9 Objectives and expectations of the IWRM and Megacities funding initiatives

After scrutinizing the policy discourse on cooperation with developing countries and emerging economies in sustainability research in strategies and general statements, this chapter turns to the policy discourse in the IWRM and Megacities funding initiatives as examples of the transmission of policy discourse into concrete funding initiatives, which generally aim at causing a certain effect. The expectation of a certain effect on social reality is part of any policy's *raison d'etre* (Pressman and Wildavsky 1984). The BMBF's policies are no exception to this. Both the IWRM initiative as well as the Megacities funding initiative have concrete objectives which lie beyond the generation of scientific knowledge. The BMBF accordingly does not only expect scientific publications as results of the projects funded, but furthermore expects research-based results to have an effect – an *impact* – on the real world as an outcome of funding. These expectations can be traced from the calls for funding through all further stages of funding projects – in their selection, in later interim reporting, status seminars, in final evaluations and reports etc (ch. 10.1).

Speaking about impact of policies requires a caveat: Instead of *evaluating* the success or failure of policy in view of its implementation, measuring its outcomes or other quantifiable policy results, I chose the perspective of SKAD. I thus focus on the preceding stages of *conceptualizing* policy expectations in the BMBF as parts of the policy discourse. Instead of quantifying the policy outcomes as such, I am interested in the *idea* of specific outcomes. As Ely and Oxley (2014) contend, the framing of impact is political – as political as the larger policy objectives that the idea of impact is coupled to in the BMBF's case, I argue. Through these concrete objectives and expectations of effects, the BMBF's discourse tries to shape a specific reality in partner countries and thus exerts a power effect. It is therefore highly relevant to analyze which specific objectives each funding initiative pursues and which type of effect it foresees. The different types of effects of policy discourse and its influence on the projects' reality in their implementation attempts, will then be dealt with in the next chapter. At the same time, by envisaging specific types of effects through the projects, policies also shape the type of research aimed

at achieving these effects. I argue that this may have long-term consequences for the German science system as well.

Based on the SKAD perspective and a phenomenological analysis of the discourse contents, in this chapter I consequently put the specific objectives of funding in the IWRM and Megacities funding initiatives in the spotlight: the BMBF's underlying expectations of outcomes, as well as the assumptions of how impact is generated, which manifest in the mode of science promoted. I argue that the specific policy discourse is made up of different concepts which fulfil different functions around the main storyline of cooperation with developing countries and emerging economies in sustainability research. The analysis of the discourse contents of the policies for cooperation with developing countries and emerging economies in IWRM and Megacities as exemplary funding initiatives is structured along the concepts' function: I first analyze the *causal or final concepts*, which embody the underlying rationale and the objectives of cooperation in the BMBF's conception in each funding initiative (ch. 9.1). After, I expose the *instrumental* concepts which are closely related to the objectives in establishing the mode and pathways to reach these – thus the mode of research that the BMBF considers apt for cooperation and sees as a means of producing impact (ch. 9.2). Hence, this chapter centres on both the objectives as well as the path of action that policy proposes, the mode of science that the BMBF prescribes to reach the objectives. I shed light on the divergence of high expectations and low level of conceptualisation of effects in the concluding section (ch. 9.3)

9.1 Deviating expectations in different funding initiatives of the Sustainability Subdepartment

In view of their policy direction, the policies of the different working units within the Sustainability Subdepartment can be juxtaposed. The funding initiatives for cooperation with development countries and emerging economies originating in the Global Change Unit, like the Megacities Programme, differ from those originating in the Resources Unit, such as IWRM, in certain aspects. They are motivated by different rationales, use different sets of arguments, aim at different objectives, envisage differing types of impact and propose different potential solutions.

9.1.1 IWRM as a showcase for a predominantly economic rationale in the BMBF's Resources Unit

The IWRM funding initiative fits smoothly into a long line of BMBF funding for international cooperation in water-related research. Closely coupled to a technological approach, water related funding has a long tradition in the BMBF's funding

portfolio (ch. 5). Throughout the BMBF's past, funding international cooperation in water-related research has primarily been legitimated through targeting German economic benefits. With its funding initiatives, the BMBF wishes to contribute to Germany's leading position in the water sector, which it considers as a lead market, expected to grow to EUR 800 billion in the next 10 years, with an annual growth rate of 6% (BMBF 2012c). As these numbers show, the German industry in the water sector is strong. In this respect, it is important to point at the co-development of policies and institutions. As one interviewee put it, "German enterprises are strong because they have been funded for 40 years" (PT03).

