20 – 21 June 2011

Tools & Measures

1st Cluster Expert Board (CEB)

SIC adapt!

Discussion Paper

Findings and conclusions from the Cluster projects' adaption tools and measures

Investing in Opportunities

This project has received European Regional Development Funding through INTERREG IV B.

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1 Introduction

1.1 Background

Impacts and vulnerabilities in North-West Europe due to climate change

There is a general scientific and political agreement that climate change is happening and that the impacts could have severe consequences for human and natural systems (IPCC 2007). In North-West Europe (NWE) for the summer season, reduced precipitation and an increasing risk of droughts are anticipated. Water availability and crop yields could decrease; biodiversity loss, forest fires and heat-waves may increase. However, in winter and spring, the intensity and frequency of river floods may increase significantly due to more and heavier precipitation. Low-lying coastal areas could face major impacts due to sea level rise and a possible increased frequency of severe storm surges. More intense storms could affect shipping, tourism and links to island communities. Cities and urban areas become even more threatened by heat waves, flooding and droughts. And although climate change may also offer certain short- and medium-term opportunities such as increased forest or tourism growth, at the same time the potential for greater damage due to, for example, winter storms and the rising risk of forest fires are to be expected (EEA 2010).

Status quo of action regarding adaptation to the spatial impacts of climate change in NWE

Regionally tailored strategies to adapt to climate change are therefore needed to manage these expected impacts. The EU understands the task of adaptation as a matter of joint responsibility with the Member States and regions (CEC 2009, 2007). Whereas the EU adaptation framework aims at developing a comprehensive European Adaptation Strategy by 2013 – complemented by a clearing-house mechanism – most of the Member States have already developed National Adaptation Strategies (PEER 2009). Besides the continued political discussion on the need for adaptation, in practice adaptation to the expected effects of climate change is already taking place albeit at specific locations and at different scales. Although the question of how to deal with uncertainties regarding future climate conditions often hinders proactive action, a certain amount of new developed adaptation tools and proactive adaptation measures can, indeed, be identified. These are often developed within the scope of European and national funding schemes. While the majority of funding programmes focus on research, INTERREG helps to bring climate change adaptation into action and practical implementation.

1.2 Approach of *SIC adapt!*

The Cluster's objectives and actions

SIC adapt! is a Strategic Initiative Cluster (SIC) of the INTERREG IV B NWE Programme dealing with adaptation to the impacts of climate change in seven Member States. Eight current transnational projects with around 100 partner organisations are involved in the initiative which includes representatives from all levels of public authorities, scientific institutions, non-profit and private organisations.

In addition to the aims of each project the Cluster will:

- ensure that the outputs from the projects illustrate how existing management instruments can be tailored to facilitate adaptation across a range of sectors and locations,
- foster implementation of adaptation measures by widely tested and known good practice examples throughout NWE and beyond for use by regions with similar projected impacts,
- encourage policy recommendations in order to develop policy frameworks that will support local, regional and national adaptation initiatives across NEW,
- strengthen the impact of each project, especially at higher policy levels.

General information on the eight Cluster projects (see also separate PDF document with compilation of project flyers)

The eight Cluster projects all deal with the effects of climate change and possible adaptation strategies. All look for sustainable, cost-efficient, good-practice solutions across four action fields:

- Built environment (urban and regional)
- Water environment (rivers, urban water management, coastal / marine)
- Natural environment (forest / nature / agriculture)
- Social environment (society / behaviour change)

SIC adapt! is lead by the German Water Board Lippeverband. The eight Cluster projects are:

