Chapter 2
Knowledge for fisheries governance: participation, integration and institutional reform

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Abstract:

As outlined in Chapter 1, the GAP project is situated within a transition zone from a traditional fisheries management approach that relies upon a clear separation of knowledge towards a new 'bridging perspective', which aims to establish a common knowledge base for fisheries governance. The transition builds on collaborative practices of participatory research and joint knowledge production, as will be described in the GAP case studies in subsequent chapters. Before these detailed empirical explorations, this chapter will first take a brief look at the knowledge gaps that are created by the dominant perspective of fisheries management and the resulting implications on sustainability of fisheries including the legitimacy deficits created by the traditional approach to fisheries. Second, three key domains of social science research that the GAP project connects with will be presented (participation, knowledge integration and institutional reform). Finally, some central aspects of the overall GAP approach are highlighted, and a brief overview of the GAP case studies is presented.

1. Introduction: the gaps in traditional fisheries management

The traditional conceptualisation of fisheries management in the developed world established a division of knowledge between scientific expertise and policy-making on one side of the

system and fisher's knowledge perspectives on the other side (Gezelius 2008; Linke et al. 2011; Holm 2003). This classic division of knowledge has been inscribed into (and is enforced by) the dominant institutional framework that established modern fisheries management after WW II (Nielsen 2008; Holm and Nielsen 2004). In this arrangement, which Holm and Nielsen (2004) coined the 'TAC machine', a scientific advisory system and governmental agencies are interdependently connected through an exclusive science-policy interface, with precisely defined divisions of labour for expert communities (e.g. the *International Council for the Exploration of the Seas*, ICES) and the clients that request their services (e.g. EU Commission and national governments) (Hegland 2012; Penas-Lado 2016). In the practical reality of fisheries management, this institutional division of labour implies that the work of fisheries scientists is constrained to react to a ready-made policy agenda by providing stock assessments and giving advice, mainly in form of catch-quotas, to policy and decision-makers, who are equally constrained to use this knowledge as a legitimate basis for decision-making. This institutionalised practice of science-policy interactions inevitably exacerbates meaningful inputs from the fisheries sector due to specification of the science-policy 'cogs' in a finely-tuned and technically inert management machinery (Schwach et al. 2007; Nielsen and Holm 2007; Wilson 2009).

However, the management system relying on these exclusive science-policy interactions has not provided desired outcomes in terms of long-term sustainable fisheries and has been criticised for creating problems with regard to the knowledge gaps and the legitimacy of the knowledge holders on either side of these gaps (Khalilian et al. 2010; Daw and Gray 2005; Nielsen and Holm 2007). By and large, fishermen have felt excluded from a management system that affects their daily businesses and livelihoods. Mistrust, frustration, noncompliance with regulations and sometimes deep-rooted conflicts between fishermen and scientists or policy-makers are, at least partly, a consequence of the legitimacy deficit that this system has created. Apart from the legitimacy problems, valuable knowledge from the fishing sector has also been disregarded by the TAC Machine's institutional configuration. The most dramatic example, where relevant information from inshore fishermen was not sufficiently considered, is the Canadian stock assessment and management before the collapse of the Northern cod (Neis 1992; Finlayson 1994). The gaps created by the traditional top-down science-based fisheries management system has aptly been pointed out by Hubbard (2012: 129):

> *The shift away from local to remote, centralized control, mediated by scientists, marginalized those actually involved in the fisheries, who could make little input into*

policy decisions, resulting in growing chasms in communications between fishers and policy makers.

As a consequence of such failures and resulting legitimacy deficits, these gaps in knowledge production and use have increasingly been accepted as a key problem for conventional fisheries management and served as an important motive for reform. A common knowledge base, open to inputs from both science *and* the fisheries sector, was envisioned both in the research community (Mackinson and Nøttestad 1998; Wilson et al. 2003; Gray 2005; Hoefnagel et al. 2006), as well as in policy discourses (CEC 2009; Penas Lado 2016). As a way to bridge the gaps for establishing a common knowledge base, participatory research practices involving scientists and stakeholders (fishermen and others) became a cornerstone of a new research and policy agenda, to which the GAP project belongs (Mackinson et al. 2011; Mackinson and Wilson 2014). This is the context in which we want to introduce the GAP case studies in this volume – as practical exercises exploring participatory knowledge production in practice.

