



Assessment of Water Management and Governance: the Rijnstrangen Case

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Acronyms

AGOR	Actueel Grond- en Oppervlaktewater Regime
DLG	Dienst Landelijk Gebied
LTO	Land- en Tuinbouw Organisatie
GGOR	Gewenst of Gewogen Grond- en Oppervlaktewater Regime
REGIS	Regional Geohydrological Information System
SLA	Service Level Agreement

The minimum surface water level will be increased with a range of 0 to 45 centimetres varying locally. The maximum surface water level will not increase, instead it will undergo reduction up to 30 centimetres during the summer months. Due to this intervention of the water board, Rijnstrangen will become more saturated on average, while measures will be taken for high water levels during the summer period. This will probably positively affect the soil of the natural area, especially for the upland areas.

The lowland areas might however experience an abundance of water. Local farmers might encounter disadvantages, as the soil becomes over-saturated, making the use of heavy machinery practically impossible.

Therefore the main goal of this report will be to assess the policy of the implementation of the increase of local water levels for the natural area of Rijnstrangen. Ultimately, recommendations will be given concerning potential improvements on the design of the policy. This governance assessment of water management will be executed by means of an integrated method, which is depicted in figure 1.2.

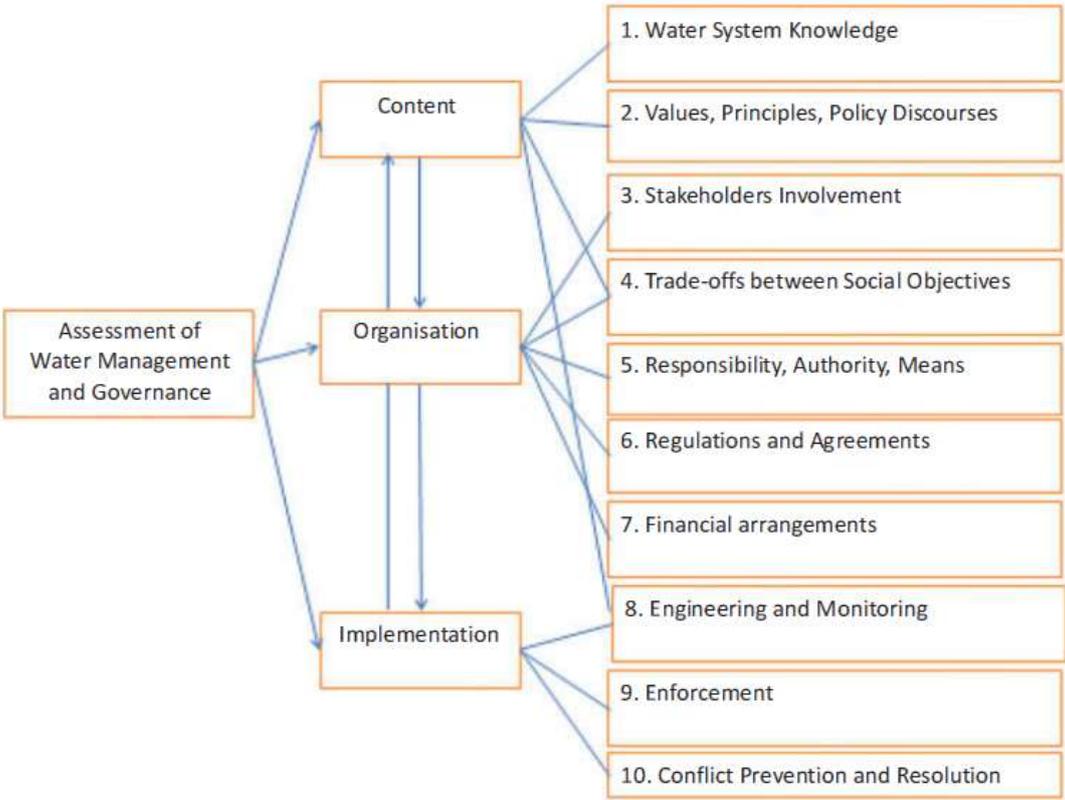


Figure 1.2: Applied framework of the assessment method of water management (Rijswick et al., 2014).

Equivalent to the framework, this report will consist of three sections, i.e. Content, Organisation and Implementation. These can be subdivided into ten subsections as defined in figure 1.2, i.e. Water System Knowledge; Values, Principles, Policy Discourses; Stakeholders Involvement; Trade-offs between Social Objectives; Responsibility, Authority, Means; Regulations and Agreements; Financial arrangements; Engineering and Monitoring; Enforcement & Conflict Prevention and Resolution. Furthermore, it presents the cyclic aspect of the method, as the arrows between the building blocks and dimensions form a loop defining a relationship of causality.

Using assessment criteria as established by Rijswick et al. (2007), the water management governance applied to the Rijnstrangen area will be regarded, while looking for potential improvements or recommendations to the current policy. The assessment's main goal is to find the main gaps in the knowledge base, instabilities in the organisation process and conflicts in respect to implementation of the plans. The water governance plan for the Rijnstrangen area can be assumed to be interdisciplinary and robust, when all three sections and the coherent subsections (i.e. ten building blocks) are conformed. However it must be mentioned that assessing a building block includes subjective aspects and one can experience a deficit of adequate knowledge. Judgement will be case specific. Eventually, the report will be brought to an end with a conclusion and a summary of the assumed to be most significant recommendations for the project.