Name and meaning of acronym		Lead Partner	Contents
ALFA www.alfa-project.eu	Adaptive Land Use for Flood Alleviation	Rijkswaterstaat, NL	ALFA aims to protect citizens in the North West Europe region against the effects of the risk of flooding due to climate change. This will be done by creating new capacity for water storage or discharge of peak floods within river catchments in Belgium, France, Germany, United Kingdom and The Netherlands
AMICE www.amice-project.eu	Adaptation of the Meuse to the Impacts of Climate Evolutions	Etablissement Public d'Aménagement de la Meuse et de ses Affluents (EPAMA), FR	AMICE is about the adaptation of the Meuse river basin to the impacts of flooding and low waters from climate change.
C-CHANGE www.cchangeproject.org	Changing Climate - Changing Lives	Groundwork London, UK	C-CHANGE demonstrates how changes to both local open spaces and to day-to-day behaviour can help city regions to cope with a changing climate. C-Change will also enable all its Partner Regions to examine their spatial planning strategies and adapt them in response to the challenges posed by climate change.
FRC www.floodresiliencity.eu	FloodResilienCity	Rijkswaterstaat, NL	FRC enables responsible public authorities in eight cities in North West Europe to better cope with floods in urban areas. This will be done through a combination of transnational cooperation and regional investments.
ForeStClim http://forestclim.eu	Transnational Forestry Management Strategies in Response to Regional Climate Change Impacts	Landesforsten Rheinland-Pfalz, DE	ForeStClim aims of is to develop proactive and adaptive regional forestry management and forest protection strategies in the face of the expected climate change scenarios.
Future Cities www.future-cities.eu	Urban networks to face climate change	Lippeverband, DE	Future Cities aims at making city regions in Northwest Europe fit to cope with the predicted climate change impacts. The Future Cities strategy combines selected strategic urban key components - green structures, water systems and energy efficiency - for a proactive transformation of urban structures.
IMCORE www.imcore.eu	Innovative Management for Europe's Changing Coastal Resource	Coastal & Marine Resources Centre, University College Cork, IE	IMCORE aims at building adaptive capacity to deal with coastal climate change. Nine partnerships from across North West Europe's coastal areas are developing adaptation strategies to address the economic, social and environmental implications of climate change.
WAVE www.waveproject.eu	Water Adaptation is Valuable for Everybody	Waterschap Regge en Dinkel, NL	WAVE aims to prepare for future changes in regional water systems brought about by climate change. It will contribute to the development of more climate-proof water systems. The WAVE project is intended to improve the integration of water management into spatial planning; regional risk analysis is an important aspect of this.

1.3 Purpose and target group of this paper

The purpose of this paper is to:

- present the findings from analysing the adaptation tools and measures developed and implemented by the eight Cluster projects,
- reflect those findings taking the actual status of discussion on adaptation tools and measures in Europe into account,
- pose questions to be discussed with the participants of the first Cluster Expert Board (CEB 1) meeting, 20-21 June 2011, Holzwickede / Dortmund, Germany,
- set up the basis for the *SIC adapt!* knowledge platform (containing a compilation of experts, tools and measures) and
- prepare key messages as basis for policy recommendations (outlook on second phase of Cluster activities).

The target group for this paper is initially participants of CEB 1. However, the paper will be revised and put online after this discussion process a broader audience will be reached. Furthermore, it is envisaged to disseminate the main results of the discussion process as well as the paper itself to selected policy makers at regional, national and EU levels.

2 Terms and methodology

2.1 Definition of relevant terms

Within *SIC adapt!* **mitigation** is understood as effort to mitigate further climate change (e.g. by reducing the emission of greenhouse gases) and **adaptation** is understood as adaptation to the impacts of climate change (e.g. the impacts of changing climate conditions like raising temperature and changing precipitation patterns, increase of extreme weather events etc.).

With respect to analysis of the Cluster's projects' adaptation tools and measures we interpret **adaptation tools** as instruments which help to:

- identify climate change itself (by climate / hydrological / hydraulic modelling),
- assess risks and opportunities posed by climate change (by impact / risk / vulnerability assessment),
- identify appropriate adaptation measures and to foster implementation of these measures and
- raise awareness and acceptance concerning the issue climate change itself as well as concerning the adaptation measures to be realised to tackle the impacts of climate change.

Overarching strategies, planning concepts and working methodologies are also regarded as 'tools' as they support adaptation processes.

In contrast, **adaptation measures** in the *SIC adapt!* terminology are understood as to a specific location oriented, operational, often sector-specific actions with tangible results. They help to adapt a certain element / receptor (e.g. a building, a drainage system) to the expected impacts of climate change. These may be structural (technical, engineering) or non-structural (juridical, planning, communication) measures.

