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BACKGROUND OF THIS REPORT

The European Conference on Climate Adaptation (ECCA) was organized in Hamburg as the first European conference to address the broad range of issues related to climate change adaptation. It stands in line with the international conferences "Adaptation Futures" hosted in Australia (Gold Coast, Queensland) in 2010 and in the United States (Tucson, Arizona) in 2012. This conference placed a greater emphasis on understanding and assessing adaptation in action under the theme **Integrating Climate into Action**.

Since research on adaptation requires knowledge of the risk and decision-making contexts, while adaptive action requires a combination of scientific and practical knowledge – the interface between science and practice became a focus of the conference, in addition to the scientific components. ECCA 2013 focused on assessing and developing interactions between scientists, practitioners and policymakers in the field of climate change adaptation. Therefore the organizers had put together a set of 31 science practice sessions over the three day course of the conference from which 29 sessions could be held as planned. There were great interest in these sessions with attendees ranging from scientists from various fields (i.e. climatology, environmental sciences, economics, hydrology, social sciences, biologists among others) to practitioners (i.e. from water management, special and regional development planning, energy experts, health-care specialists) to miscellaneous decision-makers, local and federal politicians among others.

Main Sponsors and organizers of ECCA 2013

The conference was co-sponsored by the European Commission, the German Ministry of Education and Research and the City of Hamburg. The concept and programme of the conference was developed by a team with representatives of four climate policy-oriented FP7 projects (RESPONSES, MEDIATION, CLIMSAVE and CLIMATECOST) in collaboration with the German hosts.

CIRCLE-2

CIRCLE-2 is a European Network (ERANET) of 34 institutions from 23 countries committed to fund research and share knowledge on climate adaptation and the promotion of long-term cooperation among national and regional climate change programs. CIRCLE-2 has during its life cycle gathered extensive experience with science and practice interactions and for this reason it not only contributed substantially to various science and science-practice sessions, it also seized the opportunity to learn from the discussions and outcomes of the science practice sessions. Using a predesigned common template, a team of CIRCLE-2 representatives prepared short reports of all science practice exchanges. A synthesis of these reports is presented here.

The individual session reports were written by David Avelar, Tiago Capela Lourenço, Ingrid Coninx, Paul Dostal, Kirsten Hollaender, Stephanie Janssen, Birgit Kuna, Gregor Laumann,

Markus Leitner, Carin Nilsson, Ana Rovisco and Rob Swart (Rob Swart also provided valuable feedback to the compiled report) whom we wish to thank for their support. The synthesis report was prepared by Birgit Kuna and Kirsten Hollaender.

THE ECCA SCIENCE-PRACTICE SESSIONS

CIRCLE-2 representatives were motivated to engage in the ECCA science-practice sessions because during the development of this ERANET, they increasingly realized how complex and challenging the science-policy, or rather science-practice interface is: science-practice interactions are much more complex than linear models of knowledge transfer suggest. It is apparent that the concept of knowledge being produced by scientists who then hand it over to recipient practitioners or policy makers is over-simplistic. In fact in many adaptation processes, knowledge gains its value by being tailored to a specific context (contextualisation). That is why the relationship between science and policy or practice needs to be designed as a multidirectional interaction. The concept of knowledge co-production between science and practice is often mentioned in this context, but it is as yet largely unknown under which conditions this concept is useful and how it should be designed in various situations to be the most effective.

In contrast to the science sessions at the conference, the science-practice sessions had to encourage and shape the practitioner-oriented part of the conference and use a much more proactive style of management in order to encourage practitioners and policymakers to participate and to ensure the conditions for a good exchange of knowledge and views between practitioners and researchers. The science-practice sessions used mixed methodological approaches, including a number of more-or-less interactive forms such as roundtables and serious games.

Overall, the evaluation of the conference format showed that the objective of bringing scientists, practitioners and policymakers together was generally much appreciated and seen as valuable. The purpose of science-practice sessions (35% of the programme) was generally clear and they were well-attended. The evaluation revealed that for further successful outcomes in science-practice sessions even more practitioners and policymakers could and should be actively involved (see in that respect also the internal report “Evaluation of the ECCA conference”).

