

Transdisciplinarity for Integrated Coastal Zone Management Report on an Expert Meeting

The Socio-Cognitive Map
of Dutch Coastal Defense Research: Report 5

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of Dutch Coastal Defense Research: Report 5**

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1 Introduction

In report 2 it is concluded that at present integrated coastal zone management is high on both societal and policy agendas and will probably continue to be in the future. The report furthermore concludes that integrated coastal zone management requires transdisciplinary research. The bird's eye view of coastal defence research that was presented in report 3 gives some, though not a conclusive indication whether transdisciplinary research is taken up sufficiently. That also holds for the bibliometric analysis presented in report 4. In particular, the integration between scientific and non-scientific knowledge sources and the orientation towards concrete societal problems is difficult to trace with the institutional mapping and bibliometric approach.

To further improve the analysis in this respect we organized an expert meeting with practitioners, researchers and intermediary actors working in the field of coastal management, coastal engineering and coastal research. A mixture of people was invited: scientists from different disciplines, consultants, civil servants, organizations financing science, and policy makers (see Annex 1: List of Participants). We used the expert meeting as a method for mapping drivers and barriers for transdisciplinary research. It is important to gain insight in barriers and drivers for transdisciplinarity, because these form points for policy intervention.

This report presents the results of this expert meeting. The programme of the expert meeting is given in Annex 2. Chapter 2 reports on the introduction given by Femke Merx in which the concept of transdisciplinarity is explained and defined. Chapter 3 reports on an introductory lecture given by Bill Kamphuis, emeritus professor of civil engineering at Queen's University in Canada, who presented his views on the need for integration in coastal zone management. Chapter 4 and 5 report on the discussion that took place during the expert meeting. Finally, chapter 6 concludes with a brief analysis of the main issues that were discussed.

2 Transdisciplinarity: definitions

Introducing the topic, the meeting chairman Wim van Vierssen¹ stated that transdisciplinary research concerns ‘subjects that ask for practical and integrated solutions’. He continued to say that many scientists are not used to this way of working and therefore it is difficult to set up transdisciplinary research. According to him, one characteristic of such transdisciplinary investigations is the interweaving of formal, scientific knowledge with less formal, tacit knowledge.

Femke Merkx, principal investigator in the project, then proceeded with a presentation on the workshop’s background. As the concept of transdisciplinarity is relatively new and little known, she explores this notion further. Transdisciplinary knowledge is distinct from multidisciplinary, interdisciplinary or applied knowledge. The usual model for science-society interactions is one of demand & supply, where science produces knowledge and this is applied to societal problems. This model supposes a clear problem definition from the part of society. In this view science and society are two more or less distinct worlds (Figure 1).

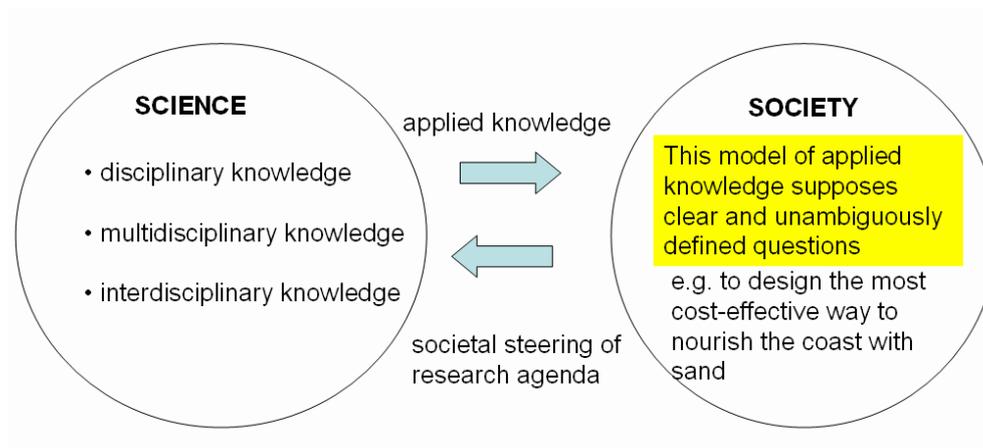


Figure 1 Traditional model of science-society interaction

(from presentation by Femke Merkx)

¹ Director, Alterra research institute

In coastal zone management however the problem definitions are not clear, and models used to define solutions have considerable uncertainties. In addition, many solutions exist and the choice of optimal solution results not only from a creative search but also from a political negotiation process. This kind of problems is called ‘badly structured’ and its solution requires transdisciplinary research (Hoppe & Huijs, 2003). Transdisciplinary knowledge is developed through the interaction of research, policy making and project implementation when they work together to solve a particular problem (Figure 2). Accordingly, all parties involved contribute to the development of transdisciplinary knowledge: not only scientists but also policymakers, consultants, stakeholders, etc.

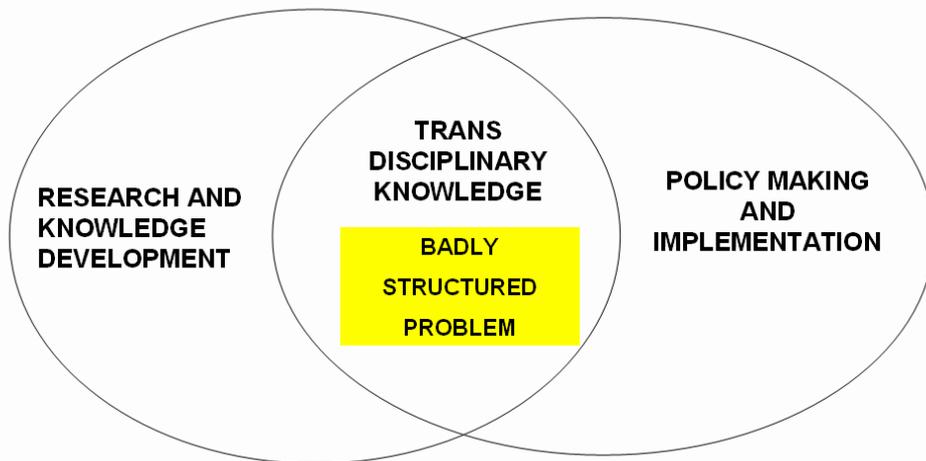


Figure 2 Locating transdisciplinary knowledge development (from presentation by Femke Merkkx)

In conclusion, transdisciplinary knowledge:

- develops in the context of a badly structured concrete problem;
- helps to define the questions as well as indicating possible solutions: problem definition and research question are formulated during the process;
- requires the integration of (formal) scientific knowledge with less formal, tacit knowledge from practice and with stakeholder interests;
- surpasses the usual disciplinary borders;
- requires the skill to speak different disciplinary languages but also to go beyond these.

The purpose of this expert meeting was to explore whether the transdisciplinary challenge presented by coastal zone management in The Netherlands is being addressed, and in particular to investigate the barriers to transdisciplinary knowledge development as well as ways of overcoming these barriers.

In the brief discussion following the presentation the concept of transdisciplinarity was further clarified. According to Wim van Vierssen, transdisciplinarity requires an addition to traditional research practices: non-traditional research methods are asked for as non-scientific knowledge and stakeholders are involved. Mark van Koningsveld² warns that transdisciplinarity is not primarily a question of different knowledge or scientific research but foremost concerns a different process. Bart Parmet³ thinks that there is a link between the transdisciplinarity concept and his department's work on transition processes. Exactly how would be worth investigating. Ger Vos⁴ adds that the kinds of problems that ask for transdisciplinary research are not confined to coastal management but occur in other domains as well. This means that barriers to transdisciplinarity might exist in the science system as a whole rather than in specific problem areas.

² senior researcher WL Delft Hydraulics; secretary of Netherlands Centre for Coastal Research (NCK)

³ process manager Knowledge & innovation, DG Water, Ministry of Transport, Public Works and Water Management

⁴ Director, Innovation Network

3 The need for integration in coastal zone management (introductory speaker)

Bill Kamphuis, emeritus professor of civil engineering at Queen's University in Canada, then presented his views on the need for integration in coastal zone management. According to him the problem can be understood against the background of the history of science in Western society. In the idealized view science provides facts. It is separate from society which produces opinions only. However, in reality the picture is less clear (Figure 3). Science has to account for large uncertainties, and societal opinions are influenced by research findings. Engineering can be pictured in the intermediary position, trying to solve problems using the outcomes of imperfect science and taking account of societal demands. The view of engineering as applying science to design is therefore incorrect; rather it is a synthesizing practice where science, expertise and society are integrated.

