WaterCAP taskforce – Work Package 3

Analytical framework for the identification of stakeholders and regions

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1 WaterCAP taskforce – WP 3

Final Report

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Content

Abbreviations

Aquarius	Farmers as water managers in the North Sea Region
C2CI	***C***radle-***to***-Cradle ***I***slands
CLIWAT	***Cli***mate and ***Wat***er
CPA	***C***limate ***P***roof ***A***reas
DiPol	Impact of Climate Change on the Quality of Urban and Coastal Waters – ***Di***ffuse ***Pol***lution
DPSIR	***D***river-***P***ressure-***S***tate-***I***mpact-***R***esponse
MTTF	***M***obile ***T***ransnational ***T***ask ***F***orce
SAWA	***S***trategic ***A***lliance for Integrated ***W***ater Management ***A***ctions
TIDE	***Ti***dal River ***De***velopment
WP	***W***ork ***P***ackage

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Preface

The WaterCAP taskforce partnership consisted of six organisations and institutions working together in a European Interreg IVB project funded through the North Sea programme. This partnership was initiated through the cooperation in the WaterCAP cluster project running from autumn 2011 until spring 2013. The aim of the WaterCAP cluster project was to bring the knowledge and experiences of six different European water projects together and communicate to European political level. These water projects are represented by partners from out six Member States along the North Sea.

Based on these European water projects the six partners joint their forces in WaterCAP taskforce to collate and prepare the existing knowledge and experiences from out their Interreg projects and related networks. They like to offer new ways of thinking and developing innovative solutions for water related problems and future requirements in different regions of Europe.

This report reflects and summarises the way on how to prepare and to offer the existing knowledge and experiences within the WaterCAP taskforce partnership which was the main task of Work Package 3 “Analytical Framework for Identification of Stakeholders and Regions”.

1 Objectives of Work Package 3

The experiences and results of WaterCAP cluster are based on problems and challenges in different areas of the North Sea Region and were presented to the political level. WaterCAP taskforce aims at spreading and disseminating the experiences to a wider community of practitioners. Work Package 3 (WP3) provided the analytical basis to achieve the envisaged aims. All beneficiaries of the WaterCAP taskforce partnership worked together to …

(1) … deliver a first list of stakeholders in their area of concern;
(2) … extend the list of challenges and problems posed by climate change to specific issues of concern;
(3) … provide selected information on the available expertise, field of competences and knowledge in their institutions and organisations.

To achieve these goals WP3 is divided into two activities:

Activity 3.1 – “Preparation of existing knowledge”
Activity 3.2 – “Analyses of stakeholders and potential regions”

Wherein activity 3.1 the existing knowledge of the WaterCAP cluster project should be merged with the EU Interreg IVB project “Living North Sea” (LNS) and other water related Interreg North Sea projects. Based on the results of activity 3.1 within activity 3.2 the potential regions and stakeholders should be identified which possibly host a visit of the “Mobile Transnational Task Force” (MTTF).

This report is divided into two main parts. The first part will explain the way towards the identification of stakeholders and regions. The available knowledge of six different EU Interreg IVB projects has to be merged which has basically been done by applying the Driver-Pressure-State-Impact-Response (DPSIR) concept. The DPSIR concept is a wide spread approach to describe and visualise human-nature-interaction - e.g. Rapport & Friend 1979; Kristensen 2004.

The second part will elaborate on the identification of stakeholders and regions. The report finishes with a discussion of the results and provides conclusions.

2 The fundament of WaterCAP taskforce

The fundament of WaterCAP taskforce is built on the WaterCAP cluster project where the knowledge and experiences of six EU Interreg IVB projects have been amalgamated.

In section 2.1 a short summary of the WaterCAP cluster results will be given. In section 2.2 the integration of further water-related projects is described, especially the summarised knowledge and experiences of the Living North Sea project which is partner of the WaterCAP taskforce partnership.

2.1 Existing knowledge based on WaterCAP cluster

In WaterCAP cluster it has been chosen to adopt the commonly-used DPSIR concept (Driver-Pressure-State-Impact-Response), a causal framework for organising information about the state of the environment (Pirrone et al. 2005; Borja et al. 2006; Carr et al. 2007; Mateus & Campuzano 2008; Nobre 2009). The definition of the different aspects of DPSIR is according to Pirrone et al. (2005) as follows:

- The **Driving forces** are processes and anthropogenic activities (production, consumption, recreation etc.) able to cause pressures;
- The **Pressures** are the direct stresses, deriving from the anthropogenic system, and affecting the natural environment, i.e. pollutant release;
- The **State** reflects the environmental conditions of natural systems (air, soil and water quality);
- The **Impact** is the measure of the effects due to changes in the state of environmental system;
- The **Response** is the evaluation of actions; oriented to solve environmental problems in terms of management strategies.

In WaterCAP cluster it was mainly concentrated on drivers linked to climate change, e.g. temperature, precipitation and sea level rise (see Table 1). Water resources, both quantity and quality, are influenced by factors such as land use, agricultural policy, the construction and management of reservoirs and waste water treatment plants. Water use is driven by changes in population, food consumption, economic policy, technology, lifestyle, society's views on the value of

freshwater ecosystems and water management. Whilst the population in most NSR countries is expected to stabilise or decline (source: Eurostat), there is a high demand for space throughout much of the region, particularly in and around Hamburg, Bremen, London and central Holland, and an increase in urbanisation and therefore impermeable surfaces is expected. Secondary effects of climate change include projected increases in land capability for agriculture in certain regions, leading to potential agricultural intensification. The list is sorted according to the respective pressure, because the projects are mainly working on influencing the pressures different identified drivers pose on the natural environment.