The BMBF has a strong tradition of supporting water related technology development – and in doing so has substantially strengthened its structures. The case of the German Water Partnership (Box 7-2) illustrates how the policy discourse led to the institutionalisation of actors and actors' networks. As external speakers within the discourse coalition, these then contributed to a continuation of a storyline of cooperation with developing countries and emerging economies based on and aiming at market opportunities. The focus on international cooperation specifically in research on water technologies can be explained by a lacking local demand in Germany itself:

> "In the case of water, the biggest problems don't occur in Germany but elsewhere. It is an obvious consequence to go to arid or semi-arid regions to adapt existing technologies or solve their problems otherwise. Therefore, the [international] orientation is not surprising in case of water. And it was done from early on." (PT03)

In extension of the rationale of getting access to research subjects abroad, the motivation here was to obtain access to water issues as a research topic of interest on the one hand, and as a business opportunity for technological stakeholders within the research consortia on the other. The Masterplan Environmental Technologies, issued by the BMBF and the BMU in 2008, makes this underlying rationale explicit. The transfer of adapted technologies to foreign markets aims at economic benefits for the German side:

> "From the perspective of the German water sector, creating a big market demand and direct financial support of innovation activities are the most important drivers of innovation. On the background of a massively expanding world market, the connection between innovation support and export orientation turns into a decisive policy lever." (BMBF and BMU 2008a: 17, *own translation)*

In this line, past BMBF's funding activities included a number of research projects and capacity development measures specifically dedicated to exporting water technologies to developing countries and emerging economies. In addition, the ministry sponsored meta research on exporting technologies (BMBF 2014j; 2014k; 2014l). In these funding initiatives as well as in the Masterplan Environmental

Technologies, the rationale of the BMBF largely overlapped with the demands of the German water industry.[1] Science and research cooperation turned into tools of reaching economic benefits: "To be more widely competitive on the global water market, we need to target new paths for technology export. Science cooperation can be used as a vehicle to anchor technologies at international markets." (BMBF and BMU 2008a: 18, *own translation*)

It is interesting to note that the exporting demands of an economically important industrial branch are listed as a strategic goal in a strategy of the BMBF and the BMU, two federal German ministries whose core mission supposedly is not taking care of economic progress, but of research and education in the case of the BMBF, and of environmental issues in case of the BMU. While in interviews, BMBF employees pointed at fostering research as one of the main objectives of policy and funding, viewed in the bigger picture of the strategic frames, science as such plays only a subordinate role to superior economic objectives in water related research and technology funding.

The close-up perspective reveals a more detailed picture, however. In the IWRM initiative as well as other research funding initiatives on water management and technologies, the BMBF made use of diverse argumentative strands to justify funding. Beyond economic benefits for German side, the importance of cooperation on water issues was stressed for the partners, as well. In doing so, the BMBF used rational arguments to come to inherently value-based decisions. The ministry argued that water research and funding require an international orientation because "the protection and sustainable use of water resources plays a decisive role for the future of humankind" (BMBF 2008c). In the same line of thinking, the official brochure on the IWRM funding initiative opened by stating that "[w]ater is mankind's most important resource – water is life" (Ibisch et al. 2013).

Project participants interviewed similarly argued that water was an essential element for all life, and that funding IWRM research therefore logically needed to turn into a priority of funding (fieldnotes IWAS Brazil, 1.10-30.11.12, informal conversation with PP28). The argumentation bears an inner logic, as the importance of water as such and the need for international cooperation on water related topics is hard to deny. Nevertheless, the same line of argumentation might be equally used to justify cooperation in other areas of sustainable development, such as climate change, health, agricultural research or research on social development. Still,

1 The bond between the water industry with the BMBF as a science ministry instead of a bond with BMZ is not surprising if considering the strict regulations and debate around *tied aid*, which restrict the opportunities of the water sector to enter markets in developing countries and emerging economies via development cooperation (OECD 2010; OECD 2014). Cooperation in research and innovation, restricted far less by international conventions (ch. 7) thus opens new gates for exporting technologies without bearing high risks of investments.

in contrast to water-related research the latter have a much more recent funding history or have not been funded at all so far (ch. 5).

I'd like to maintain that next to those arguments promoted in public documents, institutional demands also play a role in choosing funding priorities. While the needs in other areas of sustainable development may be equally crucial, they may not be publicly discussed and thus provide lesser visibility to the ministry in public; problems might require long term research; or potential solutions may be more complex and not be solved by simple technical interventions which shine back positively on the BMBF as a funder. As one interviewee stated in view of water-related research:

> "I think that two criteria meet. First, water needs are very obvious needs. In other areas, they are not as evident. But if water provision is not working, you notice right away. And therefore, the demands from the countries are bigger. And at the same time, the BMBF is motivated by strengthening the German economy and to access markets. In the area of water, German businesses have something on offer. That contributes to promoting water as a topic." (PP04)

Prioritizing certain topics and areas over others, such as in case of water-related research, illustrates that rational arguments can be used to legitimize value-based decisions in policy making, as constructivist research on other fields of policy have shown (Leach et al. 2010). This does not mean that funding IWRM was based on invalid arguments, but rather points to the fact that a *prioritisation* of (rational) arguments is often based on norms and values. A strict separation between value and ratio in political decision-making is therefore impossible.

Value-based decisions may lead to contrasting patterns of action: While in the Sustainability Subdepartment, cooperation with developing countries and emerging economies was promoted, in the Department of Key Technologies, international cooperation with developing countries and emerging economies was barely funded, even though there was a demand from the latter. The same underlying motivation – strengthening the German economy – lead to different policies: In case of key technologies, such as information and communication technologies, developing countries and emerging economies were not interpreted as future markets, but as competitors. Cooperation was avoided in order not to enable future opponents (interviews with PA05, PA08, PA14).