As a theoretical framework, we present three themes of social science research in the following section, pertaining to collaborative knowledge production and how that knowledge is enabled by a transformed governance system. The three themes have contributed to and reflect the transition movement which the GAP project represents. As illustrated in Figure 2.1, they can be seen as three 'pillars' of a broader governance transformation, on which the GAP project rests. A central concept by which this movement can be captured is that of the "scientific fisherman" described by Dubois et al. (2016), which draws on the Devon crab case study described in chapter three of this volume. The 'scientific fisherman' emerges from collaborative knowledge practices and allows fishers (or their representatives) to take on a new approach by forming alliances with scientists and managers drawing on the methods, language and materials of science. As Dubois et al. highlight, the fisher's participation in the GAP project enabled them to gain new roles and agency as knowledge actors – in the form of 'knowledge agents' rather than of 'knowledge holders'. Instead of using scientifically accredited expertise merely as providing or disproving truth claims, the fishers used the co-created knowledge as a "political commodity to negotiate for their interests in the management arena" (ibid 53), in relation to the sustainable use of the natural resource (Devon brown crab). However, as highlighted in Chapter 1, this book is essentially about the co-creation of knowledge among fishermen and scientist and does not explicitly address the interplay between knowledge, interests and power, despite the relevance of this nexus in

several of the case studies. In Chapter 17 we will return to the scientific fisherman as a central figure emerging from the GAP project with a synthesis of lessons from the 14 case studies by using as our yard-stick their contributions to the three pillars of transformation. The chapter at hand is intended to provide a background reading for Chapter 17 and aims to make the reader of this volume familiar with some key research discourses that the GAP project relates to.

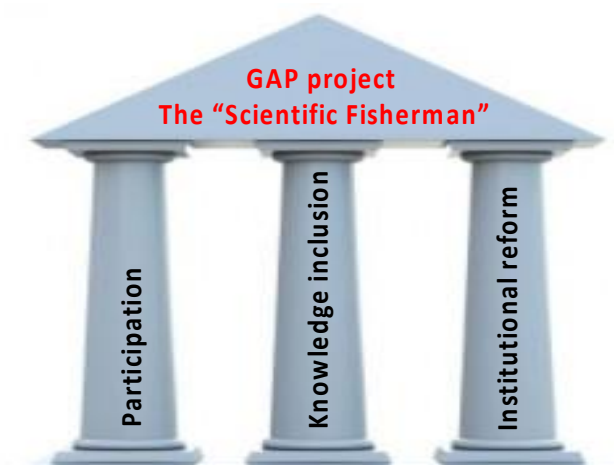

Figure 2.1. Illustration of the three-pillared transformation of fisheries governance serving as theoretical framework for the GAP project analysis (for explication see text).

2. Theorizing GAP: Participation, knowledge inclusion and institutional reform

Fisheries management is in transition. The GAP project is both a result of that shifting policy discourse as well as an exemplification that this transition can be rendered possible in practice. Three major research issues can be identified that form tightly interconnected pillars of this transformation. *First*, we find that a general turn towards participation and 'principles of good governance' (COM 2001), as addressed and investigated in various social science fields, have left traces on research about fisheries governance (cf. Linke and Jentoft 2016; Griffin 2013). *Second*, we find a strong quest today for including knowledge from fishers and other stakeholders[1] in policy and management (Stephenson et al. 2016, Mackinson and

[1]. Stakeholders are usually defined as those actors considered to be 'legitimately concerned' (Metzger et al. 2017) within a policy field. In our case we refer to stakeholders as actors from the fisheries sector (i.e. fishermen and their representatives). In most of the GAP CS projects, fishermen are the dominant

Middleton 2018, Mangi et al. 2018). *Third*, the two first points in turn require substantial institutional reforms, the most outstanding example of these being the 2002 reform of the *Common Fisheries Policy* (CFP; cf. Hegland 2012; Daw and Gray 2005; Penas Lado 2016).