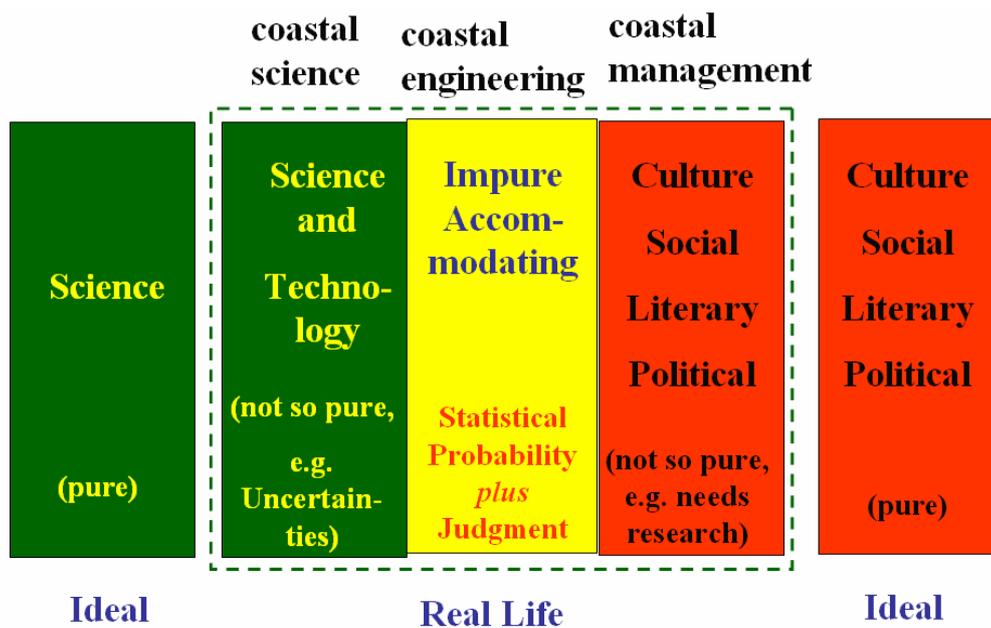


Figure 3 Conceptual map of science and the real world (adapted from presentation by Bill Kamphuis)

Coastal problems are complex and their solution involves all three domains: sciences, engineering and the socio-economic framework represented by coastal management. Coastal problems are badly structured both organizationally and technically. Any solution contains large uncertainties, and needs to be based on hard data and judgment. Typically a case for transdisciplinarity then. However, barriers exist within each of these domains as well as between them which makes integration hard to accomplish. The domains in turn:

In coastal science, problems are by definition interdisciplinary since the physical system is composed of wind, waves, water, sediment and life. Each of these is studied by a distinct scientific field. Unfortunately, scientists in general are not very good at respecting other disciplines which makes collaboration between fields within coastal science difficult.

Coastal engineers have lost some standing because of mistakes that were made in the past, with shoddy work and unexplained failure due to uncertainties. Traditionally, coastal engineering is concerned with design and construction, but nowadays much more emphasis is put on the background science. This means that engineering skills are getting lost, and as a consequence the skills needed to achieve integration are also declining. At present engineers are resisting the pressure to give up some of the management role they used to have (to coastal managers – see below). At the same time, they do not seem to be very good at communicating with the various parties that are now part of the decision making arena. So while in principle coastal engineers could fulfill an integrating role, in practice they are not very good at that – and increasingly so.

Coastal management is a new professional field and concerned with policy making, strategic planning and risk management. It is not yet well defined and the foundations of common professional expertise or standards are still weak, also because most coastal managers have moved across from other disciplines. Generally there is a lack of training in integration or communication skills, while the complexity of contemporary decision making requires both. It is also necessary to include social sciences, policy studies and possibly the humanities in the training of coastal managers.

In summary: the relative power and position of the three fields concerned with integrated coastal zone management is unclear – and varies between countries. In The Netherlands coastal engineering is still very strong, with coastal science being only a little less influential. Coastal management as a field of expertise is very much in the making in The Netherlands, while in Canada this is now as important as coastal science. Coastal engineering in Canada is getting squeezed between these two fields.

Integrative skills held by engineers are getting lost at present through emphasis in education on scientific training rather than design practice. In professional practice,

emphasis is shifting to scientific underpinning instead of engineering judgment. Both are related to the training of the new coastal professionals. Four academic generations ago, coastal problems were solved by engineers who had an overview of all related aspects. However, since then, the engineering content of engineering education has been gradually replaced by science. This produces engineering graduates with fewer engineering skills who are less capable to have the overall view needed to solve complex, poorly structured coastal issues. ‘The present (fourth) generation of coastal professionals is essentially educated as scientists rather than engineers, because there is no one left to teach engineering skills.’ According to Bill Kamphuis, the managers who could take over this task have not yet learnt how to cope with the complexity of coastal management. Somehow the three domains will have to work together within a transdisciplinary framework (Figure 4).

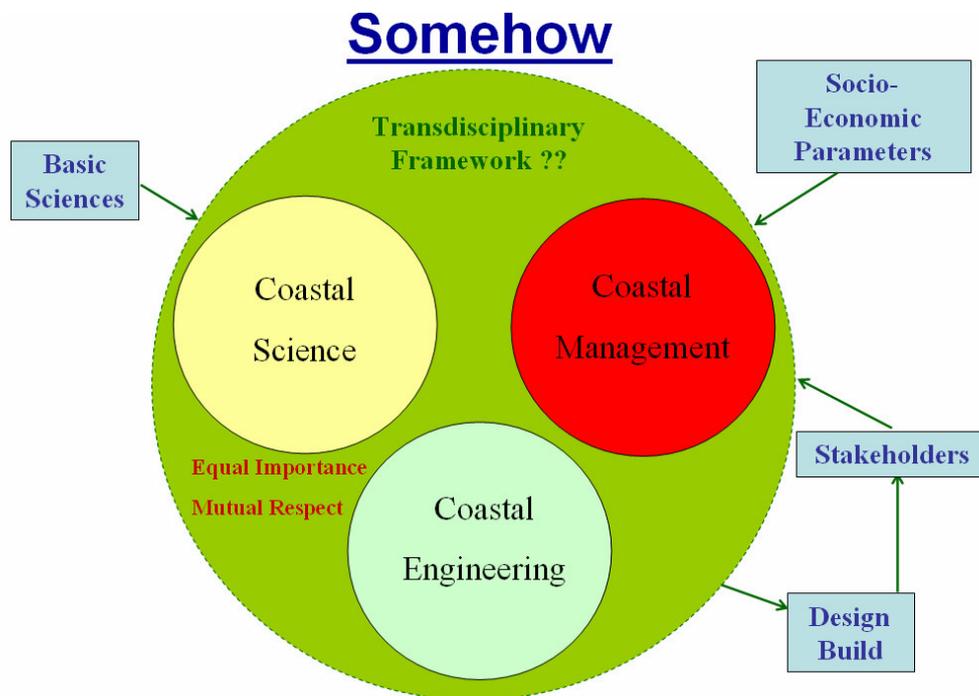


Figure 4 The future of integrated coastal management (adapted from presentation by Bill Kamphuis)

Mutual respect and an equal footing of the involved professions are necessary pre-conditions, and emphasis needs to be given to teaching communication skills. Establishing a ‘learned society’ that goes beyond the discipline-oriented existing societies might help connect these domains, exchange ideas and sharpen wits.

However, this will not be enough. In this post-modern world there are multiple valid points of view, multiple stakeholders who want an input. There are no single best answers, only optimum solutions. Therefore transdisciplinarity must be more than an exchange of scientific points of view. And there are plenty of coastal problems waiting to be solved in this way: climate change, subsidence, increasing population density, evacuation procedures, insurance questions...

The brief discussion after Bill Kamphuis' presentation was concerned with possible barriers that might be encountered. The points that were raised are included in the next section.

4 Discussions

The discussions aimed to answer two questions:

1. Which barriers exist to transdisciplinary knowledge development?
2. In what ways can these barriers be overcome?

Both questions were discussed with the help of propositions prepared by Femke Merckx. These were sent to the participants before the meeting, together with an explanatory note⁵. A few propositions were added by the meeting participants. The objective was not to achieve consensus but to explore the opinions held by participants.

4.1 *Barriers for transdisciplinarity in integrated coastal zone management*

This discussion was not strictly following the propositions. However, most of the topics covered by the propositions were raised. The report below follows the structure of these propositions.

Proposition 1: The disciplinary organization of Dutch science is a barrier for transdisciplinarity. There are two aspects:

- **academic reputation is based on disciplinary specialization, hampering transdisciplinary orientation;**
- **the organization of research groups and research institutions along disciplinary lines hampers transdisciplinary cooperation.**

Marcel Stive⁶ agrees with this proposition. He finds that designers, e.g. architects, are systematically undervalued. Their work is by definition integrative because they have to solve at once all problems that a particular site and a particular client impose. The success of the result is in effect the test for successful integration.

⁵ see Annex 3 'Achtergrondnotitie Transdisciplinariteit voor integraal kustzonebeheer'

⁶ Professor of civil engineering for coasts, Technical University Delft; scientific director of Water Research Centre Delft; member of expertise network flood defense.