2.2 Methodology of analysis

To analyse the Cluster projects' approaches a combination of **expert interviews and a desktop study was commissioned to review** the projects' materials (i.e. application forms, web pages, reports, presentations etc.). Early in 2011 all Lead Partners (LP), partly joined by relevant Project Partners (PP), were visited and interviewed in order to select and compile the Cluster relevant adaptation tools and measures originating from the distinct Cluster projects. As the focus of *SIC adapt!* is on adaptation no stand-alone mitigation tool / measure was taken into account but combined adaptation and mitigation measures have been considered. The presented compilation and assessment of tools and measures was agreed on using repeated **feedback loops** on LP and PP level. The results are shown in **two matrices** (Appendices T and M) and contain the tools and the measures selected to date **categorised** by purpose, spatial scope, technical outline, target group, applicability and various other attributes. These matrices have formed the basis for the comparative analysis detailed in Section 3 (below). In general, the matrices are **open for further input** as the Cluster projects progress. However, as some of the Cluster projects activities have just started or are currently in a conceptual state there is scope for additional input regarding the purpose and intention of the tool or measure in the majority of cases.

The analysis itself does not claim to be a statistical examination in the strictest sense although it does present some statistical information on the amount and allocation of tools and measures with regard to the chosen categories. Instead, the descriptive presentation of the compiled information on the Cluster projects' adaptation tools and measures in the following chapters is intended to give evidence on the status quo of practical climate change adaptation in NWE and to raise questions for further discussion regarding the applicability and transferability of the identified approaches in relation to distinct action fields, spatial scopes and target groups.

3 Findings from analysing the eight projects' approaches and interim results

3.1 Tools and measures identified

To date, the **'tools'** and **'measures' matrices** comprise each **around 50 entries**, which show a selection of examples from the Cluster projects' on-going work. The **range of tools** reaches from different modelling tools to assessment, management and communication / engagement tools. Often the tools are based on existing approaches and show a further development or the integration of different, already existing approaches in order to tackle climate change impacts. This also holds for the **measures** which mostly follow known procedures that are adapted to the issue of climate change.

The comparative analysis reveals that certain **meta tools** are being developed that comprise multiple tools. What also may be of interest is that most measures are – although implemented locally – part of larger scale **strategic approaches**. The analysis also revealed that within the different Cluster projects the steps from analysis to action follow (though not explicitly but implicitly) known **strategy cycles.** For example the Flood risk management strategy cycle or the UKCIP Adaptation Wizard, the ETC/ACC Guiding principles for adaptation to climate change in Europe or the Ecologic guidelines for the elaboration of Regional Climate Change Adaptation Strategies (Prutsch et al. 2010, Ribeiro et al. 2009).

Figure 1 Strategy cycle for the development of regional adaptation strategies (Ribeiro et al. 2009:19)

Table 1 Overview on selected tools per Cluster project

	Project	Action field*				Purpose of tool*															
						to identify climate change				to identify and assess risks and opportunities				to identify adaptation measures and to foster implementation				to raise awareness and acceptance			
						Modelling				Assessment				Management				Stakeholder interaction			
Sum of selected tools per project		Built environment	Water environment	Natural environment	Social environment	Climate modelling	Hydrological modelling	Hydraulic modelling	Other	Impact assessment	Risk assessment	Vulnerability assessment	Other	Providing a pool of existing measures	Prioritisation and Decision support	Monitoring of effect and outcome of measures	Climate proofing spatial plans	Information	Exchange	Participation	Cooperation
5	ALFA	1	4	4	3	0	0	0	0	0	1	0	2	1	1	1	2	3	1	2	1
5	AMICE	0	5	0	0	1	1	1	0	1	1	1	0	1	2	1	1	5	0	0	5
5	C-Change	4	1	3	3	0	0	0	0	0	0	0	0	1	0	0	4	4	2	2	2
6	Flood ResilienCity	6	6	0	0	0	1	1	0	2	2	5	0	3	1	0	0	6	1	0	0
11	ForeStClim	1	3	11	2	2	1	0	1	5	1	1	0	0	3	5	0	11	4	2	1
11	Future Cities	10	9	2	7	0	0	0	0	2	0	4	0	6	6	3	5	10	9	4	6
7	IMCORE	1	4	1	5	0	0	0	2	0	2	1	0	2	2	0	1	5	4	4	3
5	WAVE	3	3	0	3	1	1	1	0	1	1	0	0	0	0	0	0	3	4	1	0
55	**TOTAL**	24	35	22	23	4	4	3	3	11	8	12	2	14	15	10	13	47	25	15	18

