1 Project characteristics

A. Type of project

■ D. Innovation and valorisation oriented research.

B. Full title

Towards implementation of promising measures for local freshwater supply and salinity control in the Southwestern Delta

C. Short title

Valorisation of promising measures for local freshwater supply in the Southwestern Delta

D. Hotspot[1]

☐ Wadden Sea	☐ Haaglanden region
■ South-West Netherlands Delta	☐ Rotterdam region
☐ Major rivers	☐ Shallow waters and peat meadow areas
☐ Dry rural areas	

E. Main applicant

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F. Abstract (max 200 words)

In the SW delta, the agricultural sector is confronted with growing impacts of water shortage and salinization..The Province of Zeeland is aware of the negative influence on the socio-economic development and the agricultural sector (ZLTO) and municipalities (e.g. Schouwen-Duiveland) consider a reliable freshwater supply as one of the key issues for future development and sustainable growth. On a national level, strategies to reduce freshwater demand and increasing freshwater supply are being developed in the Delta Programme..

Our project's main goal is to improve the use of existing fresh groundwater resources and create new freshwater reserves, thereby increasing regional self-sufficiency and reducing dependence on external freshwater supply. Research already takes place on theoretical feasibility of possible measures. Building on this knowledge, our

[1] The submission of proposals is coordinated by the hotspots. Therefore, proposals are to be submitted by the coordinator of the hotspot(s).

main research goals are 1) to investigate which measures actually 'work' in practice and 2) whether such measures are economically feasible.

The project aims to develop showcases of three promising technologies which increase local or regional water supply. Basically, two showcases are set up on aquifer storage and recovery (ASR), utilizing the potential of sandy creek ridges for water storage. These showcases are 1) the freshmaker concept in Zuid-Beveland and 2) infiltration via drainage on Walcheren. The third showcase is optimizing the freshwater volume in shallow rainwater lenses with a pilot on Schouwen-Duiveland. Integration of new knowledge, stakeholder participation and opportunities for practical implementation in the region (including economic feasibility analysis) will take place in two parallel work packages.

2 Scientific aspects

A. Objective

Freshwater availability in the Southwestern Delta is not obvious due to the presence of saline groundwater and will be under more pressure in the future. Though fresh groundwater is available in dunes, creek ridges and shallow rainwater lenses, large parts of the SW delta have no external supply of freshwater. As such, the freshwater availability in the root zone entirely depends on precipitation and supply from the groundwater system and these systems are vulnerable to increasing drought and salinization. To make freshwater supply less dependent on weather conditions, strategies and operational technologies are needed to guarantee freshwater availability during dry periods.

Our main goal is practical: *make better use of existing fresh groundwater resources and create new reserves, thereby increasing regional self-sufficiency and reducing dependence on external freshwater supply*.

To achieve this, two different types of measures are defined:
1. Infiltration, storage and recovery of freshwater in shallow aquifers (executed in two showcases),
2. The agricultural parcel subjected to seepage of saline groundwater (executed in one showcase).

To date, it is not clear which measures actually 'work' in practice and whether such measures are economically feasible. Although several technologies have been developed on the drawing table, there is no experience with real field applications. For that reason, we will investigate promising technologies in three field studies, with the aim to demonstrate the potential of each technique for increasing local water supply, including an economic assessment. The transition from theoretical considerations to real field testing will also advance our scientific knowledge basis.

The investigation comprises an intensive stakeholder processes. The transformation to the entire region will be evaluated, paying attention to both hydrological and economic feasibility. This holistic approach (sound technology testing, economic feasibility study, stakeholder participation) is unique to our project and will lead both to scientific advancement and practical benefits (technology implementation).

B. Central research question and sub-question(s)

WP1 Infiltration, storage and recovery of freshwater in shallow aquifers

- Can the freshmaker concept be proven in the field and provide sufficient freshwater reserves? How can the concept be optimized and what are the potential risks?
- What are the water quality changes occurring during storage periods with the freshmaker concept?
- What are the costs of water supply using the freshmaker concept and are they competitive compared to the costs of current external water supply?
- What are other possible technical measures, what are their costs and (global) benefits, and what is an economically favourable option?
- Which operational configurations (depth and distance drainage, controlled water levels, etc.) are most favourable, in order to maintain the freshwater volume under different hydrogeological conditions?
- How can different types of creek ridges be characterized to define an optimum yet sustainable water storage configuration for the entire region?

