming decades our energy supply will be continually shifted toward renewables and will become substantially more efficient. Coincidentally, the share of energy generated from coal and lignite as well as nuclear power will decline. This conversion entails many infrastructural projects. In terms of quality of life we should ask what we could learn from the conversion of the Emscher for the conversion of the energy system.

In general, we can say that such conversion measures provide an opportunity to increase the population's quality of life. Looking at the energy transition, there are positive and negative effects as well as less obvious issues. The closing and renaturing of a lignite pit initially has a positive effect on the population's quality of life. Pollution from active open-cut mining pits is on the decline, at the same time as the area's landscape is evolving, thus raising the recreational value of the region. Likewise, the closure of nuclear power plants will lower the risk of accidents and improve the safety of the population. This also entails a rise in quality of life. Every plant closure, however, also means job losses — and renewable energies do not always create as many new jobs.

In addition, new energy sources and associated technologies also need to be adapted to the infrastructure, which may also affect quality of life.

For instance, wind power stations are often perceived to disfigure a landscape. Offshore wind parks require new power lines to transfer the power from the coast to the non-coastal regions.

The separation of carbon dioxide from the emissions of large industrial complexes for underground storage is a further example. Industries are obliged to use these technologies to attain climate protection goals, which require installing the requisite infrastructure (storage facilities, pipelines, etc.). Many people from those regions where carbon dioxide could be pumped underground are concerned about the effects it could have on the eco-system and their health. It is up to those responsible for the energy transition to determine such conflicts at an early stage and to make use of participatory mechanisms to minimise the effects.

The experience of a large-scale project such as the conversion of the Emscher is especially important here. For one this includes the very concrete experience in the field of energy provision. For instance, the *Emschergenossenschaft* in Bottrop is planning to further upgrade a sewage treatment facility to make it generate even more power in the future. Other concepts are already being employed, such as using wastewater piping to heat public buildings.

However, it is also possible to transfer more general lessons to other structural areas, such as, those involved in building suitable management structures to manage large-scale infrastructure projects. The traffic system is a further field of infrastructure where the conversion processes can be used to improve the population's

quality of life. Traffic increases also constitute a burden that considerably reduces quality of life for a town's population: noise, emissions, sealed-off ground and, of course, the entailed danger of traffic in particular. Recapturing urban space for non-motorised traffic has to be a key concern of policies and the relevant authorities. The conversion of the Emscher showcases how important it is to think outside the box. Joint planning makes it possible to resolve apparently unsolvable problems and find solutions in a joint effort with all affected parties. Everyone should be motivated to participate and be guided by the idea of improving quality of life.

Visionary ideas should also be followed up. Why not convert the cycle routes along the Emscher into an innovative pedelec route with corresponding infrastructure? The interfaces between the different infrastructure systems should be identified and visible synergies should be used creatively. This would be a more forward-looking and up-to-date approach than simply sealing the Emscher and building a new west-east motorway on the resultant surface, as had been the central idea for many years before the conversion process had been started. Fortunately, the decision was taken to design the Emscher as a living environment instead.

Theses for a new infrastructure model

1 — **Quality of life cannot be measured unidimensionally using economic metrics. It is influenced considerably by several factors such as the social settings, security and an intact environment. This should be accounted for in the planning and infrastructure processes.**

2 — **A different mindset in urbanistic, architectural and cultural processes is key to upgrading the metropolitan region. Enhancing quality of life in the region is one of the most relevant quality criteria for infrastructure projects such as the conversion of the Emscher river, which means it should be a key element of the planning.**

3 — **Positive effects on the population's quality of life enhance the acceptance of infrastructure projects. The potential for social conflicts of infrastructure projects must be identified early and reduced by intensively involving the affected parties.**

Further thoughts ...

The conversion of infrastructure offers potential for improving the quality of life, as was shown in the previous descriptions. Of course, what applies to the conversion of water infrastructure is also relevant to other infrastructure fields.

Undoubtedly, we experience the greatest impact from the traffic infrastructure and actual traffic. We all want to be mobile without restriction. For many, this means automotive mobility, which is also what most people associate with quality of life. The consequences of such a desire for mobility are continuously growing traffic zones that are quickly occupied by the rise in traffic volume. More tarmac, noise and pollution mean a lower quality of life.

In future we must succeed in increasing the use of environmentally friendly vehicles to fulfil our desire to be mobile. An adequate infrastructure needs to be established or converted.

The expansion of cycle paths on disused railway track beds is a good example of an infrastructure project designed to enhance the quality of life. Across the nation there are already 600 such projects underway, adding up to a total length of approximately 4,300 km. North Rhine-Westphalia is one of the main focal points, especially due to the Emscher Park cycle route and the Ruhr area circular track. They are the main sections of the industrial culture routes and pass through former industrial man-made landscapes.

Recommendation for further reading:

www.route-industriekultur.de/route-per-rad.html www.bahntrassenradeln.de

Infrastructure conversion creates common goods

New common goods for better quality of life

This chapter explains how converting infrastructure can create new common goods — thus raising the quality of life. It follows straight from the previous statements.

The Emscher region once was the power stronghold of German industrialisation. The furnaces, pit shaft towers and gasometers bear witness to the times when nature was tamed and scenery was changed during the age of industrialisation: excavations and earth deposits have created an artificial industrial landscape. The Emscher riverbed was canalised, as it had to transport waste and refuse away from the settlements and drain the effluents from numerous production sites. The entire region was rearranged to meet the needs of coal and iron production, which rendered it almost inaccessible for humans. Fencing was installed to restrict access to the Emscher River.

Work to repair the ecological damage caused in the Emscher and Ruhr area had already started early in the last century. On April 28, 1961 at the Beethoven concert hall, Willy Brandt demanded: 'The sky above the Ruhr must turn blue again'. This is symbolic of an era of German environmental policy where industrial damage was eliminated in stages. The 1968-1973 Ruhr development programme of the government of North Rhine-Westphalia took a decisive step here. For instance, it was possible to improve considerably the quality of air and water in the Ruhr area by utilising filter systems in industrial production. The current ecological and social revitalisation of the Emscher River and Emscher towns is taking things to an even higher level. The Emscher River conversion is enabling people once again to use and experience the tarnished and inaccessible landscape as a whole. The 'Schwatte' (black) Emscher is turning blue and the residential and commercial buildings along the river are turning green.

Cycle paths are being built on disused track beds along the rivers and open and intermediary spaces are being redesigned and opened up for new use. Thus, the conversion of the Emscher is considerably more than simply a renaturing technique, and removal of the fencing is only the most visible element of a comprehensive transition.