However, they do not publish in scientific journals and as a consequence their score is low when departments are evaluated. This reflects a general undervaluation of people who **do** transdisciplinarity. In spite of this, some departments or faculties manage to bypass the system and survive by formulating their own goals. Jan Mulder⁷ suggests that there are two different kinds of valuation: scientific status and reputation, and public responsibility and appreciation. Emphasis in academia (both with researchers and with accreditation procedures) seems to be given to the former, but we as coastal professionals should ask ourselves what our role should be and whether we shouldn't take responsibility first of all for solving the problems society faces rather than producing high academic scores. Ger Vos agrees, saying that many scientists seem willing to work more toward fulfilling societal needs, but they have no incentives to do so. This means they publish in scientific journals and not in e.g. professional magazines. For him appreciation should work the other way round: solving societal problems is more important than writing scientific articles. Bart Parmet would like to see a valuation system where both were taken into account. He thinks the essence of transdisciplinary research is for people to collaborate. Appreciation for this skill is one of the incentives that can contribute to increased transdisciplinarity.

Marcel Stive finds communication between disciplines important, however to encourage this skill is not enough to encourage transdisciplinary working. It is necessary to create places where people who want to can work in a transdisciplinary way and at the same time to create an appropriate valuation system. According to Govert Geldof⁸ this place should not take the shape of a bounded structure but rather of a coalition between people with the same aspirations. He sees general developments move away from transdisciplinary practices, and people who insist they want to work in a transdisciplinary way are being punished, sometimes severely. The coalition he envisages should aim to offer protection as well as aim to improve societal appreciation for transdisciplinary work.

Wim van Vierssen mentions that money is already made available for transdisciplinary research. This should offer a reward for scientists who choose to work in a different way. However, according to Bert Satijn⁹ these sums of money, e.g. from Living with Water, are peanuts compared with the traditional funds, but more importantly: scientists who manage to obtain these funds are still judged by their publication score, not by their ability to bring in transdisciplinary research funds. Bill Kamphuis thinks the situation is worse: we have come such a long way along the road of specialization (the present fourth generation of coastal engineers

⁷ senior advisor, National Institute for Coastal and Marine Management (RIKZ); guest lecturer University of Twente

⁸ senior advisor, Tauw consulting; reader Institute of Environment & Resources, Technical University of Denmark

⁹ programme director, Living with Water programme

consists essentially of specialists¹⁰) that even if money is made available for interdisciplinary research, scientists do not know what to do with it. His experiences with funding agencies have shown that if money is made available for interdisciplinary research, it is usually snipped up into a number of specialized and not necessarily inter-related PhD projects, because that is what the research supervisors are comfortable with and that is what produces academic recognition through publications. Wim van Vierssen concludes from the discussion that the existing measuring rod for scientific performance is not suitable for encouraging transdisciplinary research. Bart Parmet replies we should be careful not to reduce the question, which is essentially about how to collaborate, to a matter of funding criteria.

Proposition 2: The research funding system lacks criteria to positively direct and evaluate transdisciplinary research.

Dick van der Kroef¹¹ explains that peer review forms the basis for allocation of NWO research funds, and this encourages disciplinary proposals. However, NWO increasingly applies interdisciplinary and/or external assessment as well as practical value criteria, not only to allocate funding but also to formulate research questions. As a category, transdisciplinary projects cannot be funded from the existing budget and additional funding is needed. However, NWO is certainly capable to organize also this kind of research. Arjen Hoekstra¹² has the experience that it is difficult in practice to get funding for this kind of work even if on paper it looks promising, because peer review is so important: scientists judge their own colleagues and favor the kind of disciplinary work they like to do themselves. Dick van der Kroef understands this impression but he insists that NWO is changing e.g. with the establishment of new important action lines like ‘science for society’. The available NWO funds in his domain for Earth and Life Sciences are split in three equal parts: one third to be spent without a priori limitations (the open programme), one third allocated to excellent talented researchers, and one third to thematic research in the action line “science for society”. NWO strategy is changing, and changes take time. Bert Satijn is critical of the present funding system, saying that scientists need to be able to justify their expenditure to the taxpaying public in a concrete way. Although this is often a requirement for funding, in practice this question is often dealt with in a cursory manner when applications are filled in or judged. It cannot be explained to the public that money is spent on fundamental science if it cannot be shown to be useful to society at one point in time; the usefulness may only become clear sometime in the future. Dick

¹⁰ see his introduction, Section 1

¹¹ adjunct director Earth and life sciences, Dutch Science Foundation (NWO)

¹² professor Multidisciplinary Water Management, University of Twente

van der Kroef explains that it is often difficult to see at the start of a research project which concrete applications it will produce. Ger Vos doubts whether NWO is the appropriate organization to allocate society-oriented funding. The objective is to encourage innovation, and society should be much more involved in formulating research needs. For Mark Lindo¹³ it is not obvious either that transdisciplinary research should be instigated by NWO as this tastes like central planning. Astrid Stokman is of the opinion that the availability of funding is not the greatest barrier to integrated research as a lot of money is currently obtainable, e.g. in *Living with Water*. Many projects look integrated on paper, but this is no guarantee for integrated research in practice.

Dick van der Kroef thinks that NWO, as an organization from and for scientists, could play a brokering role in connecting scientists with interdisciplinary projects. They have extensive knowledge of the science infrastructure and can facilitate meetings and negotiations to set up collaboration. Wim van Vierssen concludes from the present discussions that apparently it remains difficult to set up transdisciplinary projects in spite of NWO's facilitating role: why is this? Marcel Stive has experienced that transdisciplinary projects on a limited spatial scale are able to meet with scientific approval and funding. For example, scientists have been able to convince STW that their work on mudflats in the Westerschelde merited their contribution. On a more aggregated scale e.g. to national levels it becomes difficult to meet the scientific criteria that NWO *et al.* apply. Dick van der Kroef suggests this means that additional criteria are needed to assess transdisciplinary research proposals. He compares the difficulties in evaluating transdisciplinary work with the difficulties in evaluating natural sciences next to social sciences. While in the former it is clear how to score, in the latter this is in his experience a more fuzzy procedure. Take for instance the applicability of bibliometrics in both areas.

Harm Albert Zanting¹⁴ disagrees, saying that no additional criteria to evaluate scientific proposals are needed. Instead, criteria need to be found to select the kind of people who can help bring about these changes. The scientific system should not try to regulate transdisciplinary research on the higher aggregation levels, just make sure people are available for this kind of work. Arjen Hoekstra fears the kind of discussion that will result: this will focus on how to establish a measuring rod while the real problem is the more general societal appreciation and status of the researchers doing it. Even if you can measure relative excellence, if the research itself is little valued by society this does not solve anything. Bert Satijn explains how *Living with Water* is applying very practical criteria to ensure their funding is used for interdisciplinary research. Often project participants try to distribute money amongst each other and return to their own department. *Living with Water*

¹³ Head, Engineering Division Van Oord Dredging and Marine Contractors.

¹⁴ Head, Decision Support & Communications Group, Arcadis consultants

prevents this, as it also instigates publication of results outside academia. Only, the funds Living with Water distribute are far too limited to have a real impact on the way science is generally performed. He pleads for extra money, to be allocated by provinces, water boards etc. in order to ensure that the questions they face are dealt with. If sufficient funding becomes available for transdisciplinary research, the measuring rods will automatically follow: this is not the real problem.

Proposition 3: There is a systematic under-representation of the social sciences in integrated coastal zone management.

This topic was discussed when solutions were considered (see below).

Proposition 4: In practice cultural and cognitive barriers between professionals with a different background are a substantial barrier to collaboration.

Added proposition: students are brainwashed to fit into a disciplinary frame. This inhibits their communication with other disciplines.

According to Jill Slinger¹⁵ one way to work towards better integration is to value individuals who have the communication skills and attitude to look over the hedges of their own domain. Integration is not a matter of bringing disciplinary fields together, but of bringing *people* from these fields together. There is no question of suppressing the separate domains: disciplinary products are also necessary. Rather, supplementary evaluation criteria should be used when measuring someone's performance in transdisciplinary projects. Following on from this, Arjen Hoekstra observes that in their education students are brainwashed to fit into the separate frames held by ecologists, economists, engineers, etc. Students need to learn to reflect on their own frames in order to be able to communicate with others in their professional life. Bill Kamphuis thinks that attitude is the main problem here: some engineers can collaborate with economists, some can't. There is a lot of mistrust between disciplines. Astrid Stokman¹⁶ agrees with the general picture sketched here. It is useful to have 'super-specialists' but people are also needed who speak several disciplinary languages and can move between fields. In a sense, the 'homo universalis' should be valued again, without discarding the specialists. One barrier she experiences is the transmission of knowledge from scientists to implementers.

¹⁵ lecturer policy analysis, Technical University Delft.

¹⁶ senior policy advisor water, province of North Holland; project leader Coast Vision/Weak Links for province of North Holland

If this would happen, the use of scientific research to society would be greater. This is a question of attitude, too.

Proposition 5: The disciplinary mixture in the implementation of coastal projects is not fine-tuned with the needs of integrated coastal zone management. Engineers dominate while other kinds of knowledge is also needed, especially ecological en socio-economic knowledge.

This topic was discussed when solutions were considered (see below).