2 Content

In this section knowledge about the water system in time and space, and values, principles and policy discourses for the Rijnstrangen area will be discussed. The applied assessment criteria will eventually decide if the current knowledge is adequate for the project and whether it will contribute to potential improvements and recommendations to the case study or not.

2.1 Water System Knowledge

The assessment criterion that is used for assessing knowledge about the water system is;

“Is there sufficient knowledge of the local water system in order to supply the required service level of societal functions; if not, what are the gaps? Do we feature sufficient knowledge to assess the impact on the water system as a consequence of changes in the environment and societal functions?” (Rijswick et al., 2014)

The water system is represented by all existing natural physical resources of water (e.g. rivers, seas, lakes and precipitation) and all artificial forms of infrastructure (e.g. canals, reservoirs and flood defences). Besides these forms of atmospheric water and surface water, the system also includes water related to ecosystems, and domestic and industrial use.

The water board of the Rhine and IJssel has underwent considerable developments for sufficient knowledge of the existing water system, by conducting a broad environmental analysis on multiple physical factors. Firstly, they have produced a topographic map, wherein two areas can be distinguished, i.e. the project area and the model area. The focus is on the first, as this covers the area of Rijnstrangen. The model area also includes the vicinity of the area. It must be mentioned that for this area only the relevant aspects have been considered.

Furthermore a digital land use map has been produced, however it must be mentioned that this changes frequently. A combination of existing soil maps resulted in a comprehensive and complete description of the current situation in respect of soil types. A combination of Regional Geohydrological Information System data (REGIS), a background report of groundwater model calibration and the geohydrological description of the province of Gelderland has resulted in an advanced form of geohydrological knowledge and a groundwater model of the Rijnstrangen area. This currently includes factors as the location, the altitude, the thickness, the lithology, the stratigraphy and the geohydrology of the coating sediment layer, and multiple aquiferous and separating sediment formations. As a result, the water board has even been able to create a cross section of the geohydrological situation (north to south).

As discussed in the introduction and presented in figure 1.1, the water board in collaboration with external engineers and consultants have determined minimum and maximum surface water levels, per section of the Rijnstrangen area. The water levels are managed by means of weirs and pumping stations that are designed to regulate the flow characteristics. The level of the surface water outside the dikes is controlled by spillways and the water levels of the rivers (Witteveen+Bos, 2007).

The groundwater system has already undergone a comprehensive analysis (by means of monitoring well measurements), whereby multiple main and sub systems have been distinguished. As a consequence the knowledge concerning special hydrological relationships has developed considerably. The result is a complete overview of all forms of

water that enters and exits the system, including precipitation, evapotranspiration, seepage, infiltration and (both domestic and industrial) groundwater abstraction.

The water board of the Rhine and IJssel (Witteveen+Bos, 2007) states that as a consequence of both upstream as downstream measures (heightening of the Spijkse spillway in 1959 and closing the river near Kandia in 1970) Rijnstrangen has undergone a loss of water flow and dynamics.

The knowledge of the Rijnstrangen water system can be assumed to be sufficient, whereas the environmental analysis and plan study form a complete research that covers all aspects of the natural area. Potential changes in the near future as the consequence of climate change seem to be disregarded, however this can be imputed to the constancy of the water system.

2.2 Values, Principles and Policy Discourses

The following assessment criterion is used for assessment of values, principles and policy discourses:

“Do we feature sufficient knowledge of shared or conflicting values, viewpoints and principles, which are represented by different policy discourse coalitions, for water issues and their consequences for facing water management issues?” (Rijswick et al., 2014)

As discussed in the introduction the minimum surface water level will increase with a range of 25 to 45 centimetres. On average Rijnstrangen will become a more water carrying area. Consequently the water board has to take environmental principles into account and has to keep an eye on the water level during the growing season and peaks on the Pannerdens channel, to ascertain the soil to be and remain adequate for agriculture.

The extensive saturation of the natural area will benefit the ecosystem, including upland agricultural areas. The lowland areas might however experience an abundance of water. The water issue that can be framed is that local farmers might encounter disadvantages, as the soil becomes over-saturated, making the use of heavy machinery practically impossible. Moreover a changing water level management will move into the picture, which will put more pressure of river on the system and induce an increased chance of flooding for the scattered inhabited areas. The water board of the Rhine and IJssel (Witteveen+Bos, 2007) states that there will be no absolute inevitable forms of flooding, as they are currently unaware of the floor levels of the concerned buildings.

The subject of a water problem is framed by several policy discourses. Two relevant and opposing policy discourses for the Rijnstrangen case are living with water and the protection against severe water events (e.g. floods). Furthermore adequate values contribute to reliable water management and governance, wherein one must find legitimate solutions that can be implemented to avoid conflicts. Faith in the principles of all concerned parties and the goal to find a solution that is acceptable to all is of significant value (Rijswick et al., 2014). A new integrated policy that will consider both safety and spatial quality is a necessity. The primary value for the Rijnstrangen area can be specified to be the water domain, i.e. flood protection, which concerns both the nature/ecology as the society/urban areas. A societal and/or financial compensation can be assumed to be appropriate. Adaptive water governance must be applied to cope with the complex water issue, wherein the present water regulation is inferior to the near future.