Pressure	Likely drivers	Project	Pilot areas
Coastal flooding & coastal erosion	Sea level rise	CPA	Schouwen-Duiveland (NL), Weser-marsch (D), Eastern Scheldt (NL), Titchwell Marsh (UK)
		CLIWAT	Fryslan mainland (NL), Zeeland (B, NL)
Freshwater shortage (groundwater salinisation)	Sea level rise (saltwater intrusion into aquifers) In-creased groundwater ab-straction in coastal areas	CPA	Wesermarsch (D)
		C2CI	Many
		CLIWAT	Zeeland (B, NL), Terschelling (NL), Borkum (D), Föhr (D), Als (DK), Fryslan mainland (NL), Zeeland (B, NL), Oostende (B), Schleswig (DK, D)
Freshwater shortage (droughts)	Increased evapotranspira-tion Increased abstraction	CPA	Wicken Fen; Great Fen (UK)
		Aquarius	Veenkoloniën (NL), Ilmenau Jeetzel (D), Smedjeåen (S)
		CLIWAT	Schleswig mainland (DK, D)
Riverine and lake flooding	Increased precipitation Building on floodplains	Aquarius	Midden-Delfland (NL), Smedjeåen (S), Tarland (UK)
		SAWA	Wandse, Ilmenau (D); Gaula, Tana (No); Lake Vänern (S); Hunze (NL)
Urban flooding	Intense rainfall events Urbanisation	CPA	Wesermarsch (D), Arvika (S)
		CLIWAT	Horsens (DK), Schleswig (DK, D)
		SAWA	
Diffuse pollution – nutrients	Summer low flows Intense rainfall events Agricultural intensification	Aquarius	7 out of 8 pilot areas
		CLIWAT	Esbjerg (DK)
Urban pollution: heavy metals & other contami-nants; landfill emissions	Intense rainfall events Increase in groundwater level Urbanisation	DiPol	All (Gothenburg, Copenhagen, Oslo, Hamburg)
		CLIWAT	Horsens (DK), Schleswig (DK, D), Horlokke (DK), Aarhus (DK)

Table 1: Summary of the main water quantity and quality-related pressures in the NSR that are anticipat-ed as a result of climate change, and the associated projects and pilot areas that deal with them. Source: WaterCAP cluster (2013)

Table 2 provides a summary of some responses that are either recommended, developed, implemented or evaluated within the WaterCAP cluster projects.

Pressure	Possible impacts	Responses	Project
Coastal flood-ing	Damage to property & agricultural land, risk to human life, displacement, loss of historic sites	Develop integrated spatial planning and water management strategies to improve sea defences in a sustainable way, maximising other benefits	CPA
	Loss of shallow intertidal habitat	Protect intertidal areas, e.g. sand bank nourishment, oyster beds. Wetland restoration	CPA
	Loss of low-lying freshwater wetlands	Managed coastal realignment	CPA
River/lake flooding	Damage to property & agricultural land; areas become unsuitable for agriculture	Develop adaptive flood risk management plans and strategies for their implementation	SAWA
		Creation of wetlands for water storage	Aquarius
		Optimise storage capacity during floods using automated 3-weir flow regulation	SAWA
		Lake dredging	SAWA
		Develop emergency plans to deal with flood waves	SAWA
		Creation of decision support database of flood alleviation measures in the NSR; where possible, cost-benefit analysis of these measures	SAWA
Urban (pluvial) flooding	Damage to property, flux of contaminants to water bodies	Assess adaptation/response needs. Design flood mitigation measures, e.g. separate sew-age systems for rain water and sewage; increase of water storage in urban areas	CPA
		New urban infrastructure; better draining of surplus groundwater and excess rainwater	CLIWAT
		Sustainable Urban Drainage Systems (SUDS)	SAWA
Freshwater shortage (not salinisation)	Lack of freshwater for human consump-tion/agriculture	Water storage (small weirs), more efficient groundwater use (sprinkling, pivots)	Aquarius
		More efficient water storage: Artificial ponds; encourage active recharge of groundwater	Aquarius
	Loss of freshwater wetlands	Creation of wetland using low-cost non-engineering methods	CPA

Flooding/GW salinisation	Decrease in land fertility; areas become unsuitable for agriculture	Salt-resistant agriculture/aquaculture	CPA
Groundwater salinisation	Lack of freshwater for human consumption, agriculture and ecosystems	Better freshwater management systems on islands and low-lying coastal areas: use/storage of excess precipitation during wet periods of the year	CPA
		Desalination for drinking water, storage of winter rain water for summer use, sanitation and separation of household water, purification and reuse of waste water effluent.	C2CI
		Better knowledge of island subsurface/hydrological system. Optimise water supply well configuration	CLIWAT
		Increase storage capacity of polders/more pumps; monitor groundwater resource	CLIWAT
Diffuse pollution	Eutrophication - damage to aquatic ecosystems Restrictions on bathing	Identify technical, financial/institutional and participatory problems to achieving "farmers as water managers"	Aquarius
		P filters to reduce particulate P delivery to surface water bodies	Aquarius
		Diffuse pollution mitigation measures, e.g. buffer strips, fencing streams, etc.	CLIWAT
Pollution from urban/industry	Damage to aquatic ecosystems Restrictions on bathing Aquifer pollution - damage to drinking waters	Ascertain contaminant sources, to target response. Monitoring or urban groundwater quality	DiPol
		Retention ponds	DiPol
		Simaclim regional relative risk ranking model - help prioritise actions & plan response	DiPol
		Water purification prior to discharge to surface water bodies	CLIWAT
		Landfill: evaluation and remediation if necessary (climate-proof)	CLIWAT

Table 2: Summary of the kinds of responses recommended, developed, implemented and evaluated in the WaterCAP cluster projects. Source: WaterCAP cluster (2013)

2.2 Integration and extending the knowledge base

In the previous section the knowledge base of the WaterCAP cluster project was shown. The follow-up project WaterCAP taskforce has, on the one hand side, to build upon this knowledge base and, on the other hand side, to integrate some more projects from out the EU Interreg IVB programme. The WaterCAP cluster partnership was extended by the Living North Sea (LNS) project (Table 3).