The three issues, or as we prefer 'pillars', are not unmated but tightly connected with each other. They are literally co-producing each other since each of them is both dependent on developments of the other two as well as reinforcing their prospects. This mutually dependent transition of reforming fisheries management is a precondition for the improved governance situation explored in the GAP project and illustrated with the "scientific fisherman" (Fig. 2.1). The new governance context has also been described by Röckmann et al. (2015) with the concept of an 'interaction triangle', which highlights the importance of new types and intensities of interaction between three key actor groups of fisheries management: decision makers, scientists, and other actors. Röckmann et al. argue that appropriate interactions between these three actor groups are crucial for integrating social, economic and ecological sustainability criteria for improving fisheries governance. Effective knowledge that is co-created and used in interactions among the three actor groups needs to be characterised by balancing the three knowledge criteria of *credibility*, *legitimacy* and *salience*. Finding the right balance (or trade-offs), to mutually improve these three criteria under recursive modes of interactions between these three actor groups is seen as an important prerequisite for more sustainable knowledge production and use in environmental governance (ibid; Cash et al. 2003; Clark et al. 2016).

2.1. The turn towards participation

Over the last three decades, we have seen a wide-ranging turn from top-down management approaches towards more inclusive forms of 'participatory governance'. These new modes are particularly prominent in environmental governance, where new interest groups are accepted as stakeholders, and often deliberately invited to participate. The shift to participatory governance, often referred to as a 'deliberative' or 'participatory turn' (Chilvers 2009), has become a central research theme in various social sciences disciplines, particularly in *Science and Technology Studies* (STS) and environmental science. The turn from top-down, science-based decision-making to the novel orthodoxy of participation has been pointed out as a new

stakeholder group. For a discussion of the stakeholder concept and 'stakeholderness' see Metzger (2013).

"age of participation" (Chilvers and Kearnes 2016: 2; cf. Irwin and Michael 2003). It is described as an opening-up of science and policy-making for improving democracy by including diverse forms of public engagement and stakeholder participation as well as a "redistribution of expertise" (ibid; see also Stirling 2008; Hagendijk and Irwin 2006; Irwin 2006; Callon et al. 2009).

More recent scholarly work emphasises a need for critical investigations of the concrete methods of public participation and the implications and ambiguities that specific forms, formats, techniques and tools of participation bring about (cf. Metzger et al. 2017). Accordingly, participatory arrangements should be analysed not only in terms of their limitations and deficiencies, but also in terms of how these arrangements construct their specific subjects (Braun and Schultz 2009) and thereby enact stakeholders through particular 'performative practices' of participation (Turnhout et al. 2010).

When investigating participatory practices of collaborative research, as in the GAP case studies presented in this volume, we need to be reminded of the breadth and width of such exercises, i.e. the various forms, functions and objectives that participation entails (Metzger et al. 2017; Arnstein 1964; Pretty 1995). The GAP approach per se does however not engage with the broader and persisting issues of participation such as power and representation but has a more limited focus on participation of fisheries' stakeholders in the context of knowledge (co-)creation. Previous experiences from collaborative research, for example 'participatory modelling' approaches in EU fisheries research, have drawn explicit attention to the different stages of the processes: "The appropriate stage(s) for stakeholder input in the modelling process need to be identified *at an early stage*. […] To stimulate the feeling of ownership and to increase legitimacy and effectiveness, *stakeholders should be involved from the very first, the problem-framing, step*" (Röckmann et al. 2012; our emphasis). Similarly conclude Phillipson et al. (2012, 56) from a survey on stakeholder involvement in UK research projects that "much greater attention should be given to early processes of knowledge exchange and stakeholder engagement within the lifetime of research projects". This sensitivity to participation in the early stages of the collaboration processes has been a key premise to the overall GAP approach. However, a particular feature of the GAP project is that it goes beyond including (early) participation in order to fix legitimacy deficits but allowing for 'real' participation in terms of joint problem definition and framing, which have been taken seriously in all case studies through close interactions between researchers and fishers in setting up the collaborative research projects (Mackinson et al. 2015).