Common goods in industrial landscapes

In terms of transforming the Emscher area, 'common goods' refers to sharing and participation options. The citizens are involved in the conversion and future use of the river. They are the custodians and stakeholders of the process. Residents in the New Emscher Valley can experience the formerly fragmented area as an entirely green yet still densely populated post-industrial urban landscape. The concept of common goods goes a step further, however, as it allows for a new regional self-image. A cooperative development of a public space comes to the fore when focusing on common goods. This involves decentralisation and participatory utilization and production techniques that are founded on citizen participation and experiments in civil society. Today, a focus on common goods is already employed at former industrial landscapes. Nature is partially reconquering unused sites, wastelands, industrial forests and urban areas. At the same time they are being made accessible for everyone. The idea is not to restore such wasteland according to a plan, but to enable a common, natural and uncontrolled development. Ideal examples can be found in the well-known industrial forests of the Ruhr area such as the Rheinelbe industrial forest at the tripoint of the towns of Gelsenkirchen, Bochum and Essen. Birch and pine trees are growing into a young forest on the abandoned dumps and mines. Sculp-

tures are being erected between the trees, simple paths are being laid out and regular guided tours are offered. Little by little a specific aesthetic landscape unique to this area is emerging.

The focus on common goods is not a new concept to the Ruhr area. As there are limits to the growth of the economy and society due to the special problems in the Ruhr area, the motto of the International Building Exhibition (IBA) Emscher Park also was 'Change without Growth'. This structural change is still on-going and involves a demographic and economic downward trend. The mining industry will continue to play a role in the Ruhr area, but it has been losing its economic relevance for many decades. This is not a regional problem. The calculations for when the global oil reserves will be depleted may vary; however, it is indisputable that the natural resources on which the western model of prosperity is founded are declining. Neither research nor politics can answer for sure how income and social participation will be distributed once regular growth as seen in the past decades is no longer possible. Regions like the Ruhr area, which have already experienced such phases of economic decline at an early stage, are 'laboratories of the future' in this process: here, concepts and solutions for the future are already being tested and realised today. This may show that the focus on generating further economic growth may not necessarily be the best way to further develop a post-industrial and ecologically downgraded region. Far more, the search for new drivers for growth could impair the quality of the location and environment of the region even further. One alternative could be to concentrate on quality growth and concepts that focus on the strengths of the region. There are already positive examples, such as the renewable energies industry.

How will the Emscher develop as a common good?

The *Emschergenossenschaft* has set itself a goal to balance the demands of the people and nature. The Emscher is a river of industrial character and its environment and especially the Emscher Valley are a type of 'industrial scenery' with artificial hills and valleys. Along the 80 kilometres from the source to the estuary of the river, these 'intermediate spaces' can become niches for urban gardens and oases of deceleration, thus acting as a counterbalance against our modern high-performance society. Joint projects are the power centre for the transition to a functional economy and society that go beyond an exckusive focus on economic growth. These projects flourish particularly in times of crisis, in shrinking towns of the Ruhr area and on contaminated spaces. The New Emscher Valley offers all citizens the opportunity to rediscover the new urban landscape that is being created and to participate in developing the region.

Focussing on common goods is a difficult subject matter when dealing with the natural environment. The notion of common goods is an old concept for jointly using a resource. The so-called Allmenden (common land) originally referred to cultivated land or meadowland jointly owned by the village community that could be used free-of-charge by all citizens. In the course of modernisation these common goods also disappeared and were replaced by private property and competitive use. Today, the original idea of common goods has returned as an innovative solution to the problems when distributing resources. The global course is to search for strategies to deal with the ecological crises of the 21st century: climate change, limited resources and loss of biodiversity. In general, the current discussion is about common goods and the renunciation of individual and exclusive access to resources as well as the development of

Water as a common good — The art project 'Between the waters — The Emscher Community Garden' by Marjetica Potrč and Eva Pfannes (Ooze Architects) utilizes treated sewage to water a communal garden

cooperative use and legal forms. The online encyclopaedia 'Wikipedia', on which users create the knowledge provided by themselves, is the best-known example of a common good. Until today projects from around the world have shown that almost anything can be produced by a cooperative — everything from vegetables to cars.

Elinor Ostrom, winner of the Nobel Prize for economics in 2009, discovered in her work over many years that if common goods are to work well special institutions have to be created and maintenance must be provided for as long as possible.[1] Such an institution is primarily the user community of a resource, which is built on trust, mutuality and transparency.

The *Emschergenossenschaft* is the oldest and largest association for water management and an outstanding example of such joint usage. Their activities extend beyond the tasks of water management and create spaces for realizing the community focus. These projects are solutions for the ecological and social challenges of the 21st century, and they are already yielding first results. Fresh water is scarce and only makes up 3 percent of the earth's total water reserves. At the same time it is crucial for the survival of the human race, animals and plants. The project *Between the Waters — The Emscher Community Garden* demonstrates nature's ability to clean itself in a participative experiment. It was initiated as part of the *EmscherKunst.2010* exhibition, which used the Emscher Island as a stage for ambitious art projects. Between the Waters temporarily tied a 150 metre-long 'infrastructure tape' from the Emscher River to the Rhine Herne Canal. It consisted of two publicly-accessible toilet buildings and a constructed wetland that cleansed the wastewater from the toilets while adding additional water from the Emscher. The output could be used to water the fruit and vegetable plants of a joint garden of edible fruit. The water was filtered again as a final stage, which even made it drinkable. People were allowed to access, use and alter the entire facility. *Between the Waters* will be revived in *EmscherKunst.2013.* (www.emscherkunst.de).

1 Ostrom, Elinor: Polycentric systems as one approach for solving collective-action problems. 2008, online at: http://ssrn.com/Abstract=1304697 (21.02.2013).

The diversity of common goods along the Emscher

The focus on common goods allows for innovative utilization, consumption and production concepts to be developed and improved. Many natural or older infrastructures in the Emscher zone are available to be used quite differently by local people such as for arts projects. This would hardly be possible under commercial circumstances. Many good examples of common spaces can be found in the Emscher zone.

From the Rhine-Elbe mine to a space for learning, playing and experiencing

If the 'remaining surfaces' are left to themselves then spontaneous, that is, wild growing pioneer trees such as birch trees, will grow to become a dense forest. The industrial forest will become a part of nature in the midst of the town, without requiring forest work. The IBA Emscher Park gave the citizens and artists an impetus to use these common woods. In the meantime such urban industrial forests have permanently established themselves in the Emscher Valley. In the past, private enterprises such as ThyssenKrupp or Deutsche Steinkohle AG have established paths and regularly offer tours of their premises.

The forest is also a place for children to learn and play. Schools are re-experimenting with forest hours where the children play and climb about in nearby industrial forests and build improvised 'forest furniture' together. The former Rheinelbe mine in Gelsenkirchen is a state-of-the-art education area in a green environment. The popular industrial forest is open to playschools and schools at all hours, but the children can also discover their forest by themselves.

Today, children sit in front of computers and tap on their mobile phones all day. In the forest they learn how to move and act cooperatively in social terms. They join forces to carry large branches – five can carry more than one – and they don't even notice that it is a learning process for them.

Expert interview with Prof. Dr. Karl-Heinz Otto Geography didactics at Bochum Ruhr University, on July 24, 2012.