The LNS project enhances the WaterCAP cluster partnership focussing more on ecological water-related challenges, e.g. fish migration. “The Living North Sea project aims to promote *free fish migration from sea to source* to keep our waters alive. It addresses three essential aspects about the management of migratory fish:

- migration routes
- threats such as man-made barriers and fish migration measures; and
- influencing future policy at a regional, national and international level and informing the general public

Migration routes

The work on migratory routes will focus on sea trout, eel and salmon, but will be applicable to many other species. The partnership will carry out analysis and visualization of migratory routes, populations and consequences of management actions. New communication and mapping tools for working and sharing data between partners will be explored.

Fish migration measures

The second part involves the innovation of fish migration measures. In the North Sea Region some deltas and estuaries are closed to fish and many more have barriers such as dams and sluices throughout their system. This means that many fish species like the eel, salmon and sea trout cannot reach their spawning and breeding grounds. The partnership focuses on the development of better and innovative migration measures, such as passages or sluice management and the implementation of these in demonstration projects” (Source: www.living-north-sea.eu).

Furthermore, to enhance the knowledge base of WaterCAP taskforce consisting of water-related projects dealing with ground water, flood risk management,

climate change adaptation and ecological improvement of rivers and estuaries another project has been integrated into the knowledge base. The EU Interreg IVB project Tidal River Development (TIDE) conducted investigations on the four biggest estuaries in the North Sea Region: Elbe, Humber, Scheldt and Weser (Table 4).

"The goal of the TIDE project was to help make integrated management and planning a reality in the Elbe, Weser, Scheldt and Humber estuaries. For this, TIDE took into account the ecological, economical and societal needs of the regions involved and interlinked the multiple processes and large scale efforts taking place in the estuaries. TIDE integrated the knowledge and solutions generated by previous projects such as HARBASINS, SedNet and New!Delta (e.g. optimised sediment management strategies, historical development of the estuaries). TIDE also drew from the numerous management plans that have been or are being prepared as responses to urgent issues like flood prevention or nature protection in compliance with EU directives" (Source: www.tide-project.eu).

Besides these two projects there are many more water-related projects that can contribute to the WaterCAP taskforce, e.g. MARE, SKINT, PURE North Sea, NoLimp, etc. For the WaterCAP taskforce partnership it is not important to have in-depth knowledge on all the results and experiences of those projects, important is to know where to find potentially requested knowledge and expertise and to get in contact to key-persons in the respective networks.

Likely Drivers	Pressure (in general)	State	Impact *(in general)*	Response		Pilot Area
				General	Technical	
Navigable waterways (sea and river)	Hydraulic engineering	Ecological status (quantity & quality) of water bodies (i.e. ditches, brooks, rivers, coastal waters, groundwater)	Stream flow interruption (dams, barriers, weirs, etc.)	Aim is the improvement of the upstream and downstream migration of fish, e.g. Guidance on the Realisation of Fish Migration at Pumping Stations (Heemstra & Veneberg 2012)	Installation of fish passage, Research and development of innovative technical devices (e.g. Archimedean turbine)	Water Board Veluwe (NL)
			Habitat degradation, fragmentation (e.g. intertidal areas, river zonation)		n.i.	n.i.
Water Management (drainage, watering, irrigation)	Water engineering		Stream flow interruption (dams, barriers, weirs, etc.)		Fish flaps and fish passage, Siphon fish ladder, Installation of "Venturi-System"	Axe Estuary, Devon (UK), Ouwe Rij, Province Friesland (NL), Water Board Hunze en Aa's (NL)
			Habitat changes (e.g. saline to fresh and vice versa)		n.i.	n.i.
Flood protection (coastal, riverine, lake)	Coastal and water engineering		Stream flow interruption (dams, barriers, weirs, etc.)		Examples in Rickard, et al. (2003): River Weirs – Good Practice Guide, Technical Report	n.i.
			Habitat degradation, changes, fragmentation		Examples in Gough et al. (eds.) (2012): From sea to source; Intern. Guidance for the restoration of fish migration highways	n.i.
Drinking water supply	Fresh water storage (river, reservoirs)		Habitat changes, degradation		n.i.	n.i.
			Stream flow interruption (dams, barriers, weirs, etc.)		n.i.	n.i.

Table 3: DPSIR concept applied to the LNS project (n.i. = no information)

Likely Drivers	Pressure	State	Impact *(in general)*	Response		Pilot Area
				General	**Technical**	
Navigable waterways in estuaries	Hydraulic engineering (river engineering)	Ecological status (quantity & quality) of water bodies and intertidal areas (mud and sand flats, shallow water areas, anabranches, side channels, etc.)	Decrease of intertidal areas	Restoration, creation or preservation of intertidal areas	Managed realignment measures	B, GER, NL, UK
			Increased turbidity (i.e. higher concentration of liquid mud)		Revitalisation of old side channels or anabranches	GER
			Degradation or fragmentation of habitats		Managed realignment measures	B, GER, NL, UK
		Hydro-morphological status (in different reaches of the estuary)	Increase of tidal current (e.g. tidal pumping)	Developing a Morphological and/or Sediment Management Strategy	Making space for the river (e.g. revitalisation of side channels), maintenance and capital dredging	B, GER, NL
		Hydro-morphological status (in different reaches of the estuary)	Increase of tidal range	Developing a Morphological and/or Sediment Management Strategy	Managed realignment measures	B, GER, NL, UK
			Morphological changes (e.g. decrease of certain habitats)		n.i.	
			Sedimentation of anabranches and side channels		Maintenance or Capital Dredging	B, GER, NL

Table 4: DPSIR concept applied to the TIDE project (n.i. = no information)