As several farmers might be unable to achieve a maximum agricultural yield once the new water management regulation is applied, the water board of the Rhine and IJssel

(Waterschap Rijn en IJssel, 2013) has confirmed to compensate the lower utility value of lowland agricultural plots. A settlement has agreed on a procedure whereby the water board will assist the landowners in applying for a financial compensation or subsidy in advance for the expected impact of the over-saturation.

It seems that there is sufficient knowledge of shared or conflicting values, viewpoints and principles for the water issues and their consequences for facing water management issues. However, it must be mentioned that the potential over-saturation of lowland agricultural lands is put on the foreground and other aspects on the background. Although this is a process of focussing, whereby the main water issue is the overarching element wherein the rest fits, the research on the impact on civilized areas and remaining nature areas, the chemical and ecological water status, stability of the riverbanks, hydromorphological changes and the biodiversity should be more amplified as the consequences of some scenarios still seem to be not completely clear.

3 Organisation

In this section the stakeholders involvement, insight into the trade-off between social, objectives, attribution of responsibilities, authorization and the associated means as well as regulations, agreements, and financial arrangements for the Rijnstrangen area will be discussed. The applied assessment criteria will decide whether these aspects that the organizational process requires, is adequate for the project and whether it will contribute to potential improvements and recommendations to the case study.

3.1 Stakeholders Involvement

The assessment criterion used for assessing knowledge about stakeholder involvement is;

“Are all relevant stakeholders involved, is their knowledge shared, are their conflicting values and their interests taken into account in the decision-making, problem analysis and search for solutions?” (Rijswick et al., 2014)

The final report GGOR Rijnstrangen, performed by Witteveen+Bos in collaboration with the water board of the Rhine and IJssel (Witteveen+Bos, 2007), states that a diverse group of stakeholders is represented through a stakeholder group.

Firstly an assessment is made regarding the current spatial functions of the area. Subsequently it is translated to water management goals of these functions, which results in the optimal water management situation. In order to achieve this situation, the current situation is reviewed and the changes, which are needed to achieve the optimal water management situation, are compared to the interests and goals of the stakeholders. If these interests and goals are in conflict with the optimal water management situation, the costs to mitigate these problems are compared with the benefits. If the costs are lower than the benefits, the optimal situation is pursued and the stakeholders will be compensated in a different way. If the costs are higher than the benefits, the project will fall back to the planning and allocation of functions (=Ruimtelijke Ordening en functie toekenning). A change in function of the area will then be the solution (Witteveen+Bos, 2007).

Other stakeholders in this case are the province Gelderland, which is in charge of the management plan, the European Union with the Natura 2000 policy, EU-habitat guidelines and the bird guidelines. The stakeholders that were taken into account in the stakeholder group are the water board of the Rhine and IJssel (=Waterschap Rijn en IJssel), the office of rural areas (=DLG), the local agriculture and horticulture organization (=LTO Noord), Kreisverwaltung Kleve, the province of Gelderland, state forest management (=Staatsbosbeheer), the Twickel foundation (=Stichting Twickel), Witteveen+Bos and Deichschau Huthum-Elten.

It might be recommendable to put more focus on Germany and their institutions about water management as a stakeholder. It is a fact that a large part of the Rhine flows through Germany. Consequently the actions they take near or in the Rhine will have a considerable effect on the Rijnstrangen area in multiple ways. The water from the river Die Wild for instance has a large effect on the Rhine water and the Rijnstrangen area (Witteveen+Bos, 2007). The water framework directive about integrated river basin management could be an outcome when dealing with transboundary issues. If arrangements can be made with Germany in regard of water management, the chances of floods or other alterations in water quantity and quality could be tackled.

While agriculture, nature and residential areas are taken into account in this project, it has to be pointed out that some of the changes, in some scenarios, will benefit the

agricultural sector and damage the natural areas and the ecosystems in the Rijnstrangen area. These changes are in conflict with the Natura-2000 policy. Nonetheless all stakeholders have to decide whose interests and goals should be pursued. However, it has to be taken into account that some factors like the loss of biodiversity or quality of nature are hard to define in terms of money and can therefore not so easily be put into a cost-benefit analysis.

Lastly more stakeholders could be included in this project. For example communities and more agricultural stakeholder groups, as they own and use a considerable amount of the land of the Rijnstrangen area.



3.2 Trade-offs between Social Objectives

The assessment criterion used for the evaluation of trade-offs between social objectives is;

“Are the social level objectives and agreements based on trade-offs of costs, benefits and alternative solutions?” (Rijswick et al., 2014)

According to the the water board of the Rhine and IJssel (Witteveen+Bos, 2007) the trade-off between agriculture and natural objectives is the most important aspect. These trade-offs are made by developing the GGOR, i.e. the desired or measured ground- and surface water regime. In this way, the water board can make solid estimations in respect of the future water (level) management.