Proposition 6: Time pressure is too high to allow transdisciplinary ways of implementing projects.

Added proposition: Stakeholders should be involved at an earlier stage in the process, they are part of it.

According to Bill Kamphuis the mutual understanding achieved through transdisciplinarity will improve speed and reduce costs. Mark van Koningsveld wonders whether increased costs or lack of experience will be barriers to transdisciplinarity in implementation. Bill Kamphuis replies that there will be a learning curve, so benefits might not be immediately clear. Mark Lindo agrees with the proposition, adding that getting stakeholders involved in particular should improve efficiency. This is added as a statement.

Proposition 7: Currently integrated coastal zone management is still mostly a matter of policy discourse. Too few examples of implementation exist. Lack of integrated administrative responsibility is the greatest barrier here.

Added: Compartmentalization of government departments impedes transdisciplinarity.

According to Ger Vos the compartmentalization of government departments is a big barrier for collaboration between different disciplines. As at the moment each department has its own research institutes it deteriorates the compartmentalization between different research institutes. This is added as a proposition. Astid Stokman wholeheartedly agrees. The situation on the coast has degraded since Rijkswaterstaat is not responsible for the project 'coast' any more. She would like

to see one responsible administrator for each project, depending on the scale either a minister, a provincial deputy or a municipal alderman. This lowers the barriers between departments and is therefore also likely to lower the barriers for interdisciplinary collaboration as at the moment each department has its own research institutes. Along the same lines, Harm Albert Zanting believes that concrete initiatives are much more important for increasing transdisciplinarity than trying to set up transdisciplinary research. The questions to be solved should be initiated by decision makers (administrators), not by the scientific community. [This could be considered an added proposition, but this was not voiced as such during the meeting.] Research institutes tend to frame the questions mostly from their own expertises. He agrees that people have to be available who can cross borders. These skills are developed in practice not at universities. Transdisciplinarity happens where concrete results have to be realized, and success depends foremost on participants' capacities to build bridges. Bart Parmet thinks that one way to start building bridges is to work on a common knowledge base. Through working together trust can be established as a basis for more extensive and sensitive discussions. This is transdisciplinary learning.

While Jan Mulder agrees with the value of transdisciplinary practices, he sees potential problems with the formulation of research questions that can be tackled by disciplinary scientists. Questions are likely to be fuzzy in character, and many scientists cannot deal with this. According to Harm Albert Zanting however the recent negotiations with Belgium on the Schelde show that this approach can work. Questions were formulated by the administration and there was regular interaction between researchers and administrators to ensure that the research would fit the demands. According to Ger Vos it is unlikely that administrators are always up to this task so scientists have to take responsibility for making sure their work agrees with the needs from projects. Jan Mulder thinks formulating the questions is the most difficult part of a project and it should be a shared responsibility between administrators and scientists.

Proposition 8: Operational goals have become objectives on their own accord, thus blocking the search for integrated solutions.

This proposition did not receive any attention.

4.2 Priorities

When asked to prioritize the barriers that were mentioned, Arjen Hoekstra mentions three factors: lack of appreciation and respect for each other, fragmentation both in the scientific arena and in policy making, and the education

system's emphasis on scientific & disciplinary training. He feels that the sources of funding, measuring rods or scientific reputations are not the most important issues. Contrary to Arjen Hoekstra, Ger Vos thinks the way research is financed is the single most important barrier. This should be organized in a different way. Marcel Stive agrees with this. Referring to the Westerschelde where he felt transdisciplinary research had been successful, he suggests that the urgency and importance of this project was the overruling factor to the success of the transdisciplinary research, e.g. ensuring that enough money was made available.

Jan Mulder thinks lack of clarity on both temporal and spatial scales is another important barrier. For issues that need transdisciplinary research, e.g. the impact of climate change on coastal zone management, it is typically unclear on which time scale they will become important, and who is responsible for solving them. Lack of understanding of the dynamics in space and time impede setting up transdisciplinary investigations. [This could be considered an added proposition, but this was not voiced as such during the meeting.]

Jill Slinger explains that often it is thought that integrated means everything should be included. This can be a barrier to transdisciplinary work as people imagine it to be more complicated than necessary. The composition of project teams should be reconsidered anew for every issue. [This could be considered an added proposition, but this was not voiced as such during the meeting.]

4.3 Towards solutions

This discussion followed the propositions.

Proposition 1: A transdisciplinary community should be established in The Netherlands where scientists with different disciplinary backgrounds, engineers and professionals working in planning and implementation of projects can meet, exchange ideas and sharpen practices and views.

Ger Vos explains that he used to think that putting people from different disciplines together would give rise to transdisciplinary creativity. However, he now realizes that this is not enough. You need people who can connect the disciplinary scientists. Bill Kamphuis adds that in his experience it does not work to hire outside management consultants like Anderson to do this. You need people 'from within the field' to make these connections. Govert Geldof phrases this as 'people who are interested in each other'. He explains that the theory of spiral dynamics calls this 'the capacity for empathy'. This capacity creates the ability to

synthesize i.e. integrate different frames: this is what transdisciplinarity requires. The minority of scientists who have this capacity understand that knowledge does not reside only with themselves or within science, but also e.g. with fishermen. If you can enlist these empathetic scientists you don't need influential knowledge brokers. What is important however is to monitor the processes for the existence of trust: this is the condition *sine qua non*. He ends by saying: 'my reaction to proposition 1 is: you don't need all disciplines, you need people who have synthesizing abilities'.

Proposition 2: Special transdisciplinary evaluation criteria are needed for scientific research. This would stimulate a new kind of researcher, whose strength lies with transdisciplinary working methods and solving problems. Possible alternative evaluation criteria are: post-graduate education, external doctoral theses, extended peer review.

Govert Geldof, following his analysis in terms of empathy, replies that participants in a successful project will say 'this was great'. Ger Vos reacts to this proposition by saying that a suitable criterion for him is the use of the innovation in practice. The diffusion of agricultural research findings in The Netherlands used to be publicly funded and organized as a three-pronged process: research, information and education. In the past, very often scientist were present at meetings of farmer organizations. This enabled scientists to respond to the problems farmers faced. There was an organic flow of knowledge. At present agricultural research funding is project-based, the three-pronged system has collapsed and the communication channels with it. Some of these might be re-established if the use of innovation in practice would be used as an evaluation criterion. Jan Mulder explains that the program Coast 2000, financed by Rijkswaterstaat, was a similar example of collaboration between policy makers, scientists and entrepreneurs. Projects were guaranteed financing for 5 years. This approach has unfortunately disappeared now all projects have to be tendered in an open market.

Bart Parmet adds that the criterion of successful innovation could indeed be the link with [policy making, planning and implementation] practice. This could be measured along a stepped scale rather than absolutely (i.e. 'yes' or 'no') as intermediary projects might still be useful. Mark Lindo fears that the implementation of this criterion in practice will be difficult because researchers are very good at indicating social relevance when in fact there is hardly a link to practical or policy problems. Bart Parmet replies that the right people have to be involved in evaluating this criterion. Jan Mulder supports the idea of the link with

practice being the single most important criterion for transdisciplinary research. This will show e.g. in scientists spending 20% of their time in interaction. He feels it is important to realize that all research processes are unpredictable. He therefore opposes the linear production-oriented way of thinking that transpires from the present discussion. Transdisciplinary research is a process, and cannot be planned in advance to reach a certain goal or fulfill certain evaluation criteria. Bert Satijn warns that it is nevertheless important to keep the goal of the research in mind, even if this may change during the research process. Risks cannot be avoided and failures do happen, but it is important to always be aware of the purpose, i.e. to produce outcomes useful to society. Whether this is the case may only become clear after 10 or 20 years, but we have to be more cost-effective in spending the available money. Ger Vos affirms that mistakes should be allowed: these enable learning. Still, the aim should be to produce useful knowledge. The correct attitude is therefore all-important.

Proposition 3: The involvement of social scientists in integrated coastal zone management should be increased.

Mark van Koningveld agrees with the proposition. However, the completeness of the disciplinary spectrum is not of prime importance, it is to involve people who can ensure that communication takes place. Astrid Stokman is adamant that in her work she does not need more social science research, as they hardly ever add something. She needs people who have an overview. This is a general skill, not necessarily brought in by social scientists. Jill Slinger explains that the facilitation skills that are discussed here are not part of social sciences although this is often what is implied in the call for involvement of social scientists. Bert Satijn supports the view that communication needs to be established: 'people who can help engineers to talk to politicians.' However, he thinks that we do need social scientists who can solve his questions, e.g. economists who can show the real benefits of coastal defense instead of calculating discounted values, or policy scientists who can explain the intricacies of decision making processes. He uses the metaphor of an oil rig to explain his point: you can only drill for oil (=obtain valuable research results) if your pillars are strong and well anchored (=strong disciplinary science); however, without a platform to connect the pillars (=transdisciplinary researchers or generalists who can integrate) the setup will collapse.