The IWRM initiative in detail

As Keller (2011b) argues, discourses are not always explicit in statements – there may be gaps between statements and underlying interest (ch. 3). As such, the deeper rationales of funding may be hidden from plain sight and may not openly be mentioned as an argument in official documents. Vice versa, rationales openly mentioned may not lie at the core of the objectives but may be rather used as a

fig leaf or as a pretext. In this vein, it is interesting to observe that the rationale exposed in strategies, such as the Masterplan Environmental Technologies, differs from the one expressed in interview statements, or from the original call text of the IWRM funding initiative (BMBF 2004a). The original funding announcement provided a larger context for the IWRM initiative. The BMBF established a direct link between the IWRM initiative and the international objectives agreed upon at the UN Millennium Summit in 2000, the UN World Summit on Sustainable Development 2002, and the Dublin Principles on Water and Sustainable Development stemming from the International Conference on Water and the Environment in 1992. The BMBF thereby put a rationale of development and sustainability into the centre of its argumentation of a funding initiative for IWRM.

The call text furthermore explicitly mentioned that funded projects were to improve local situations, thus exposing a funding purpose that primarily contributed to fulfilling needs abroad. While the BMBF also mentioned access of German enterprises to markets abroad as one of the funding initiative's objectives, this was not the central argument of the call text. It rather appeared as one goal among other goals, in their majority scientific and/or targeting an analysis and improvement of the water management situation abroad. In the call, the interest in and contribution to German economic benefit was merely accompanying the primary objective of solving water related problems in model regions.

However, the multifaceted rationale revealed in the call text was put into perspective by statements in interviews, conferences and on other occasions, which emphasized technological, economy-driven objectives – as the strategies such as the Masterplan Environmental Technologies do as well. Indeed, interviewees from the BMBF, project management agencies, external experts and project participants stressed that the initiative pursued German economic benefits as a commensurate objective next to improving local situations. BMBF employees even explicitly stated that altruism was *not* a primal motivation of BMBF:

> "There is always an economic aspect. We don't only want to do good for the local people. We are not the Development Ministry. It's about companies. They are always included in the consortia. You will see that projects are never purely scientific. Business partners are part of the projects because it is one of our big goals to assist them in getting access to countries, to show what works well. We are not exclusively economy-oriented, there is the BMWi as well. We are somewhere in the middle. We support German research and the research abroad and the German businesses, and we are happy if that leads to an improvement of the living conditions abroad." (PA02)

Speaking about the funding initiative, an employee of the responsible project management agency argued similarly:

> "We do not only wish to contribute to the MDGs, but also, that's our line of argumentation, to strengthen Germany, to promote exports. That's why ideally, all projects should include technology partners of areas such as waste water or water supply technologies, which should be further developed according to the local conditions. And ideally, a market should develop for the German businesses abroad." (PT06)

In interviews, strengthening Germany economically seemed to be a rationale at least as strong as a contribution to improved IWRM and sustainable development as such.

Based on my empirical findings on the rationale, mode and effects of funding I'd like to argue that IWRM presents a case of an objective following from the instruments and solutions available, which happen to be water *technologies*. The means thus justify an end. As the saying goes, if your favourite tool is a hammer, every problem is a nail. In case of the BMBF, the preferred tool for solving water problems is technology, which in turn is an effect of its core rationale aimed at strengthening the German economy. Objectives of research and solutions proposed in international cooperation are thus chosen accordingly.

Viewing developing countries and emerging economies as an export market necessarily entails to view water-related problems as predominantly *technological* problems. This was mirrored in the conditions of funding and in the selection criteria. While the announcement did not mention that the participation of German SME in the research consortia was *mandatory*, their participation was encouraged, and they were entitled to receive BMBF funding for up to 50% of project-related costs (BMBF 2004a). An application of research consortia *without* partners from the water industry able to bring in technologies, would not have been in line with the overall aims of the funding initiative. In this sense, during the first status seminar of the IWRM funding initiative, which took place in November 2008, a BMBF representative once again set off the IWRM initiative from a previous funding initiative stemming from the Global Change Unit, GLoWa. According to the opening presentation, IWRM provided a common ground for both funding initiatives. But while GLoWa aimed at a systemic analysis of the impacts of global change on the ecosystem as well as on the socio-economic system, the IWRM initiative was to strengthen German industrial competitiveness (Zickler 2008).

According to the IWRM call, projects were to develop holistic water management concepts, but technological components were required to be tested and implemented. The IWRM call was thus very much in line with High-tech Strategy objectives, while at the same time trying to achieve impact on sustainable water management in the partner countries (BMBF 2004a). Through the economy-oriented rationale and the subsequent involvement of business partners in the research consortia, the BMBF blazed the trail for technological solution pathways.

While a focus on technological solutions potentially provided economic benefits for the business partners involved, technologies as prescribed solutions were also perceived as beneficial for the visibility of funding initiatives and their success (ch. 9.3).