From a sewage treatment plant to a hotel and park area

In Bottrop-Ebel, the site of the BernePark sewage treatment plant that is owned by the *Emschergenossenschaft* and was closed down more than ten years ago has become a meeting point in the midst of a multi-cultural urban quarter. Landscape architecture was employed to convert the treatment basin into a walk-in garden. The dasparkhotel_bernepark theme hotel where people sleep in converted drain ducts is also located on the site. The drains offer utmost convenience on minimum space as well as storage facilities and a network connection. The guests pay the fee they think they can afford and are prepared to pay per night ('pay as you wish'). The ducts should be reserved early, as the dasparkhotel_bernepark is fully booked for months in advance. (www.bernepark.de/parkhotel.html).

From a mining pit to a place of culture

The picturesque building ensemble of the Zeche Zollverein XII pit in Essen has become the flagship of the Ruhr area and is the most important tourist attraction in North Rhine-Westphalia besides the Cologne Cathedral. The Zeche Zollverein plays an important role in ExtraSchicht – the night of industrial culture in the Ruhr area.

From railway track bed to a cycle path

A railway track bed that has been converted into a cycle path runs from the 'Jahrhunderthalle' (Century Hall) in Bochum to the Rhine Herne Canal.
'On both sides of the stretch of water there is a strip of open space that varies in width, and represents the characteristic elements of the new Emscher design style. The goal is to use this strip of open space that enhances the Emscher in order to link it better to available green spaces. The key element of this interlink is a system of routes that creates continuous longitudinal and cross-interlinking path relationships from Holzwickede to Dinslaken.' Dr. Jochen Stemplewski.

Quote from: Stemplewski, Jochen: 'Das Neue Emschertal 2020 – Vision und Werkzeug regionalgesellschaftlicher Innovation' (The new Emscher Valley 2020 – Vision and tool for socio-regional innovation). In: Fehlemann, Klaus, et al. (ed.): Charta Ruhr. Denkanstöße und Empfehlungen für polyzentrale Metropolen. Lernen von Ruhr. (Ruhr Charter: Ideas and recommendations for polycentric metropolises.) Dortmund, 2010, p.23.

What can we learn from the conversion of the Emscher for an increasing focus on common goods?

For decades, the Ruhr area has experienced a process of economic change that coincides with the demise of industrial manufacturing. As a result of this change, employment in some Emscher towns is more than twice as high as in Germany as a whole. Working with common goods provides an opportunity to mitigate the social effects of high unemployment rates in such a difficult environment. It can help to create a feeling of purpose and strengthens self-responsibility. This means that the people rely on the effectiveness of their own actions and feel strong enough to meet the challenges and requirements.

Sleeping in pipes: The Parkhotel at BernePark on the site of the converted Bottrop-Ebel sewage treatment plant.

Unquestionably, work and economic activity with a greater focus on common goods is difficult to implement. It means to restrain individual material desires in favour of a common good. Many people would at first consider this a loss of freedom; however, it may also have a positive effect such as more personal contacts, less stress, hectic and other harm to our health as well as more time, leisure activities and participation. There would be stronger demand for the ability to communicate, creativity and empathy that would be developed further — skills that all people generally have. Thus, slowing down our lifestyles and intensifying civil commitments could help make us happier in the long run.

Theses for a new infrastructure model

1 — The post-industrial society of the Ruhr region does not need new growth drivers. It needs approaches that improve the quality of life in the region and build onregional strengths.

2 — Common use of open spaces in the Emscher Valley helps create a sustainable balance between the people and nature. Free spaces in diminishing urban areas enable its citizens to participate in the design of their region and create an ecological urban landscape.

3 — Common projects can offer alternatives to today's high-speed society. They offer space for experimenting on innovative utilization, consumption and production paths, as well as starting points for expanding them on the long term.

Thinking ahead...

The Emscher conversion is creating new open spaces along the river, which local people can design and use as they like. Similar room for experiments can also be found in towns and urban regions even if they do not seem obvious at first. For instance, so-called urban gardening has become very popular in recent years. It involves hobbyist gardeners planting flowers or vegetables in public places such as meadows and trees along the streets, which prettifies the urban environment and also improves the microclimate by adding fresh, green plants. In Berlin, some municipal administrations have therefore initiated so-called tree ring partnerships.

An 'urban gardening' movement also has developed in the Ruhr area. Called UrbanOase, a mobile garden was planted in Dortmund on the site of the vocational training centre (BTZ) in 2002. The event was supported by the Rheinische Strasse quarter management. 'Mobile' means that the garden has been planted entirely in mobile containers until a permanent site can be found. Women of different origins have created an intercultural women's garden in Oberhausen on their own as a peace project. In Castrop-Rauxel's Habinghorst district people from different countries are managing an intercultural vegetable and herb garden.

Recommended reading:

Müller, Christa (ed.): Urban Gardening. Über die Rückkehr der Gärten in die Stadt.
(Urban Gardening. The garden returns to the city.) Munich, 2011

Müller, Christa: 'Die grüne Guerilla' (The green guerilla).
In: der Freitag. May 31, 2012. www.freitag.de/autoren/der-freitag/die-grune-guerilla

Notes by the Naturschutzbund (Nature Protection Association) about correctly planting tree rings:
http://berlin.nabu.de/themen/baumschutz/06663.html

Information on UrbanOase in Dortmund: www.dortmunder-oase.de
http://speiseraeume.de/ – Blog about towns and nutrition

Developing the future together. Changes to society by participation

It is worth looking into the questions raised when thinking how it could be possible to involve people more in the infrastructure conversion process. This issue was already covered in the explanations on 'common goods'. The following chapter focuses in more detail on the participation aspect.

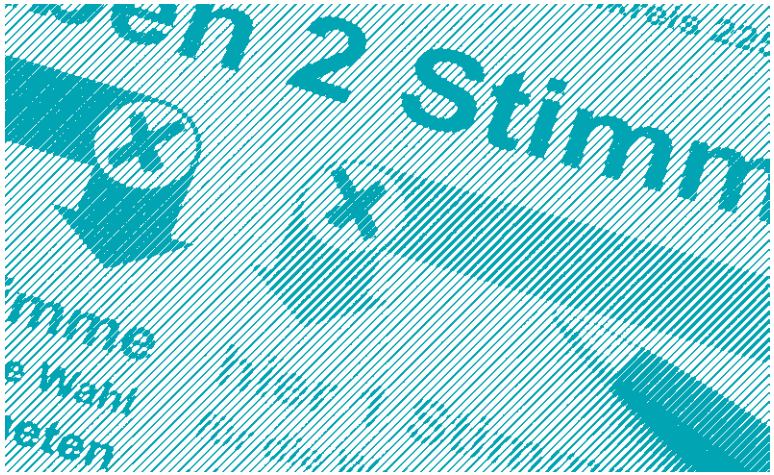
Participation – What does it really mean?