A few of the boundary conditions that had to be maintained during the project were Natura-2000/ - and  habitat guidelines. This means that certain ecosystems or species had to be maintained or even developed; in this case the vitality of the bog vegetation. The second boundary condition was the water management plan of the province of Gelderland, which means that a specific area has a certain function such as agriculture, residence or nature. These functions have to be maintained or developed according to the plan. The third condition is the water management plan of the water board of the Rhine and IJssel. This is mostly in line with the second boundary condition, but it adds the goal of functional water management and a balanced water system that can withstand a dry or wet event.

Based on these boundary conditions and in consultation with the stakeholders, five scenarios have been created next to the AGOR, i.e. actual ground- and surface water regime. These scenarios have been tested by the stakeholders based on certain criteria, which has been developed by the stakeholders and project executives (Witteveen+Bos, 2007). The scenarios are; Agriculture, Reed swamp, Nature+, AGOR+ and Reed swamp through dynamics.

Only the Agriculture scenario will lead to a decrease in the structural damage through water for the agricultural sector. In the other scenarios the farmers will be compensated if the economical functionality decreases (IJssel, 2015).

The scenarios Reed swamp and Nature+ are the most suitable scenarios for the swamps due to the increased dynamics with a new maximum water level of 12.00 m +NAP. The costs are estimated at 6.8 million euros (Witteveen+Bos, 2007). However the negative effects on agriculture in these scenarios are expected to be the worst of all scenarios.

In the scenario AGOR+ and Reed swamp through dynamics the maximum water level dynamics are raised to a maximum of 10.70 m +NAP for the benefit of the swamp. The costs are 0.1 million euros for the AGOR+ scenario and approximately 0.2 million euros for the

Reed swamp scenario (Witteveen+Bos, 2007). These scenarios are assumed to be the best scenarios for agriculture and natural areas.

For the risk of water damage to the residential area every scenario has a similar result. This is partially due to the scale of the project, but it can also be imputed to the lack of information and research.

The Reed swamp and Nature+ scenarios seem to be the best scenario of the five considering the goals from natura-2000.

The goals from natura-2000 policy and the provincial water management plan concerning the development of natural areas are similar. The goals in both plans expected an over-saturated environment in the future however. Therefore the goal to increase the wet grassland vegetation is not achievable in any scenario. On the other hand, the goal for the dry grassland vegetation is already met in the current scenario.

3.3 Responsibility, Authority and Means

The assessment criterion used for the evaluation of trade-offs between social objectives is;

“Are the authorities, responsibilities and means well-organized to deal with at the appropriate administrative scale(s) in a participative and integrative way?” (Rijswick et al., 2014)

In order for a project to be successful a division of means and responsibilities among authorities is an important aspect of the project. In general the instruments for a project are supplied by the Agencies, as in this case is done by Witteveen+Bos. They advise what developments can be made within the boundary conditions, such as natura-2000 and bird- and habitat guidelines, with the use of water framework directives on national and international level. It is based on the GGOR-method that was developed by the office of rural areas (DLG) in collaboration with the union of water boards (=Unie van Waterschappen). Witteveen+Bos is responsible for creating a plan, in which the goals for the natura-2000 and bird- and habitat guidelines are met within three years (Witteveen+Bos, 2007).

The plans for spatial development are in general developed by the provinces and water boards, i.e. in this case the water board of the Rhine and IJssel and the province of Gelderland (Dieperink, 2015). The water board is furthermore responsible for the arrangements and procedures concerning the compensation for negative effects of the project (IJssel, 2015). The province of Gelderland is responsible for the management plans concerning the needed activities for the development of the area and the permits for these activities. Moreover this management plan concerns the water management plans and function assignment of areas within Rijnstrangen (Witteveen+Bos, 2007). In this case the provincial water management plan is nearly identical with the water board management plan, in regard of the function assignment of areas within the Rijnstrangen area.

Although the advised measures may not have a negative effect on the water quality, the project does not focus on water quality. It furthermore disregards land trade, function assignment of areas within the area, damage claims and compensation or local effects on residential and agricultural areas. This is assumed to be the task of the water boards and the province. This would however be against the resolution regarding water quality demands and monitoring water of 2009 (Milieu, 2015).

Furthermore the province has supervision on the development of the regional plans, which do not only include the municipality zoning plans but also water management plans. However they have to abide to the water management plans from the water board.

The water boards are responsible for the maintenance, monitoring and future plans of any water related issue. Subsequently the water management plans has to be reviewed every 5 years and changed, based on the monitoring results. In this aspect the water boards collaborate with the municipalities and landowners, mainly through the stakeholder groups.

The municipalities and stakeholders, which get assistance and information from the water boards and provinces, are mainly responsible for spatial planning in their own area. This spatial planning is based on the Spatial Planning act. Most land on which developments are planned to be executed, is owned by farmers or inhabitants of that area. As mentioned before, due to the impact of potential over-saturation they have to be compensated in case of a negative effect on their land.

The other authorities and/or groups are the inhabitants, investors and stakeholders, which are represented by the stakeholder groups. In this case LTO for instance, who focusses on agriculture (LTO, 2015) and Staatsbosbeheer that manage natural areas.