In view of additionally putting the initiative into the context of development objectives, an interviewee asked: "The question is in how far the MDGs are just the flag under which your boat is sailing. And what is the cargo of the ship under deck?" (PT03) The interviewee thus suggested that internationally accepted concepts, such as the MDGs, were used as an additional legitimizing frame, as a fig leaf for different objectives. This line of argumentation can be extended to the BMBF's usage of the idea of IWRM as such. The fact that the BMBF made use of the concept of IWRM as a frame for its funding initiative is worth a closer analysis, as the concepts seems to differ from the BMBF's objectives.

While ideas of an integrated and systemic water management have been around for long, the concept of IWRM has turned into a discourse of global scope since the 1990s, embedded in policies and norms at regional, national and international levels (Biswas 2004; Mukhtarov 2008; Saravanan et al. 2008). As such, the concept of IWRM is a holistic, systemic concept of water management. It acknowledges that water management is complex, as water is crucial for the natural environment as well as for socio-ecological and economic systems. As water is a finite resource within the global eco-systems, water management needs to adequately take into account the needs of the natural environment as well as accommodate the diverse physical, social, cultural, and economic needs of humankind (Agarwal et al. 2000; Biswas 2004; Grigg 2008; Allan 2012). A basic definition of IWRM is given by the Global Water Partnership, an institution established to enhance IWRM (thus fulfilling a function of discourse perpetuation and dissemination, itself part of the IWRM discourse's dispositive): "IWRM is a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems." (Agarwal et al. 2000: 22)

The concept of IWRM is based on the principles of bridging and integrating different (sectoral) needs in a participatory and inclusive process. It suggests cross-sectoral policy making across all relevant fields (food, energy, ecosystems, industries etc) and points at the role of management instruments; the importance of an enabling environment such as policies and legislation; and of adequate institutions and their governance and coordination for a sustainable management of water (Agarwal et al. 2000).

The concept of IWRM thus essentially stresses the role of management, governance and participatory processes to secure sustainable water. Researchers have accordingly scrutinized the aptness of institutions surrounding water issues in

view of their institutional fit, scale, or interaction (among others Moss and Newig 2010; Horlemann and Dombrowsky 2012) and examined stakeholder integration and participation (among others Pahl-Wostl 2002; Carr et al. 2012). Additionally, learning and capacity development are portrayed as essential crosscutting elements to enable individuals and institutions to participate in IWRM and fulfil their roles adequately (among others Pahl-Wostl et al. 2008; Lebel et al. 2010; Leidel et al. 2011). While these aspects were stressed substantially in the implemented projects funded in the BMBF's IWRM initiative, they received far less attention from the policy-makers side, who stressed technological aspects (ch. 10).

The concept of IWRM has been criticized both in view of the shortcomings of the theoretical concept as well as in view of the limitations of its implementation. Different authors stress that IWRM neglects the highly political nature of water – or rather the power asymmetries among stakeholders; the conflicts that may occur; the trade-offs between different usages, and rather conceive of it as a normative vision than an implementable option (Biswas 2004; Molle 2008; Mukhtarov 2008; Allan 2012). However, in its common discursive meaning, IWRM is certainly *not* a concept that stresses the infrastructural or technical side of water management, but rather focusses on the *non-technological* aspects of it. Indeed, most authors attribute only a minor role to the actual technologies involved in the larger context of IWRM. For example, in the Global Water Partnership's definition, technologies are pictured as one part of the puzzle of achieving a sustainable management of water, while at the same time, the authors warn about the uncritical application of technologies and advises context-adapted, suitable solutions (Agarwal et al. 2000).

However, IWRM may be and has been utilized to pursue other means below its label. In this line, Biswas (2004) states that "people have continued to do what they were doing in the past, but under the currently fashionable label of integrated water resources management in order to attract additional funds, or to obtain greater national and international acceptance and visibility" (Biswas 2004: 251). In case of the BMBF's uptake of IWRM as a frame for the IWRM funding initiative, I conclude that a similar dynamic was at play. Linking up to objectives and frames of (sustainable) development, such as to the MDGs, as well as to IWRM, fulfilled a dual function for the ministry. Both discourses are used as *vessels* to transport the BMBF's core objectives of technology export, thus contributing to German economic benefits in the long run. Embedding a funding initiative in an international discourse of general consent provided additional legitimacy and visibility to the policy. Framing the funding initiative as IWRM allowed the ministry to set it into a larger development-oriented context while still maintaining the focus on German economic benefit. On the other hand, combining different objectives by drawing on different discursive sources also potentially addressed and appealed to a larger group of discourse recipients, including applicants for the funding, other min-

istries as well as the Bundestag, and the larger public – thereby providing a higher degree of visibility for the BMBF.