Participation refers to activities in society that encourage people and groups to get involved and actively participate in processes and decisions.[1] There are two types of participation. One very personal and direct method is to use your own vote to participate in a poll. Other methods include participating in or even organising demonstrations or citizen conferences. They are attended by a larger community and the results can hardly be predicted and are difficult to manage. Sometimes, participative behaviour may be close to being illegal, such as blocking traffic and house squatting.[2]

There are diverse reasons to become involved, that is, actively participating in participative procedures or kicking off such a process. In general, they are founded on deep-rooted changes to society that have a direct effect on life and everyday activities of people or could have such an effect in the future. The effect people attribute to such planning is critical for their willingness to cooperate: How much will they or society in general benefit? What are the personal risks of change or the risks for society? The conversion of the Emscher also inflicts considerable changes to the population of the Ruhr area, particularly in terms of designing and utilizing infrastructure and the public (natural-) spaces. The changes also affect the different areas of life and thus also

1 cf. Gabriel, Oscar W.; Völkl, Kerstin: 'Politische und soziale Partizipation'. In: Gabriel, Oscar W.; Holtmann, Everhard: Handbuch Politisches System der Bundesrepublik Deutschland. (Handbook for the political system in Germany) München, Oldenburg 2005, p.529.

2 cf. Gabriel, Völkl 2005 (cf ann.1), p.530 ff.



quality of life for the people of the region. This raises the question of what the benefits are and what risks citizens are willing to accept? Will this evaluation of possible consequences suffice to permanently, constructively and actively participate in the process?

The special relevance of participation for the Emscher process

The potential risks of converting the Emscher system mainly focus on the actual construction phases. Here, there were individual cases of people being severely affected by dust and noise, for instance. Streets are being dug up, lease agreements terminated and roads blocked or permanently re-routed. The familiar landscape scenery also changes. Participation is a possible and quite adequate tool for dealing with potential risks caused by and due to the Emscher conversion. Making information available to all participants, thus allowing them to form an opinion about the conversion project and to also communicate it, makes the process transparent. Participation also allows for risks to be discovered at an early stage, which can then be discussed and solved together. It is obvious that such a procedure in the case of the Emscher should not only be considered and used as an opportunity to protest, which can also be seen in the following project description.

First, the classic, legally required decision processes are applied. The construction measures for the Emscher conversion are mostly founded on an official planning approval. This is a special type of administration procedure that requires all affected citizens to be involved. Moreover, the authorities whose areas of expertise are affected by the project also need to be involved. Objections by those affected are presented at a hearing up to a specific deadline. The authority has the freedom of planning, for example, when preparing development plans for use of land or for constructions. It reaches a decision after taking all objections into account. This procedure allows for the evaluation and prevention of specific risks that might be linked to a sub-project of the Emscher conversion. The scope of public participation regarding the planning approval procedures is limited to individual construction projects. This may not suffice in the case of the Emscher conversion project, especially if such developments are planned that may exceed the construction phase and permanently characterise the landscape of an entire region. Thus, it would not suffice to only take into account the formally specified standards of political participation concerning the conversion of the Emscher. This is also necessary — to emphasize this once again — despite the fact that the planning approval procedure is important for recording and evaluating risks of individual construction measures. Thus, it represents an important form of participation. As a result, personal and social risks in particular that do not develop as a result of specifically planning technical construction measures must be evaluated by means of a more broadly designed participation process. Such a participative process allows for direct communication between the citizens and the *Emschergenossenschaft*.

A broader participation during the design phase allows for the analysis of potential risks and for the personal and social benefit of the Emscher conversion to be discussed much more selectively and with regard to specific target groups. The citizens can only take advantage of the benefits of the conversion after it has been completed. In addition to the technical, ecological and economic opportunities the *Emschergenossenschaft* also sees social benefits as a result of the conversion. They include improved quality of life, multi-purpose green and open spaces as well as an enhanced and distinct landscape and urban scenery. In addition, the conversion of the Emscher will trigger social change as it creates a culture of participation by citizens as well as by representatives from politics, businesses and the cultural sphere.[3] The expectation when comparing the risks and opportunities is that the long-term benefit for the population of the Emscher Valley will prevail. As this benefit will only become visible

3 cf. Emschergenossenschaft (publisher): Masterplan Emscher-Zukunft. Das neue Emschertal (Emscher future master plan. The new Emscher valley). Essen 2006, p.9.

to local people step-by-step, that is, from construction phase to construction phase and also very slowly (over decades), participation and communication for this process is particularly important.

The *Emschergenossenschaft* has identified a large band of dramatic changes to society. It has observed the problems and opportunities for the people who are interested in and affected by the construction measures. Thus, the *Emschergenossenschaft* is attempting to recruit local people to participate on a continuous basis in the conversion of the Emscher. In addition to the decision processes and options that formally are only for the citizens, the *Emschergenossenschaft* is also creating a new design leeway that mainly refers to issues that are not key to the classic business areas of the Emscher. It mostly specifies the leeways and areas itself, but also picks up ideas from the population and collaborates with the initiators of these ideas in order to develop them further.

In the meantime many forms of participation have developed around the Emscher conversion. The following sections describe how they emerged and what concrete projects have been developed.

Initiators and motivation to participate

In the late 1980s the *Emschergenossenschaft* developed its first ideas on replacing the original system of open water ducts with underground sewage conduits, which had not been possible from a technical stance for a long time as intensive coal mining had resulted in subsidence. Thus, underground sewage conduits had not been an option. Consequently, the rivers and streams of the Ruhr area were used as open sewage flows. The people of the Ruhr area had tolerated the industrial use of their rivers as this was considered to be an important prerequisite for the productivity of their region.

Then and sometimes even today the Emscher has been referred to as 'Köttelbecke', where the word 'Köttel' stands for faeces and the word 'Becke' for stream. This perception indicates that most people tended to avoid the highly odorous and fenced-off Emscher. At the time, the Emscher had been lost as a living environment.

With the irrevocable decline of the mining industry and its dramatic consequences came also a change in the technical preconditions for a sewage system in the Ruhr area. And the people slowly became less and less tolerant of the 'after-effects' of heavy industry that had been necessary until then. This also applied to the 'Köttelbecke'. The 1960s and 1970s also saw a strong protest movement against structural rigidities and deficits in society. People developed a greater sensitivity for ecological topics and public disapproval of the odorous overground canals rose.

Political stakeholders mostly were the first to support the initial proposals of the *Emschergenossenschaft* to upgrade the sewage system. The former Minister of the Environment, Klaus Matthiesen, and the former Minister of Urban Planning, Christoph Zöpel, both were important initiators and supporters. However, the previously mentioned active co-design in the conversion of the Emscher by interested and affected citizens was not yet up for debate at the time. In the early 1990s the *Emschergenossenschaft* took first steps in public relations. This involved employing a classic method, which was quite justifiable for the time as it first focused on conveying information on the activities of the company. It was directed at its own employees, the political, communal and commercial organisations as well as mass media and interested citizens of the surrounding area. One of the goals of these attempts was to build the 'profile' of the *Emschergenossenschaft*.

At the same time and apart from this intra-company development there were people and associations who had specifically and critically followed the planned conversion of the Emscher from its first years. The 'Menschen an der Emscher' (People on the Emscher)

Change needs participation — during the construction phase those affected by noise, dirt and vibrations also need to be informed. Example: Gelsenkirchen pumping station

association also should be mentioned here, as committed individuals such as regional artists and — at the time — the media helped ensure that the *Emschergenossenschaft* continued to adhere consistently to its own goals, which were formulated as an element of its PR work during the course of the conversion activities. Interested people and groups also developed initiatives while the *Emschergenossenschaft* was pursuing efforts to get the population actively involved in the conversion of the Emscher, which gained considerable influence over time. In summary, a meticulously planned and structured process did not coin the participation of the Emscher conversion that widely exists today. Far more, a dynamic process has emerged over the years that turns out to be a suitable frame for cooperation today.