The absolute costs are financed by the water boards and the provinces. However it must be mentioned that the majority of this money generated through taxes, which originates at the Dutch society. 

3.4 Regulations and Agreements

The assessment criterion used for the evaluation of the regulations and agreements in the Rijnstrangen area is;

“Are the regulations and agreements legitimate and adaptive?” (Rijswick et al., 2014)

Whether the project and the plans are legitimate is based on a set of aspects. First of all, are the values and principles accepted by all groups (mainly the vulnerable ones) and are conflicts avoided? In the case of the Rijnstrangen area it is stated that the scenarios cannot conflict with the agreed functions of areas within the Rijnstrangen area. The GGOR-trajectory must consider the natura-2000, bird- and habitat guidelines and function assignments in the water management plan. In the first two cases there has to be a management plan which deals with conflicting issues between the development of the Rijnstrangen and the natura-2000 and bird- and habitat guidelines. This will be executed by the province of Gelderland. The function assignments in the water management plans are similar in the water board plan and the water management plan from the province. There are no conflicts expected there.

Inhabitants of the residential areas suffer no negative consequences according to the project/ research done by Witteveen+Bos. However, they do state that more research is needed while they did not look in to that issue on a local scale.

The farmers that will suffer negative consequences of damage through over-saturation or drought will be compensated. According to LTO the water board of the Rhine and IJssel will have to pay these compensations. This compensation is realized in terms of land trade, moving the company or farm as a whole or adapting the projected plans to the local issue (Luijmes, 2015).

The second aspect is to be in conformity with the rule of law. In the Rijnstrangen project European law is acknowledged and respected, even when knowing that abiding the natura-2000 and bird- and habitat guidelines will have a negative effect on the agriculture. Agricultural areas with damage due to over-saturation and due to drought will increase in

every scenario in which the health of nature or the reed swamp is taken into account (Witteveen+Bos, 2007). Then again, the farmers will receive compensation while this is promised in a court of law (Luijmes, 2015). The resolution about water quality demands and monitoring water of 2009, will ensure that the water quality is maintained during the execution and maintenance of the projected developments (Milieu, 2015).

The third aspect concerns the rights, duties and accountability to provide the base for action (Rijswick Edelenbos, Hellegers, Kok, & Kuks, 2014). Like stated before, if any negative effect will occur during the realization face of the project, the water board of the Rhine and IJssel will be the institution to go to. Witteveen+Bos executed the research and created the optimal scenario for the development of the Rijnstrangen area. The regional water board and the province of Gelderland have overseen the project.

By creating the scenarios Witteveen+Bos found the most effective and realizable scenario concerning the goals of the area (boundary conditions taken into account). This resulted in the Swamp and Nature+ scenario, which satisfy the natura-2000 guidelines the most (Witteveen+Bos, 2007).

By creating and stakeholder groups and considering their goals and interests in the decision making process everyone who is affected by the development of Rijnstrangen is being informed about the processes (through stakeholder meetings).

By involving Witteveen+Bos and other organizations both private and public sectors benefit from the collaboration and development of the Rijnstrangen.

The aim to take distributional effects into account to avoid damage to the water system other interests and policy fields, in order to avoid conflicts, has been taken care of by the management plan of the natura-2000 and bird- and habitat guideline commitment, through the resolution about water quality demands and monitoring water, in order to maintain the water quality, and by compensation for negative effects of the project. The last measurement has been causing some conflicts, because the water board and the landowners did not always agreed on the compensation agreements. So concerning the question whether the regulations where legitimate and adaptive this is not clear and therefore not sufficiently handled in the project.

3.5 Financial Arrangements

The assessment criteria that has been applied to evaluate the financial arrangements is the following:

“Is the financial arrangement sustainable and equitable?” (Rijswick et al., 2014)

Good water governance needs empowerment with financial means. Because of equity and sustainability of the project a discussion about the ways water management is financed is needed. In the case of the Rijnstrangen area the financial costs are paid by the water board. Indirectly the people will pay for this project while 95% of the budget of a water boards finds its origin in taxes. In this case the water board of the Rhine and IJssel will pay 550,000 euros for the construction of the two weirs, costing 0.1 and 0.2 million euros. This is however on the condition that the province of Gelderland will pay for 75% of the money needed for the entire project. The weirs are needed to sustain the water levels in the Rijnstrangen area (Klieverik, 2013).

There is however not yet a definitive policy agreement about the damage due to over-saturation. This is needed in order to receive money from the Plattelandsonwikkelingsprogramma (POP) and the Provinciale meerjarenprogramma (PMJP). The province of Gelderland has set a subsidy condition, before the realization of the two

weirs can be executed, that the water board of the Rhine and IJssel and province of Gelderland must come to a written agreement about the costs and the distribution of the costs due to the damage caused by over-saturation.

The landowners will only allow the construction of the weirs when their projected damage due to over-saturation is compensated.

The Province of Gelderland is willing to contribute money for the development of the Rijnstrangen. This money should be used to pay for land trades, movement of companies/farms or adaptation of the project plans to avoid damage due to over-saturation, drought or natural development (Luijmes, 2015).