Depoliticizing effects of the technology focus

In view of IWRM in general, Molle has argued that using IWRM to frame water management may lead to a *depoliticisation* of water (Molle 2008). In view of the BMBF's reinterpretation of IWRM, depoliticisation may be an even higher risk, as the concept of IWRM is used to primarily promote *technological* solutions. In this vein, the reduction of the following international initiative issued by the Resources Unit, the CLIENT initiative (BMBF 2010b) to pure technology development seemed a consequent development towards depoliticizing water management in difficult contexts. Asked why CLIENT did not embrace the analysis of the socio-economic conditions of technological research and innovation in China, a ministerial interviewee stated, that "[t]he Chinese would have been against any interference. That's too big and too political. Therefore, you rather take these kinds of steps in order to reach a larger one. That might be more sustainable than the IWRM projects. If you leave these behind, they might collapse" (PA05).

CLIENT thereby epitomizes the tendency of the ministry to promote a *one-solution* technology, which in the IWRM funding initiative already shone through. Potential trade-offs or contradictions within society, the social aspects of water, such as promoting sufficiency instead of technological efficiency, are excluded as research questions. From the policy perspective, this might be a convenient approach, as it enables the ministry to maintain good relations on the policy level even with non-democratic partner countries.

While framing IWRM and other environmental problems as technical problems may have originated as a conscious or unconscious discourse strategy, it has also turned into a deeply internalized belief. The belief in a technological approach to IWRM among some interviewees in the ministry, the project management agency and projects was so strong that the idea seemed unquestionable. Technology was seen as the most effective solution – which the quote above illustrates. Provoking the thought that IWRM might be more than technological interventions was met with total incomprehension in some cases (interviews with PT06, PP09, fieldnotes FONA Forum, 09.-11.09.13).

This exemplifies a high level of discourse dominance: Water management as a *technological challenge* was perceived as a natural fact, and actors thereby unreflectively reproduced the discourse without being aware of it. Based on Latour, this phenomenon of making a concept appear as a given fact is described as *black boxing* (Hajer 2003a; Keller 2013), a notion similar to that of Foucault's *political technology*, through which political, discursive issues are "set out as objective, neutral, value-free" (Sutton 1999: 14).

In conclusion, the BMBF's focus on IWRM, and specifically on the technological aspects of water management, did not stem from an orientation towards the needs and demands of partners. I argue that the objective of the initiative was not to investigate context-adapted solutions at any potential entry points. Instead, the solutions were predetermined by the underlying economic rationale, which translated into a technology focus. This was beneficial for the German business partners involved as well as for the BMBF: Technology provides easy visibility which can be pictured as manifestations of impact, which shines back positively on the ministry.

By combining different argumentative strands into its objectives, i.e. strengthening the German economy *and* contributing to sustainable development, the IWRM funding initiative essentially transmits an overall rationale congruent to the High-tech Strategy as well as other policy strategies, such as the Internationalisation Strategy, FONA and the Environmental Master Plan. The funding initiative presents technology-based solutions as best options for solving water-related issues and for reaching sustainability, while at the same time allowing and stimulating economic growth. The same holds true for CLIENT (BMBF 2010b) and other funding initiatives for cooperation with developing countries and emerging economies which aim to tackle environmental problems abroad mainly through technological solutions, with an underlying rationale of contributing to German economic prosperity. In doing so, with IWRM or CLIENT the BMBF follows a tradition of eco-modernism – concentrating on technical solutions of environmental problems, on cost of a holistic concept of sustainability (on eco-modernism, see Jessop 2012; Partzsch 2015, ch. 2).

The technology focus has some negative side effects. In their focus on technologies at the expense of taking into account the entire socio-ecological system, policy makers forget that technologies always have a social, political context. The focus on apolitical, technical solutions apart from their social context is not likely to be successful. Moreover, the policy focus on economically viable knowledge and depoliticized technology may also have damaging effects on the science system as a whole. If the science system shall adequately cope with global challenges, next to technological research capacities, *critical* social sciences are essential to address complex problems: Sustainability challenges always have a political dimension.

9.1.2 The Megacities funding initiative and other initiatives of the Global Change Unit: Using room for manoeuvre

The Megacities funding initiative illustrates a case that differs from IWRM in many aspects – not only in its thematic focus. The Megacities initiative was set up in the same year as the IWRM call, in 2004, but originated in the Sustainability Subdepartment's Global Change Unit, while IWRM stemmed from the Resources Unit. Whereas funding IWRM research fell into a tradition of water-related BMBF fund-

ing activities, Megacities were a new topic for funding without any antecedents. Urbanisation entered the funding agenda as a hot topic in the beginning of the millennium, with two further funding initiatives on Megacities emerging at the same time as a research initiative in the Helmholtz centres (UFZ 2007) and as a DFG priority programme (DFG 2006).

The BMBF set its Megacities initiative into the context of global ecological change and global responsibility and specifically addressed future megacities in developing countries and emerging economies. The call text stated that shaping the development of fast-growing megacities would be essential for reaching all dimensions of sustainable development. Megacities were presented as hubs of economic activity, centres of humans and resources with large effects on the surrounding rural areas. The global interdependencies of megacities were emphasized as well. According to the initial call for proposals, the funding initiative was aimed at identifying risks and options for sustainable city development, developing solutions for problems that posed severe challenges to a sustainable development path of the respective cities. Projects were to carry out research "for megacities instead of research about megacities" (BMBF 2004b).