* multiple nominations possible

Table 2 Overview on selected measures per Cluster project

	Project	Action field*				Type of measure*					Approach	
Sum of selected measures per project		Built environment	Water environment	Natural environment	Social environment	Adaptation	Mitigation	Combined adaptation and mitigation	Structural (technical, engineering)	Non-structural (juridical, planning, communication)	Strategic approach	Single measure
5	ALFA	0	5	5	2	5	0	0	5	1	2	3
7	AMICE	1	6	4	1	5	0	1	3	5	5	2
2	C-Change	0	0	0	1	0	0	1	1	1	0	1
6	FloodResilienCity	6	6	0	1	5	0	1	5	3	2	4
1	ForeStClim	0	0	1	0	0	0	1	1	0	1	0
17	Future Cities	17	9	4	2	11	0	6	17	1	13	4
0	IMCORE	0	0	0	0	0	0	0	0	0	0	0
8	WAVE	2	8	6	2	5	0	3	6	2	5	3
46	**TOTAL**	26	34	20	9	31	0	13	38	13	28	17

* multiple nominations possible

3.2 Categorisation of tools (analogue matrix of analysis, cp. Appendix T)

Modelling tools

Modelling (multiple nominations possible)			
Climate modelling	Hydrological modelling	Hydraulic modelling	Other
4	4	3	3

With respect to the tools identified there are some approaches aiming to **increase the regional knowledge basis** concerning climate change (modelling tools).

These are, for example, the ForeStClim regional climate scenarios (T24) providing datasets for the analysis and interpretation of regional climate change. These are also the creation of climate change scenarios for the international river basin of the Meuse (T6) within AMICE or the 'Flood Modelling and Visualisation' approach (T56) within the scope of the WAVE project. For those three projects focused specifically on the natural environment, the provision of regional climate scenarios and respective regionalised data sets is an important precondition to carry out the other project work packages. The other Cluster projects either did not include their modelling work as being Cluster relevant or do not include model development in their work plan. Most of the Cluster projects do not concentrate on new model development as existing models developed (by other organisations or in previous projects) can be readily applied.

Assessment tools

Assessment (multiple nominations possible)			
Impact assessment	Risk assessment	Vulnerability assessment	Other
11	8	12	2

The impact, risk and vulnerability assessments carried out by nearly all of the Cluster projects (assessment tools) are intended to increase the regional knowledge basis and to **inform the decision making processes**.

These are often GIS based regional analyses leading, for example, to vulnerability maps and reports (see the examples for vulnerability assessment (T26, T41) from ForeStClim and Future Cities or the GIS for urban resilience (T22) from FloodResilienCity). Apart from those studies several of the Cluster projects also developed guidelines, handbooks and computerised tools on risk and vulnerability assessments focusing on different sectors and target groups. The FloodResilienCity project, for example, has developed guides on flood proofing of existing and new (public) infrastructure and buildings such as 'Construction in flood-prone areas' (T19) or the 'Project developers guide' (T20). IMCORE has developed an integrated 'Futures approach' (T51) comprising GIS, web based virtual reality and a customised simulator suite.

Management Tools

Management (multiple nominations possible)			
Providing a pool of existing measures	Prioritisation and decision support	Monitoring of effect and outcome of measures	Climate proofing of spatial plans
14	15	10	13

In order to **identify appropriate adaptation measures and to assist decision makers** the Cluster projects present different approaches on how to provide a pool of existing adaptation measures and how to develop methodologies for climate proofing spatial plans or existing management concepts (management tools).

These are for example the **meta tools** 'Web based information portal' (T23) providing information and training material, originating from FloodResilienCity, and the Toolbox on Urban Heat Islands (T35, Future Cities). Other examples include Future Cities' Adaptation Compass (T37) which is meant to help planners, experts and water boards to structure the working steps (involving e.g. a pre-structured vulnerability assessment), to give examples for best-practice and experiences of Future Cities partners and highlight possible barriers. With respect to climate proofing of spatial plans, C-Change is working on transnational planning recommendations based on the experience of climate proofing of different spatial plans (T15). These include spatial development plans on the state and local levels in Germany, The Netherlands and Luxembourg. With respect to the adaptation of management concepts an example is the ForeStClim approach of integrating existing impact assessment, soil and water assessment and forest management tools (T25) in order to optimise the predictions of forest growth under future climate conditions. Although the mini-table above shows 10 tools for 'monitoring of effect and outcome of measures' it can be stated that this is an issue still not covered well in practice. Looking at Table 1 reveals that 5 out of these 10 tools originate from ForeStClim where they are developed and applied in a research dominated context. Therefore it can be concluded that procedures for prioritisation of adaptation measures and for monitoring the effect of adaptation measures are still rare in practice.