WP2 Shallow rainwater lenses at agricultural parcels

- Which customary, operational measures exist, aimed at the preservation, enhancement and/or development of rainwater lens at the scale of the agricultural parcel (e.g. drainage techniques, water level management)?
- How can the storage capacity of rainwater lenses be increased?
- Which operational configurations (depth and distance drainage, controlled water levels, etc.) are most favourable, in order to maintain the freshwater volume under different hydrogeological conditions (such as soils, freshwater and saltwater distribution, altitude)?
- Do these characteristics lead to new drainage design standards?
- What are other possible technical measures, what are their costs and (global) benefits, and what is an economically favourable option?
- What type of agricultural management could benefit from these (technical) measures?

WP3 Socio-economic feasibility and opportunities for practical implementation

- To what extent are the measures feasible from a technical, economical and environmental point of view in the southwestern delta? What can be said regarding the feasibility in other regions in the Netherlands and abroad?
- What is the market for these measures compared to other available measures to conserve water, such as supply of water via piping or water basins?
- How do the measures fit in future policy scenario's for freshwater resources management, as currently explored within the National Delta programme?

WP4 Knowledge transfer and stakeholder participation

- How can the accumulated knowledge of the consortium partners and specific stakeholders be made available to the target group during and after this project?
- How can stakeholders be part of the implementation process and what are the most effective dissemination methods and instruments?
- What are the most important questions for farmers and policy makers related to creek ridges and rain water lenses?
- What are, for the different stakeholders, farmers and policy makers, the most effective dissemination methods and instruments?

C. Scientific relevance and innovative value

The proposed measures have been designed and theoretically tested in previous desk studies, leading to better understanding of the underlying processes. However, none of these measures has been explored in practice, and neither has the economic feasibility of these measures been tested. So the scientific challenge is to test the different measures under real field conditions, both for technological performance and economic feasibility. For example, one of the concrete outputs of the project could be new or adjusted standards for drainage practices. If the technology can be proven to be sound, possibilities for upscaling to other areas in the Netherlands, Europe (Belgium, Po Delta) and worldwide (Nile, Mekong, vulnerable islands) will be considered.

The innovative character of out project lies in the development and testing of novel technological concepts which can be used to address water scarcity issues on a global scale, in terms of approach and in terms of specific measures. As stated before, the regional government is very much concerned about a guaranteed fresh water supply. Fresh water availability is very much under stress in delta areas due to climate change and increased human pressures. Common practices to guarantee availability very much focus on regional, large scale, approaches. In this current project, it is proposed that replicating local measures provide a promising solution. We will consider not only the technical aspects but also the socio-economic aspects. For instance: one of the measures is to redefine the current drainage design criteria which up till now were solely based on drainage during wet periods.

Lastly the project is innovative in terms of consortium composition. For a successful approach to sustainable fresh water availability it is inevitable that knowledge institutes, private sector, and government should work together. Only through such a combination the approach is substantiated by scientific evidence, practically feasible and approved by the policy makers.

D. Approach and methodology

The project aims to develop three showcases of two different types of measures (see Figure 1). This consortium is building on (scientific) research in previous projects; for instance, for WP2, the reference situation in several agricultural parcels is already known, from both a stakeholder and a hydrogeological (viz. monitoring, water system analysis, modelling) point of view. As such, this consortium already has a pretty good idea of where the different showcases could be located. However, we will in the beginning of this project bring together all necessary expertise (stakeholders as well as knowledge institutes) to discuss risks and opportunities of different locations, ending up with the most promising locations.

