

A Vision of Floods, Nature and Mineral extraction

Main results and experiences from
the SAND project 2003-2008





A Vision of Floods, Nature and Mineral Extraction

Main results and experiences from the SAND project 2003-2008



The SAND project involves partner organisations in France, Germany and the Netherlands.

As a result of climate change, the sea level is rising and precipitation is increasing. In combination with population growth and economic expansion along rivers, the risk of floods is increasing as a result. Greater retention and discharge capacity is therefore required to provide adequate protection against high waters. Raising dykes or moving dykes further in land is often impractical as these measures conflict with the interests of people and businesses living or located in those areas.

Surface minerals, such as sand, clay and gravel have long been extracted along European rivers. As the centuries have progressed, a large number of excavation sites have resulted. The SAND project investigates possibilities to combine mineral extraction and flood alleviation in such a way that spatial quality and water quality along the rivers benefit as a result. This can be achieved only by *integrated spatial development*, in which context measures relating to mineral extraction, flood alleviation and spatial quality are coordinated.

In the past five years, the SAND project has combined the efforts of five partner organisations in France, Germany and the Netherlands. As part of the European Interreg IIIB programme, the project focuses on developing an integrated vision regarding mineral extraction and flood alleviation.

Five pilots

As part of the project, five *pilots* were carried out. The pilots were intended to create retention and discharge capacity for flood waters, to improve spatial quality and ecological corridors along European rivers and to facilitate mineral extraction or to redevelop existing extraction sites. Public-private cooperation played a crucial role in this respect. The five projects are:

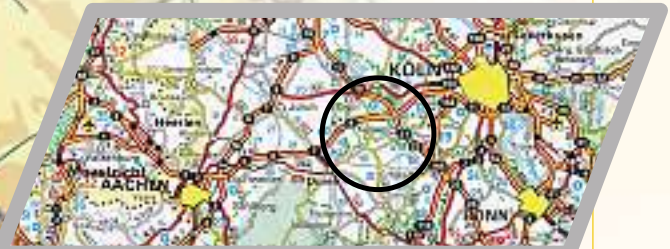
- The Netherlands: Afferdense and Deestse Waarden, near Druten on the River Waal;
- The Netherlands: Keent near Oss on the River Meuse;
- France: La Bassée upstream of Paris on the River Seine;
- France: Choisy-au-Bac near Compiègne on the Oise and the Aisne rivers;
- Germany: Mödrath near Cologne on the River Erft.



1: Afferdense en Deestse Waarden, The Netherlands



2: Keent, The Netherlands



5: Mödrath, Germany



4: Choisy-au-Bac, France



3: La Bassée, France

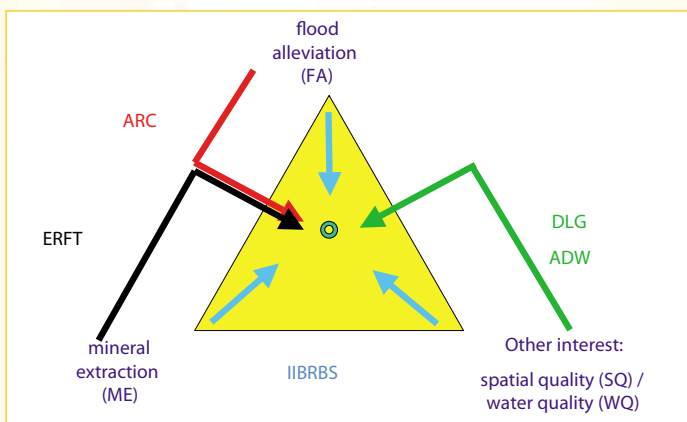
As part of the SAND project, five pilots were carried out in three countries.

Integrated approach & knowledge sharing

The overriding aim of the SAND project was to develop a *vision* for the combination of mineral extraction and flood alleviation in such a way that improved spatial and water quality resulted. Two aspects were central in this respect: an integrated approach and added value by knowledge sharing.

An integrated approach means that measures relating to mineral extraction, flood alleviation, improvement of water quality and improvement of spatial quality are coordinated. In contrast to a sectoral approach, an integrated approach offers new opportunities to improve European rivers and their environment.

The international character of the project – collaboration takes place with partners in three European countries – presents an excellent opportunity to share knowledge relating to mineral extraction, flood alleviation and improving water and spatial quality.



SAND partners



Ministerie van Verkeer en Waterstaat
Rijkswaterstaat
Oost Nederland

'Rijkswaterstaat Oost Nederland'
(Directorate General for Public Works and
Water Management, The Netherlands)



Ministerie van Landbouw,
Natuurbeheer en Voedselkwaliteit
Dienst Landelijk Gebied

'Dienst Landelijk Gebied Regio Zuid'
(Government Service for Land and Water
Management, The Netherlands)



'Institution Interdépartementale de
Barrages – Réservoirs du Bassin de la
Seine' (Grand Lacs de Seine, France)



Agglomération de la Région de
Compiègne, (France)



Erftverband, (Germany)