2.3 Summary and conclusions

Based on the investigation of the previous mentioned projects by the DPSIR concept a selection of so called *wow!-Stories* were identified in the WaterCAP cluster project. The identification of the *wow!-Stories* was done by a two-step selection process. This selection process was enabled and enhanced by clustering water-related Interreg projects. In the first step each single Interreg IVB project identified promising pilot projects as "good-practice" examples. These pilot projects were the basis for the lessons learned of each single project. In the next step, initiated by the Interreg project clustering, the success and the performance of these pilot projects were checked against the experiences and results of the other Interreg IVB projects in WaterCAP cluster. In a workshop each project representative has to choose one or more pilot projects and elaborate on the highlights of these projects. After the presentation and discussion of these highlighted pilot projects from out the entire WaterCAP cluster projects, some very promising examples were selected. These selected pilot projects build the basis for the *wow!-Stories*. A detailed description and a comprehensive list of all *wow! Stories* is provided in WaterCAP cluster (2013). The selected *wow!-Stories* are sharing common issues such as:

- challenging the complexity of multifunctional land-use;
- encouraging integrated solutions based on participatory processes;
- readiness for further development and/or up-scaling.

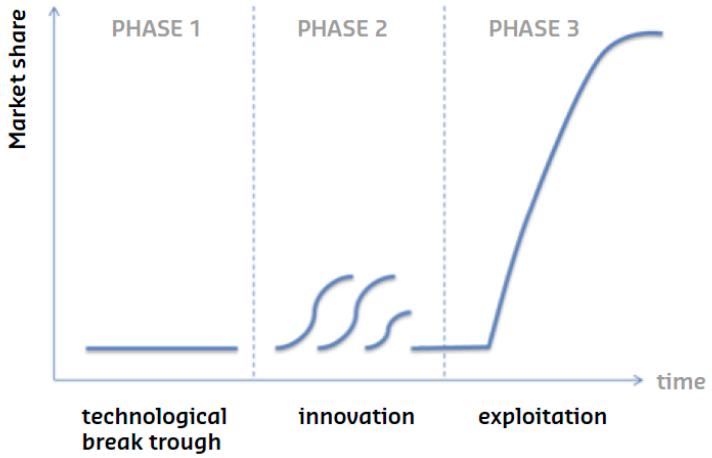

Figure 1: The innovation chain: from technical solutions towards innovations and exploitation. Source: WaterCAP cluster (2013)

On the other hand side, these *wow!-Stories* share a common drawback: most of them are sticking in the second phase of the innovation chain (see Figure 1, e.g. adapted from Grubb 2004; Hansen & Birkinshaw 2007). The innovation chain outlines the way from fundamental research and development of an idea (technological breakthrough) towards market entry (exploitation). Roughly spoken, the first phase represents the research and development phase after the birth of an idea. In the second phase the idea has been developed so far that it could be tested in a pilot case. In case of a positive performance and result during the testing phase the idea has to be evolved to get marketable.

In WaterCAP cluster the aim was to disseminate the good practice examples to the EU political level and to formulate that there is a need to increase the success to get to the third phase (Figure 1) instead of ending up with smart innovations in the second phase of the innovation chain. Two pathways will have to be followed to tackle this challenge:

i. Encourage the political level to support smart innovations to get a step further, e.g. “create a window of opportunity” and
ii. check the marketability of ideas and solutions successfully applied in pilot projects.

One recommendation of the WaterCAP cluster project was to *develop opportunity maps in the North Sea region as a bridge to successful implementation*: It was recommended to create an export package for climate change adaptation in other regions. Based on this recommendation WaterCAP taskforce is going to walk this pathway by identifying stakeholders and regions which are looking for support for their challenges and problems with climate change (host a “Mobile Transnational Task Force”). The idea of doing so is to offer the bulk amount of experiences and expertise inherent in the WaterCAP taskforce partnership to interested organisations and/or institutions within the North Sea Region.

3 Identification of stakeholders and regions

The main focus of Work Package 3 was to identify potential stakeholders and regions which are willing to host the "Mobile Transnational Task Force" (MTTF). A common way of identifying stakeholders and regions is the conduction of a stakeholder analysis. Within a stakeholder analysis all relevant persons, organisations and institutions will be identified which are related to the problem or challenge. The conduction of such a stakeholder analysis in the framework of WaterCAP taskforce is not applicable because the range of problems, challenges and questions related to climate change and water are very broad. Therefore, the first step was to develop an analytical framework (section 3.1). Furthermore, the results of the application of the analytical framework are described in section 3.1. The analytical framework is based on the idea that the two sides of the coin have to be brought together: the WaterCAP taskforce partnership would like to spread the existing knowledge and experiences, they have something to *OFFER*. On the other hand side, the potential "customers", the stakeholders and regions of the North Sea region, are having a *DEMAND*. Consequently, both *OFFERs* and *DEMANDs* have to be matched to create a win-win-solution (see section 3.2).

3.1 Analytical framework for the identification of stakeholders and regions

The analytical framework for the identification of stakeholders and regions consists of two steps:

1. Structuring the available knowledge and expertise within the WaterCAP taskforce partnership by the DPSIR concept
2. Developing a framework for the identification for project ***internal*** and project ***external*** stakeholders

The first step has already been conducted and has been described in the previous sections. The results will build the fundament for the knowledge base of the WaterCAP taskforce partnership.

The second step is divided into three sub-steps as shown in Table 5.