Topics

All of the sessions had relevance for both research and practice. The sessions covered a broad range of topics, ranging from climate vulnerability assessment and decision-support methods to governance and adaptation planning (see table 1).

Table 1: Topics covered by ECCA science-practice sessions

Topic: Economics of adaptation
a| Challenges to respond to loss and damage of climate change
Topic: Decision-making under uncertainty
a| Decision making with incomplete data in forest adaptation to climate change
b| Uncertainties in decision-making processes: Will guidelines help do the trick?
c| Addressing uncertainties in national adaptation strategies
e| From science and concepts to climate resilient development in developing countries
F| Decision making for climate robust infrastructure
Topic: Governance of adaptation
a| Local adaptation to flood risk. Lessons learned from Hamburg, Rotterdam and Dordrecht
b| Climate adaptation sciences meet stakeholders: Challenges of transdisciplinary research
Topic: Adaptation strategies and planning
a| EU Cities Adapt – urban adaptation strategies
b| Adaptive delta management and decisive points in climate change adaptation
c| Building robust strategies for a climate proof fresh water supply
d| Exploring biophysical and socio-economic perspectives for a robust ecological infrastructure

Topic: Mainstreaming climate adaptation
a| Assessing options for governance in climate adaptation from regional experiences
b| From building capacity to taking action: lessons for an integrated approach
c| Tapping other resources: of practise
d| Dealing with stormwater adaptation - lessons learned by water utilities
Topic: Role of tools and knowledge in adaptation
a| Science-practice lab for decision support: the practice of 'serious gaming' part 1 + 2
b| How to create resilient storm surge protection using building with nature concepts
c| Planning climate adaptation in the energy sector
d|Risks from urban flooding - Interactive science and policy assessment
e|Monitoring of adaptation at EU, national and local levels
Topic: Transnational cooperation
a| Share information on climate adaptation on a European and transnational scale
b| Climate change adaptation in mountain areas
c| Lost in translation? Linkages between EU, macro-regional and national strategies
Topic: Good Practices
a| Adaptation in Europe in practice: how did they do it?
b| Adaptation of European forests to climate change
c| Designs boosting urban climate change
d| Adaptation Engineering: Managing Climate Change by Engineering Solutions Part 1 + 2

METHODOLOGY

The rapporteurs in the science-practice sessions tried to catch the main points of the – in part very lively – discussions in the group. They used a reporting template with the following structure:

a) Mechanisms, methods or tools to implement science-practice interactions
b) Main conclusions and findings of the sessions about science-practice interactions
c) Success Factors
d) Barriers
e) Transferability of tools and mechanisms for science-practice interactions
f) Overall insights and special observations
g) Looking forward: conclusions for future science-practice interactions in the field of climate change adaptation.

Mainly written and some oral reports were received from the sessions that took place during the conference. Due to the nature of the actual discussions and the different session formats it was not always possible for the rapporteurs to follow this reporting structure precisely. Especially the "looking forward" part was often not covered by the sessions. In general, many sessions focussed on the focal theme and outcome of particular science-practice experiences, not on the (effectiveness of the) process of those interactions.

SESSION CHARACTERISTICS

The affiliation of the session organizers had more or less equal shares from science and practice. All sessions had an international dimension and were organized by partners from at least two (European) countries. Many sessions had organizers from three or more European countries, with Germany, the Netherlands, Finland, Sweden but also UK, Portugal and Italy featuring prominently, next to some other European Countries. In addition, some sessions brought in global perspectives (mainly Australia, the US and also some developing countries which are involved in, e.g., World Bank projects or UN activities). A high percentage of sessions had organizers from the Netherlands and Germany, which is due to the fact that the event took place in Germany and partners from the Netherlands were actively involved as co-organizers of the conference. The science-practice session programme in particular was coordinated by Florrie de Pater, Head of Knowledge Transfer in the Dutch Programme Knowledge for Climate. The institutions involved in the organisation of the sessions range from local (municipalities) to regional (regional councils), national (national environmental agencies), European (EEA, European part of ICLEI) and international level (World Bank, UN).