PROJECT DESCRIPTIONS

Five pilots in three European countries

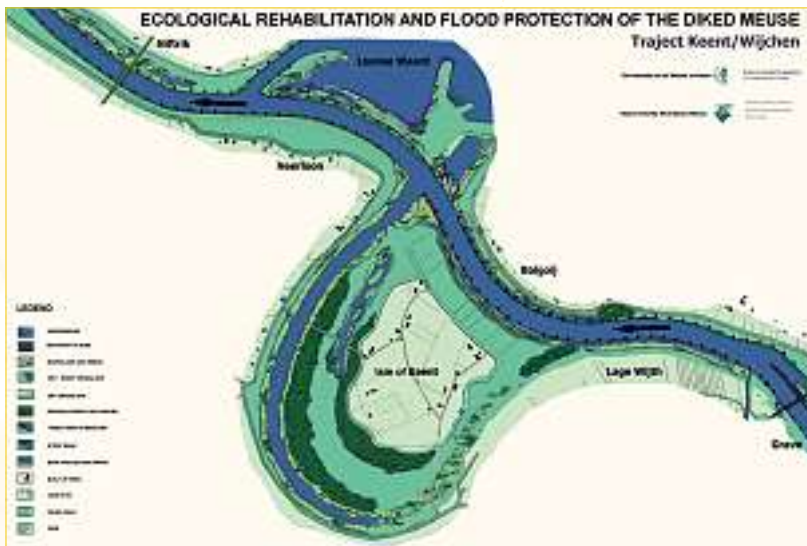
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The Afferden and Deest Flood Plains are washland areas along the River Waal near Druten. By excavating sand and clay, a lower area is created that can contain more water. A secondary channel to be excavated will provide extra space for nature and recreation. The extracted soil will be stored in a new underground extraction site or sold.

The project is being implemented by *Rijkswaterstaat Oost Nederland* (Directorate-General for Public Works and Water Management, East Netherlands Division). The following local partners are involved in the project: the Province of Gelderland, the Municipality of Druten, the Rivierenlanden Water Board (*Waterschap Rivierenlanden*), the Ministry of Agriculture, Nature and Food Quality, delegated to the Government Service for Land and Water Use (*Dienst Landelijk Gebied*).





Keent near Oss, on the left bank of the River Meuse is an area used for farming and cattle breeding. In 1938, a meander in the Meuse was straightened at this location. The aim of the project is to restore the former meander and to develop a nature area with recreational facilities. Excavating the old Meuse meander will result in a lowering of the water level on the Meuse. This will increase safety for inhabitants behind the dykes while creating a high-quality nature area. The extracted sand will be dumped in a new underground sand extraction site to be developed.

The Government Service for Land and Water Use will have final responsibility for the planning and implementation of the project in close cooperation with *Rijkswaterstaat Limburg*. The project is being supervised by a project group with delegates from the Ministry of Agriculture, Nature and Food Quality, the Ministry of Transport, Public Works and Water Management, the Province of Noord-Brabant, the Municipality of Oss and the State Forestry Service in the Netherlands (*Staatsbosbeheer*).





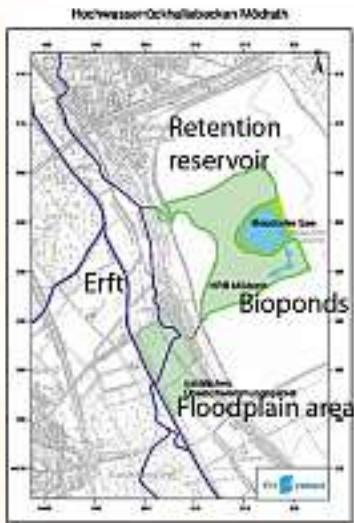
The **La Bassée** area is located in the Seine river basin near the confluence with the River Yonne. Simultaneous high waters in the rivers or high waters in one river immediately following the other may cause huge problems for Paris. The area is being developed in order to offer Paris greater safety. Existing and new gravel pits are being surrounded by dykes and will be filled with river water by means of pumps during high water. In the future these important wetlands will be used to protect ecology and nature, for gravel extraction, farming and tourism, as well as drinking water supply. Those functions will be harmonised with the temporary retention. The responsible implementing party is the Great Lakes of the Seine institute (IIBRBS). This body cooperates closely with local, regional and national parties on a voluntary basis to detail the use of the area and to realise it.





The area around **Choisy-au-Bac** near Compiègne where the Oise and Aisne rivers meet has suffered from serious flooding in the past few years. As a result of the creation of a new extraction site, the retention capacity of which is being increased by the construction of new dykes, a total retention capacity of one million cubic metres of water will result. In addition, a high water channel will be constructed with culverts through two existing roads and parts of the river banks will be lowered. The project is part of the *Entente Interdépartementale Oise-Aisne* (a public authority aiming at flood damage reduction along these two rivers), a project that covers huge stretches of both rivers and which is being implemented under the responsibility of *Agglomération de la Région de Compiègne*. The project is being carried out in close cooperation with extraction company *LaFarge*.





Lignite is being extracted near **Mödrath** on the River Erft near Cologne. Following exploitation, the pit was only partly filled, which resulted in the possibility to develop a retention basin. Part of the former overflow areas of the Erft have been restored, as a result of which a system has been created that links the Erft to the former pit. By introducing bioponds and other measures, eutrophication of the water in the lake is avoided. The project is being implemented under the direction of the Erftverband, in cooperation with the mining company RWE Power, which operated the pit. The project was completed in 2007.