This development is not always a standard for large infrastructure projects that are planned and executed over a very long timescale, and it is even more difficult to plan. The process concerning Stuttgart 21 is a concrete example of how opinions and positions can reach a deadlock: a project that can be compared to the conversion of the Emscher in terms of the financial scope and timescale.[4] The persistent protests in Stuttgart conveyed the impression that the goals of the project were under threat. But how are these projects distinguished from each other? Why has the Emscher conversion not triggered widespread public protest? There are no detailed scientific findings to answer these questions. The decisive factors for accepting or rejecting such a large-scale project are complex and quite diverse when referring to each individual project. A glance at the different initial situations of both projects could yield first insights.

The people at the Emscher had endured the unpleasant odour of the river and other downsides for a long time when the conversion started. Thus, supporting the process, either by simply accepting what was necessary or actively participating, also meant an acceleration of the process. In the long term it is a considerable improvement of the personal and social living environment for local people.

4 Both projects have envisioned costs of approx. EUR 4.5 million (cf. Angaben Stuttgart 21: www.stuttgarter-nachrichten.de/inhalt.nach-auftragsvergabe-bahn-bleibt-im-kostenrahmen-von-stuttgart-21.75dc38f4-1f61-437d-a730-8fc1049e6cb9.presentation.print.v2.html (14.09.12). The timeframe for Stuttgart 21 is approx. 25 years. Planning started in 1995, and completion is envisioned for 2020. Thus, the time envisioned for Stuttgart 21 is only marginally less than for the project plan of the Emscher conversion.

The initial conditions for Stuttgart 21 were far less dramatic in terms of perceived personal and social quality of life. Here, it had not been necessary to tolerate a severe burden for many decades. Moreover, the new station will probably contribute far less to a noticeable improvement of quality of life in Stuttgart than can be expected from the conversion of the Emscher. There are also many other important factors that explain why the Stuttgart 21 project was rejected and why the Emscher conversion has enjoyed widespread acceptance among the population. In future, the Emscher process will mainly focus on utilizing the positive initial situation to involve the local residents even more.

Active participation in the course of the Emscher conversion

Which specific projects and activities involving interested and affected citizens have developed during the course of the Emscher conversion?

The following small selection of projects is exemplary of describing the diverse participative efforts concerning the Emscher conversion. The *Gestaltungswerkstatt Pumpwerk Oberhausen (Oberhausen Pumping Station Design Workshop)* is one of these examples.

During the course of the Emscher conversion the largest of the three pumping stations is being developed in the Biefang district of Oberhausen. Besides being necessary from a technical standpoint, it will also constitute a new landmark in the Emscher Valley.[5] Following an initiative by the *Emschergenossenschaft*, interested local residents participated in designing the new pump station at a public

5 Emschergenossenschaft: Gestaltungswerkstatt Pumpwerk Oberhausen. Dokumentation der Werkstattergebnisse. (Oberhausen pumping station design workshop. Documentation of the workshop results.) Essen 2012, 31 pages. www.emscherplayer.de/media/content/publication/000/021/000021195.pdf.

Involving citizens in planning – kick-off for the Oberhausen pumping station design workshop on July 15, 2011

citizens' gathering in July 2011. The *Emschergenossenschaft* selected this participative pathway with the goal to erect a pump house of higher design quality, which will harmonize with the environment and that is interesting for the citizen's gathering. The architects and landscape planners incorporated the suggestions for a future design of the building that were collected at the gathering into the further development of their designs. Public participation did not extend the design phase of the building. Thus, the site of the new pump station was already determined and public suggestions were not allowed to impair the technical functionality and operation of the pump station. At a second citizens' gathering in December 2011, the revised plans of the architects and landscape planners were presented to approximately 80 participants. Then the citizens were allowed to raise questions and comment on the selected design. They were also informed about the pending measures.

As the issue concerning the smokestacks was taken seriously at the presentation I think they [the decision makers at Emschergenossenschaft *(ed.)] still can influence what is said and will respond as far as it is technically feasible. But I only wonder how the citizens could contribute to this issue at all. There are certain requirements that really should be met from a technical standpoint,' Rudolf Fastrich, a citizen of the town of Oberhausen, speculates at a public event for the Gestaltungswerkstatt Pumpwerk event in Oberhausen.*

Rudolf Fastrich **quote from: www.emscherplayer.de/playMedia.yum?mediaID=76726 (12.09.12).**

The contribution by Rudolf Fastrich, who participated in both citizens' events, indicates that the people involved in the process exhibit a certain level of trust and respectability. Maybe there is still a little scepticism with regard to whether the specified goals can be realized. It remains to be seen whether after the completion of the structure, which is planned for 2016, participation will have contributed to achieving the desired satisfaction of citizens with the overall process.

The *MährenFurt — Grenzen überwinden* project is a so-called participatory art project that was initiated by Recklinghausen-based artist Reiner Kaufmann in 2006. River kilometre 39 of the Emscher route is at the centre of the tripoint of the towns of Recklinghausen, Herne and Castrop-Rauxel. This is the location where the Bärenbach and Landwehrbach streams flow into the Emscher.[6] The name of this locality, 'In der Mährenfurt', bears witness to the past of a small settlement on the Recklinghausen side.[7] 'Furt' (ford) describes a very shallow section of a river or stream where the water can be crossed either by foot or using a vehicle. At river kilometre 39 such a ford once was used to cross the river. During the conversion of the Emscher into an open sewage canal, more and more bridges replaced the fords that people had used for decades. It was necessary to construct bridges in order to ensure that the Emscher would not become an insuperable barrier that would have separated the quarters on its southern and northern banks. People soon avoided the landscape directly on the riverbanks and the bridges entirely due to the fetor of the Emscher.

The *MährenFurt* project stages the crossing from one bank to the other and symbolically anticipates the development of the New Emscher Valley. Here, art sculptures cross the Emscher on five paths installed in parallel. The sculptures represent a herd of Emscher horses imaginarily crossing the river while suspended on ropes. The horse motif, formerly described as a 'Mähre' (old mare) is a cultural-historical symbol of nature, humans and civilization that, as the artist says, leaves room for broadly designed interpretations and also reflects the diversity of the living environment on the Emscher River. The horses, lovingly called 'Jokoos'[8], were developed together with the students of neighbouring schools and parents, teachers and members of the children's and youth parliaments. During the experimental phase of the project the first Jokoo models were suspended across the Emscher as placeholders and were presented to local residents and the employees of the *Emschergenossenschaft* and other project partners. Further activities, creative events and workshops will characterise the project in the future and ensure and strengthen the diverse forms of participation and communication involving the Emscher. Here, the goal is also publicly to reclaim living space that was already thought to have been lost and to establish a new quality and culture of life on the banks of the Emscher River.