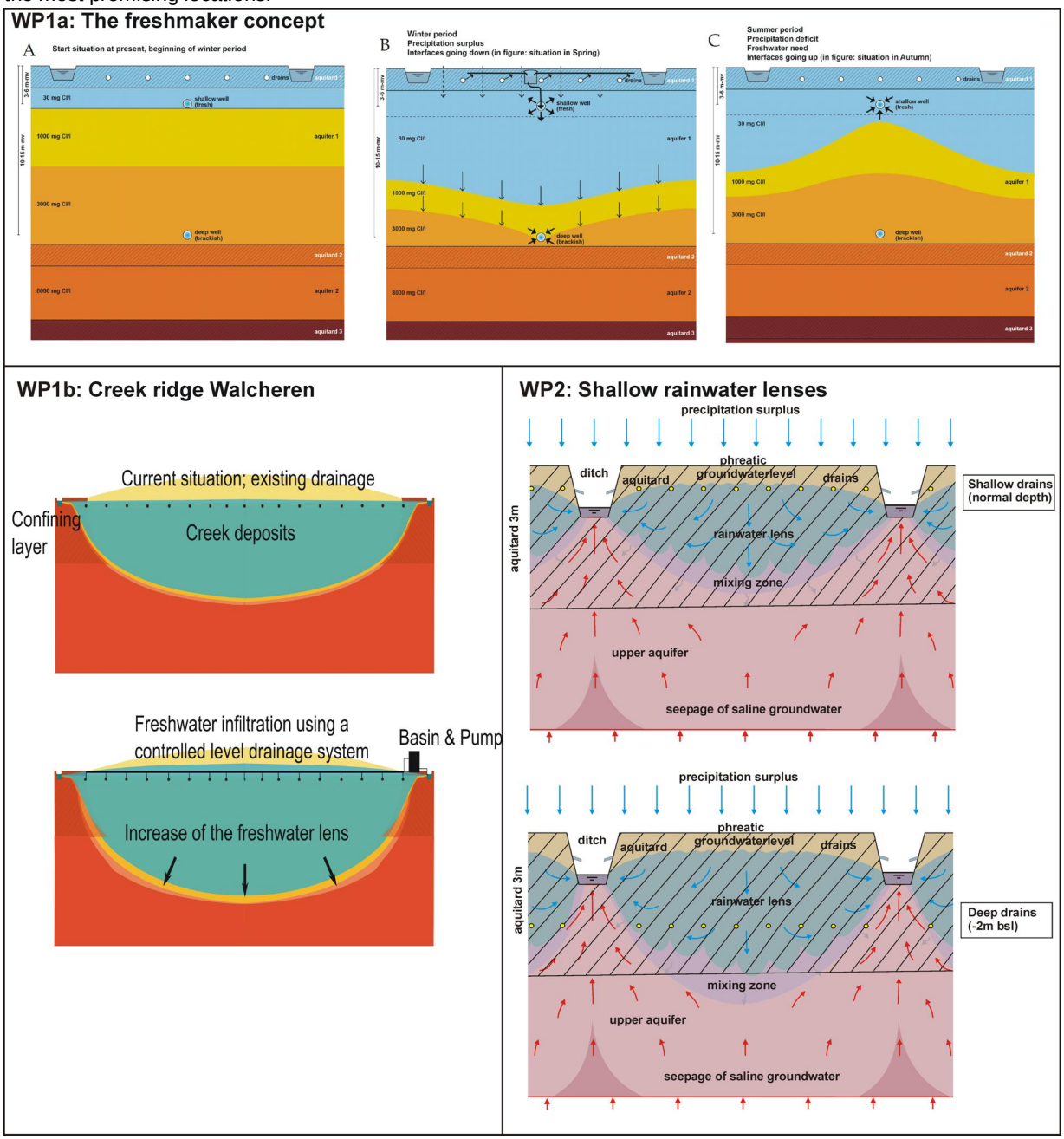


Figure 1: the concepts of the thee showcases: better use of existing fresh groundwater resources and create new reserves.

WP1 Storing water in creek ridges on a local scale through infiltration and recovery

In the region Zuid-Beveland, water supply to agriculture relies heavily on a separate network, operated by the water company Evides. To reduce summer peak demand on the Evides pipeline, it is recommended to use basins or deep drains to store water for peak demand (Commission Water Control and Desalination, 1983-1986; Evides, 2010). To increase the performance of (underground) water storage, model calibration using improved modeling techniques, local geohydrological knowledge, and analysis of water quality changes and clogging (infiltration wells) are essential. Two potential showcases in WP1 are:

- *Case WP1a: The freshmaker concept:*

  In this case, enlargement of small fresh groundwater reserves is achieved during times of excess rainfall by brackish water extraction by deep wells and simultaneous freshwater injection by shallow horizontal wells (Figure 1, WP1a). This concept has been subject of an intensive assessment under the '*Small business innovation research (SBIR)*' programme of AgentschapNL, in which it was judged to be a (economically and technically) feasible concept.