Facts and figures concerning the five pilots

Pilot	ADW	Keent	La Bassée	Choisy-au-Bac	Mödrath
Partner	Rijkswaterstaat	Dienst Landelijk Gebied	Grand Lacs de Seine, IIBRBS	Agglomération de la Région de Compiègne	Erfverband
Country	The Netherlands	The Netherlands	France	France	Germany
Excavation	1.2 million m ³	2.5 million m ³	N/A	500,000 m ³	334 million tonnes
Material	Partly contaminated river sediment, partly mineral sand	Partly contaminated river sediment, partly mineral sand	Gravel and sand	Gravel and sand	Lignite
River	Rhine/Waal	Meuse	Yonne and Seine	Aisne and Oise	Erft
Project area (ha)	285 ha flood plain	364 ha flood plain	2,500 ha (20 km along the valley)	70 ha	11.5 km ² mining
Retention reservoir (m ³)	N/A*	N/A*	55 million m ³	1 million m ³	1.7 million m ³
Design discharge (m ³ /sec)	9,500	3,800	1,200 at confluence of Seine 300 and Yonne 900	320	45
Retention flow (m ³ /sec)	N/A*	N/A*	200, pump flow		15, bypass capacity

* No retention capacity, but increased discharge capacity

WHAT THE PROJECT HAS TAUGHT US ABOUT ...

Public-private cooperation

The combination of flood alleviation and mineral extraction is an excellent opportunity for public-private cooperation. After all, sand, gravel and lignite are products with a clear commercial value. The SAND project has provided interesting examples of the way in which these types of projects can be structured from an administrative, financial and practical point of view. A number of those examples will be considered here; there are, of course, far more on the DVD.



Time spent on a careful division of tasks will be time well spent.

- **A tailor-made approach has its own rewards**

The five pilots are all complex and ambitious and generally involve a great many parties. As a result of the cooperation with businesses, in particular, there are a great many different interests. For instance, commercial interests are not always in line with the interests of nature development or the increase of water quality. There is no uniform recipe for success and that is an important lesson: cooperation in these types of projects requires a tailor made approach, and the division of tasks requires a great deal of attention in this respect. Time spent on a careful division of tasks will be time well spent.

- **Exchange of employees as relationship management**

It goes without saying that all SAND partners agreed that confidence is crucial in the case of public-private cooperation. And that is certainly the case, but more is required. After all, trust is between people and not organisations. For this reason, contacts are very important. In order to build up a satisfactory long-term relationship with partners, you have to go and work with them.

- **Land ownership is decisive for cooperation**

Who owns the land? The answer to that question was a major determining factor for the cooperation process in the individual projects. There were three possibilities that resulted in various types of complexity: the area belonged to a mineral extraction company, a public authority or a private owner. In general, companies are better equipped to coordinate area development than private individuals. Although no tender procedures are required for land owned by companies, permits are required and obtaining them often presents an obstacle to the planning. In the case of various SAND pilots, appropriate solutions were found to this dilemma.



In the case of the Afferdense and Deestse Waarden pilot, most of the land was owned by the government.

- **Every effort deserves a reward**

In general, businesses want to see money on the table: every effort deserves a reward. This means, for instance, that market-sensitive information sometimes can only be made public to some extent, a fact that is at odds with European tender procedures, where maximum transparency is the rule of the day. A well-defined framework within which there is sufficient flexibility for a profitable structuring of the project may offer a way out. If that possibility does not exist, the project must be implemented using supplementary funds and without the private party.

- **Is there a leading party?**

Public-private cooperation does not have a ready-made solution when it comes to the contribution of the parties. That contribution differed in the case of all five projects: on some occasions the public party was leading, on other occasions the private party took the lead. Experience has shown that, where the leading principle is concerned, public-private cooperation requires a continual process of give and take. Once this is accepted, there should be few problems.

- **Involve the public at an early stage**

In all the goings-on relating to public-private cooperation, the public is easily overlooked. The SAND projects have demonstrated in any event that it is advisable to involve the public in the plans at an early stage. A communication plan is a good way of structuring communication right from the beginning. If communication can continue to be handled by the same people during the project, effectiveness will benefit.



It is advisable to involve the public in the plans at an early stage.

- **Designer = implementing party?**

If a public party invites tenders for a project that has already been worked out in detail, market parties have little opportunity to make their own (profitable) contribution. While it is true that policy and objectives have to make clear what is expected, choices should still be available during the implementation. Applying for permits is, for instance, a task that should preferably be left to the implementing party.

- **Time monitoring: parallel planning**

Projects such as the SAND project are complex due to their size, their duration, their subject matter and due to the large number of parties that are involved. A public-private cooperation structure does not make it easier. In such projects, delays generally trigger a chain reaction: every delay in the planning usually results in new delays. Careful monitoring of the project phasing is therefore vital. The SAND projects have demonstrated that *parallel* planning of all aspects of the project is a good way of maintaining the momentum. An initial declaration of intent signed by all parties is a satisfactory instrument for shortening the planning period.