Analytical framework for the identification of internal stakeholders and regions

Step	Internal *Stakeholders and regions within the WaterCAP taskforce partnership*	External *Stakeholders and Regions outside the WaterCAP taskforce partnership*
1	Collection of problems and challenges posed by climate change and water-related issues (i.e. problem analysis per partner)	Define access-points to receive requests for support
2	In-depth interrogation and structuring and amalgamation of the results (formulate specific questions, i.e. problem identification in the partnership)	Visualisation of knowledge and expertise and establishing a "knowledge-broker" to identify "supporters" for external requests
3	Prioritise specific questions and identify project internal "supporters"	Pooling the WaterCAP taskforce experts and offer a MTTF meeting

Table 5: Stepwise approach to build up the analytical framework for internal and external parts of the WaterCAP project

General collection of information

The identification of internal stakeholders and regions within the WaterCAP taskforce partnership was conducted by workshops. For the first workshop all representatives of WaterCAP taskforce project partners should collect current problems and challenges posed by climate change and/or water-related problems (i.e. creating a *long-list* of problems/challenge per partner). This collection has been presented to and intensively discussed by all WaterCAP taskforce partners. The result of the intense discussion between all partners was a *mind-map* prioritising the urgent or most relevant problems/challenges structured by problem categories and linked with possible "supporters" (Figure 2). The "supporters" are going to help to find solutions for the challenges/problems mentioned by one of the WaterCAP taskforce partners, e.g. the OOWV needs support for the theme "salt water intrusion" and Deltares is able to provide support.

Specification by in-depth interrogation

The next step was to specify the problems and challenges mentioned in the *mind-map* by questions. Therefore, an in-depth interrogation has been executed with all WaterCAP taskforce partners (see Table 6). The result was a *long-list* of questions related to the problem categories (Table 7).

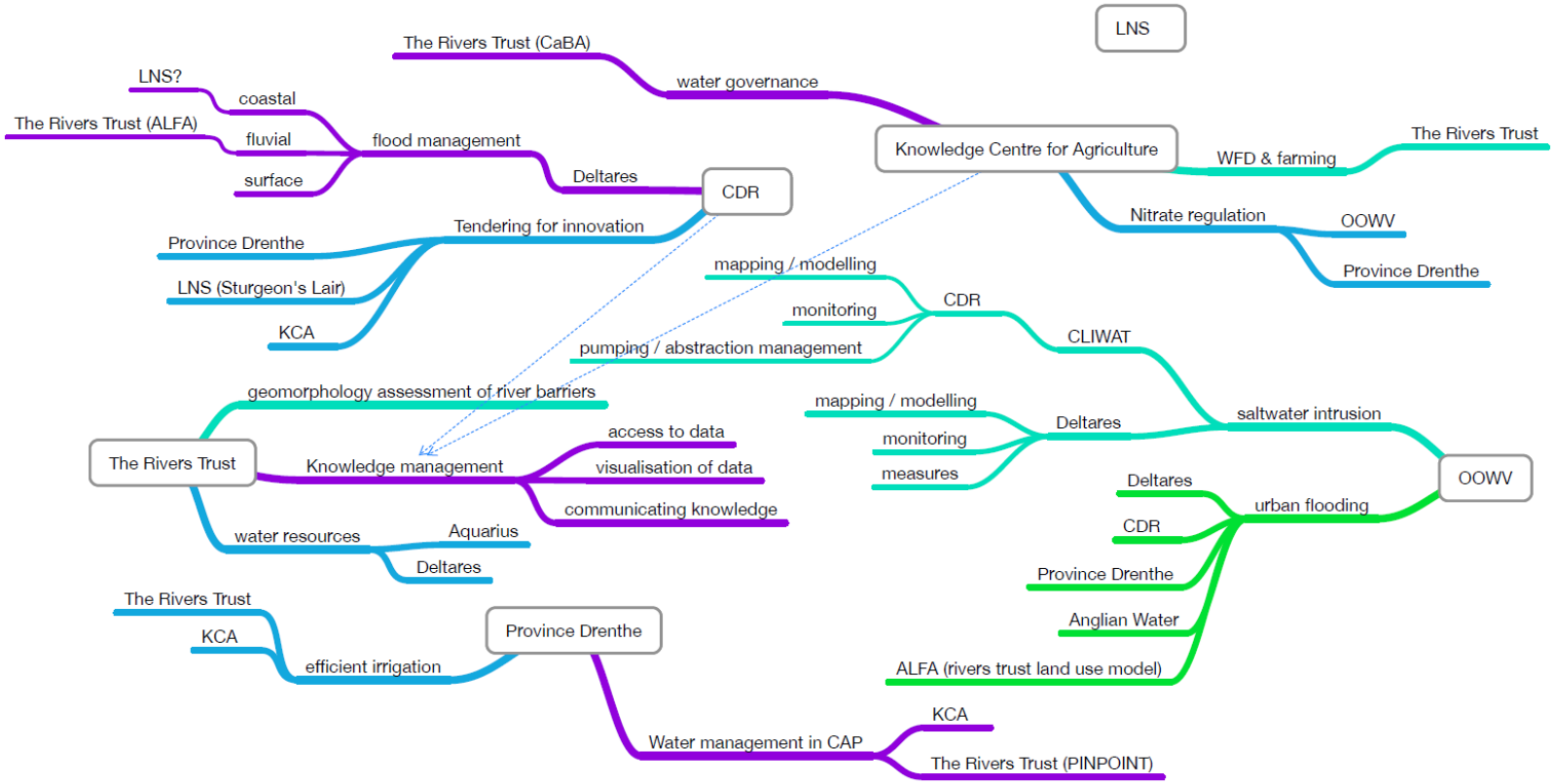

Figure 2: Mind-map of the WaterCAP taskforce partnership representing problems and challenges posed by climate change and water-related issues.