  Project phases include: site selection and exploration, design configuration and installation of the freshmaker, monitoring and model calibration, determination and classification of boundary conditions for application of the freshmaker concept in other areas.
- *Case WP1b: Creek ridge Walcheren (Serooskerke)*

  This case focuses on infiltration of surface water via deep drains (Figure 1, WP1b).

  Actions are: select location and monitoring campaign; infiltrate water; analyse socio-economic feasibility, model and up-scaling to other regions.

WP2 Optimizing the freshwater volume in shallow rainwater lenses

Rainwater lenses in low-lying agricultural parcels are sensitive to salinity increases, especially under the pressure of future climate change and sea level rise (Figure 1, WP2). The current drainage design is focused on drainage and not on reducing the inflow of saline groundwater. Measurements in Zeeland, the northerns part of The Netherlands and Noord-Holland show that just by drainage, salinity may increase. In addition, model simulations confirm the dominant role of drainage in the development of shallow rainwater lenses in saline seepage environments. The aim of this case is to optimize the drainage system, using only a limited number of sophisticated operational measures. Synergy is expected with the research project Salinisation and freshening of phreatic groundwater in the Province of Zeeland. Actions are: choosing together with stakeholders the final location; modelling different scenarios (drain distance and depth, level driven or not, different controlled water levels); designing the drainage system; setting up the field site with measures; setting up a monitoring campaign (using various hydrogeological and geophysical methods), and up-scaling the concept to other regions.

WP3 Socio-economic feasibility and opportunities for practical implementation

WP3 aims to assess the socio-econmic feasibility and the market potential for the studied technological concepts (Freshmaker, innovative draining design) in WP1 and WP2.

This will be done by a market analysis, from the perspective of the agricultural sector. It is difficult to get these promising technological concepts from idea to a product that is widely used in agriculture. There are differences insights between experts, regional government and farmers about the costs and the possibility to scale up drainage techniques from parcel level up to the level of the whole delta. It is also important to assess the benefits of the measures, for example in terms of yield production and reduced costs for irrigation. Also environmental impacts will be taken into account, derived from literature and expert judgment. A bulk-list of possible socio-economic indicators for this type of measures will be prepared. This list of indicators will be discussed with ZLTO, the Province of Zeeland, the Delta Program, the involved research institutes and the farmers from the test sites. In a workshop the most relevant indicators will be selected and evaluated regarding the reliability of the currently known figures regarding the costs, benefits and environmental impacts.

The following rough thematic classification is used to cluster the indicators:

- Profit maximization, minimization or revenue loss through wet, drought or salt damage,
- The sustainable use of freshwater (stocks; self-sufficiency),
- Dealing with long term challenges (climate change, population growth),
- The quality of the environment (e.g. ecology of surface water),
- Administrative integration (permits, regulations, etc.).

In the marktet analysis, the selected indicators are used. The measures from WP1 and WP2 are then compared with (a) current drainage / irrigation management at the plot level for pilots and (b) ther future (promising) alternatives, between which the farmers in practice can choose.

WP4 Knowledge transfer and stakeholder participation
Effective knowledge transfer is supported by a "learning by doing" approach. For this project the connection of knowledge need and supply is recommended as follows":

- Identification of problems and need-analysis of the target-group (farmers and policy makers)
- Collecting available knowledge, identify and solve knowledge-gaps in cooperation with inner circle partners
- Disseminate processed knowledge towards outer circle partners like farmers and policy makers

During interviews/workshops in the beginning of the project, stakeholders and consortium members will exchange knowledge on innovative techniques to increase water availability. In addition, a preliminary analysis of the economic feasibility will be performed. Practical implementation on a larger scale is accompanied by an intensive stakeholder process.