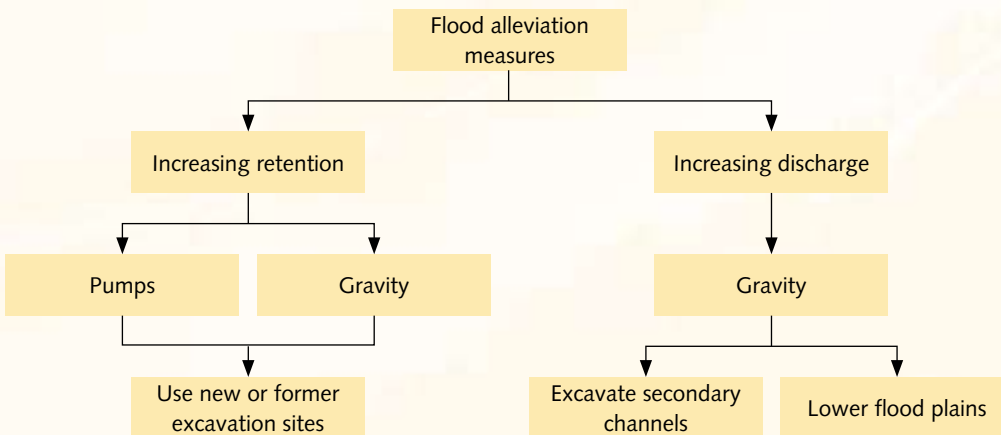
WHAT THE PROJECT HAS TAUGHT US ABOUT ...

The combination of mineral extraction and flood alleviation

Although the concepts used are strongly dependent on local factors, the SAND project has clearly shown that flood alleviation and mineral extraction can be efficiently combined in an excellent manner.

- **Two principles: retention or discharge**

Within the SAND projects, two principles are used to tackle high water problems: increasing retention capacity and increasing discharge capacity.



In the case of the SAND pilots, various combinations of measures are used for the integration of mineral extraction and flood alleviation.

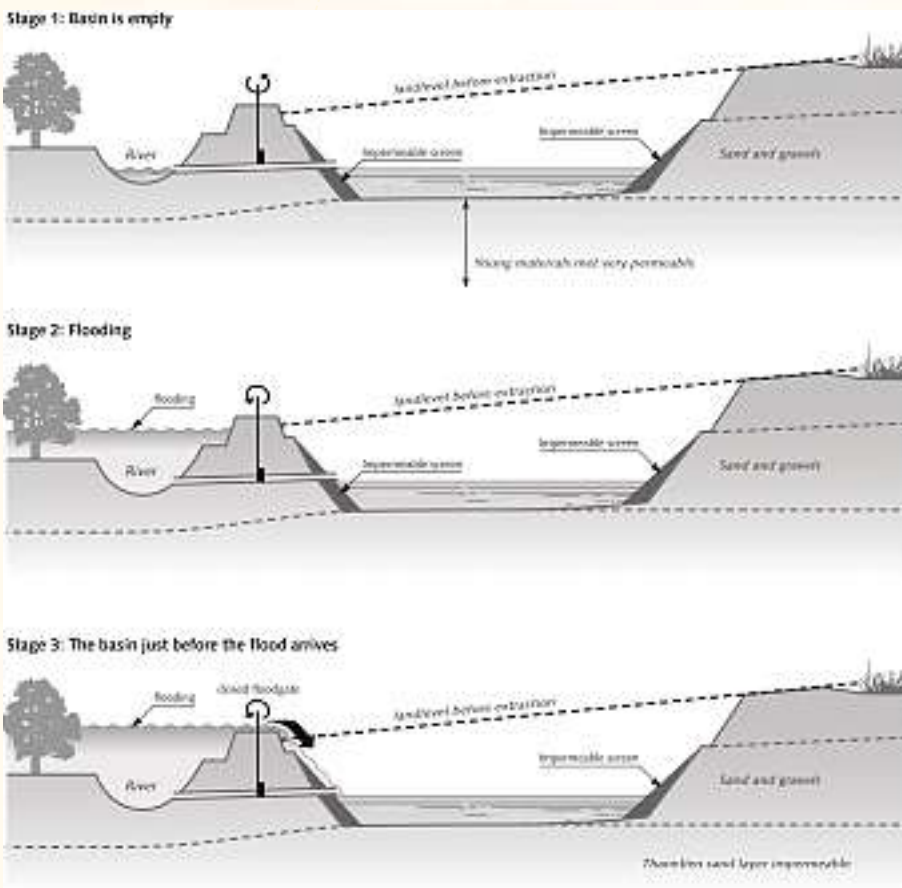
- **Increasing retention capacity**

One way of solving the high water problem is to increase retention capacity by storing river water elsewhere temporarily: in mineral extraction pits or on flood plains. The question is how should this be effected. There are two possibilities: the water flows to the retention area by gravity or it is pumped to the intended destination. In the La Bassée project, for instance, pumps will be used because the retention area is higher than the rivers.