Tools for stakeholder interaction

Stakeholder interaction (multiple nominations possible)			
Information	Exchange	Participation	Cooperation
47	25	15	18

In addition to (climate) modelling, assessment and management tools all the Cluster projects are heavily involved in developing and implementing tools for **stakeholder engagement and communication** (tools for stakeholder interaction). These are aimed at raising awareness and acceptance regarding the issue of climate change, the potential impacts and the necessity of developing adaption measures. The communication and stakeholder engagement tools differ in their purpose.

Pure informational tools (one-way flow of information from sender to receiver) were identified such as the WAVE movie (T54) or the Coastal legal codex (T47) from IMCORE. Bi-lateral tools, designed to provide exchanges of knowledge and experience are also been developed, for example, the information and educational schemes (T1, T32, T33) developed by ALFA and ForeStClim. Many of the assessment and management tools also fulfil the objective of actively engaging stakeholders in the project development and decision making, for example the Multimedia Distance Learning Tool (T52) from IMCORE or Future Cities' Adaptation Compass (T37). Again, both of these are meta tools comprising a range of different tools and methodologies.

There are tools also aiming at facilitating a process of collaborative working where stakeholders are partners and joint decision-makers for project development and direction. These are for example the games and role plays (T36, Future Cities and T53 WAVE) or the 'Guidelines on Stakeholders Engagement for Driver and Issue Identification Workshops' (T49) complemented by the 'Training of Trainers' (T50), both originating from IMCORE, the latter can be applied in fields outside of climate change.

Other innovative approaches in engaging stakeholders are the Healthy Climate WeZt project (T12, C-Change) where young people with diverse ethnic and cultural backgrounds have been engaged and

empowered to develop climate proof spatial plans for their neighbourhood; or the Klimaroute (T17, C-Change) informing and inviting visitors to educate themselves at certain art and design stations along the River Main in Germany.

Analysis of further categories

Technical outline (multiple nominations possible)					
Checklist	Guidelines / guidance book	Report / maps	Computerised tool	Role play / game	Other
3	15	26	14	5	14

Target group (multiple nominations possible)						
Experts / professionals	Laymen	Administration	Politics	Science	Economy	Civil society
45	19	40	23	22	8	27

Spatial scope (multiple nominations possible)				
building/plot level	quarter/community level	local / municipality level	regional level	supra-regional level
9	22	28	33	17

The **technical outline** of the tools shows a great variety from checklists over guidelines/guidance books, reports/maps, computerised tools through to role plays/games and other outputs. The **target groups** addressed are mainly, but not exclusively, experts/professionals from public authorities (mostly for the modelling, assessment and management tools). Experts and laymen from civil society are also being targeted (in general focussed on information and communication tools). The **spatial scope** of the tools also varies from building level, to quarter/community, level, local/municipality level and regional level up to the supra-regional level but is mainly focused on the local and regional level - unsurprising given the INTERREG funding context.

Summary regarding the analysed adaptation tools:

It is evidently clear that there is a focus on management and stakeholder interaction tools and that these tools tend to concentrate on local and regional level. As to be expected within the INTERREG context the core target group is experts in public authorities but there is equal emphasis in engaging with politicians, scientists and civil society.

3.3 Categorisation of measures (analogue matrix of analysis, cp. Appendix M)

Type of measures

Type of measure (multiple nominations possible)				
Adaptation	Mitigation	combined adaptation and mitigation	structural (technical, engineering)	non-structural (juridical, planning, communication)
31	0	13	38	13

As the focus of *SIC adapt!* is on climate change **adaptation**, measures that help to adapt certain discrete elements like a building, an urban green space or a floodplain to the expected impacts of climate change have been identified. Nevertheless, many of those measures also fulfil **mitigation** goals by actively contributing to reduce greenhouse gas emissions. These are mainly measures in the

urban context which deal with green spaces like a natural Playground (M12) designed and to be implemented in Amsterdam (C-Change) or the various green walls and green roofs projects (M21-M26) being part of Future Cities. Also large structural measures such as the Lock of Ham (M7) in Belgium, (AMICE) are intended to contribute to the adaptation of the River Meuse by increasing problem of low flows whilst improving green energy production.