Problem			Specifying by question	"Supporter"						Amount of Supporter
"Owner"	Category	Specification		CDR	KCA	RT	OOWV	PD	Deltares	
Central Denmark Region (CDR)	Flood Management	Coastal							x	1
		Fluvial				x			x	2
		Urban							x	1
	Knowledge Management	n.i.								0
	Tendering for Innovation	n.i.			x	x		x		3
Knowledge Centre for Agriculture (KCA)	Water Governance					x				1
	WFD	Farming				x				1
	Agriculture	Nitrate regulation					x	x		2
	Knowledge Management	n.i.								0
Oldenburgisch-Ostfriesischer Wasserverband (OOWV)	Saltwater Intrusion	n.i.		x					x	2
	Flooding	Urban		x		x		x	x	4
Province Drenthe (PD)	Water Management	in CAP			x	x				2
		Efficient irrigation			x	x				2
Rivers Trust (RT)	Geomorphology	River barriers								0
	Knowledge Management	access to data								0
		visualisation of data								0
		communication knowledge								0
	Water resources	n.i.			x				x	2

Table 6: Restructured mind-map prepared for the in-depth interrogation to get specific question related to the problem categories (n.i. = no information)

Problem "Owner"	General remarks	Specific Questions
Central Denmark Region (CDR)	Holistic and comprehensive planning process to find multi-functional, sustainable, long-term, short-term solutions	Do you have examples that create a barrier against coastal flooding and take other elements into account? Do you have examples on how to solve more than one purpose? - example Peize, participation Can you provide us with solutions that secures flooding in urban areas and creates added value? Intelligent infrastructure, technical features, …
	How to get solutions "out of the box"?	How to get the most innovative solution which fits best without restricting the tendering too much?
Knowledge Center for Agriculture (KCA)	How to get more involved from the first beginning of processes and projects?	How to involve and how to find solution amongst stakeholders on all levels? How to get more involved in WFD issues, ealier in the process?
		How is the definition of terms used in the WFD done in partner countries, e.g. HMWB? How are the impacts on ground water handled, e.g. pesticides, nitrate, salt intrusion? How to match the EU funding with developed solutions? How is WFD interpreted and implemented in other Member States (i.e. WaterCAP partner countries)? How do you look on nitrate from farming? How to regulate it? Which measures have been taken? How has the process been started, and executed for nitrate problems? How to assess the efficiency and effectivity of measures (assessment methods, benchmarking, …)?
	Knowledge managment	How to bring new knowledge into use? How to ensure that (almost) all available knowledge has been used to solve a problem?
	How to conduct a participation process?	How to intiate a process, problem analysis, problem definition, approaching of stakeholders, …?
Oldenburgisch-Ostfriesischer Wasserverband	Salt water intrusion	How can the effects of water abstraction in coastal aquifers been modelled regarding salt water intrusion?
	Urban flooding events	How to manage urban flooding in a specific area in Oldenburg?
Province Drenthe (PD)	How to involve people which are normally not willing to be involved?	How can farmers be moved to contribute to reach the water goals in the area (for instance WFD)? Which scale of the process, small or big area? Can a water problem in an area be translated to individual issues on a farm? How can farmers together work on a water issue in a watershed area to reach the water goals? In which way can farmers contribute to issues on water quality, fresh water supply, salinisation and flooding? How to finance the measurements? How to predict the effect of individual measurements?
	How to close the gap between "acting within law" and ground-truth impacts on e.g. water bodies?	How to connect the agriculture dossier (CAP) to the water dossier (WFD)?
	Efficient irrigation	Which information need farmers to irrigate in time? How can technical innovation be used? How to finance the cost of technical innovation? Which contribution can real time information deliver (use of soil sensors)? How to translate information of one point to an area (parcel)? How far ahead do we need information (hours, days or weeks)? Are there more technical solutions for efficient water use (like steered drainage and drip irrigation)? Can efficient irrigation be connected to the water quality? Precision farming: Can efficient irrigation be combined with the gift of nutrients in a cost effective way (sugar cane, potatoes)?
Rivers Trust (RT)	Urban flooding events	How to handle of diffuse pollution caused by run-off in urban flooding events? Urban flooding: How to stimulate/change hard-surface into soft-surface areas?
	Water abstarction	Handling of water abstraction licenses in rivers if they exceed the carrying capacity? General management of water resource availability for different kind of abstractors (e.g. agriculture, water companies, …)?

Table 7: Long-list of questions as result of the in-depth interrogation

Prioritise specific questions and identify supporter

The last step of the analytical framework to identify project internal stakeholders and regions that could be visited by a "Mobile Transnational Task Force" (MTTF) was done in a final workshop. The long-list of specific questions (see Table 7) was the basis for bilateral discussions to identify the relevant supporters which are willing to form a MTTF group.

Analytical framework for the identification of external stakeholders and regions

Definition of an access-point for external requests

Two options (indirect and direct) are possible to define access points for external requests to the WaterCAP taskforce partnership:

i. *Indirect option*: Enabling the approach of external requests on the project website by a contact form
ii. *Direct option*: Advertising and pro-active approaching of network partners of the entire WaterCAP taskforce partnership

Visualisation of knowledge and expertise and establishing a "knowledge-broker"

The visualisation of existing knowledge and expertise of the entire WaterCAP taskforce partnership has been done by collecting and investigating the projects results by the DPSIR concept. Furthermore, the available information on all EU Interreg IVB projects merged in the WaterCAP taskforce partnership is accessible on the respective websites and in the provided technical reports on general and specific issues related to the projects objectives.

The information on all WaterCAP taskforce projects is available, the question rises on how to channelise and process external requests in an effective way. Therefore, a "knowledge-broker" could be established who is able to process external requests. A more detailed elaboration will be given in section 3.2.

Pooling the WaterCAP taskforce experts and offer a MTTF meeting

The final steps for a MTTF visit at an external "customer" are the identification of relevant supporters from out the WaterCAP taskforce partnership and/or the related network. Additionally, the set-up of a draft time schedule and the preparation of the MTTF meeting have to be organised (task of Work Package 4 of WaterCAP taskforce).

3.2 Ideas for the WaterCAP taskforce "knowledge broker"

Introduction

At a typical market individuals or companies are offering their products and services. The market will be visited by people looking for solutions for their problems or demands, e.g. hunger, optimise the production line for cars, build a storm surge barrier against flooding. This shows that markets are existing to satisfy different demands. The same is true for the water-related problems and challenges posed by climate change and other issues. On the *DEMAND* site there are a variety of problems and challenges existing that are dealing with risk management of coastal or riverine flooding's. It is not the aim to enumerate all the (urgent and current) problems and challenges posed by climate change on the water sector, for this everybody can retrieve different platforms and networks. There are also a lot of solutions and solution approaches existing which are able to solve many of these problems. There are many individuals, companies or organisations available which are offering their solution approaches. Either these approaches are integrated with participatory action or high-end technical engineering constructions. Sometimes the *OFFER* site on a market place is overwhelming the ones who are looking for solutions: "You cannot see the wood for the trees".