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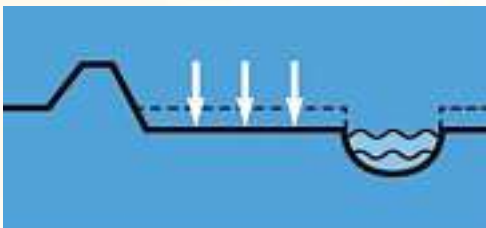
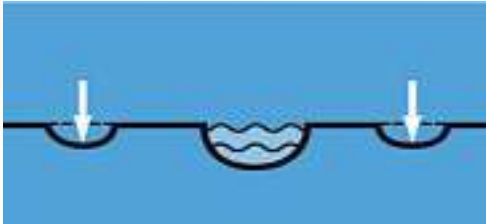
If the retention area is lower or at the same level as the river, gravity can ensure that the water reaches its destination. In the case of high water, the water flows into the retention area. Once the water in the river has fallen below the level of the retention area, the water can be emptied from the retention area back into the river. This principle is being applied, for instance, in the case of the Mödrath and Choisy-au-Bac projects.



In the project near Choisy-au-Bac, gravity is used to transfer the water to the retention area. In this case, the retention area is lower than or at the same level as the rivers.

• **Increasing discharge capacity**

As an alternative to storing the water temporarily, the excess water can be drained using extra discharge capacity in the flood plain. In the SAND projects, two options are used for this purpose that both ensure an increase in the discharge capacity.



The discharge capacity may be increased by means of secondary channels or by lowering the flood plains.

• **The two strategies in relation to mineral extraction**

The two strategies to limit the consequences of high water – the increase in **retention** or the increase in **discharge** – have contrasting effects, are suitable for various locations and present several opportunities and challenges. These are described in detail on the DVD. They are summarised below in a table.

		Increasing retention capacity	Increasing discharge capacity
A.	Link to mineral extraction	<ul style="list-style-type: none"> • Connecting to former mineral extraction sites • Forming a depression during new extraction 	<ul style="list-style-type: none"> • Digging a secondary channel • Lowering the flood plain
B.	Flood alleviation principle	Cutting off flood peak	Reducing water levels by increasing hydraulic profile
C.	Flood alleviation effect	Downstream river reach	Upstream river reach
D.	Preferable location of application	<ul style="list-style-type: none"> • Midland rivers • Small/medium discharge 	<ul style="list-style-type: none"> • Lowland rivers • High discharge
E.	Range measure	Medium (10 – 50 km)	Local (5 – 10 km)
F.	Operation during flood	Required	Not required
G.	Concept	<ul style="list-style-type: none"> • Gravity • Pumping 	Gravity
H.	Operation risk	<ul style="list-style-type: none"> • Low (gravity) • Medium (pumping) 	Very low
I.	Maintenance	Hydraulic structures	Roughness of channel and flood plain (vegetation)

WHAT THE PROJECT HAS TAUGHT US ABOUT ...

Communication

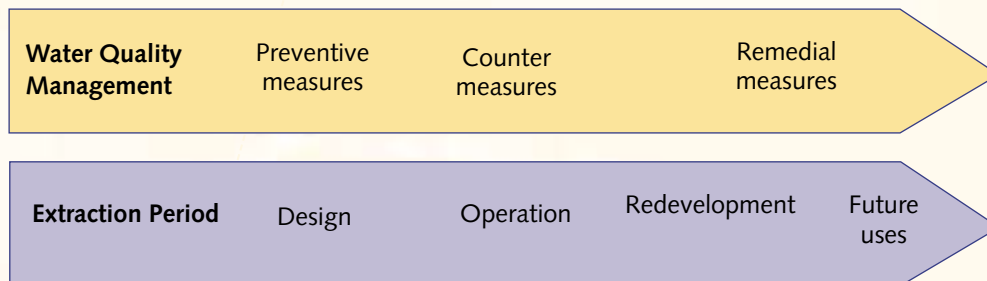
The greater the complexity of a project, the greater the importance of communication. Needless to say, that also applies to the five pilots of the SAND project. In this case, communication is not just the dialogue between the partners in the various countries (which was already complicated enough in itself), communication also refers to the external dialogue, with the local inhabitants and interested parties in question.

It has become clear that it is extremely effective to involve local parties in the project from a very early stage. In this case: the earlier the better. It was also evident from the various projects that the international importance of the projects can be a decisive argument for attracting support. A proper communication plan is vital to any project.

WHAT THE PROJECT HAS TAUGHT US ABOUT ...

Water quality

Mineral extraction could have a negative influence of the water quality of surface water and groundwater. Controlling water quality prevents or reduces these negative effects. It is clear in any case that water quality must be reviewed before, during and following the period of mineral extraction. It is therefore a matter requiring constant attention. It has also become clear that preventive measures are better than remedial measures, such as having to clean or isolate the water at a later stage.



Water quality must be reviewed before, during and following the period of mineral extraction.

In de SAND projects, both preventive and remedial measures were involved. These measures took the form of four different use concepts: a polder, a lake, a supplementary channel or a sub-aquatic disposal site. Each use concept has its own effects on the quality of the surface water and the groundwater. There are possibilities to solve any negative consequences. Those possibilities are detailed on the DVD.



Biopond in the Mödrath area.