The *'Emscherbrücke in Dortmund-Mengede' (Emscher Bridge in Dortmund Mengede district)* on Waltroper Strasse is an example of a very direct but maybe not quite so far-reaching example of citizen participation. Local residents contributed their own ideas to the planning draft prepared by artist Jan Bormann. This design was also presented at a citizens' event in December 2003.[9] The ideas submitted by the involved public contributed to the redesign of the bridge balustrade and the illumination system. The involvement of the population and implementation of their ideas was celebrated with the bridge festival in August 2004, which was attended by almost one thousand interested people and thereby expressing the positive feedback among citizens.[10]

6 cf. www.emscherplayer.de/media/content/publication/000/018/000018938.pdf (12.09.12).

7 cf. Emschergenossenschaft 2006 (as Anm.3), p.F19.

8 Jokoo is an African term for confronting someone face-to-face.

9 cf. Mengede. Politische Zugehörigkeiten und besondere Begebenheiten, Ereignisse und Urkunden (Political affiliation and special occurrences, results and certificates) by Willi Burg. 24.02.2011. www.dortmund.de/media/downloads/pdf/Zeittafel_Mengede.pdf (11.09.12).

10 Emschergenossenschaft (ed.): Flussgebietsplan Emscher (Emscher river area plan) Essen 2009, p.129.

Crossing borders – The MährenFurt project illustrates the departure for new horizons in the Emscher Valley

Participation at the Emscher: Boon or bane?

So far, active participation by the public in the future design of their Emscher Valley can be considered a success. In essence, the results of the participation have resulted in a positive reception of the Emscher conversion process by the participants who, in addition to actively realizing their ideas, obviously also were able to identify themselves with the greater goal of conversion.

Looking at the wide selection of participative instruments used in the process of the Emscher conversion so far, it becomes clear that there are considerable differences in the level of participation and effectiveness. Thus, the project *Emscherbrücke in Dortmund-Mengede* enabled a very direct and personal participation where the result was shapeable and could be followed up by all participants. The conditions were fixed and not up for discussion, similarly to the design of the pumping station in Oberhausen. In comparison, the forms of participation of the presented art project have a greater creative leeway. The participants can determine the duration and type of their activities by themselves, as the project is supported by a considerably larger community and diverse range of activities. The participation of individual persons is less binding and specific here. It also is hardly possible to predict the activities of the art process as its realization depends on few, but very committed people.

Both participative approaches so far have in common that due to the diversity of the projects they have yielded a benefit for the *Emschergenossenschaft* at entirely different levels as well as for the participants. Links with unexpected and seemingly hardly relevant topic areas of the *Emschergenossenschaft* have developed as a result of involving the various parties. Thus, the link between culture and nature has fostered a stronger identification of the people with the natural river enviroment and has also created a new level of communication between the *Emschergenossenschaft* and interested persons. Art has developed into an integrated medium. Accustomed structures were broken up to create value for both parties. Participation can be used to criticise technical infrastructures and also communicative structures. The benefit for all involved parties induced by the participation of many different actors should also be mentioned as an important factor for successful participation.

Overall, the added value of the participative processes is visible and this experience also can be used for future construction and project stages of the Emscher conversion. The *Emschergenossenschaft* has acknowledged that there are no 'blueprints' for successful participation. There will always be new 'experimental situations' when testing and further developing a desired cooperation, which is a result of the complexity of the diverse future construction projects and the people who are directly or indirectly affected by the measures. So far, it appears that the courage of the *Emschergenossenschaft* to deal with issues that are not part of its daily business has been rewarded.

The use of participative procedures will hardly delay the Emscher conversion. It is a fact that heavily disputing such topics delays the process, but they definitely cannot be avoided entirely by using participative techniques. In general, they provide a considerably greater scope of action for mediation at an early stage. At the beginning, feelings are still balanced and thus it is possible to stick to facts during arguments, which ensures discussions are factual and goal-oriented.

To conclude, the following statement summarises the mission of the *Emschergenossenschaft* and provides reassurance for future manifestation and further development of already successfully mastered initiatives.

There are many ways to contribute to a more sustainable society. Administration, businesses and politics as well as the citizens can get involved at many points. Many people are already involved in various initiatives in the Emscher region with its many towns, but concentrating and structuring the initiatives can also help point out to politics empty spaces, deficits and new paths. If citizens get involved at such a level, their commitment will gain weight and will help the people and the region.

Emschergenossenschaft **Quote from:**
www.emscherplayer.de/playMedia.yum?mediaID=74265&itemsPerPage=10&offset=10 (12.09.12).

Theses for a new infrastructure model

1 — **The benefit of infrastructure projects often only becomes visible in the mid-to long-term while lengthy construction phases directly affect the local residents. It is critical to involve the population at an early stage in order to gain continuous acceptance for the lengthy realization of such infrastructure projects despite the burdens at the starting phase.**

2 — **There is no 'blueprint' for participation. Far more, participation concepts have to be tailored specially to meet the requirements of the local people. This is why participation processes are experimental 'lab processes' that develop continuously during the course of infrastructure projects.**

3 — **Participation is not an instrument to create acceptance and is thus not a unidirectional route. This means that the realization and ideally the goals of large infrastructure projects should be open to change or adaptation. Participation means to systematically and seriously integrate peoples' concerns and suggestions. Ideally, both sides will learn from each other and will build a new culture of communication and trust.**

Thinking ahead …

Last but not least, the dispute about Stuttgart 21 caught the public eye when it came to involving citizens in large infrastructure projects. The discussion shows that issues of participation and co-determination are continuing to become more important. There are many well-developed instruments that enable citizens to participate and help to prevent the escalation of conflicts. There are many ways to involve the citizens in political and planning decisions. The scope ranges from co-determination and co-design techniques through future workshops and round-tables to extensive planning cells. They can be employed in the most diverse areas: in communal budgeting (citizens' budgets), in urban planning and quarter management and also in large-scale construction and infrastructure projects. Many positive examples show that – even in the case of converting the Emscher – politics, planning and citizens all benefit from these forms of participative democracy.

Recommended reading:

Informationen der Stiftung Mitarbeit beim 'Wegweiser Bürgergesellschaft': www.buergergesellschaft.de

Bischoff, Ariane; Selle, Klaus; Sinning, Heidi: Informieren. Beteiligen. Kooperieren. Eine Übersicht zu Formen, Verfahren und Methoden. (Inform. Involve. Cooperate. An overview of forms, procedures and methods.) Dortmund, 2005

Ley, Astrid; Weitz, Ludwig: Praxis Bürgerbeteiligung. Ein Methodenhandbuch. (Citizens' involvement in practice. Methodology handbook), Bonn, 2009

Emscher 3.0 as an impetus for ‘Blue Infrastructure’ models

This book highlights the Emscher conversion from very different perspectives. It showcases that the conversion by far exceeds only engineering tasks. It explains how the large-scale conversion of water infrastructure creates new nature and common goods, tests new planning and management approaches, opens new pathways for participation in society and raises people's quality of life in the Emscher region.