The height of this contribution is determined by appraisers. The appraisers will put a value on the land of the farmers, the potential damage to revenue of the land and the loss of capital worth of the land (Luijmes, 2015). 

4 Implementation

This chapter focuses on assessing the implementation of service level agreements. In order to be able to assess this implementation, the chapter is divided into three distinctly different subjects, i.e. engineering & monitoring, enforcement and conflict prevention & resolution. These are the final three building blocks of the policy assessment framework depicted in the introduction (see figure 1.2).

4.1 Engineering and Monitoring

Assessing engineering and monitoring is based on a certain assessment criterion. This criterion consists of a few questions one can ask in order to conclude whether the engineering and monitoring assessment is adequate for this project or not:

“Are SLA’s sufficient available (implicit or explicit) in order to redesign the existing infrastructure? Are design and consequences of different alternatives sufficient available? And finally, is there sufficient monitoring of the system and is the data analysed?” (Rijswick et al., 2014)

During the increased water elevation project of Rijnstrangen different contracting and performing companies will be actively cooperating. This highlights the importance of clearly described expectations and goals of the involved parties. The SLA’s concerning the Rijnstrangen case are the actual agreements between the stakeholders, the water board and other authorities regarding the implementation of the earlier mentioned weirs and pumping stations along the channel to regulate the flow characteristics of the river. Moreover they include the accompanying rules and agreements about land ownership, responsibilities, monitoring and maintenance.

The building and operation of weirs and pumping stations from an engineering point of view are a rather simple concept. However, raising the water level to stimulate natural areas in Rijnstrangen will restructure the area along the river. The main focus of the area is agriculture, hence certain areas that are currently used for this purpose will inevitably become inundated while others will remain allocated to the agricultural sector. The water board of the Rhine and IJssel (Witteveen+Bos, 2007) concluded in consultation with other involved parties (especially the agricultural sector) that re-allocation of areas to the river will be achieved by subsidising the farmers for areas lost due to this project or in some cases trade-offs leading to the farmers being reallocated to new areas outside this project area. Farmers of agricultural areas, which will retain their purpose, will receive subsidy for potential damage to crops due to the wetter conditions.

In cooperation with the involved parties, the regional water board (Witteveen+Bos, 2007) made a total of five scenarios for this project. Accordingly, the parties also agreed on certain criteria to assess the results of the scenarios, which include agricultural moisture increase/decrease, quality of nature area, structural damage due to higher groundwater and finally the costs. As mentioned before, the five different scenarios are: Agriculture, Swamp, Nature+, AGOR+ and Reed Swamp due to dynamics. Briefly, all scenarios obviously focus on increase in water level, but in addition the Agriculture scenario aims its’ attention on minimizing the agricultural damage due to the higher water level, the Swamp scenario focuses on achieving ideal conditions for the development of a healthy reed swamp, the Nature+ scenario has the same purpose as the swamp scenario but instead incorporates some minor measures regarding the agriculture, the AGOR+ scenario fixates on keeping the water management in the downstream locations of the old Rhine (where reed swamp is absent) tuned to the reed swamp in the upstream location and finally the Reed swamp due to

dynamics scenario, which is an iterated scenario based on the combination of the most suitable measures in the four before mentioned scenarios (with the main focus on the quality of the natural areas).

After carefully analysing the results of the scenarios, a mutual conclusion is made in favour of scenarios Swamp and Nature+. According to the water board of the Rhine and IJssel (Witteveen+Bos, 2007), these are the two scenarios that satisfy the predefined so-called Natura-2000 goals for the Rijnstrangen area to the highest degree.

The actual building of the structures that regulate the water characteristics (weirs and pumping stations) is not included in the SLA's. These can form an objection for the citizen in that area and possible effects should be carefully discussed and agreed upon. However, this project mainly concerns the improvement of the natural system, which will be achieved by raising the water level in the before mentioned way and regarding this project, the SLA's are sufficient available with the purpose of redesigning the infrastructure.

The water board of the Rhine and IJssel (Witteveen+Bos, 2007) mentioned a total of five scenarios with the accompanied effects of each. The scenario results are carefully analysed on their correctness by the involved parties with the utilization of predefined assessment criteria. Hence, design and consequences are sufficiently available and data is well analysed, which satisfies the last questions of the assessment criterion mentioned in the first paragraph of this section. In conclusion, the assessment criterion is satisfied 

4.2 Enforcement

The evaluation of the enforcement of the Rijnstrangen case  is also based on a certain assessment criterion:

“Are regulations and agreements enforceable by public and/or private parties, and are there appropriate remedies available?” (Rijswick et al., 2014)

Insufficient progress of a project can become apparent through monitoring for instance. In such case, an intervention is desirable by means of enforcement (Coppens & Meijer, 2013). Concerning the enforcement of regulations and agreements it is stated that public parties can only enforce public regulations and agreements, while private parties can enforce public regulations and agreements as well as private regulations and agreements. In the case of Rijnstrangen private parties are involved in the project, however the outcome of the project is a result of cooperation between public and private parties, hence only public regulations and agreements apply here.