The involved municipalities were mainly large cities, often with harbours or coastal locations, which obviously have a special interest in climate change adaptation.

Session attendance

Overall, a balanced mixture of scientists, practitioners and decision-makers attended the sessions, but in some particular sessions there was an overrepresentation of scientists as compared to other types of participants. The business sector was relatively underrepresented in the sessions. There were a number of representatives from consultancy firms present, e.g. from the UK, often consultancies specialized in consulting for the public sector. Some sessions, such as the session on "Challenges to respond to loss and damage of climate Change", did involve representatives from the insurance sector. A number of engineering consultancies attended the session on engineering.

Session aim and format

Some sessions had rather ambitious aims, e.g., to use the session to start building a network or platform for exchange (e.g., Communities of Practice). While such networks or communities could be very valuable in furthering and sustaining science-practice interactions, it remains to be seen if such ambitions can be realized.

The majority of sessions had a conventional format of presentations followed by questions. However, also a significant number of sessions applied other formats, with group discussions and panel discussions with the audience being used a number of times. A number of sessions had designed special formats to increase opportunities for mutual exchange and learning, e.g. by role play, by exploration of visualizations, and in one case serious gaming.

RESULTS

All the major comments from the rapporteurs reports were compiled and structured into the 7 categories of the reporting template (a-g, see annex). In the following paragraphs these findings are summarized and some overall conclusions distilled from the "raw material" in annex 1.

Mechanisms, methods or tools to implement science-practice interactions

Scientists and practitioners described several experiences how they interact within projects and collaborations. Roughly, these interactions can be divided into

A) Informing partners - one party (i.e., scientists) determines problem-oriented research questions and, based on research, proposes a strategy to address the

problem. The proposal is then discussed with other parties (i.e. practitioners, stakeholders) in order to get acceptance for the proposed strategy.

B) Active exchange with partners – while the problem-oriented research questions are still mainly determined by the scientific community, regular exchanges with other parties (i.e. practitioners) are organized from the start in order to develop a meaningful response strategy that will get support from the stakeholders (user consultation).

C) Joint development of research needs – from the very beginning, all relevant parties are engage actively in a process to jointly determine problem-oriented research questions and subsequently develop a strategy to address the problem ("co-production" of knowledge, sometimes from a scientific perspective referred to as transdisciplinary research).

Furthermore, the group discussions focused on the importance of a stepwise exchange (i.e., each "interest group" needs to go through an iterative process to clearly articulate their adaptation questions and then – as soon as possible – start the exchange with the each other). The attendees especially recommended workshops as an efficient way to start an active exchange between scientists and practitioners. If many stakeholders are involved, or if sensitivities are expected, it seems sometimes justified to work with a "Memorandum of Understanding" at the beginning of the process, in order to clearly define roles and responsibilities and avoid confusion and conflicts later on.

In addition, knowledge about tools and methods useful in science-practice-interactions was exchanged in several sessions. Promising approaches included:

- Usage of decision-support systems and tools (such as Mulino-DSS-IT, or DST-UK for coastal zones) in cooperation between scientists and practitioners
- Development of decision trees as a method for structured strategic thinking in science-practice-interactions
- Development of master plans for science-practice interactive processes
- Involvement of scientists AND stakeholders in development and applications of modelling approaches
- Development of a guide to identify and manage uncertainties with respect to available options for decision makers
- Development of innovative forms of networking between scientists and practitioners

Main conclusions and findings of the sessions about science practice interactions

The majority of rapporteurs reported that discussions focused often on the role of communication between scientists from different specialties, between scientists and practitioners, stakeholders and the public in adaptation to climate change.

First, there is a need to develop appropriate formats how to initiate, operationalize and sustain interactions between these groups. There is already a growing community of scientists, stakeholders and others who practice different and promising ways of jointly developing research agendas with a high degree of practical importance, but these efforts appear to be ad hoc and fragmented.

Second, it seems important and promising for effective joint work to sensitize partners in a very literate sense including A) regular personal contact, B) visualization of adaptation challenges through data visualization/imaging/modelling and C) stimulation of personal experiences with locations at risk or examples of adaptation in practice (i.e. through excursions).