In recent years the Emscher region has experienced considerable change, which can be seen symbolically in the improved ecological quality of the Emscher and its tributaries. State-of-the-art sewage technology was employed to convert the Emscher step-by-step from a 'Köttelbecke' to Emscher 3.0 — an ecologically revitalised Emscher, which is no longer in its original condition *(Emscher 1.0)*; however, after years of industrialisation and pollution *(Emscher 2.0)* it is now an enriching, ecological element for a region in the midst of structural change *(Emscher 3.0)*.

This concluding chapter examines the lessons to be learned from this particular example of structural transformation and their relevance for other infrastructure policy and projects in the Ruhr area and beyond.

Emscher 3.0 as a model — about the relevance of models for urban and regional planning

The Emscher conversion was able to generate such diverse effects due to the high symbolic relevance of the river and its history for the Ruhr area. It flows through the entire Ruhr area and stands for the 'dirty' side of the industrial success story. Hence, its renaturation marks a change and departure in the economic and social development of the Ruhr area. Emscher 3.0 is thus becoming a model for the overall development of the Ruhr area — and beyond. Developing guiding models plays an important role in urban planning, (regional) structural and technology policy as well as in infrastructure policy. The models provide points of orientation for participating stakeholders. They focus the stakeholders' ideas on the future and facilitate discussion on new ideas and approaches. Models can thus be used to bring together trend-setting and symbolic ideas about a desirable future, particularly for very dynamic developments such as urban planning, economic structural change or issues regarding the availability of resources and their adequate use. They open up the possibility of integrating different concepts and contents and help to convey them. This is what makes the transition to Emscher 3.0 so important.

As the term 'desirable' already indicates, models are normative in character. They are founded on moral concepts of good quality of life, a sustainable economy and desirable society.

Models in the Ruhr area: From a blue sky to 'blue infrastructures'

The Ruhr area has a rich history of models that have been ground breaking for the whole of Germany.

In 1961 Willy Brandt said the following about the Ruhr area, which until then had mostly borne the stigma of being a 'Kohlenpott' (coal pot): 'Alarming research results show that the pollution of air and water correlates with an increase in leukaemia, rickets and changes in blood counts, even in children. It is disconcerting that this common task, which concerns the health of millions of people, has been neglected almost entirely. The sky above the Ruhr area has to turn blue again'. Willy Brandt at the SPD election conference in the Bonn Beethovenhalle on April 28, 1961.[1]

His vision of having a blue sky above the Ruhr area took on the force of a model in the early 1960s. It expressed a desire for the future of the region that clearly described the direction in which politics, planning, industry and society would have to move in order to make the Ruhr area worth living in again.

The ideal Willy Brandt expressed remained merely a vision for decades, but it was nonetheless always a point of reference for modern environmental politics. In the 1980s, further publicly-observable dynamic models for the development of the region evolved in the Ruhr area — the Emscher Park International Building Exhibition from 1989 to 1999 was path breaking in this regard. Its goal was to create impetus for more quality of life and higher residential standards by means of numerous projects. Architectural, urbanistic, social and ecological measures were to form the basis for the economic success of an industrial region and to help it change its face.

1 Quote from: Vorwärts. Nr.18.May, 3 1961, p.20.

Many ideas initiated at the building exhibition were continued immediately after 1999, such as the 'Arbeiten im Park' (Working in the Park) concept.

The Ruhr decade strategy, with both inter-communal workgroups 'Konzept Ruhr' (Ruhr Concept) and 'Wandel als Chance' (Change as an Opportunity), took up the content of the impetus provided. The geographical-conceptual model is founded on the so-called 'ruhrbasics'. They include (www.konzept-ruhr.de):

- A spatial orientation along the east-west axes
- Upgrading the quality of the town centres and quarters
- Developing high-quality commercial and industrial sites
- Creating framework conditions for private investment
- Preparing trans-regionally important events

This model was supplemented by the thematic triad 'Stadt-Bildung-Klima' (Town-Education-Climate) as well as the establishment of the Ruhr Metropolis 'brand' since the name Ruhr area seemed no longer up to date. The term 'metropolis' refers to a key feature of the area and suggests similarities regarding the goals, strategies, projects and the necessary organisational forms.

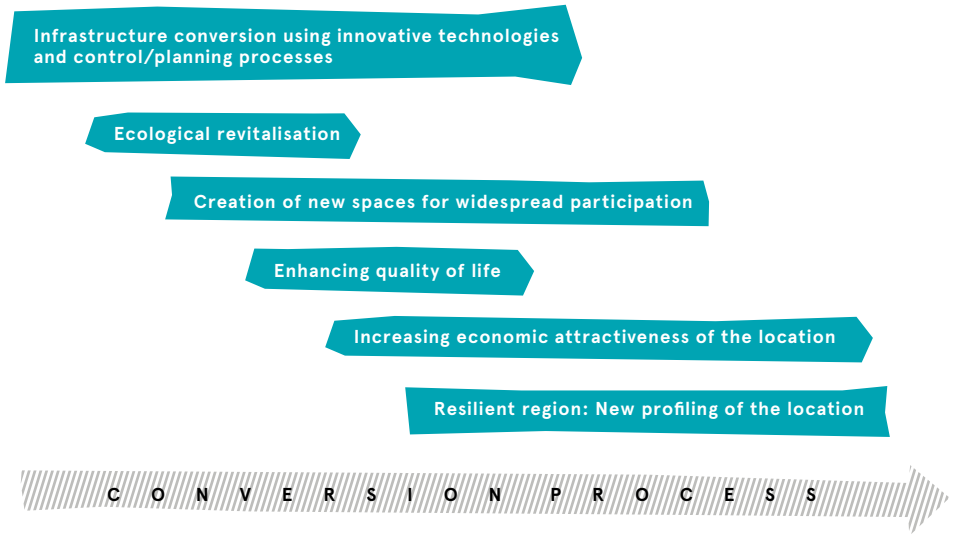
This brief explanation shows that models have been important for the development of the Ruhr area for approximately fifty years. What sorts of impetus did the Emscher conversion experience provide that can be used for the future development of models for the Ruhr area?

Sustainable infrastructure change as impetus for regional development — towards 'blue infrastructures'

The conversion of the Emscher plays a special role as it turns the conversion of an infrastructure element (a water canal in this case) into a comprehensive regional development project (cf. illustration on p. 199): The ecological revitalisation of the Emscher was initiated by using innovative infrastructure technologies as well as planning and management processes. It has allowed people to experience the project directly. This revitalisation, which was supported by accompanying measures, among others those within the framework of its being the RUHR.2010 Capital of Culture, creates new spaces for participation and involvement of the people of the region. It provides the foundation for a considerable improvement in quality of life as well as an economic upgrade. All this indicates a basis on which to re-profile the location and ensure its resilience against future economic, social and ecological challenges.

The Emscher 3.0 conversion serves as a blueprint not only due to its successful concepts, but also with regard to the management patterns of the accomplished change. It was only the specific structure of the *Emschergenossenschaft* that made it possible to complete a transformation process of 4.5 million Euros of investments over several decades according to a clear schedule.