In the case of the Rijnstrangen area, most of the regulations and agreements are more or less implemented by the province of Gelderland, which is the supervisor of the water management in the area. Indisputably, this implies that the province is the supervisor of the water level raising project and all agreements related to it. Regarding the spatial planning act on local scale, the municipalities implement the enforcement. In their local plans areas are emphasized where zero activities (e.g. building of pumping stations and weirs) can be executed without the necessary permits. These locations must be protected and enforced to avoid the performance of the earlier mentioned activities.

Regarding the appropriate remedies to enforce regulations and agreements, the Council of State Administrative Law section serves as the highest court of appeal for citizens against executive branch decisions. Therefore, it is possible to have an appeal at the Dutch Council of State against the approval decision of the provincial authority in the Rijnstrangen case. This can serve as an administrative instrument to enforce predefined regulations and agreements for the involved private parties.

In conclusion, in case of the Rijnstrangen project regulations and agreements are definitely enforceable by public and private parties and the appropriate remedies are available to the parties as well.

4.3 Conflict Prevention and Resolution

The following assessment criterion is used for the assessment of conflict prevention and resolution:

“Are there sufficient conflict prevention and resolution mechanisms in place?”
(Rijswick et al., 2014)

During a project involving multiple parties, conflicts may arise where responsibilities are not clear especially when the border between property rights are vague (Coppens & Meijer, 2013). Coppens & Meijer (2013) also mentioned an example of such a conflict in their report. According to them the water board supervised the construction of an eco-friendly riverbank in the past, which was maintained by a different party and resulted in a damaged dike. In this particular case it was unclear who was responsible for the disintegration of the structure and thus who had to pay for the damage remained unclear.

In the Rijnstrangen case there are different values assigned to the importance of raising the water level between the water board and the farmers. Divergent values assigned by multiple parties are undoubtedly promoting conflicts. As mentioned by the assessing criterion, the question remains whether there are sufficient mechanisms available for conflict prevention and/or resolution in this case or not.

In general, concerning the implementation of weirs and pumping stations to artificially rise the water level, the impression in the province of Gelderland is that they made an effort in the prevention of conflicts due to the attempt to inform the involved stakeholders to be transparent, responsive and following the law. Furthermore, in the process of construction and maintenance clear agreements can also contribute to conflict prevention.

Coppens & Meijer (2013) mention that in some cases  agreement between the water manager and the current landowner is not accomplished. Regarding resolution mechanisms there is in such case a possibility to charge a policy of tolerance for the construction at the private property. However, the water manager has to have made an attempt to reach a bargain in order to utilise this mechanism. After the policy of tolerance is announced, a six-week period follows in which the landowner is eligible to write an objection to the water board. In case of denial, the landowner can go to court. However, in case of unclear responsibilities the effectuation of judgement is not easy and therefore prevention seems much better.

In conclusion, conflict prevention seems to contribute a lot to a smooth execution of a project and is in this case especially reached by strongly advising stakeholders to be transparent, responsive and following the law, while in addition also establishing agreements and providing clarity on the involved subjects and responsibilities. Furthermore, a policy of tolerance seems to be the only resolution mechanism involved in this project.

Discussion, conclusion and recommendations

In this paper an assessment of the GGOR Rijnstrangen Eindrapport by Waterschap Rijn & IJssel and Witteveen+Bos has been made. This assessment has been conducted using the ten building blocks for sustainable water governance. In the first building block, concerning water system knowledge, an assessment has been made about the sufficiency of the knowledge of the local water system in order to supply the required level of societal function.

A broad environmental analysis on all physical factors has been made for the Rijnstrangen project. This analysis resulted in a topographic map, digital land use map, soil map and geohydrological models. This model determined the minimum and maximum water levels, which are regulated by weirs, pumping stations and spillways. The groundwater system has already been analyzed by means of monitoring of well measurements. All this research resulted in an overview of all the water that enters and exits the system. Due to measurements up- and downstream Rijnstrangen has undergone a loss of water flow and dynamics. All in all, the knowledge of the Rijnstrangen water system is sufficient, whereas the environmental analysis covers the aspects of the natural area. A point of improvement is an analysis about the potential changes in the future due to climate change, which has been disregarded as of yet.

In the second building block, concerning values, principles and policy discourses, an assessment has been made about the sufficiency of the shared knowledge, conflicting values, viewpoints and principles for water issues and their consequences. The Rijnstrangen report shows that the minimum surface water level will increase with 25-45 cm as a result of the projected developments. This will have benefits for nature and upland areas. The lowland areas however will face over-saturation. The damage as a result to this over-saturation will be compensated by the water board Rijn & IJssel. However, the values given to this damage differs between the landowners, mostly farmers, and the water board Rijn & IJssel. The Water board agreed to compensate for a lower agricultural yield but not for loss of capital due to loss in value of the agricultural land. The impact of the project for the civilized areas and nature areas that remain nature areas, are disregarded in this project. Besides the statement that the research conducted for the project does not cover local consequences of the project. This is an important factor in the decision making process of this project. If the damage to the residential areas would be proven to be severe, the realization of the currently planned project will become too expensive and will probably not be implemented in the way it is currently planned. Due to the lack of research concerning the damage for residential areas on local scale and the disagreement about the compensations, it can be concluded that the project is not sufficient ewed from the second building block concerning values, principles and policy discourses.