Third, common (big-scale) challenges in adaptation to climate change are often found across political borders. There is a growing understanding of the need to become more efficient (time/moneywise) in respect to the resources put into determining the needs of adaptation (including research needs) and how to implement and evaluate adaptive measures. There is great potential to increase the output of the resources spent. In order to enhance efficiency, the political and bureaucratic framework has to be developed to make inter- and transnational collaboration easier and sustain it over time. Working groups in specific fields of transdisciplinary adaptation research would increasingly comprise not only scientists but also include practitioners, industry, stakeholders, and maybe even the public from climate change affected regions with similar needs for adaptation, possibly connected through Communities of Practice on specific adaptation themes.

Success factors

From the ECCA science-practice sessions the following generic factors for successful science-practice-interaction can be derived:

- Scientists, stakeholders and decision makers explicitly work to learn to understand each other and speak a “language” that can be understood by the other parties.
- Emphasis should be laid on recognition of positive opportunities in adapting to climate change rather than on trying to solely minimize risks and prevent dangers.
- Participation and cooperation stands at the beginning of all effective research and policy-making processes.
- A roadmap is required to plan and structure the science-practice-interactions in each specific context.

Barriers

One may consider the absence of success factors as given above also as barriers in the process. In addition, participants identified the following impeding factors:

- Incentives are missing for
  - preparedness for climate change and climate-related events
  - prevention of climate impacts
  - engagement with stakeholders, decision makers, politicians, scientists, etc.
- Costs of inaction (damage costs) are not known or very uncertain.
- The required long-term orientation is often hampered by thinking in terms of short-term benefits.
- A comprehensive synopsis of available quantitative and qualitative information to derive meaningful adaptation measures is not yet exploited.
- Multi-scale dimensions, multiple scenarios and models, and many sources of uncertainties are difficult to handle.

Transferability of tools and mechanisms for science-practice interactions

The issue of transferability of tools and mechanisms was often not discussed as a separate theme, but rather implicit in other session points. In general, participants, recognizing the benefits of using available knowledge about adaptation challenges and measures, assumed that these could be transferred to regions with similar challenges. Especially, it was considered worth the effort to find ways and means to transfer tools, mechanisms and collected knowledge, notably for adaptive solutions with multiple benefits for society.

The participants were aware that different groups of stakeholders, cultures and societies tend to have different ways to communicate, share tools and mechanisms, as well as accepting exchange in the field of adaptation to climate change. Therefore, the majority agreed that the opportunities to transfer knowledge should be carefully examined, taking into account the specific characteristics of the adaptation situation.

Overall insights and special observations - looking forward: conclusions for future science practice interactions in the field of climate change adaptation

In addition to the results given above some cross-cutting findings can be derived from the reports as a whole.

A long-term collective benefit can be gained from adaptation to climate change. This collective benefit can be best exploited when the world of science interacts effectively with the world of practice. Elements of a framework on how this interaction can most effectively take place in different adaptation situations were discussed at the conference, but the adaptation community are still fragmented, with room for the further development of a coherent

framework. This development should be strengthened by providing appropriate opportunities and resources for science-practice-interactions in real-world situations. This holds true for more fundamental research in adaptation to climate change as well as in practice-driven, problem-oriented research aiming at the development and implementation of measures for adaptation. The success, or failure, of adaptation measures should be evaluated systematically in a collective process involving both scientists and practitioners. Furthermore, (regular) opportunities should be provided for exchanging experiences in this inviting and new era of science-practice-interactions.

Adaptation to climate change is intricately intertwined with human wellbeing. If scientists, practitioners, politicians and the public discuss the needs for adaptation, these are often related to the protection of humans, to the fostering of human well-being, or to the further improvement of the life of those strongly at risk of climate change. To reach a common understanding of what “well-being” and “quality of life” means to stakeholders is not straightforward but necessary, especially when science-practice-interactions cross cultural and national borders.