E. Expected scientific output

Although the project focuses on the practical applicability of measures, the results will be reported scientifically and therefore be verifiable and replicable, focusing on the development and testing of novel technological concepts to address water scarcity issues on a global scale. We foresee one integrated peer reviewed paper, reporting on the main findings of the whole project. As a number of PhD students (from KfC second tranche - Theme 2 - *Project Climate Proof Fresh Water Supply*) will be involved in the project, we foresee an integration of findings. This will also result in various scientific papers in peer-reviewed journals and participation in international conferences, e.g.:

- WP1: (a) on the use, efficiency and boundary conditions of the freshmaker concept, (b) Thesis Koen Zuurbier (KfC second tranche - Theme 2 - Project Climate Proof Fresh Water Supply)
- WP2: (a) new insights into the complex behavior of shallow water and salt movements in clayey soils, (b) understanding of the influence of field drainage on the size and dynamics of rainwater lenses, (c) Thesis Pieter Pauw (KfC second tranche - Theme 2 - Project Climate Proof Fresh Water Supply)
- WP3: Insights in the way how costs and benefits can be calculated for measures to increase the efficiency of the use of local available freshwater resources (precipitation, ground water resources) by agriculture

Next to scientific publications, we foresee more popular publications (in professional Dutch magazines) on the main findings. The target groups of such publications are for example water managers, practitioners and policy makers.

3 Societal aspects

A. Societal relevance

A guaranteed availability of sufficient, good quality water in times of water stress is an important precondition for maintaining production and growth within the agricultural sector; this especially holds for fruit cultivation. Stakeholders are very concerned about the future water availability; they identify the problem and prioritize solutions.

The Province of Zeeland -responsible for spatial planning and economic development- is concerned about future freshwater supply for agricultural purposes and is aware of the risk that freshwater scarcity negatively affects the socio-economic development of the region as capital-intensive agriculture is a key industry of the region.

Three other stakeholders:

- ZLTO wants to support its members on freshwater supply issues in the context of climate change;
- Municipality Schouwen-Duiveland sees a reliable freshwater supply as one of the key issues;
- The Water Board Brabantse Delta wants to see if promising measures for local freshwater supply and salinity control can also be implemented in its own setting.

All stakeholders agree that a strong stakeholder process is essential to actually implement successful measures in the field. The importance is endorsed by the KfC Hotspot Team Southwestern Delta and is described in the Knowledge Agenda Southwestern Delta.

B. Relation to the Regional Adaptation Strategy developed by the hotspot(s)

The KfC Hotspot Team Southwestern Delta has identified the following opportunities:

- Agriculture: maximum self-sufficiency of freshwater supply by storage, retention and use of freshwater by specific site planning, technical facilities and market price support instruments
- Opportunities for learning about "Governance" of area development processes in relation to climate adaptation

In particular, it is proposed to experiment around freshwater supply, supporting and helping the development of new products and services that improve climate adaptation; in our project, the showcases will be such products. In addition, we will also accommodate parts of the research agenda of the Delta Program (Sub-program Southwestern Delta) on the theme of Freshwater Supply: on internal salinisation and on '*which operational measures are possible to preserve rainwater lenses and to expand its freshwater volume*'.

We will also provide input to the Conference *Dynamic Deltas* (April 2012) and to the *Dutch Delta Academy*. Finally, the (research) institutes forming the so-called *Centre of Excellence*, established in the KfC project *Climate Proof Freshwater Supply* (2nd Tranche) can now most effectively share knowledge and, with essential input by local stakeholders, make a difference!

C. Knowledge transfer

The Smart Services Boulevard is the valorisation facility of the Hogeschool Zeeland (HZ). HZ organizes workshops (WP4) to identify knowledge and expertise, to appoint knowledge gaps and to transfer knowledge to stakeholders. The main focus at the first part of the project is the direct stakeholders (local/regional policy makers, farmers, draineurs). The results of this project will be important for stakeholders from other regions or sectors as well; activities are organized to show how to implement the showcases in the whole region. For the general public, activities are linked to the '*Zeeuws Jaar van het Water 201'2*.
Activities are:

- Need-analysis stakeholder workshop for farmers and representatives
- Need-analysis stakeholder workshop for policy makers
- Collection and processing of available knowledge with farmers, policy makers and researchers. Cooperation with WP4
- Consolidation of new knowledge in cooperation with WP1 and WP2, production of dissemination products and processes,
- Calculation sheets for farmers and practical decision tools for both farmers and policy makers. Close cooperation with ZLTO.
- Training workshop for farmers: calculation sheets and decision tools.
- Combined mini-symposium and field trip to showcases in Zuid-Beveland, Walcheren and Schouwen-Duiveland