In contrast to the IWRM initiative, the BMBF took a more holistic approach in the Megacities initiative with the overall aim of fostering sustainable development and joint problem solving of potentially global scope. This overall objective was *not* chosen based on German technologies as pre-existing instruments to prescribe a type of solution. Indeed, the call text did not specify any solution or sector to address in the projects, which were encouraged to develop solutions and strategies for sustainable mega urban futures, and to put these into practice in pilot studies (BMBF 2004b). Potentially, social, cultural, policy or other types of non-economic innovation could equally turn into entry points for problem solutions in fields relevant to the sustainable development of the cities at stake, such as water supply and waste water, food, mobility, energy, housing, work, health and quality of life. The call additionally explicitly asked for research projects bridging different sectors and scientific disciplines in an encompassing approach (BMBF 2004b).

In a later stage of the funding initiative, the BMBF refocused the Megacities funding initiative to address energy efficiency and adaptation to climate change within the projects. Interviewees set this refocus, unusual in funding, into the context of new knowledge about the severity of climate change, as exposed in the IPCC report in 2007, which resulted in increasing importance attributed to the topic in political discourse and action. In this light, Megacities in developing countries and emerging economies were now conceptualized as centres of emission – thus demanding mitigation efforts. Additionally, Megacities were pictured as places most susceptible to the impacts of climate change, thus most needy of adaption measures (BMBF 2010d; Ehlers et al. 2010, interviews with PT07, EE25).

Next to those arguments, the refocus allowed the BMBF to put an existing initiative into the context of the new High-Tech Strategy for Climate Protection, issued in 2008 (BMBF and BMU 2008b). Along with the thematic reorientation, the previous openness to all potential solution pathways and all sectors of life and economy in the city narrowed, or at least required a shift of focus of the projects which had already been running for a few years at the time of the refocus (ch. 10).

In contrast to the IWRM call, with its focus on supporting German businesses and its technological approach, the Megacities funding initiative encouraged German business partners, but their inclusion was not a condition for obtaining funding. Interview statements enhanced the objectives exposed in the call and did not show divergence. In this sense, an interviewee from one of the project management agencies stated that the underlying rationale of the Megacities initiative was to "[f]ight problems where they emerge, global responsibility…and of course we hoped to introduce German technologies to export markets of the future." (PT09)

Despite of strong German institutions and business in environmental technology, the funding initiative did not completely submerge in the core discourse of German science policy as expressed in the High-Tech Strategy. Acknowledging the necessity of a "multi-faceted way towards a climate-adapted and energy-efficient Megacity" (Ehlers et al. 2010: 10), the BMBF enabled the funded projects to carry out a systematic analysis of the problem context in their first stages (fieldnotes Lima, 01.08.-31.09.12; interviews with PP40, PP39) in order to search for adequate types of solutions at different entry points of the urban landscape, which thus included different solutions – even those not aimed at German economic benefit. In view of the suitability of German high-tech solutions for the cities at stake, a member of the Megacities advisory board differentiated as follows: "With high tech and Megacities, you'd compare apples and oranges. That wouldn't fit together. You can't have everything. In the projects' interest and for the good of the stakeholders […] I'd rather have adapted technologies, modified to suit the conditions." (EE25) Aware of the dominant policy discourse focused on high-tech, the interviewee added in view of the megacities initiative's missing technological focus, "[i]t is worth acknowledging that research on megacities follows a different approach, research question, methodology and theory. But that does not mean that the projects are of inferior standards." (EE25)

The statement illustrates that the high-tech discourse had turned into such a strong normative background for BMBF funding initiatives that this member of the advisory board felt the need to provide a justification for *not* following technological thinking with the funding initiative. Fostering technologies, preferably high-tech, seemed to be the most valid legitimation within the ministry.

Instead of focusing on a specific type of solution, in later stages of the Megacities Initiative the BMBF introduced the notion of *transferability of solutions* as an objective of the funding initiative. While individual projects necessarily focused

at creating impacts on the local scale in form of context-adapted solutions for a specific topic within the respective city, at the same time the ministry pushed for a transferability of results beyond the individual projects' cities and arranged the exchange of ideas about transferable solutions between the projects at conferences (interview with PT07).

According to some researchers, the policy assumption that solutions developed for a particular setting can be generalized, upscaled, and applied in different settings is wrong, as solutions have to be socially and ecologically embedded in the local context (Ely et al. 2010; Leach et al. 2012). Other researchers, however, put forward that only by aiming at transferability, solutions turn into international public goods (Douthwaite et al. 2003). In case of the Megacities initiative, fostering the transferability of results through abstracting from specific city contexts can be seen as the BMBF's attempt to achieve a broader impact as well as a better visibility of funding, thus adding legitimacy to spending public money on the funding initiative. However, the projects re-interpreted these demands. They rather exchanged their transformation knowledge and discussed its applicability to other contexts (Future Megacities Support Team 2012). In the same line, final transferability reports, such as the one issued by LiWa (Schütze 2015), did not promote the solutions as such as blueprints for other cities, but rather reflected on methods and pathways of impact potentially adaptable in other contexts.