During the science-practice-sessions the often transnational character of adaptation was highlighted. Collaboration between neighbouring countries with similar adaptation needs was generally viewed as an expedient though challenging endeavour. Also, the need to develop and operationalize a global responsibility in relation to adaptation to climate change was articulated, especially in the context of long-term effectiveness of measures. In the science-practice-sessions adaptation to climate change was seen in the context of the need to transform our societies towards a sustainable future.

Annex – ECCA rapporteurs results

Listing of comments from ECCA rapporteurs in science-practice-sessions

Mechanisms, methods or tools to implement science-practice interactions

1) collection of mechanisms, methods and tools used

1.1. information only

- Awareness campaigns with urban developers
- Informative sessions
- Public information sessions

1.2. dialogue (not yet work together)

- Dialogues
- Stakeholder dialogue via workshops and meetings
- Stakeholder consultations
- Webinars
- Virtual platforms
- "Gaming" (serious game)
- Annual symposia
- "soft support", interpersonal relations
- Political representatives had workshops with scientists
- Development of National Adaptation Strategy by ministry: website, newsletter, presentation of activities in other countries

1.3. work together

1.3.1 work together – selected groups in one sector

- Co-production between researchers, consultants and big firms
- "conflict-oriented cooperative understanding"(scientists act as knowledge brokers)
- IPCC-like mini-assessments via finding consensus areas and areas where experts disagree
- Students from different countries (i.e. field: applied sciences) work together

1.3.2 work together – all stakeholders in sector

- Jointly conducted work like evaluations

- Staff exchanges
- Culture of interactive policy making
- Role play exercise
- "meet and greet plots", i.e. in agriculture to showcase science info to farmers
- Cooperation in developing different master plans among cities

1.3.3 work together – similar human habitats/sector challenges are more important than country boundaries

- Institutions from similar human habitats in different world regions work together
- Conference for ministries with representatives from regions and NGOs
- Conference / workshop with neighbouring countries

1.3.4 work together – chain of events

- 1st workshops with scientists to develop options, 2nd workshops on how to implement
- 1st vulnerability assessment, 2nd development of regional adaptation map in a participatory approach (resilience as guiding concept), 3rd discussion with decision makers and stakeholders, 4th signed "Memorandum of Understanding" in city as basis for sustainable action plan (done so for energy sector)
- 1st joint development of indicators for monitoring of adaptation(expert and planning authority level, think-tanks, planning departments or science), 2nd develop joint sense for management options

1.4. tools

1.4.1 developments/tools in developing science-practice-interactions

- use decision support systems and tools (such as Mulino-DSS-IT or DST-UK for coastal zones) in cooperation between scientists and practitioners
- develop decision trees as strategic thinking theme for science-practice-interactions
- develop master plans for science-practice interactive process
- involve scientists AND stakeholders in modelling
- develop guide to uncertainties in respect to available options for decision makers
- develop innovative forms of networking between scientists and practitioners (example: excursions involving students, practitioners, interested people etc. to discuss adaptation challenges and options at site)

1.4.2 developments/tools as basis for developing interactions

- use of all available databases

- use of common data bases across regions (i.e. mountainous regions, crossing several countries)
- climate barometer
- adaptation toolkit
- real-option analysis (differs from cost-benefit-analysis by attributing a value to flexibility)
- comparative studies on costs and benefits of different adaptation measures
- case studies
- surveys with general public
- include future human behaviour simulations in modelling
- pilot small scale (to move to real scale later)
- questionnaire to find out about perceptions
- learning action alliances
- visualizing the effects of climate change (impact as well as implemented measure)
- "serious games" are fun and help
- "working with nature" concepts are developing

1.5. theoretical frameworks

- "Guidelines for implementing science-practice-interactions" (Bergmann et al 2005)
- "Methods for transdisciplinary research – a primer for practice" (book, 2012

Participants' experiences at the conference:

A) In science-practice interactions the "work together" with stakeholders far outweighs the "information only" or "dialogue without work" (compare 1.1, 1.2 and 1.3 above) approaches.
B) Regional challenges and work on it often crosses political borders. They lead to working groups comprising of different nationalities and regions of the world.
C) It seems promising for effective "work-together" to add "sensation"; including 1) personal contact, 2) visualization of the challenge to be met and 3) excursions to locations.