This is the point where the WaterCAP taskforce partnership wants to *OFFER* a solution. The main aim is to match the *DEMAND* site with the *OFFER* site. In some economic branches it is easy to match both sides, because the market is not very divers and only a few companies are fulfilling the "customers" demand. But, for the issue of climate adaptation, especially for water-related problems, the OFFER site is very divers and the offered solution approaches are e.g. ranging from integrated river basin management strategies to the construction of weirs in a small river. Furthermore, a specific problem could be solved in different ways depending on the aspects of the time frame, the spatial scale and the user perspective.

Time frame: A short-time (ad-hoc) solution for a problem might have negative effects in the long run, e.g. occurring erosion problems after installing groynes in a river channel.

Spatial scale: The construction of higher embankments in the upper reach of a river will solve the problem of flooding in this area, but might led to faster run-off and increased water levels downstream, and consequently flooding's in the lower reach of the river basin.

User Perspective: If the problem or challenge is dealt within a sectoral way, e.g. coastal defence, than the solutions might be too narrowed. For example, the protection against flooding in coastal areas is done by main dikes. With the rising sea level these embankments have to be heightened, but consequently space and building material is needed. Hence, some areas are occupied by coastal protection and cannot be used by other types of land-use.

The WaterCAP taskforce "knowledge broker"

Figure 3 shows a sketch of the idea of the WaterCAP taskforce "knowledge broker". On the OFFER site there is first the WaterCAP taskforce partnership that has many knowledge and expertise in the field of water-related problems ranging from agriculture over groundwater to fish migration. If there is a request for a problem or challenge the WaterCAP taskforce partnership itself cannot answer than the network of the WaterCAP taskforce partners will be approached. The WaterCAP taskforce "knowledge broker" has to fulfil three functions:

i. Access-point for external request (i.e. outside the WaterCAP taskforce partnership)
ii. Processing and mediation point for external requests
iii. Organising hub to match external request with internal offers (i.e. WaterCAP taskforce offers to support the external requester)

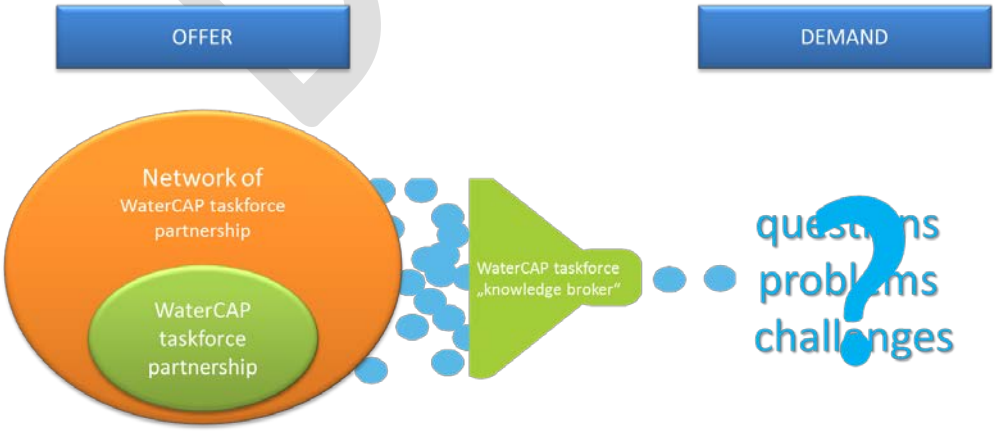

Figure 3: Idea for the WaterCAP taskforce „knowledge broker"

Access-point for external requests

Necessary feature to get in contact with the "external" part of the WaterCAP taskforce partnership is the project's website. Currently, the utilisation of social networks, exchange platforms such as different fora or wiki's are enabler to promote the offers of the WaterCAP taskforce partnership into the North Sea Region. But, promoting the offers of the partnership means also to explain where the potential "requester" has to send his request. The access-point for potential "requester" could be the website of WaterCAP taskforce or simply an Email address. An important communication rule in that respect is to keep "one face to the customer (i.e. "requester")". The WaterCAP taskforce "knowledge broker" has not necessarily to be one person it could also be a group of different brokers with different fields of expertise.

Processing and mediation point for external requests

The quality of requests may differ in specification, e.g. one organisation is looking for support to generate an adaptation strategy and another organisation is searching for specific information on fish friendly weirs. The task of the WaterCAP taskforce "knowledge broker" in this step is twofold:

1. Get in contact with the "requester" and start a problem identification and description process
2. Translate the identified problem into the *bits and pieces* of the WaterCAP taskforce offers

The first task of the "knowledge broker" is not solely settled by giving a positive feedback to the requester, saying "we are dealing with your request". Sometimes it is necessary to have in-depth contact which can lead to bilateral meetings to fully understand the broad range of the problem or challenge the requester is facing. This could also lead to a consultation meeting for the comprehensive analysis and identification of the requested problem or challenge. It is necessary to get focussed support for the development of tailor-made solutions.

After finishing this task the "knowledge broker" has to investigate which fields of expertise and knowledge are necessary to support the requester. Therefore, the "knowledge broker" has to divide the problem/challenge into parts that could be matched with the existing expertise and knowledge within the WaterCAP taskforce partnership. If in the partnership the necessary expertise could not be found, the investigation has to be broadened to the associated network.

Organising hub to match external request with internal offers

If the investigation on the available expertise and knowledge has been successful the "knowledge broker" has to assemble a group of supporters for the requester (i.e. "Mobile Transnational Task Force (MTTF)"). The final task now is to organise the meeting of the MTTF with the requester to provide support for the problem or challenge he is facing.