D. Stakeholders

Government (local/regional/national):

- Province Zeeland
- Municipality Schouwen-Duiveland
- Water Board Brabantse Delta
- Delta Sub-program Southwestern Delta / Steering committee Southwestern Delta
- Government Service for Land and Water Management (DLG)
- Water Board Scheldestromen

Agricultural sector:

- ZLTO (agricultural entrepreneurs and employers' organization Southern-Netherlands)
- Farmers
- Meeuwse Handelsonderneming Goes BV
- Draineurs, e.g. Barth Drainage

Others (e.g. representatives):

- STOWA (Foundation for Applied Water Research)

- Productschap Tuinbouw (horticulture organization)
- LEI (Agricultural Economics Research Institute)

E. Expected societal output

New technology to deal with water scarcity issues, with sound underpinning of technological performance and economic viability, is highly valuable to the design of sustainable regional water management strategies. In particular, storage of water during times of excess (creek ridges, fresh maker) and increasing the freshwater volume in shallow rainwater lenses will increase the potential for local and regional self-sustainability for fresh water supply. This will offer better opportunities for water-dependent functions, such as agriculture, industrial manufacturing, and aquatic ecosystems.

4 Innovation and valorisation of knowledge

The various technological concepts tested in this project will contribute to sustainable water supply for important economic sectors (e.g. agriculture, industry). In order to become economically competitive, the technology has to be proven sound and the economic viability of the technology has to be assessed by comparison with alternative water supply options (e.g. transporting water from elsewhere, reuse of WWTP effluents, or desalination). Thus, for every pilot a **business case** will have to be set up in order to assess the economic viability of the technology. If the technology is proven sound and economically competitive, the possibility to exploit the technology in other deltaic areas (with similar problems of water supply and salinization) should be considered. The consortium partners have relevant connections with deltaic regions all over the world (e.g. via the Delta Alliance) where the technology could be introduced after the demonstration phase in the south-western delta.

5 Links to other KfC projects, other programmes and international initiatives

A. Links to KfC projects in first tranche

Project HSZD03: investigates how entrepreneurs in Zeeuws-Vlaanderen (sectors agriculture and tourism/recreation) transform opportunities and threats of climate change into adaptation strategies.

B. Links to KfC themes in second tranche

Project Climate Proof Fresh Water Supply: includes scientific research on hydro(geo)logical processes and on the potential of measures to either increase water availability or decrease water demand (e.g. assess the effect of elevated salt concentrations on crop damage). In this proposal, we will investigate the practicality of proposed measures.

C. Links to Delta Programme

- *Sub-program Freshwater*: looks at the national scale to what extent we can and must deal with a reduced freshwater supply and increased demand.
- *Sub-program Southwestern Delta*: works on a climate-proof delta at a regional scale.

Both programmes set the boundary condition for our project; we focus on local self-sufficiency but with regional impact if scaled-up properly.

D. Links to other (inter)national programmes

- *Salinisation and freshening of phreatic groundwater in the Province of Zeeland:* studies the strategic fresh water resources in a changing environment: extensive monitoring campaign, 3D modelling tools for the regional variable-density groundwater flow system.
- *KVR project A32* (Climate changes Spatial Planning Programme): shows that rainwater lenses are crucial to agriculture in saline seepage environments. Physical input parameters and variables were estimated to model the behaviour of these rainwater lenses.
- Interreg IV-B projects *CliWat* (www.cliwat.eu) and *Climate Proof Areas* (www.climateproofareas.com): use innovative monitoring- and modeling techniques in combination with stakeholder participation processes to place regional fresh water supply under the pressure of climate change and human activities in the Southwestern Delta on the regional (political) agenda.

- *National Models and Data Center critical zone*: the partners Deltares, Alterra, TNO, KNMI and PBL better connect various modelling concepts on agriculture and nature in Walcheren and quantify uncertainties.
- *Meta-study in the Southwestern Delta*: evaluate the current land use and water supply under the pressure of the W+ climate scenario.