Bart Parmet fears that many of the social scientists that are needed in coastal management do not exist at the moment, so there is also a task for education. Dick van der Kroef adds that the inclusion of social scientists from the beginning, also when questions are formulated, will help integrating social sciences. Jan Mulder

phrases this as ‘stretching coastal management in the direction of social sciences’. To ‘open a tin of social sciences’ for the sake of it does not by default improve integration of social sciences into coastal management.

Proposition 4: Using the instrument of ‘back casting’ to determine societal concerns can improve the relevance of scientific research for transdisciplinary issues.

Jill Slinger agrees with the usefulness of futures exploration tools, but wonders why only one out of several was selected here. Scenario development is another example instrument that can be used. Harm Albert Zanting thinks that the question here is ‘how do we determine which knowledge we need to solve the problems of the future’. Instead of a linear process where the next question follows from the research conclusions, futures exploration could help to see the bigger picture. Jill Slinger adds that this is a good way to explore and use uncertainties.

Proposition 5: The establishment of interdisciplinary problem-oriented research institutes is necessary to enhance transdisciplinarity.

Mark van Koningsveld agrees with the proposition as such, but dreads the thought that more concrete-and-brick institutes are established. The point is, again, that transdisciplinarity centers around the right people: you have to encourage them to get involved and to collaborate. This pleads for a loose collaboration but separate institutes. Harm Albert Zanting gives the example of the Delta institute. The reason for bringing these people together is their excellence in physical modeling. He thinks that the addition of social scientists in order to make it more interdisciplinary is contra-productive as such a small group of social scientists will become ‘neutralized’, i.e. less influential in the organization than when they remain on the outside. Bert Satijn adds that he has experienced that it is easier to involve people from external institutes than to recruit them from inside your own organization. For example, TNO has a department of social scientists with whom he regularly gets in touch. However, people from other departments within TNO itself do not know where to find these colleagues. There are high institutional barriers to internal collaboration.

Added proposition: the way financing of science is set up should be changed to encourage transdisciplinary research.

Wim van Vierssen adds this proposition. Bert Satijn thinks the present financing system could continue while organizing added money for ‘the people who run around on the platform’ (referring to his metaphor of transdisciplinarity as the platform of an oil rig). Harm Albert Zanting feels existing institutes should commit themselves to spending x percent of their budget to transdisciplinary work in their mission statement. In his view integrated coastal management is vital to The Netherlands. The funds for transdisciplinarity should therefore be allocated on a permanent basis to make transdisciplinarity work. This is only one example: there are other issues for which the same holds. Bert Satijn supports the idea that scientists need to be able to rely on this money, because the knowledge society will continue to need this kind of research. Dick van der Kroef does not want to establish such firm rules, as they will be difficult to change if other societal priorities emerge.

Proposition 6: People working in planning and implementation of integrated coastal zone management projects should strive towards increased professionalism.

Dick van der Kroef feels the proposition is not phrased correctly: the issue is not increased professionalism, for people working in planning and implementation are professional. Rather, they should be more aware of transdisciplinary issues. Bart Parmet supports the view that professionalism in general is not the issue, it is awareness of complexity that should be improved. Ger Vos adds that practices will improve if it is accepted that people learn all the time, and attention is paid to support this. Govert Geldof also believes that people working in planning and implementation **are** professional. If it does not seem like this, this is a result of the separation between planning and implementation from policy making and the separation between planning and maintenance. This results in failure to implement projects, which in turn gives the impression that the implementers do not know how to do their job. He compares integrated coastal management with renovating a house, where all issues have to be dealt with at the same time because you are dealing with an existing situation. The best way for things to actually start to happen in coastal management (‘renovation’) is to arrange the processes of policy making, planning and implementation much more in parallel. At present coastal management is arranged as if a new house is built: implementation cannot start until policy makers have overcome the fear that they might not have found the best solution. Things should be organized around ‘doing it’, not around ‘how should we

do it’: we will keep getting stuck in discussions while we should learn from trying in practice to work in a different way. It is possible that we have very little time left to act, if certain scenarios for sea level rise become true. Start doing something and learn from what happens by involving scientists in the process.

Bill Kamphuis thinks transdisciplinary experiments will be difficult to organize because so many parties are involved, each with their own criteria. Bert Satijn explains that Living with Water wants to face up to these difficulties e.g. by establishing a chair ‘water and society’ with the aim of doing transdisciplinary research. So far no university has responded positively to this proposition. Arjen Hoekstra indicates that he would like to discuss the offer. According to Bill Kamphuis the question of how to educate people in empathy is much more important than the question of finance. The same applies to communication skills. Specifically: how can we find someone who can fulfill the proposed chair ‘water and society’, who has a network in both natural and social sciences? This person will encounter a lot of antipathy and will have trouble gaining scientific credibility and societal appreciation.

There was no time left to discuss propositions 7 and 8.

Proposition 7: More time and money should be made available in implementation of projects for transdisciplinary research.

Proposition 8: There should be more political space for dealing flexibly with operational goals if this benefits achieving strategic objectives.

5 Concluding round

To end the meeting everyone was asked to make a final comment.

Harm Albert Zanting: if we want transdisciplinarity we need to bring together knowledge, not to do new research.

Bert Satijn: there is an important link between the knowledge economy and transdisciplinarity. It would be worthwhile to explore this link further.

Ger Vos: in his exploration of the 'knowledge paradox', i.e. the relationship between knowledge and innovation, with university chairmen, the same barriers as discussed here were identified. The dominant reaction was: you are right, but it will be very difficult to change because of vested interests. Something has to change, at the same time the existing system is well established. To make changes will be difficult.

Jan Mulder: responds to Govert Geldof's plea for learning by doing: Rijkswaterstaat should start doing things again instead of only talking about what should be done and how.

Dick van der Kroef: a lot of these proposals can be achieved within existing systems, by formulating new research programs. Existing institutes should be saved because they do valuable work. We should watch out for suggestions to restructure and reallocate, because we could destroy valuable existing research. Some of the things discussed this meeting go too far: we should stay closer to the existing system and seek optimisation within it.

Jill Slinger: a virtual university department aimed at doing transdisciplinary research seems a good idea. This can be set up by selecting and funding young scientists, as they have not become as institutionalized as established researchers.

Bill Kamphuis: in transdisciplinary research asking questions is more important than answering them. To ask a question means to show empathy and to ask a question invites communication. We can start doing transdisciplinarity by asking our collaborators questions rather than immediately offering to solve their problems (as we perceive them).

Mark Lindo: there needs to be a focus on implementation if we want to encourage transdisciplinarity. His proposal is to hand over the maintenance of a stretch of coast to a construction firm or alternatively to work together in a partnering/alliance type of contract form. In this way clients, construction firms, consultants and scientists (oftentimes also taking part in these contract forms either

via construction firm or client) will work together in achieving one joint goal. Pain/gain sharing is one of the guiding principles in such a contract form. They will find cost-effective ways to achieve the policy objectives; at the same time a lot can be learnt about how the system works.

Peter van den Besselaar: if transdisciplinarity is important and does not just comprise putting knowledge together, how should we organize it? Which incentives can encourage existing bottom-up developments? It is important to look at the long term because scientists need to be able to base their career on it.

Arjen Hoekstra: the present disintegration is the result of a long historical and cultural process. The change we are looking for is therefore also cultural, and will therefore be difficult to bring about. Solutions cannot be found in reallocating money or changing criteria. Education will play an important role as young people are not yet as fixed in their ways of looking and working. The fact that we are now dealing with ‘the fourth generation of specialists’ (see presentation by Bill Kamphuis) does not make this easier – and it reinforces the view that change is cultural and a slow process.

Bart Parmet: Amongst the many things that were said, he retains the idea that collaboration is something we have to **do**. The right attitude is important, e.g. one of asking questions. We can start by asking ourselves ‘who else should be involved’. For example, in DG Water there are developments towards ‘asking the right questions’ rather than ‘providing the right answers’. It would also be useful to point at examples of successful transdisciplinary projects. They do exist, and knowledge of them will encourage others to do more of it.

Govert Geldof: we agree that transdisciplinarity is necessary in coastal management: the coast is a dynamic system, and we have to respond to it in a dynamic way. Reality is complex: so what – enjoy it. The discussions we have had are taking place in many settings now – often to support each other and provide shoulders to cry on. Maybe it is time to organize the groups working on these themes, taking care not to overdo the organizing and thereby stifling creativity. After all, the results will emerge as a combination of spontaneity and steering. There is a danger in looking for the ideal way of organizing transdisciplinarity research, for we can talk about it at length and nothing gets done. It is also a question of learning by doing. Society will start to respect and appreciate transdisciplinary research when they see the results.

6 Analysis of the discussion

The expert meeting on ‘Transdisciplinarity for integrated coastal zone management’ proved to be a valuable method for analyzing what are the main barriers for transdisciplinarity. Information was obtained that cannot be found through document analysis. And the interaction between people with different backgrounds provides an overview of which understandings are shared and of which are more controversial. Furthermore the interaction forced people to explicate their points of view. In this last section we will briefly discuss the main lessons on transdisciplinarity that came out of this expert meeting.