Infrastructure conversion levels



The aforementioned challenges apply to numerous further infrastructure conversions in Germany and in the Ruhr area in particular over the next decades:

- Energy infrastructures — Transition to a renewable and decentralised energy system
- Building infrastructures — Transition to energy-efficient building structures as well as a reaction to demographic change
- Industry infrastructures — Adaptation of infrastructures to further industrial structural change processes
- Traffic infrastructures — Conversion to traffic infrastructures for sustainable mobility
- Information infrastructures — Conversion of the information-technical infrastructures in the Ruhr area

The same questions that arose with the Emscher conversion emerge for each of these areas, and concern: suitable management processes, suitable participation, and the links to the development of wealth in the overall region.

The conversion process to Emscher 3.0 can act as a point of orientation and a model for the conversion of these infrastructures. As with the Emscher conversion, the Ruhr area could be an international pioneer for the modernisation of infrastructures in the 21st century. Flagship initiatives such as the 'Innovation City Ruhr' could play a key role here.

What we can learn from the Emscher 3.0 process

The goal of the book is to have a look at the Emscher conversion from very different perspectives. The diverse results and experiences of the Emscher conversion were presented in the individual chapters and are summarized as the following theses:

The development of technical and natural infrastructures has to be carried out together

Humans have irreversibly changed the natural state of the Emscher system over the past century. Only a comprehensive package of mostly concealed technical and water management measures can establish the prerequisites for ecological development of the former effluent streams. Thus, technology and nature should be considered in concert today and in the future.

The Emscher conversion has shown that the creation or modernisation of new infrastructures often has a direct effect on nearby eco-systems. Thus, in the case of infrastructure projects, issues concerning the possible generation of ecological improvements that exceed the simple avoidance of negative effects should be included in the planning from the beginning.

The revitalisation of eco-systems creates new eco-system services and thus considerably contributes to the social, cultural and economic enhancement of an entire region. It raises its level of attractiveness for the people and for potential investors.

Creating resilient regions requires a network including all agents and their knowledge

Regions, and consequently also their infrastructures, must be 'resilient' — that is, they must be highly adaptive and robust in times of economic, social and ecological crises. This requires that the knowledge of various agents be connected as well as the development of new management models.

Informal urban planning instruments such as master plans should complement legal planning instruments. In this way, the expertise of many actors becomes utilizable, and the focus shifts from territorial borders to the actual spatial dimensions of infrastructure projects.

Informal planning instruments and processes thrive on the desire of committed stakeholders to actively contribute to the conversion process. Cooperatives are particularly important in this regard. They combine diverse stakeholders whose common goal is responsible, long-term value-creation.

A variety of innovations as an impetus for regional transformation

Infrastructures are embedded in a regional environment. For this reason, they have to be adapted to the region's demographic, economic and social conditions. In this regard, the Emscher conversion is exemplary for other infrastructure projects.

Infrastructure modernisation requires not only technical innovation, but is rather part of a comprehensive process that also demands ecological, social and institutional innovations. Thus, it requires that the collaboration of many stakeholders and diverse innovations be linked.

Seeing infrastructure as part of a comprehensive system has facilitated the creation of a new culture of innovation in the Ruhr metropolis. In subsequent decades the infrastructure will have to be continuously adapted to the dynamically changing conditions, both local and global.

Infrastructure conversion can become a driver for improved quality of life

Quality of life cannot be measured unidimensionally using economic metrics. Instead, it is influenced considerably by additional factors such as social setting, security and an intact environment, which planning and infrastructure processes should take into account.

New thinking in urbanistic, architectural and cultural processes is key to upgrading the Ruhr area. For a key infrastructure project such as the Emscher conversion the enhancement of regional quality of life is one of the most important quality criteria and thus should be a substantial element of the project planning.

Positive effects on the population's quality of life raise the acceptance of infrastructure projects. Conversely, negative effects can undermine acceptance. The potential of social conflicts with regard to infrastructure projects must be identified at an early stage and reduced by intensively involving those affected.

Infrastructure modernisation can create new open spaces. They offer an opportunity for broader participation

In the post-industrial society of the Rhine-Ruhr metropolitan area no new growth drivers are needed, but instead approaches that improve life in the region and are based on regional strengths.

In the Emscher Valley the joint utilization of open spaces helps to facilitate a sustainable balance between people and nature. Open spaces in shrinking urban regions give citizens the opportunity to get involved in designing their region and creating an ecological urban landscape.

Common projects can generate an alternative development to today's high-speed society. They offer opportunities to experiment for innovation, utilization, consumption and production paths, and are the source of their distribution over the long term.

Acceptance requires participation. Citizen participation in infrastructure projects should be regarded as an opportunity

The benefit of infrastructure projects can often only be seen in the mid- to long-term, while lengthy construction phases directly affect the local population. It is particularly important to involve the population at an early stage in order to gain its continuous support for the lengthy realization of infrastructure projects despite the initial burden.

There is no 'blueprint' for participation. Rather, the participating concepts must be specially tailored to match the corresponding construction project and the local population's requirements. Thus, participation processes are 'laboratory processes' that continuously develop further over the course of infrastructure projects.

Participation is not an instrument to attract participation and is not a one-way street. This means that changes should be possible during the realization and ideally also for the goals of larger infrastructure projects.

Participation should take the concerns and ideas of the population seriously and involve them systematically. Ideally, this means that both sides will learn from each another and a new culture of communication and trust will develop.

Emscher 3.0 as an impetus for a new infrastructure model

These theses illustrate that the Emscher 3.0 example generally provides many ideas and new prospects. If stakeholders from diverse infrastructure areas mutually and productively influence one another, it can work to provide the basis for a new model: *The 'blue infrastructures' model.*

The sky above the Ruhr is blue again. Now the goal is to make the infrastructure 'blue' again. With regard to the idea of a 'blue economy', 'blue infrastructures' refer to infrastructures that integrate ecological, social and economic perspectives. The conversion of the Emscher is an ideal-type and tangible example of such 'blue' infrastructures.

The experiences/lessons gained from the Emscher conversion can provide important suggestions for designing such a model:

- How can comprehensive participation across urban and communal borders be enabled and arranged early on?
- Which organisational structures does the conversion require to facilitate long-term and stable planning?
- How can new and converted infrastructures be integrated into the urban and natural settings?
- How can new infrastructures be experienced positively by the people of the region?

These are only some of the questions worth discussing on the path to a new model for the Ruhr area. The Emscher conversion demonstrates what the region is capable of.

2 cf. Brüggemeier, Franz-Josef; Scheck, Hanna; Schepelmann, Philipp; Schneidewind, Uwe: 'Vom blauen Himmel zur Blue Economy: Elemente einer nachhaltigen Strukturpolitik für Nordrhein-Westfalen' (From a blue sky to a blue economy: Elements of a sustainable structural policy in North Rhine-Westphalia). In: WISO direkt – Analysen und Konzepte zur Wirtschafts- und Sozialpolitik. (WISO direkt – Analyses and Concepts on Economic and Social Policy), June, 2012. http://library.fes.de/pdf-files/wiso/09172.pdf (22.12.12). Pauli, Gunter A.: The Blue Economy. 10 Jahre. 100 Innovationen. 100 Millionen Jobs. (The Blue Economy. 10 Years. 100 Innovations. 100 Million Jobs), Berlin, 2012.

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