Other initiatives of the consortium members in the Southwestern Delta (whether or not cooperating) are: Transition and Future of Delta Agriculture, Kustlaboratorium Zeeuws Landschap, deep controlled drainage, monitoring campaigns Waterdunen and Perkpolder, National Hydrological Instruments (fresh-salt salty module), SKB Ecoboeren, The Water Husbandry (Dutch: 'De Waterhouderij'), Interreg IV-B project ScaldWIN (density dependent transboudary 3D model of Flanders), Updating the knowledge of the salt tolerance of crops, Basic Survey salt and Joint Fact Finding effects of salt.

E. Link to KfC Tranche 3 Project Haaglanden

Both originating from KfC second tranche - Theme 2 - Project Climate Proof Fresh Water Supply, this project has a strong relevance to the KfC Tranche 3 Proposal Haaglanden Optimized Aquifer Storage and Recovery of freshwater in saline aquifers (project leader Marcel Paalman, KWR).

Although the goal of both projects is similar, we believe that from a management and stakeholder point of view, two parallel projects will be more efficient. In addition, fundamental differences in applied techniques (e.g. geology, well type, source water) and field valorization in each hotspot ask for different approaches.

However, it must be very clear that knowledge transfer between these two projects will be guaranteed, due to the fact that the same research institutes (viz. KWR and Deltares) and the same scientific staff is involved. Thus, a strong knowledge transfer between Hotspot Haaglanden and Hotspot Southwestern Delta is achieved. In addition, a joint workshop will make sure that also stakeholders meet each other and learn from each other settings.

6 Project consortium

The consortium consists of Deltares, KWR Water Cycle Research Institute, Acacia water, Alterra and Hogeschool Zeeland. The partners have worked together successfully in previous projects such as the meta-study Southwestern Delta, Climate Proof Freshwater Supply, NMDC Uncertainty Critical Zone, SKB Ecoboeren and Kustlaboratorium.

The whole consortium will be active in workshops. In each WP, two institutions work together intensively together, whereas the other institutes give input if needed: for WP1 (creek ridges) KWR and Deltares, for WP2 (rainwater lenses) Acacia and Deltares, and for WP3 (stakeholder and implementation) Alterra (analysis of economic feasibility and spatial up-scaling) and Hogeschool Zeeland (Knowledge Transfer via Smart Services Boulevard). Deltares is consortium leader.

Previous projects show that the good collaboration between the partners pays off. Special is that specific knowledge developed in the KfC project *Climate Proof Fresh Water Supply*, e.g. on the concept of the hydro(geo)logical system and on modelling and monitoring methods, will be deployed immediately, because the consortium members work together regularly. The consortium is therefore convinced that relevant showcases can be developed that will be at the basis of a robust regional and local freshwater supply.