Approach of measures

Approach	
Strategic approach	Single measure
28	17

More than half of the measures follow a **strategic approach** being part of a broader strategy at local, regional or national level. This could be a local strategy like the strategy for 'Greening the city of Nijmegen' (M21, Future Cities) which frames all measures on green structures in Nijmegen. It could be a regional strategy like the concept for 'Natural Water Retention in the Ardennes' (M9, AMICE) aiming to build a whole network of wetlands. Or it can be a national strategy like the Dutch programme 'Room for the River' which builds the framework for many flood risk reduction investments in several of the Cluster projects. Less than half of the measures are **single measures**, i.e. locally and sectorally oriented measures with the input of a large deadwood pile in the middle of the River Rur, Germany, in order to use the natural hydro-energy for river restoration works (M40, WAVE) being one example of a single measure.

Climate change impact addressed

Climate change impact addressed (multiple nominations possible)						
Flood	Heavy rainfall	Drought	Heat / heat wave	Wind/storm	Fire	Sea level rise
36	20	14	12	2	1	0

Looking at the **climate change impact addressed** the majority of measures focuses on the issue of flooding and heavy rainfall. These are often measures about water retention, water storage, channelling and directing water flows. The 'Streets as Streams and Road as Rivers' approach from Dublin City Council (M16, FloodResilienCity) is one innovative example for the re-configuration of streets and other topographic features for managing surface waters away from critical areas. Considerably fewer measures address drought and heat. The 'Green Transformation of the Nijmegen City Centre' (M24) as part of the Future Cities project is one example of the use of public and private green structures for cooling a city. Wind / storm and fire are of less relevance and none of the measures addresses sea level rise. Most of the measures are suitable to tackle more than one climate change impact. Only a limited amount of measures concentrates on one impact type.

Temporal and spatial scope

Temporal scope (multiple nominations possible)		
Short term perspective	Medium term perspective	Long term perspective
31	24	18

With regard to the **temporal scope** it was interesting to find out that most of the measures tend to have short-term impact (e.g. immediately reducing the risk of inundation in case of a flood event) or at least a medium term perspective (effect within 5 to 10 years, applies e.g. to some river restoration

works). But there are also many activities of the Cluster project's that deal with perceived long-term issues. These are for example the dyke relocation at the Overdiepse Polder, Netherlands (M5, ALFA) or the Climate dyke Tiel, Netherlands (M36, Future Cities).

Spatial scope: Landscape type addressed (multiple nominations possible)						
Urban area / city centre	Suburban area	Rural area / village	Rural area / agriculture	Forest	River catchment	Coast
27	3	10	5	6	22	0

Spatial scope: Scale (multiple nominations possible)				
Building / plot level	Quarter / community level	Local / municipality level	Regional level	Supra-regional level
12	16	18	14	5

The **spatial scope** of the measures varies as for example, measures on tackling the urban heat island effect are focused on building, quarter and local level in urban areas (M24, Future Cities), whereas river restoration and widening works aiming at the reduction of flood risks are – mostly carried out in rural areas – often realised at a local level whilst also having an effect on regional and supra-regional level (e.g. the La Bassé, France (M1, ALFA) or the Lock of Ham, Belgium (M7, AMICE).

In general, measures in the built environment mostly focus on urban areas/city centres and the building and quarter level whereas measures in the water environment are mainly carried out in urban areas/city centres, rural areas and river catchments at local, regional and supra regional level. In the natural environment, the measures concentrate on rural areas, forests and river catchments primarily at local and regional level. However, measures in the social environment tend to cover all landscape types and all scales equally.

Stakeholder involvement and responsibilities

Implementation by (multiple nominations possible)			
public sector	private sector	third sector / NGOs / NPOs	private individuals / households
38	8	4	6

Many activities are characterised by a broad **stakeholder involvement** whilst developing and realising the adaptation measures. Due to the nature of INTERREG projects the public sector is mainly responsible for the **implementation** of the measures.