2. Findings, needs and questions

- The linear science to practice (speaking truth to power) approach doesn't work
- Stakeholder feel uncomfortable with multiple scenarios – single forecasts and probabilities preferred.
- "loss and damage" is complementary to adaptation, no competition
- Motivation by examples
- Robustness of supply systems not known (i.e. water supply)
- In developing countries public health is often included directly into adaptation plans (in industrial countries health tends to be forgotten)
- Choice is influenced by a) physical demand, b) developments in other fields, c) dev within society

- There are “decisive moments” in infrastructure planning: a) ageing of structure, b) when structure is damaged, c) if structure does not fit the future
- Institutionalize monitoring – outside of decision-maker
- Role of interests is underestimated.
- Stakeholder workshops are resource-intensive … and worth the effort
- “health” and “industry” are missing parts of the adaptation discussion
- Not so much leadership is needed as coordination and facilitation
- Small IPCC like assessments at local and regional level needed
- Solutions with multiple benefit to be prioritized
- It needs a “guide to uncertainty”
- Need to think global
- Develop a local “environmental observatory” to have a common info source for environmental change
- Link local reality with Macro Strategy
- Adaptation indicators should be integrated in the broader concept of sustainability
- How to link long-term collective benefits with short-term project-related costs?
- What is the appropriate governance structure to facilitate adaptation strategies?
- What is acceptable risk?
- How to organize transnational learning?
- Are more “laws on adaptation” needed or should adaptation be done by “soft” coordination?
- How to define/maintain/increase quality of life? – crucial for decisions

3. Success Factors

- Sustained dialogue between stakeholders and knowledge brokers
- Acknowledgment and acceptance of each others roles and responsibilities
- Face-to-face meetings contribute to better outcomes
- Good examples for successful adaptation gives motivation for replication
- Highlight positive aspect of CC adaptation economically, environmentally, socially
- Low-regret-options
- Present decision maker a number of adaptation options
- Experience with the effect of political measures (i.e. pricing of drinking water)
- Informing people early i.e. send SMS when flood danger
- Practice: reaction to flood (i.e. once a year)
- With the incremental transformation of cities – adapt to CC
- Belief by stakeholders in a fair and open process
- Be open to re-formulate what the challenge/problem is
- Translate language from science and practice into one from administrators and politicians
- Participation in international networks facilitates efficient finding of solutions
- It pays off to be an early mover (i.e. attract more funding)
- Pilot projects with interested partners are a success factor.
- One needs a roadmap to structure the process.
- Adaptation is more than disaster risk management.

- Change of language needed. Aiming on *safe development* better than limiting one's aim on minimizing risks for disaster
- cooperation is key to success when developing new ideas
- Learning between scientists and practitioners need informal settings
- Collaborate with low level hierarchy early
- Make cost-effectiveness of adaptation measures evident (instead of coping with future damage).

4. Barriers

- Media reporting is crucial source of information for wider audience
- Competing knowledge claims
- Multiple scenarios made stakeholders uncomfortable
- Lack of mutual understanding and appreciation
- Multi scale dimensions are difficult to handle
- Data base too small for "loss und damage"
- Lack of knowledge how to cope with uncertainties
- Poor governance
- Internal and regional competition over limited resources
- 3 "I"s: institution, incentives, instruments
- Right now more interest in quantity than in quality
- Political complot
- Role of public distrust
- Different interests between administrators and scientists
- Universities organized along disciplines – but transdisciplinary approaches are needed
- Lack of capacity, resources, awareness
- Scientific tables are not helpful for politicians
- There are no incentives for preparedness and prevention (voters reward politicians who respond to disaster but punish those who prevent them).
- There are almost no incentives for scientists to engage with policy makers and the public.
- Costs of inaction not known.
- Not enough open source data (especially regional) available
- Lack of awareness
- Long-term-orientation of adaptation versus short-term political orientation
- If adaptation does not become part of sectoral planning, it will be considered as extra burden

5. Transferability of tools and mechanisms

- Positive solutions with multiple benefits
- Different cultures require different communication mechanisms