7 Project planning

A. Duration of the project

Start of this project: January 1st 2012
End of this project: July 31st 2013

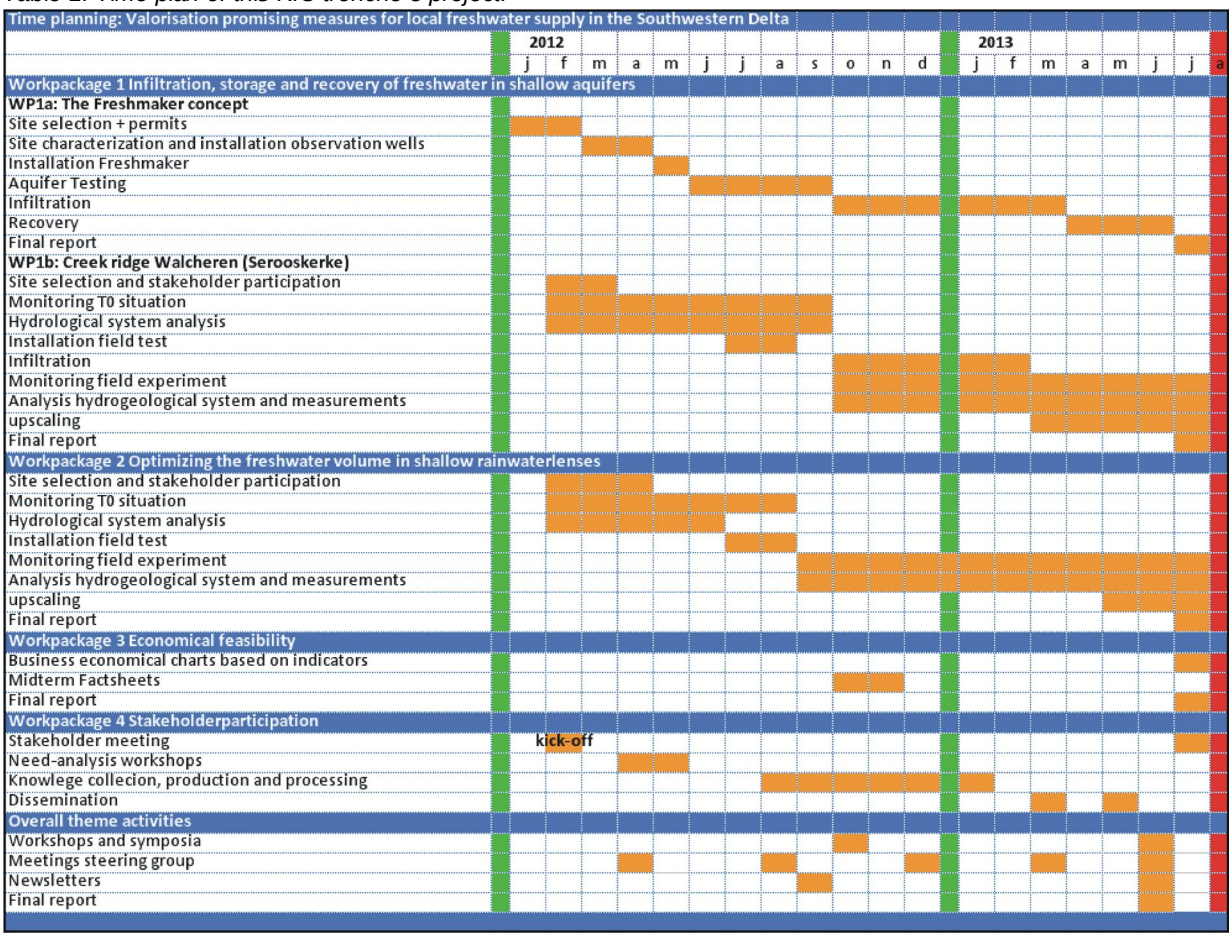
It is important to know that groundwater flow processes are very slow processes; this implies that additional monitoring time is likely required to make our showcases climate proof. Therefore, already from the start of this project, the consortium will seek new funds to continue the showcases after July 2013. It is still open to discussion whether or not this will be in the form of a dedicated foundation imbedded in a steering group and possibly a scientific advisory board. This idea has already been discussed with KfC.

B. Time plan

In the table below, the overall time plan of the whole project is given.
Knowledge transfer will mainly take place within especially WP3 (e.g., exchange of indicators), WP4 (stakeholderparticipation) and the overall theme activities, but also on the job, the contact between farmers, the consortium members and the representatives (e.g. ZLTO) will be continuous.

Note that detailed workplans (in Dutch) have already been made for all WP's.

Table 1: Time plan of this KfC trenche 3 project.



C. Scientific milestones

-spring 2012: (poster)presentation related research at Dynamic Deltas conference in Vlissingen
-autumn 2012 and summer 2013: Popular publications (in Dutch)
-summer 2013: one integrated peer reviewed paper
-articles in thesis Koen Zuurbier (KfC second tranche - Theme 2 - Project Climate Proof Fresh Water Supply)
-articles in thesis Pieter Pauw (KfC second tranche - Theme 2 - Project Climate Proof Fresh Water Supply)

D. Societal milestones

Main Goal of the project:
Preservation of agriculture as a strong socioeconomic base in Zeeland by increasing self-reliance of farmers on freshwater use. When successful, the showcases should be recognized by the stakeholders as a promising solution for future freshwater supply.
This will be achieved by:

- spring 2012: farmers, draineur, governmental hydrologists and researchers agree about the way of implementing the showcases into the field.

- autumn/winter 2012: first results of the showcases 1a and 1b and 4 (feasibility sandy creek ridges) are discusses with the stakeholders.
- spring 2013: first results of showcase 2 and 4 (feasibility rainwater lenses saline seepage areas) are discusses with the stakeholders.
- newsletter or article(s) to present the results of the showcases to society.
- several workshops: stakeholders, training workshop for farmers, mini-symposium and field trip to the showcases.