Summary regarding the analysed adaptation tools

Most of the measures show an integrated approach either addressing different climate change impacts, aiming at adaptation and mitigation simultaneously or combining structural with non-structural solutions. Similar as for the tools, the main focus of the measures is on water environment and on floods and heavy rainfall events. Distinct to the tools, the spatial scope addressed by the measures does not concentrate on the local and regional level but is spread over all spatial level from building / research plot level to supra-regional level. Responsible for implementation is as would be expected for INTERREG mainly the public sector.

3.4 Application of tools and measures

With regard to the **action fields** identified within *SIC adapt!* most of the tools and measures are focusing on the 'Water environment' with 'Built environment' second. For tools the minority of entries address 'Nature environment', whilst for measures the minority of entries was under 'Social environment'. Especially with respect to the tools but also potentially valid for the measures, a coeval focus on more than one action field was noted. This indicates an integrated approach where a tool or a measure rarely focuses only on one action field.

Table 3 Tools corresponding with action fields

	Purpose of tool*															
	To identify climate change				To identify and assess risks and opportunities				To identify adaptation measures and to foster implementation				To raise awareness and acceptance			
	Modelling				Assessment				Management				Stakeholder interaction			
Action field	Climate modelling	Hydrological modelling	Hydraulic modelling	Other	Impact assessment	Risk assessment	Vulnerability assessment	Other	Providing a pool of existing measures	Prioritisation and Decision support	Monitoring of effect and outcome of measures	Climate proofing spatial plans	Information	Exchange	Participation	Cooperation
Built environment	1	2	2	1	5	5	10	1	11	9	3	11	22	14	8	8
Water environment	3	4	3	2	8	7	11	1	13	13	5	8	52	17	9	13
Nature environment	2	1	0	2	5	3	3	2	2	6	6	6	19	8	6	3
Social environment	1	1	1	2	3	4	5	2	7	8	4	8	18	17	12	12

* multiple nominations possible

Table 4 Measures corresponding with action fields

	Type of measure*					Approach		Temporal scope*		
Action field	Adaptation	Mitigation	Combined adaptation and mitigation	Structural (technical, engineering)	Non-structural (juridical, planning, communication)	Strategic approach	Single measure	Short term perspective	Medium term perspective	Long term perspective
Built environment	18	0	8	24	5	17	10	21	11	9
Water environment	29	0	5	28	12	23	12	23	23	17
Natural environment	17	0	3	17	6	15	6	13	15	13
Social environment	5	0	4	6	5	5	5	5	5	2

* multiple nominations possible

Measures as defined under the Cluster are orientated to a specific spatial location. They are therefore mainly not directly transferable. But the approach adopted may be transferable and transfer of

experiences can lead to recommendations for subsequent application at additional locations. In contrast, tools if understood as instruments can in most cases be directly transferable. A general transferability applies to most of the communication tools, to some of the planning concepts or methodologies and the educational schemes. However for planning concepts and methodologies a direct transferability strongly depends on having the same or similar planning culture and legal context. In many further cases transferability may be possible – given that local data is fed in (e.g. Futures approach, T51, IMCORE; Toolbox Urban Heat Island, Water Game, T35-36, Future Cities). The column transferability in the matrix 'Tools' is intended to show if, and under what circumstances, a tool could be transferable.

4 Interpretation and guiding questions for discussion in CEB 1

During the action field sessions at CEB 1 the 'tools' shall be discussed regarding their
- direct applicability or
- transferability after modification

and related to
- the distinct action fields
- the spatial scope
- the target groups.

Aim of this first CEB meeting is to
- review the results of the analysis
- identify links between the projects' approaches
- discuss the applicability and transferability of the selected tools and measures
- and finally, to derive conclusions regarding
  - completeness / gaps
  - overlaps
  - contradictions
  - consequences for regulations / funding schemes

Regarding the above topics and with respect to the results presented from the analysis, the following questions were prepared:

General questions – to be discussed during the action field sessions:

Question A
Are the lists complete, is something missing? Is everything understandable, are there serious objections?

Question B
Where are links / possible synergies between tools and measures of different projects?

Question C.1
What tools and measures are directly applicable to which other context in
- the same / a different action field,
- the same / a different spatial scope and
- the same / a different target group?