The African Regional Science Service Centers, funded within the same Global Change Unit of the Sustainability Subdepartment, presented a similar case of funding that did not follow a predominantly economy-based rationale. The BMBF's core discourse on high-tech and German benefit is less influential in this initiative, too. An interviewee from the project management agency, involved in WASCAL and SASSCAL, argued:

> "In the end, what remains is a feeling of international responsibility. And we noticed that the BMBF had previously neglected its responsibility for the region. It's rather a moral cluster of arguments. In the pragmatic politics of international relations, it seems hard for the countries to realize that this is really our motivation. But it is." (PT01)

While German scientific interest and potentials of future cooperation, motives stressed in the Internationalisation Strategy, also played a role, the benefits of the partner countries – through jointly developing (scientific) knowledge about global change, but also fostering science capacities both institutionally and personally – were a major rationale of the initiative: "It's about solving problems of the regions practically, developing scenarios, starting cooperative projects. Or even building structures, such as the climate competence centres. The benefits of the countries are paramount." (PT04)

This is a very interesting finding, not only content-wise, but also in view of the relation of funding initiatives, programmes and higher-level strategies. In its funding initiatives, the Sustainability Subdepartment's Global Change Unit, responsible for the Megacities funding initiative as well as the African RSSCs, was able to choose a line of argumentation that diverged from the line of argumentation legitimizing IWRM. Calls originating in the Global Change Unit prioritized the arguments included in programmes and strategies differently. They emphasized rationales which were not as central in higher level strategies, such as the High-Tech Strategy or the Internationalisation Strategy, or even FONA – in contrast to the Resources Unit, which rather repeated the rationales of higher-level strategies in justifying its initiatives such as IWRM or CLIENT. Global Change Unit thereby deviated from the BMBF's core discourse and its standard storyline of justifying funding. The policymakers within the unit made use of the spaces for alternative discourse and funding practice within a playing field that is enabled by the non-prescriptive role that strategies have in policy making (ch. 6), as well as through the broad lay-out of strategies, which functioned as a pool of arguments.

The strategies left sufficient room for coexisting legitimations and interpretations, which in consequence enabled various approaches to cooperation with developing countries and emerging economies to coexist within BMBF, based on different strands of legitimations, with different objectives, and different modes of cooperation proposed. While in case of the IWRM Initiative, the high-tech objectives were prominent, in case of the Megacities Initiative, sustainability was a guiding concept. FONA provided a pool of legitimate arguments to back up funding, even if deviating from the BMBF's core discourse: "For the working unit, FONA is a great point of departure. It can refer to it and state that this is the programme that an initiative is based on." (PT07)

While some interviewees criticized the vagueness of programmes and strategies, at the same time the inclusion of a broad range of rationales also enabled deviation from the main storyline. Different working units used their agency to cherry-pick from strategies to different degrees. Whereas some, like the Resources Unit, remained within the safe lines of the predominant technology-oriented BMBF discourse, others, like the Global Change Unit, seized their power to emphasize different aspects of strategies and drew on different side-lines of argumentation included in the overarching policy documents. In reinterpreting and modifying the dominant policy discourse, they nevertheless stayed within its frame. By not transgressing the discursive boundaries, the working units were able to endorse even non-standard policy initiatives through the back up of policy strategies.

Remaining within the discursive frame, not totally disobeying it but merely stretching it out, may be interpreted as a measure of institutional self-protection. Although deviation from the standard discourse was possible (ch. 6), any reorien-

tations of the policy direction bear a risk of endangering the own organisational status quo. Despite the agency of decision makers to prioritize certain strands of arguments, most funding initiatives therefore did not make use of alternative rationales. Transcending traditional cooperation approaches put a high pressure on the responsible working unit to justify funding activities within the BMBF as a whole and among other units of the Sustainability Subdepartment in particular.

Units such as the Global Change Unit, which promoted funding initiatives beyond the dominant policy discourse were often met with resistance and scepticism by other BMBF units and departments. An interviewee involved in setting up the African RSSC initiative stated that they soon were viewed as troublemakers in BMBF (interview with PT01). Another interviewee, involved in crosscutting coordination and dissemination activities for the Megacities funding initiative, added:

> "Often, the target group of public relation is the BMBF itself, which has to be convinced. The different target groups within the programme are only secondary. While the brochures we design, info sheets etc should be aimed at the practitioners, they are really aimed at the ministry. The level of insecurity among the funding ministry was quite a surprise for us." (PP27)

The perceived need for legitimation can be explained as an attempt to calm potential critics within the ministry who were sceptical about the unconventional funding activities of the unit. In this line, other interviewees added that the respective working unit didn't have a solid standing within the BMBF: "What Working Unit 723 [the Global Change Unit] is doing is not well-accepted within the BMBF […] And the current ministerial leaders do not understand the argumentation of global responsibility anymore. Its legitimacy is low." (PT09)

Further interviewees even mentioned that other working units within the BMBF were eager to take over responsibilities in case of a failure of the initiatives funded in the Global Change Unit (Fieldnotes FONA forum, 09.-11.9.13). Having deviated from the dominant BMBF discourse, funding socio-ecological rather than technological research, thus led an outsider position and institutional insecurity for the unit – which explains why alternative conceptions of cooperation do not easily become institutionalized in policy making.