Succession of development

In Figure 4 the succession of development from individual EU Interreg projects to the WaterCAP taskforce "knowledge broker" is shown. In the fourth period of Interreg funding individual projects started to investigate innovative solutions according to water-related problems and challenges posed by climate change (Step 1). At the end of the funding period six Interreg clustered together to the WaterCAP cluster project to disseminate their knowledge and expertise to the high level of the EU (Step 2). The next step was to amalgamate and prepare the existing knowledge for stakeholders and regions around the North Sea (Step 3). The next possible step would be to establish a WaterCAP "knowledge broker" in the way it was described previously (Step 4).

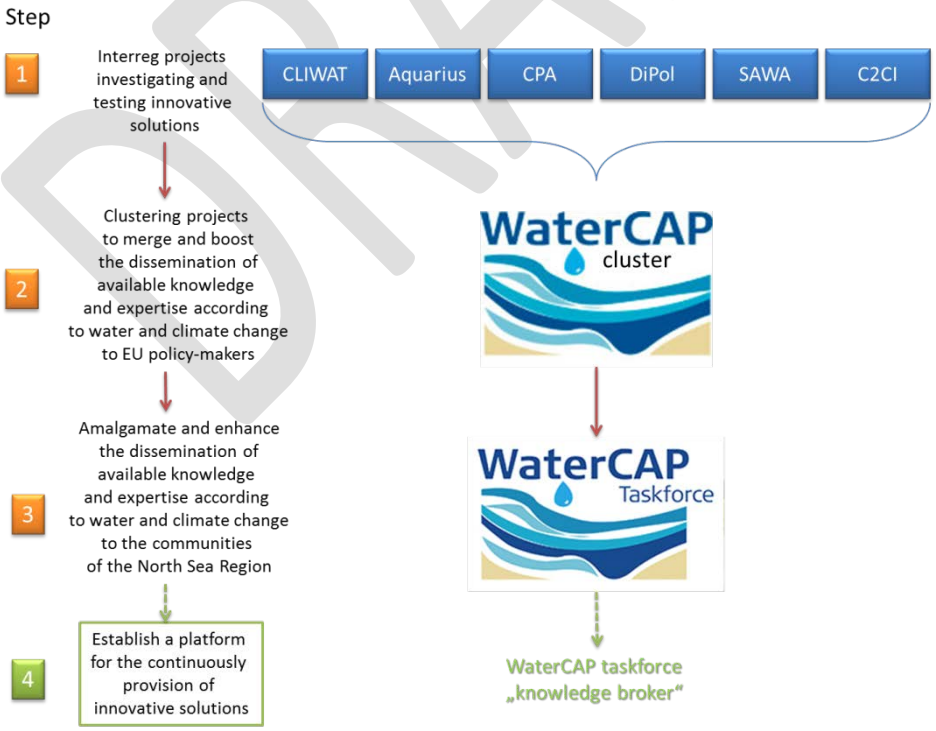

Figure 4: Succession of development from individual EU Interreg projects to WaterCAP taskforce and further on

4 Discussion and Conclusions

Discussion

The amount of knowledge, expertise and experiences collected and provided in many technical reports and on many websites is huge. This is true for most problems and challenges in the natural environment, e.g. dealing with impacts posed by climate change – see for example the European website for climate adaptation: *climate-adapt.eea.europa.eu*.

The important task is how to find the right person or organisation who could help solving my problem or tackling my challenge. Many offered solutions are tested and investigated in pilot cases, most of them are neither marketable nor fully exploitable (see section 2.1). But, the methodological knowledge and expertise is available and can help to enable solving different problems. So, it is important to know whom to approach for your own request. The typical approach of literature research and putting together state-of-the-art reports is not solely successful. To enhance the quality of support it is necessary to get in-depth insight in the problem or challenge the requester is facing. Based on this and the background of the WaterCAP taskforce partnership a specific and focussed research for tailor-made solution approaches could be offered.

The proposed WaterCAP taskforce “knowledge broker” could be seen as a filter on the vast amount of available knowledge and expertise. The “knowledge broker” will fulfil this task by providing three functions as mentioned in section 3.2: (i) access-point for external requests, (ii) process and mediation point and (iii) organisation hub.

A practical test of this methodology has been done in the WaterCAP taskforce project: Work package 3 has had the duty to prepare the matching of *OFFER*s and *DEMAND*s focussed on the WaterCAP taskforce partnership. Work Package 4 has organised the preparation of the “Mobile Transnational Task Forces” (MTTF) meetings.

Conclusions

In WaterCAP cluster one of the recommendations was to *develop opportunity maps in the North Sea region as a bridge to successful implementation*: It was recommended to create an export package for climate change adaptation in other regions. WaterCAP taskforce has started to walk this pathway and proposed a stepwise approach. Main part of this way will be the installation of a WaterCAP taskforce "knowledge broker" which is able to fulfil the three functions mentioned. The advantages of this pathway are as follows:

- The installation and maintenance of a *pro-active* exchange platform is able to disseminate worthwhile knowledge and expertise gained in several EU Interreg projects. The exchange platform will be pro-active, because a broker system (one person as "knowledge broker" or a group of persons with different fields of expertise) is implemented which is actively working on requests.
- The establishment of a "knowledge broker" serves as hub between the *OFFER* and *DEMAND* site in the field of water-related challenges and problems posed by climate change.
- While the WaterCAP taskforce project is conducting a "real-world" experiment of the "knowledge broker" methodology lessons learned could be drawn for other EU Interreg projects.

In the family of EU Interreg IVB projects of the North Sea Region programme the WaterCAP taskforce project breaks new grounds in offering expertise and knowledge. If this practical experiment of WaterCAP taskforce is felt as positive it could serve as *good-practice* example for the dissemination of knowledge, experiences and expertise of EU Interreg projects of the North Sea programme.

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