Question C.2
What tools and measures are possibly transferable (and after what kind of modification?) to which other context in
- the same / a different action field,
- the same / a different spatial scope and
- the same / a different target group?

Question D
What makes up a 'good practice example'?

The results of the discussion in the distinct action field sessions will be presented to the plenary by **action field speakers.**

The first task of the plenary group will be to reflect possible synergy effects, applicability and transferability of tools and measures **across the different action fields** in order to derive conclusions regarding completeness / gaps, overlaps / duplication and contradictions.

Preparing key messages as basis for policy recommendations (second phase of Cluster activities) the plenary will discuss the following theses derived from the analysis.

Specific questions – to be discussed during the plenary session:

Assumption		Questions	
A1	(Regional) climate modelling has little importance to the Cluster projects.	Q1.1	Is (regional) climate data already existing and available?
		Q1.2	Is detailed climate data input not necessary for the project development / implementation?
		Q1.3	For which context is the delivery / input of new climate data inevitable?
A2	Instead of development of new tools and models it is more important to adapt existing tools and models and apply these to the challenge of climate change adaptation.	Q2.1	Does this apply generally to all projects?
		Q2.2	Are there any differences regarding the different action fields / sectors?
A3	There is a shift from purely technical adaptation measures (resistance, avoidance) to a combination of resistance, recovery and adaptation.	Q3	What are the reasons for this shift? Is it a question of cost-effectiveness? Or a question of changing responsibilities?
A4	INTERREG helps to bring climate change adaptation into action/implementation.	Q4	What are the special strengths and weaknesses of INTERREG regarding the development, implementation and application of appropriate adaptation measures?
A5	Procedures for prioritisation of adaptation measures and for monitoring the effect of adaptation measures are still rare in practice.	Q5.1	What are the reasons for this?
		Q5.2	Are such procedures needed and if yes how could this be supported?
A6	The water sector is dominating the discussion on adaptation to climate change impacts within INTERREG.	Q6.1	What are the reasons for this fact?
		Q6.2	Should the role and influence of the other sectors be increased and if yes how?
A7	Adaptation to climate change is (still) not easy to place as there is limited or no awareness of the problems in general society (to date).	Q7.1	What could be the reasons for this?
		Q7.2	What are the experiences in the projects regarding this issue?
		Q7.3	What are good practice examples from the projects to tackle this issue? According to what criteria?

5 Summary and Outlook

This paper is primarily designed for the participants of the first *SIC adapt!* Cluster Expert Board meeting hold 20-21 June 2011 in Holzwickede nearby Dortmund, Germany. It presents the findings from analysing selected adaptation tools and measures developed and implemented by the eight Cluster projects and poses questions to be discussed at the first Cluster Expert Board meeting.

The analysis reveals the broad range of tools in use or in development by the projects and that their scope is wide ranging – from different modelling tools to assessment, management and communication / engagement tools and various practical solutions how to adapt to climate change at local and regional level (adaptation measures). Based on collated information the direct applicability or transferability after modification will be discussed in CEB 1 with reference to the distinct action fields, the spatial scope and the target groups.

After the discussion in CEB 1, this paper and the matrices will be subsequently revised. This revised version will then be send out to all participants of CEB 1 in order to ensure that the results inform the Cluster projects' and could be included in their on-going work. Key messages will be also communicated to a wider target group, already preparing the second phase of the Cluster's activities which is on policy recommendations.

Based on the findings of the analysis, discussion on these findings and further development by the experts at CEB 1 the *SIC adapt!* knowledge platform will be developed. This will include the selected adaptation tools and measures that were analysed and compared and a list of the CEB 1 experts.

In autumn 2011 the Cluster Steering Committee (composed by the representatives of the eight projects and the Cluster Coordination Office) and the Cluster project's Communication Officers will meet in order to

- reflect the results of the CEB 1 meeting,
- discuss and decide on the further process of the Cluster activities as well as agree on the content of the outputs,
- start the preparation of the CEB 2 meeting "Policy Recommendations" to be held in Brussels May / June 2012 (tbc) and
- reflect the first communication steps / outputs of *SIC adapt!*.

Due to the anticipated progress in the Cluster's projects an update of the analysis may be appropriate by the end of 2011 / beginning of 2012.

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Tools & Measures

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1st Cluster Expert Board (CEB)

SIC adapt!

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