In the third building block, concerning stakeholder involvement, an assessment has been made reviewing whether all relevant stakeholders are involved and whether or not their knowledge is shared and their conflicting values and interests are taken into account. One of the aims of the Rijnstrangen project is to optimize water management. This will be achieved by creating a new water management situation and compare this to the interests and the goals of the stakeholders. If some aspects of this new and optimal situations where to be in conflict with the goals and interests of the stakeholders this problems will be mitigated, if possible through compensation in one way or another. One of the outcomes of the assessment is that Germany could have been more integrated in the project and involved as stakeholder, mainly with the goal to alter water quality and quantity in benefit of the aimed goals of the project. Also the farmers, which own large areas, could be more involved

because of their major presence in the Rijnstrangen. Conclusively, it could be stated that this section is not completely sufficient.

In the fourth building block regarding trade-offs between social objectives, an assessment has been made about the social objectives and agreements and whether or not they are based on trade-offs of costs, benefits and alternative solutions. The (social) objectives of this project are based on the boundary conditions for the development of ecosystems or species and the water management plan, which are based on the management plan from the Province of Gelderland and the water board of Rijn & IJssel. The research conducted for this project resulted in five scenarios, which were in consultation with the stakeholders and tested based on the criteria from the boundary conditions. All in all this part of the project is sufficient according to the ten building blocks for sustainable water management.

In the fifth building block an assessment is made about responsibilities, authority and means and whether they are well organized or not. The conclusion of this assessment is that the water board and the province are responsible for the spatial development plans, financial compensation and permits, according to the report. However it is not in the scope of the project, the water quality that is to be monitored and protected by law has not been sufficiently been discussed in the project. The agreements about land trade and function assignments are not fully clear and the damage claims have not been handled or agreed upon yet.

The sixth building block concerned whether or not the regulations and agreements are legitimate and adaptive. As a result of the assessment it is not clear whether or not the values and principles are accepted by all groups and if all conflicts are about to be avoided or solved. While the function assignments are similar in both the water board and province plans it is not expected that any conflicts will occur. The projected plans are also in line with the natura-2000 goals and guidelines for bird and habitat and therefore with European law and guidelines. Furthermore, anyone who will suffer negative effects due to the development of the area will be compensated by the water board Rijn & IJssel and province of Gelderland. The project is very adaptive due to the presence of multiple scenarios and thus the regulations and agreements cover all side effects, which can potentially arise in the different scenarios. The project as a whole, will be overseen by the water board and the province and by involving all relevant stakeholder groups from public and private sector this part of the project is sufficiently met.

As for the seventh building block, the financial costs will be paid for by the water board and the province of Gelderland. The water board Rijn & IJssel will pay for the two weirs, but there is no definitive policy agreement on who will pay which amount in terms of compensation. The province of Gelderland and the water board are still acquiring written terms. It is also just decided in court that that compensation for loss of capital due to over-saturation must be paid.

It can be concluded that the criterion is not sufficiently satisfied in this part of the project.

The eighth building block assessing engineering and monitoring is reviewed according to the following question; *“Are SLA’s sufficient available in order to redesign the existing infrastructure? Are design and consequences of different alternatives sufficient available? Is there sufficient monitoring and data analysis?”* The result of this assessment renders two options; parts of the agricultural area retain their agricultural purpose or agricultural areas that will be allocated to nature. This will be arranged through regulations concerning compensations and land trade for the farmers and hence in both cases the SLA’s are sufficient available to restructure existing infrastructure. There are also enough

alternatives while there are five scenarios created. The results of each of these scenarios have been analysed using different criteria like for example structural damage due to over-saturation and quality of nature. Therefore this building block is concluded to be sufficient.

The ninth building block concerns enforcement. An assessment has been made about the regulations and agreements and whether or not they are enforceable by public and/or private parties. These regulations and agreements are sufficiently present, as is the enforceability by private and public sectors. The province is supervisor of the project and oversees the implementation and agreements made while the local municipalities are in charge of the local enforcements, for example local spatial planning. As a remedy the council of state administrative law section serves as the highest court of appeal for citizens against executive branch decisions. All in all, the project handles all aspect of this building block efficiently.

The last building block, concerning conflict prevention and resolution, is also sufficiently handled in this project. The conflict prevention is achieved through strongly encouraging stakeholders to be transparent, responsive and following the law. A resolution mechanism is that the citizens can go to court to oppose certain deals from the water board of Rijn & IJssel. All in all, the project satisfies the used criterion in this building block.

In conclusion, the water governance plan for the Rijnstrangen area can be assumed to be interdisciplinary and robust, when all three sections and the coherent subsections are conformed. In case of the Rijnstrangen minor gaps are still present, like for example who will pay for what and which agreements have been made financially, but overall it can be stated that the water governance plan covers the necessary aspects and is adequate for the Rijnstrangen case. As a final and main recommendation, the involvement of stakeholders from Germany in this project should be increased, while this project will probably also affect the upstream area.

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