Transdisciplinarity is a relatively new concept. It is not surprising therefore that the word was used in different combinations during the meeting: transdisciplinary knowledge, transdisciplinary research, transdisciplinary projects, transdisciplinary investigations. The use of different terminologies did not seem to affect the discussion: participants apparently accepted this fuzziness. At the same time there did seem to be an almost generally shared understanding of transdisciplinarity as a kind of research that is formulated with relevant, societal problems as a starting point, and with continuous interaction with the context where the question arose (= a part of society) as a working method. The topics that received most attention in the discussion follow from this shared understanding of transdisciplinarity. They are discussed below.

Many participants said that the questions to be investigated should not be science driven but should result from intensive discussions between administrators and scientists. The role of traditional science foundations (e.g. NWO) then has to be very limited, because funding as well as questions should ideally originate from those who require the research. Because of the character of the questions, the need for experimentation and learning by doing was emphasized. Or: we should not debate too much how to do transdisciplinary research, but start doing it.

A missing sense of urgency of the problems to be solved was identified as an important barrier to starting transdisciplinary research. The missing sense of urgency may be related to uncertainties about both time and spatial scale for ‘typical’ transdisciplinary problems, with climate change and its consequences as a good example. It is not clear whether these problems should be solved now or can wait, and it is not clear at which scale they are best investigated and solved. This uncertainty results in procrastination as well as the passing on of responsibility, which ultimately means that no one feels responsible. It is impossible to generalize at what scale transdisciplinarity is appropriate.

The scientific reputation system was identified as another important barrier for disciplinary scientists to participate in transdisciplinary research as it is difficult to establish a career on transdisciplinary research. To compensate for the lack of scientific appreciation, societal appreciation for skills needed to do transdisciplinary research should increase. This holds also for professions like architecture and engineering where integration is pursued in the design process.

It was stressed that a strong disciplinary input in transdisciplinary research is essential to ensure the quality of the results. However, many scientists are not interested in transdisciplinary projects even when funding is available. Many scientists also lack the communication skills to do effective transdisciplinary research. Reflexivity was thought important if scientists were to look over their own hedges. Communication skills and reflexivity therefore need to be taught in the education system.

No rules can be given on the need to include certain disciplines or not, as this will depend on circumstances. In fact, the idea that all disciplines should be involved at all time was even identified as a barrier (see ‘priorities’).

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Annex 1 List of Participants

Planning & implementation of projects

Mark Lindo	Van Oord Dredging and Marine Contractors
Govert Geldof	TAUW; Technical University of Denmark
Astrid Stokman	Province Noord-Holland
Harm Albert Zanting	Arcadis

Research financing & programming; innovation funds

Dick van der Kroef	Dutch Science Foundation NWO
Bert Satijn	Living with Water programme
Ger Vos	Innovation Network

Research & policy making in Ministry of Transport, Public Works and Water Management

Jan Mulder	National Institute for Coastal and Marine Management (RIKZ)
Bart Parmet	Directorate General Water (DG Water)

Academic research

Arjen Hoekstra	University of Twente
Bill Kamphuis	Queen's University, Kingston, ON, Canada.
Mark van Koningsveld	WLDelft Hydraulics
Jill Slinger	Technical University Delft.
Marcel Stive	Technical University Delft
Wim van Vierssen	Alterra

Observers

Peter van den Besselaar	Rathenau Institute
Femke Merkx	Rathenau Institute
René Rector	Rathenau Institute
Anouschka Versleijen	Rathenau Institute
Anna Wesselink	University of Twente

Annex 2 Programme

- 13.00 Lunch
- 13.30 Welcome by the chairman prof. Wim van Vierssen
- 13.35 Presentation round of participants
- 13.50 Introduction by Femke Merkx ‘The socio-cognitive map of Dutch coastal zone research’
- 14.05 Informative questions
- 14.10 Presentation by prof. Bill Kamphuis ‘The need for transdisciplinarity in coastal management and research’
- 14.35 Informative questions
- 14.45 Introduction to the discussion by Femke Merkx
- 14.50 Discussion part I: the barriers
- 15.30 Break
- 15.45 Discussion part II: prioritizing the barriers
- 16.25 Discussion part III: identification and prioritizing of solutions
- 17.05 Conclusion
- 17.25 Evaluation (form)
- 17.30 Drinks

Annex 3 Background Notes

Achtergrondnotitie

**SciSA Rathenau Expertmeeting
'Transdisciplinariteit voor integraal
kustzonebeheer'**

Author: Femke Merkx

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3	Wat is transdisciplinariteit en waarom hebben we het nodig voor integraal kustzone beheer?.....	38
4	Stellingen voor de discussie.....	39

1 Aanleiding

De afdeling Science System Assessment van het Rathenau Instituut heeft een studie uitgevoerd om het onderzoek naar kustverdediging in Nederland in kaart te brengen. De afdeling doet sociaal-wetenschappelijk onderzoek naar functioneren, organisatie en dynamiek van het Nederlandse wetenschapssysteem (Rathenau Instituut 2006). Het onderzoeksveld van kustverdediging is het eerste in een reeks van onderzoeksvelden die in kaart gebracht worden en vormde tevens een pilot voor de ontwikkeling van de onderzoeksmethodiek.

Als onderdeel van deze studie is geïnventariseerd welke kustproblemen hoog op de maatschappelijke en bestuurlijke agenda staan en hoe deze maatschappelijke prioriteiten en beleidskeuzes zich zouden kunnen vertalen naar de wetenschappelijke onderzoeksagenda. In wetenschapsbeleid wordt vaak een eenvoudige één-op-één relatie voorondersteld tussen interdisciplinair onderzoek en maatschappelijk of beleidsrelevant onderzoek (RMNO 2005). In onze studie laten we echter zien dat de maatschappelijke en beleidsmatige prioriteiten en keuzes voor de kust om verschillende soorten onderzoek vragen: disciplinair, interdisciplinair én transdisciplinair.

Eén van de conclusies van onze studie luidt dat integraal kustzone beheer één van de maatschappelijke en beleidsmatige prioriteiten nu en in de toekomst is en dat integraal kustzonebeheer vraagt om transdisciplinair onderzoek (zie het tekstkader voor een concreet voorbeeld). Deze conclusie vormt de aanleiding om deze workshop te organiseren. Wij willen daarbij benadrukken dat de aandacht die wij vragen voor transdisciplinariteit binnen het kustonderzoek niets af doet aan het belang van het in Nederland vaak excellente disciplinaire en interdisciplinaire kustonderzoek.

Kracht van de Delta – Een voorbeeld van integraal kustzonebeheer

De provincies Zeeland, Noord-Brabant en Zuid-Holland presenteerden recentelijk een ambitieuze gezamenlijke agenda voor de Delta. Een gezamenlijk aanpak wordt noodzakelijk geacht om een aantal nijpende problemen in de Delta (blauwalgen, het verdwijnen van platen, achteruitgang van de ecologische kwaliteit en van de waterkwaliteit) aan te pakken. De oplossing wordt gezocht in het terugbrengen van de estuariene dynamiek in de delta en in het combineren van functies en het maken van integrale afwegingen.

Daarbij is de ambitie ook nadrukkelijk om innovatief te zijn en ruimte te geven voor experimenten. De Delta regio moet een proeftuin worden voor integraal kustzonebeheer en onderdak gaan bieden aan een kennis- en innovatiecentrum “kust en veiligheid” i.s.m. universiteiten en het Delta instituut. Daarmee hoopt men de wereldwijde reputatie die de regio dankt aan de Deltawerken te kunnen handhaven en moderniseren.

De Delta agenda vraagt om een transdisciplinaire aanpak, waarin naast veiligheid en ruimtelijke kwaliteit ook ecologische kwaliteit, recreatie, toerisme en vernieuwing van de landbouw op de agenda staan. De uitdaging daarbij is niet alleen om verschillende bestuurslagen en experts aan integrale oplossingen te laten werken, maar ook om dat te doen in samenspraak met de diverse belanghebbenden in het gebied. De eerste ontpolderingsinitiatieven in Zeeland hebben met name onder de boeren al tot felle tegenstand geleid.

Bronnen: (Nieuw Deltaplan in de steigers. Zeeland, Noord-Brabant en Zuid-Holland op de bres voor meer veiligheid. 2006; Provincie Zeeland, Provincie Zuid-Holland et al. 2006)

2 Doel van de expertmeeting

Transdisciplinariteit behelst de integratie van verschillende vormen van kennis – verschillende vormen van wetenschappelijke of expliciete kennis naast praktijk of impliciete kennis - ten behoeve van het hanteren van complexe problemen. Het stimuleren van transdisciplinariteit vormt een opgave en uitdaging voor alle betrokkenen. Dat betreft bestuurders, consultants werkzaam in de uitvoeringspraktijk, wetenschappers met diverse disciplinaire achtergronden, financieringsorganisaties voor onderzoek en beleidmakers. Tijdens de expertmeeting willen we met betrokkenen uit al deze geledingen barrières en kansen voor transdisciplinariteit voor integraal kustzonebeheer in kaart brengen en aanknopingspunten voor beleid inventariseren om transdisciplinariteit te stimuleren. Daarbij zullen we expliciet aandacht besteden aan barrières en kansen op het niveau van het wetenschapssysteem, op het niveau van de uitvoeringspraktijk, en op het niveau van het beleid. De discussie zal gevoerd worden aan de hand van een aantal stellingen die verderop in deze notitie worden toegelicht.