9.1.3 Capacity development as crosscutting expectation in both funding initiatives

In scientific literature as well as in practice, capacity development is a concept brought forward as a key for beneficial research cooperation between industrialized countries, developing countries and emerging economies (Hurni 2001; Velho 2004). In this sense, Wall (2006) argues that science *for* development is achieved by adding a capacity development dimension to research *on* development. Capacity

development is said to ideally take place at multiple levels: At the individual level in form of education and training; at the organisational level through strengthening capacities of cooperation as well as through developing rules and institutions; at the sector/network level by enhancing larger frames and networks; and at the level of the enabling environment, which is made up of the former three and defines the overarching frame through policies (Van Hofwegen 2004).

As chapters 9.1.1 and 9.1.2 show, the IWRM initiative as well as funding initiatives such as CLIENT, stemming from the Resources Unit, differ from the Megacities initiative and other funding initiatives stemming from the Global Change Unit in view of their objectives, the type of solutions proposed, outcomes of projects envisaged as a result of the research activities. However, in both the IWRM as well as Megacities initiative, the BMBF raised expectations in view of capacity development on different levels. Funded research projects in both initiatives therefore included measures of capacity development as a type of project output (Appendices B-3a and B-3b).

The IWRM call already put the transfer of know-how into the centre next to technology transfer; and the IWRM accompanying measure specifically focussed on capacity development as a crosscutting aspect of the IWRM projects (BMBF 2004a; 2013b). In the Megacities funding initiative, the importance of capacities in the partner countries was equally acknowledged in the call text; additional funding for capacity development on the scientific level was available through the DAAD, which provided scholarships for PhD students within the funding initiative's frame (BMBF 2004b; PT-DLR 2012, interview with PA3).

Despite the differences among the outcomes envisaged for each funding initiative, the aspirations in view of capacity development were comparable. Capacity development measures explicitly accompanied both funding initiatives, targeting different levels of know-how, ranging from capacity development for the application of new technologies, to scientific capacity development. Capacity development was pictured as a long-lasting impact of research cooperation, beyond the projects' restricted time and scope.

On a very practical level, capacity development of technical staff was portrayed as necessary to enable partner countries to apply the new technologies. BMBF staff were familiar with stories of previous projects of technology transfer that failed due to lacking capacities to implement, monitor and maintain technologies and were therefore considered as failures. A member of the Megacities advisory board stated in this sense that in "the Megacities projects, capacity development was important. Educating people to become familiar with the new technologies." (EE25) On the other hand, capacity development of technical staff was also pictured as a condition of German benefits from research cooperation. Capacities in the educational, technical and research sectors were perceived as a prerequisite for cooperating:

"How do you want to run a laboratory, cooperate internationally, if the staff doesn't have the adequate capacities for specific non-scientific auxiliary tasks?" (PA09)

From a more strategic perspective, capacity development in countries of political interest was also pictured as an instrument of creating international ties. Interviewees argued in view of IWRM, that through capacity development measures, linkages were built and kept up between partners, which potentially led to further cooperation or to German brain gain: "We have to invest in the interconnections, such as through PhD programmes. From a German perspective, it is not tragic either if PhD students stay here after they graduate. We gain good brains. That is egoistic, but it happens." (EE17)

Next to deriving German benefits, capacities were also seen as a more *enduring* outcome of funding for the sake of sustainable development. Beyond the direct impact of a funded project, a positive outcome was seen in influencing the mindset of the people involved towards a more holistic sustainability thinking, which they would transport into future employments. The same idea was portrayed by a BMBF employee in view of the Megacities initiative:

> "The people working in the projects within the partner countries are important for the projects' legacy. That's those who convey the message, who may join the public authorities, who start a waste business etc. Those people who hopefully continue to be there when the German PhD students and professors have moved on to the next project." (PA03)

Capacity development was thus expected with different underlying motivations. While it aimed at strengthening capacities on individual and systemic level abroad, at the same time it indirectly targeted German labour market demands of capacitating people as future potential staff. The BMBF's request for capacity development also requires some scrutiny in view of the interlinkages between capacity development, as an expected *result*, and cooperation on eyelevel as expected *mode* of research partnership, which will be addressed in chapter 9.2.

9.2 Policy expectations and mode of science

The BMBF does not provide any overview depicting their *theory* of policy effects such as impact or knowledge transfer. If a theory about the impact pathways exists, the ministry doesn't make its conceptualisation explicit. Nevertheless, the implicit theory becomes evident in different statements in strategic documents, calls texts, selection criteria for project set up, etc., which hint at the underlying model.

Implicit theories of how policies influence social reality are a necessary element of any policy. The theory of a policy's mechanism, the concept of its pathway to cause effects, is not necessarily consciously reflected. In form of tacit and/or