WHAT THE PROJECT HAS TAUGHT US ABOUT ...

Spatial quality

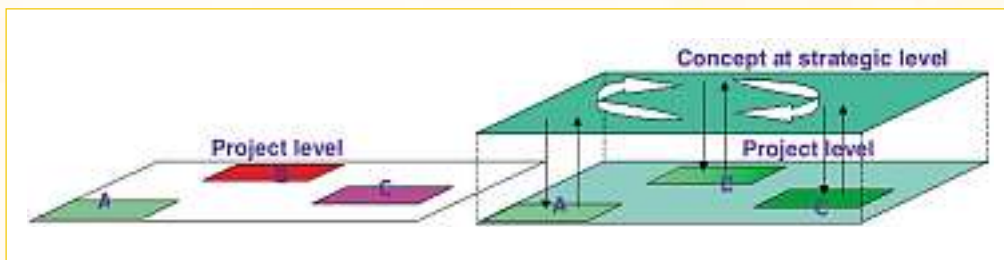
Excavating minerals does not automatically result in a landscape that is considered beautiful or pleasant by many people. However, the combination of flood alleviation and spatial quality does offer opportunities. To put it briefly: working on a large-scale project can bring about large-scale changes to the landscape. And that may have very positive results.

• Large broom

The SAND project has in any event made clear that whoever gives careful consideration to landscapes needs a large broom: think in terms of large concepts, landscape styles, corridors and transitional areas, both where land use and water use are concerned. Furthermore, all project leaders of the SAND projects are in favour of an integrated approach, in which **all** aspects of landscape development are considered right from the beginning.

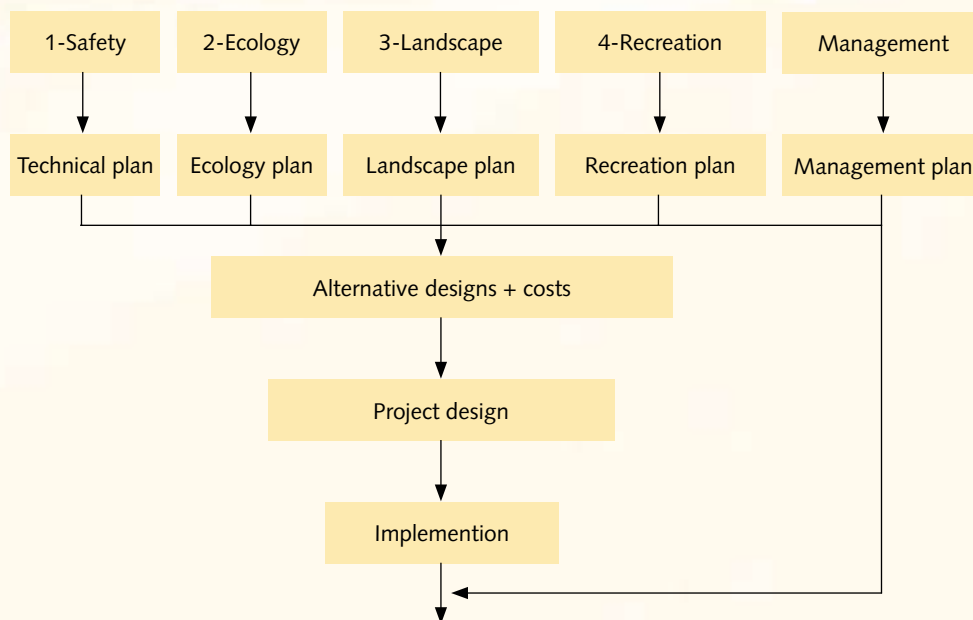
An integrated project vision

An important aspect of the SAND projects is that ideas about spatial quality have been consistently developed at two levels: at strategic and at project level. As a result, the various projects have far greater cohesion with the surrounding landscape.



Think consistently at both strategic and project level.

Design (with priority and integral)



An integrated plan requires a structured and phased approach. The SAND projects constitute a convenient model in that respect that is explained on the DVD.

WHAT THE PROJECT HAS TAUGHT US ABOUT ...

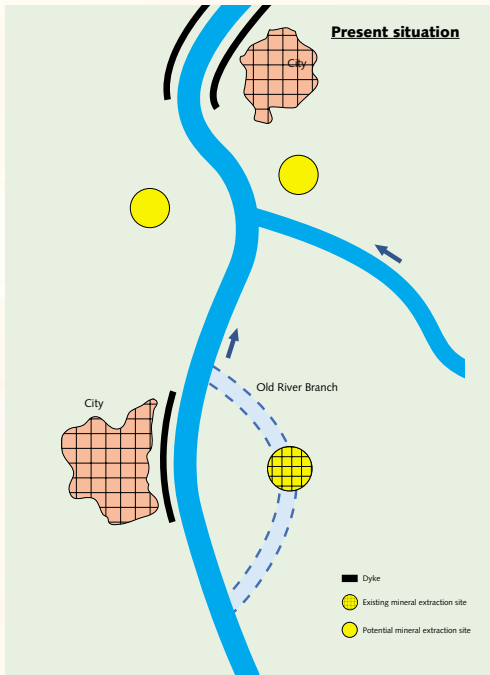
An integrated vision of mineral extraction and flood alleviation