3 Wat is transdisciplinariteit en waarom hebben we het nodig voor integraal kustzone beheer?

“Transdisciplinariteit wordt over het algemeen beschouwd als een specifieke vorm van interdisciplinariteit, waarbij grenzen van en tussen disciplines overschreden worden en waarin kennis en perspectieven van verschillende wetenschappelijke disciplines als mede van niet-wetenschappelijke bronnen geïntegreerd worden (Flinterman, Tecler-Mesbah et al. 2001; Thompson Klein, Grossenbacher-Mansuy et al. 2001).” (Pereira and Funtowicz 2005, vertaling FM). Hoppe and Huijs (2003) betogen dat transdisciplinair onderzoek nodig is om ongestructureerde maatschappelijke problemen het hoofd te bieden. Problemen zijn ongestructureerd wanneer de betrokken actoren verschillende probleemdefinities hanteren, wanneer relevante kennis ter discussie staat en wanneer onzekerheden groot zijn.

Transdisciplinariteit vergt een oriëntatie op de lokale context, het accepteren van onzekerheden en handelingsgerichtheid. Er moeten verbindingen gelegd worden tussen theoretische ontwikkeling en professionele praktijk en de kloof tussen wetenschappelijke kennis en maatschappelijke besluitvormingsprocessen moet overbrugd worden. (Lawrence and Després 2004, p.399) De doelstellingen van transdisciplinair onderzoek verschillen daarmee in een aantal belangrijke opzichten van de doelstellingen die normaal gesproken wetenschappelijk onderzoek structureren.

Wereldwijd staan kustzones onder druk. Klimaatverandering en zeespiegelstijging leiden tot een toename van kusterosie, verzilting, de vernietiging van natuurlijke

leefmilieus en een vergroot overstromingsrisico. Bevolkingsgroei en toenemende economische activiteiten in kust en delta regio's zetten de kustregio verder onder druk. Integraal Kustzone Beheer wordt algemeen erkend als de beste manier om de problemen in de kustregio aan te pakken. Integraal Kustzone Beheer impliceert een bestuurlijke aanpak, waarbij alle relevante partijen en belanghebbenden betrokken worden bij het vinden van gezamenlijke en integrale probleemoplossingen, en waarbij de verschillende problemen van de kustregio in samenhang worden benaderd en aangepakt. Multifunctioneel ruimtegebruik, de combinatie van verschillende ruimtelijke functies zoals bijvoorbeeld kustverdediging en natuurontwikkeling, of de adaptatie van economische activiteiten aan veranderende natuurlijke omstandigheden, zoals de ontwikkeling van zilte landbouw, zijn voorbeelden van integrale oplossingen.

Het vinden van dergelijke integrale oplossingen vergt de integratie van verschillende vormen van disciplinaire kennis met lokale, maatschappelijke en impliciete kennis binnen planvormings-, uitvoerings- en besluitvormingsprocessen.¹⁷ Waardendiversiteit en wetenschappelijke onzekerheden maken de problemen in de kustzone tot ongestructureerde problemen. Kortom, integraal kustzone beheer vraagt om transdisciplinair onderzoek.

4 Stellingen voor de discussie

Barrières voor transdisciplinariteit binnen het wetenschapssysteem

1. **De disciplinaire organisatie van het Nederlandse wetenschapssysteem vormt een barrière voor transdisciplinariteit. Dat betreft 2 aspecten:**
 - 1a) **Academische reputatiemechanismen stimuleren disciplinaire specialisatie, en bemoeilijken een transdisciplinaire oriëntatie.**
 - 1b) **De organisatie van onderzoeksgroepen en onderzoeksinstellingen langs disciplinaire scheidslijnen bemoeilijkt transdisciplinaire samenwerking**

¹⁷ Verschillende auteurs houden een vergelijkbaar pleidooi voor transdisciplinariteit in de context van integraal waterbeheer en integraal Noordzee beheer (NRLO/AWT/RMNO 2000; RMNO 2004; Stel and Luiten 2004). Eén van de aanbevelingen voor de onderzoeksagenda voor zee onderzoek van de RMNO luidt dat "Much sea research should preferably be transdisciplinary. That implies integration between different disciplines, as well as integration between different types of knowledge (basic knowledge, applied knowledge, practical/local knowledge). In that way societal knowledge is taken into account. This form of research averts unproductive sectoring and parcellation." (RMNO 2004)

1a) While the last decades may have shown a gradual shift towards more multidisciplinary and strategic research (Nowotny, Scott et al. 2003) the science system is still predominantly organized along disciplinary lines. This starts already with the educational system, where students are educated in a specific academic discipline, rather than in a specific (multidisciplinary) problem field. After graduation the disciplinary organization of the science system continues to structure academic careers, mainly because the academic reward system is organized along disciplinary lines. Funds for fundamental research are often organized along disciplinary lines, which can make it difficult to obtain research funds for interdisciplinary or multidisciplinary research. And academic credits are gained by publishing in high impact journals, which often have a strong disciplinary orientation. As academic talent tends to follow disciplinary reputation structures rather than changing social or policy priorities, the internal disciplinary organisation of the science system may impede a research orientation towards transdisciplinarity.

1b) Transdisciplinariteit vormt in de eerste plaats een grote cognitieve uitdaging voor alle betrokkenen. Het kost veel tijd en moeite voordat experts met verschillende disciplinaire achtergronden elkaar leren verstaan en begrijpen en voordat ze tot gezamenlijke probleemdefinities en onderzoeksbenaderingen komen. De organisatie van onderzoeksgroepen en onderzoekinstellingen langs disciplinaire scheidslijnen vormt daarom een extra barrière voor transdisciplinariteit.

2. Het ontbreekt binnen het systeem van onderzoeksfinanciering aan sturings- en evaluatiecriteria die transdisciplinariteit waarderen en stimuleren.

Wetenschappelijke excellentie en output vormt binnen het systeem van onderzoeksfinanciering het dominante evaluatie criterium. Dat geldt zelfs voor veel financieringsprogramma's die gericht zijn op toepassing. Daarmee wordt gestuurd op een oriëntatie op wetenschapsinterne problemen. Het beoordelen van goed transdisciplinair onderzoek vergt andere evaluatiecriteria dan de traditionele wetenschappelijke criteria.^{18 19} Transdisciplinair onderzoek is altijd gebonden aan

¹⁸ "One critical issue is that the sciences keep their independence and develop appropriate strategies and standards for transdisciplinarity which extend and complement the traditional criteria." (Scholz, Mieg et al. 2000, p.486)

¹⁹ Kamphuis signaleert in relatie tot coastal science en coastal engineering dat wetenschappelijke evaluatie mechanismen analytisch onderzoek stimuleren en dat dit ten koste gaat van de oriëntatie van coastal engineers op de verbetering van het ontwerp van coastal engineering structures en measures (synthese). "The question that is not asked is: What do these "improvements", which are essentially study results (analysis), do for the design (synthesis)? We need to be clear as engineers that the ultimate goal of our research

een bepaalde lokale context, er is de noodzaak om onzekerheden te accepteren en transdisciplinair onderzoek vindt plaats binnen een concrete ontwerp- en besluitvormingspraktijk. Dat betekent dat andere doelstellingen voorop staan dan die welke normaal gesproken wetenschappelijk onderzoek structureren. Transdisciplinariteit is vooral een vaardigheid om de eigen expertise en kennis te integreren met andere vormen van expertise en kennis. Deze vaardigheid vertaalt zich vermoedelijk eerder naar een goede reputatie binnen de praktijkcontext, dan naar een goede reputatie binnen het eigen vakgebied.

3. Het ontbreekt in Nederland aan een substantiële betrokkenheid van gamma onderzoekers bij de problematiek van integraal kustzonebeheer.

Barrières binnen de uitvoeringspraktijk:

Met de term praktijk bedoelen wij hier de praktijk van planontwikkeling en uitvoering van integraal kustzonebeheer. Omdat integraal kustzonebeheer integratie vergt van wetenschappelijke kennis en praktijkkennis en daarnaast een oriëntatie op probleemoplossing, ligt het voor de hand dat de praktijk de primaire lokatie is waar kennisintegratie tot stand zou moeten komen. Daarom stellen we hier de vraag wat binnen praktijken barrières zijn voor kennisintegratie?

4. Culturele en cognitieve barrière tussen professionals met verschillende achtergronden vormen in de praktijk een grote barrière voor transdisciplinaire samenwerking.