The five European projects in the SAND project have provided an integrated vision of the implementation of large-scale designs in which mineral extraction, flood alleviation and spatial quality are combined. This vision has been converted into a stepwise plan that has enabled the entire process to be mapped out clearly on the basis of the various situations and decision moments. The vision is based on four central subjects that were dealt with during the SAND projects:

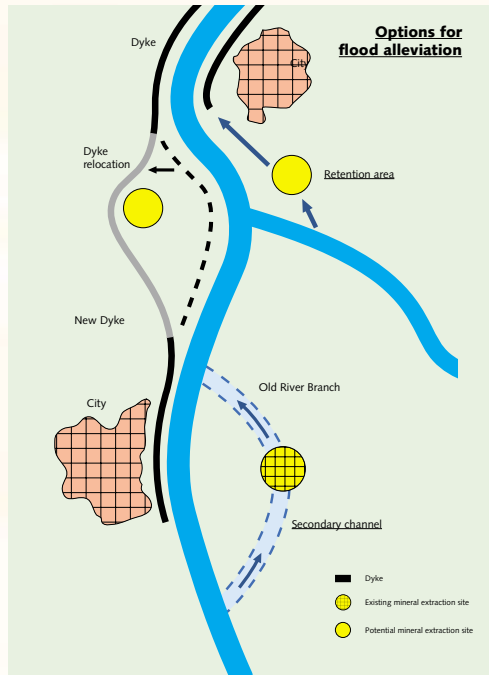
- Managing public-private cooperation;
- Integrating mineral extraction and flood alleviation;
- Managing water quality near mineral extraction sites;
- Managing spatial quality near mineral extraction sites.



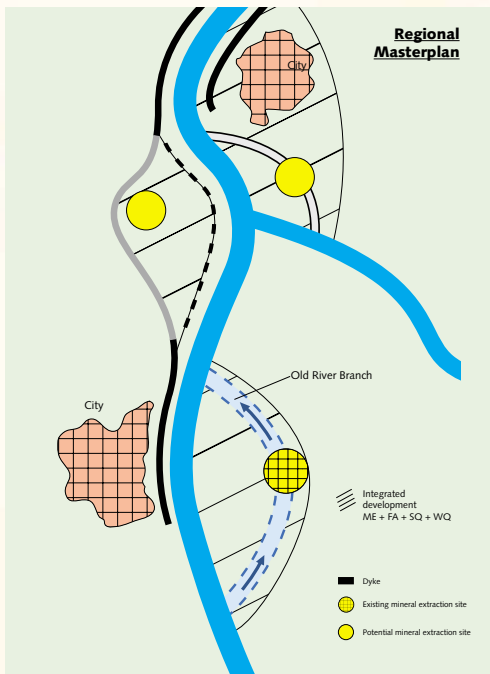
On the DVD, the vision is explained using a fictitious area along a river in four main steps, each including a number of sub-steps. The outlines give an impression of the approach.



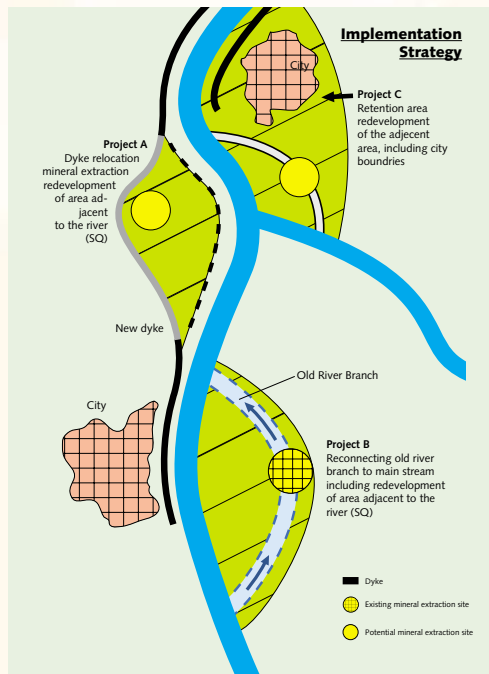
Current situation: explore the possibilities for flood alleviation and the combination with mineral extraction.



Options for flood alleviation: determine opportunities and risks and initiate land purchase.