Parallel aan het probleem van de disciplinaire organisatie van het wetenschapssysteem, is er het probleem van de disciplinair opgeleide en georiënteerde professionals. Anders dan binnen de wetenschappelijke context is hier niet het reputatiemechanisme een probleem, maar wel de culturele en cognitieve barrières die de samenwerking tussen mensen met verschillende disciplinaire achtergronden bemoeilijken. Het vergt vooral veel tijd om elkaar te

is improved design (synthesis). If it is not, we have become scientists (analysts). (Kamphuis 2005, p. 12)”

leren verstaan en begrijpen en die tijd is binnen praktijkprojecten vaak niet voldoende voor handen.

5. **De disciplinaire mix binnen de uitvoeringspraktijk is nog niet optimaal afgestemd op de problematiek van integraal kustzonebeheer. Praktijken worden gedomineerd door ingenieurs terwijl ook andersoortige kennis nodig is. Het ontbreekt met name aan ecologische en maatschappij-wetenschappelijke kennis.**

6. **In de uitvoeringspraktijk is de tijdsdruk te groot om transdisciplinair te werk te gaan.**

Deze stelling is gerelateerd aan stelling 6. Transdisciplinaire samenwerking tussen experts met verschillende disciplinaire achtergrond vergt veel tijd, omdat het tijd kost om elkaar 'te leren verstaan'. Die tijd is binnen praktijkprojecten vaak niet voldoende voor handen.

Barrières binnen het beleid en de bestuurlijke context:

Om in de praktijk tot integrale planvorming en integrale oplossingen te komen is het van essentieel belang dat de bestuurs- en beleidscontext integrale oplossingen mogelijk maakt. Er zijn echter nog belangrijke barrières.

7. **Integraal kustzonebeheer is nog vooral een beleidsverhaal en wordt nog te weinig daadwerkelijk tot uitvoering gebracht. Het ontbreekt met name aan integrale bestuurlijke verantwoordelijkheid.**

Hoewel integraal kustzone beheer als beleidsdoelstelling breed gedragen wordt, is de actuele bestuurlijke praktijk nog lang niet in alle opzichten integraal. Het ontbreekt bijvoorbeeld aan integrale bestuurlijke verantwoordelijkheid. De integrale benadering van de aanpak van de Zwakke Schakels is daarvan een voorbeeld. De beleidsdoelstelling was om de noodzakelijke kustversterkingsmaatregelen te combineren met een verbetering van de ruimtelijke kwaliteit. In de

praktijk bleek dit lastig te realiseren omdat de bestuurlijke en financiële verantwoordelijkheid voor de kustversterking bij het Rijk ligt en de bestuurlijke en financiële verantwoordelijkheid voor de verbetering van de ruimtelijke kwaliteit bij de Provincies.

- 8. Operationele doelen en richtlijnen binnen het beleid zijn te veel doel op zich geworden. Daarmee vormen ze een barrière voor het vinden van optimale integrale oplossingen.**

Terwijl operationele doelen (bijvoorbeeld het handhaven van de basiskustlijn) en richtlijnen (bijvoorbeeld de vogelhabitat richtlijn) een sterk beleidsinstrument zijn om achterliggende strategische doelen te waarborgen, kunnen ze ook contraproductief worden wanneer ze tot doel op zich verheven worden en er geen ruimte meer is voor alternatieve oplossingsrichtingen die mogelijk beter aan de achterliggende strategische doelen beantwoorden.

Domeinoverschrijdende oplossingsrichtingen

- 1. Er moet in Nederland een transdisciplinaire gemeenschap komen waarin wetenschappers met verschillende disciplinaire achtergronden (bèta en gamma), ingenieurs en professionals werkzaam in de uitvoerings- en besluitvormingspraktijk verbindingen leggen, ideeën uitwisselen en elkaar scherp houden.**

Mogelijk is hier een rol weggelegd voor het Nederlands Centrum voor Kustonderzoek.

Oplossingsrichtingen binnen het wetenschapssysteem

2. Er zijn specifieke transdisciplinaire evaluatie criteria nodig voor wetenschappelijk onderzoek. Daarmee stimuleer je de vorming van een nieuw soort wetenschappelijk onderzoekers, wiens kracht ligt in probleemoplossend en transdisciplinair vermogen. Mogelijke alternatieve evaluatiecriteria:

- **Post graduate education**
- **Externe promoties**
- **Extended peer review**

De bijdrage aan postgraduate opleidingen en het aantal externe promoties binnen een onderzoeksgroep kunnen een maatstaf vormen voor de mate waarin wetenschappelijke onderzoekers betrokken zijn bij en relatie hebben met de uitvoerings- en besluitvormingspraktijk van integraal kustzonebeheer.

‘Extended peer review’ kan een rol spelen als transdisciplinair evaluatie criterium. In de traditionele wetenschappelijke peer review processen, worden onderzoekers beoordeeld door vakgenoten. In een ‘extended peer review’ proces worden onderzoekers beoordeeld door een breder samengesteld gezelschap van wetenschappelijk onderzoekers en professionals werkzaam in de praktijk. De transdisciplinaire gemeenschap uit stelling 1 zou een rol kunnen spelen bij extended peer review.

3. De betrokkenheid van gamma onderzoekers bij het thema integraal kustzonebeheer moet versterkt worden.

4. Het inzetten van ‘backcasting’ als instrument voor maatschappelijke vraagsturing kan de relevantie van wetenschappelijk onderzoek voor transdisciplinaire vraagstukken vergroten.

‘Backcasting’ als instrument voor maatschappelijke vraagsturing betekent dat men bij het formuleren van de onderzoeksagenda denkt in termen van concrete toekomstige uitdagingen. Waar wil je over tien jaar zijn? Wat is daarvoor nodig? En wat volgt daaruit voor de onderzoeksagenda?

5. De vorming van interdisciplinaire missiegeoriënteerde onderzoeksinstellingen is nodig om transdisciplinariteit te bevorderen.

De huidige reorganisatie van de publieke kennisinfrastructuur op het gebied van delta, kust en zee onderzoek (vorming van Delta Instituut en Imares²⁰) is een verbetering t.o.v. de eerdere versnipperde structuur, maar heft de bestaande disciplinele scheidslijnen niet op. Op termijn moet daarom gestreefd worden naar nog grotere interdisciplinaire organisatorische verbanden, bijvoorbeeld in de vorm van missiegeoriënteerde koepelorganisaties. In zijn voorstel tot ‘Vernieuwing van de publieke kennisinfrastructuur van Nederland’ adviseert Hessel Speelman om de niet-universitaire kennisinstellingen te groeperen in 6 koepelorganisaties. Het bevorderen van synergie vormt hiervoor één van de argumenten: “Complexe vraagstellingen van bedrijven, maatschappelijke organisaties en overheden kunnen worden beantwoord door de kennis van meerdere kennisinstellingen te bundelen.” Ook is de verwachting dat bèta-gamma integratie – vanwege schaalgrootte – beter realiseerbaar is op het niveau van koepelorganisaties, dan op het niveau van separate niet-universitaire kennisinstellingen. (Speelman 2006, p.83,84)

Oplossingsrichtingen binnen de uitvoeringspraktijk

6. Er is een professionalisering nodig van de mensen die werkzaam zijn in de uitvoerings- en besluitvormingspraktijk van integraal kustzone beheer.

Omdat de uitvoerings- en besluitvormingspraktijk de primaire lokatie is waar transdisciplinariteit tot stand komt, zijn de professionals die werkzaam zijn in die praktijk de eerstaangewezen personen om transdisciplinair te werken. Het stimuleren van transdisciplinariteit vergt daarom met name het stimuleren van de

²⁰ Institute for Marine Resources & Ecosystem Studies, a merger of the Netherlands Institute for Fishery Research (RIVO, 120 people), the research group Ford and Sea (‘Wad en Zee’) from Alterra Texel (20 people) and the department Ecological Risks from TNO Build Environment and Geosciences in Den Helder (20 people).

Research in the Delta Institute will address the many knowledge questions that relate to living, building and working in a Delta region. Within the Delta Institute the two Grand Technological Institutes (GTIs), WLDelft Hydraulics and GeoDelft will merge with some parts of TNO-NITG, and with the knowledge sections of the Specialist Services of the Directorate General of Public Works and Water Management.²⁰ That includes parts of the National Institute for Coastal and Marine Management (RIKZ) and the Road and Hydraulic Engineering Institute (DWW)

professionalisering van mensen die werkzaam zijn in de uitvoerings- en besluitvormingspraktijk. Of zoals een van onze informanten het formuleerde ‘de beste mensen heb je nodig in de praktijk’.

- 7. Binnen de uitvoeringspraktijk moet meer ruimte vrij gemaakt worden (tijd en geld) voor transdisciplinair onderzoek.**

Oplossingsrichtingen binnen het beleid en de bestuurlijke context

- 8. Er moet meer bestuurlijke ruimte komen om operationele doelen en richtlijnen te omzeilen wanneer dit ten gunste komt aan het behalen van strategische doelstellingen.**