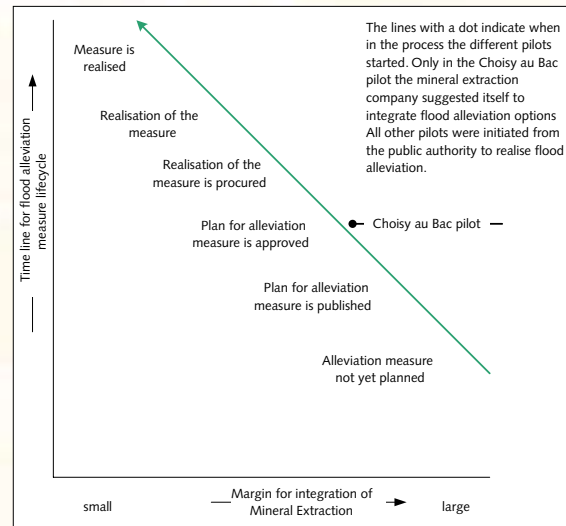
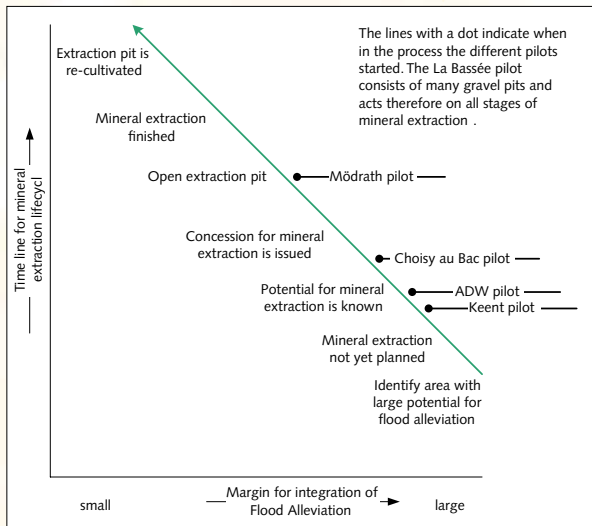
Regional masterplan: draw up a regional masterplan.



Develop an implementation strategy.

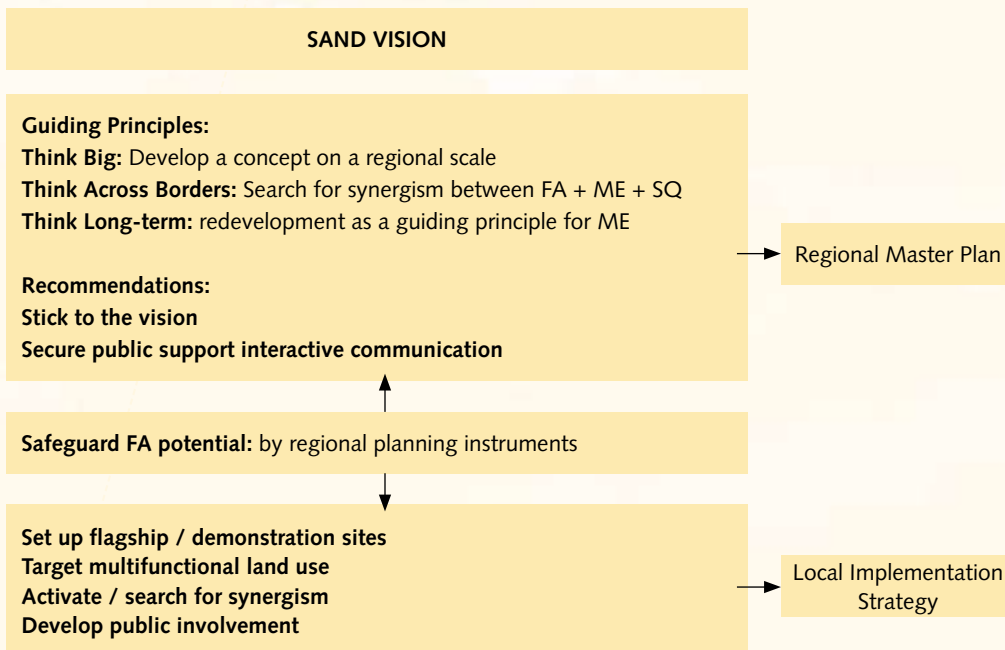
Strategies

The applicable strategy depends on the stage at which the mineral extraction and the flood alleviation project is at. Using the figures below, a project can be positioned and combination strategies can be determined. The left-hand figure is intended for the party responsible for water management measures; the right-hand figure is intended for the mineral extraction party.



The SAND vision in 10 points

The SAND vision can be summarised in ten points: three basic principles and seven recommendations. The basic principles result in a regional masterplan; the recommendations in an implementation strategy.



Project Partners and Contact

The SAND project consists of two Dutch, one German and two French partners working together to demonstrate that a combination of mineral extraction and flood alleviation measures can have a positive effect on water quality and spatial quality. The organisations involved are public authorities working at local, regional and national levels. The lead partner is the Directorate-General for Public Works and Water Management (*Rijkswaterstaat-Oost Nederland*).



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Colophon

This booklet is published by:

Rijkswaterstaat Oost-Nederland
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6826 LL Arnhem, The Netherlands

Lead Partner of the INTERREG IIB project SAND:

Spatial quality enhancement,
Alleviation of flood damage and
Nature expansion through
Development of mineral extraction sites along rivers

Full title: A Vision of Floods, Nature and Mineral extraction.
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Marc Thauront (Ecosphère)

Copywriter: Berkenbosch en Koetsenruijter, Utrecht, The Netherlands

Photographs: supplied by the SAND partners

Co-ordination of the production: Artfactory, Driel, The Netherlands

Lay-out: Artfactory, Driel, The Netherlands

Printing: Coers en Roest, ontwerpers bno | drukkers, Arnhem, The Netherlands

English text correction: Balance, Maastricht/Amsterdam, The Netherlands

This project was part-financed by the European Union