The GAP approach, enabling these close interactions among the participants of the collaborative research exercises in the early stages in the process allows us to explore the *performativities* of these endeavours, i.e. the procedures that Chilvers and Kearnes (2016) refer to as 'participation in the making'. Instead of normatively embracing participation as a necessary and unproblematic step towards more democratic forms of governance and/or effective management, Chilvers and Kearnes (2016, 56) argue for "co-productionist analyses of situated participatory experiments and practices". Despite considerable efforts in studying how the 'participatory turn' renders science and policy-making more open, transparent and accountable (cf. Stirling 2008), *"*it is striking therefore to note that the pragmatics of public participation with science and the environment have received relatively little concerted analyses in ways that deploy the tools of situated interpretive and co-productionist analyses" (Chilvers and Kearnes 2006, 5). The co-productionist type of analysis suggested by Chilvers and Kearnes implies focusing on participation as "collective experimental practices in the making" (ibid, 15) and accepts that the outcomes of various formats, ideals, normativities and techniques of participation are not pre-given, but instead emerge within the performance of the participatory practices themselves.

What does this imply for our investigation of the collaborations in the GAP project? The perspective provided by Chilvers and Kearnes' discussion on *remaking* participation appears relevant for our analyses of the participatory research exercises performed in the GAP case studies. Their account of *rethinking* participation, and it's externalized democratic norms and taken-for-granted methodological and theoretical assumptions, call for an exploration how we can approach and analyse the participatory research exercises of the GAP project. This means that from a co-productionist perspective, the cases are not merely testing how participatory research works in practice. Instead they present examples, which in themselves shape new realities of stakeholder interaction, knowledge co-creation and how the knowledge credentials of credibility, legitimacy and saliency are getting (co-)produced in such settings. Hence, what participatory research does in the cases of the GAP project is not simply to provide new arenas, platforms or responsibilities for legitimising management through participation. It also allows for a reconfiguration of established actor roles, for example through the emergence of new types of actors such as the "scientific fisherman" introduced above. Throughout Europe, we can today find an increasing trend where (primarily large-scale pelagic) fishing industries hire scientists to equip themselves with a proper scientific background, a phenomenon that

has earlier been described as a ‘communicative turnaround’ evolving from a shared burden of proof in EU fisheries governance (Linke and Jentoft 2013).

Another analytic tool that appear useful to understand and get to grips with the intricacies of the collaborative practices attempted in the GAP case studies is the concept of “boundary objects”. Originally the concept has been coined by Star and Griesemer (1989) to understand how collaboration is possible among actors from different backgrounds holding divergent views. Boundary objects according to them are “both adaptable to different viewpoints and robust enough to maintain identity across them” (ibid 387). The concepts of boundary objects and boundary work (the practice of negotiating boundaries) have recently been used in a fisheries context by Kari Stange (2017) to investigate knowledge exchange in stakeholder-led initiatives for producing management plans in EU fisheries management (see in particular Stange et al. 2016). We will return to the use and applicability of boundary work and boundary objects in the GAP context in Chapter 17.

2.2. Including knowledge: democratising expertise

Coinciding with the ‘participatory turn’ described above, expert knowledge for policy use is increasingly affected by demands for justification beyond scientific means e.g. through participation of stakeholders or so-called ‘lay experts’ in procedures of knowledge production and advice (Irwin and Michael 2003; Lidskog 2008; Horst and Irwin 2016). This opening up of scientific authority and procedures has been referred to as a “democratization of expertise” (Maasen and Weingart 2005). It implies not only that the scientific community is held more accountable for the societal use and utility of its knowledge production but also involves a shift from “a legitimation through knowledge to a legitimation through participation” (ibid, p. 2; cf. COM 2001).

The turn towards stakeholder participation and the democratisation of expertise has been discussed intensively in the context of the provision of scientific advice for political decision-making (e.g. Jasanoff 1990; Carolan 2006; Lentsch and Weingart 2011; Pielke 2007). STS scholars like Sheila Jasanoff have emphasised the specific constraints arising for science in applied contexts, for which she invented the label ‘regulatory science’ (Jasanoff 1990). Strassheim and Kettunen (2014, 265) emphasise that the use of science advice has today “become an integral and increasingly controversial part of policy making”. The controversial part relates to the difficulties of upholding an idea of basic, pure and objective science in

applied contexts, where the provision of scientific expertise needs to fit specific, pre-defined policy requirements, as for example is the case with the institutional interface between scientific advice and policy-making in fisheries management described in section 2.3 below. As noted already 30 years ago by Dorothy Nelkin, an apparent irony lies in the idea of scientific objectivity and its concurrent usefulness for policy: "… the greater the utility of science in political affairs, the less it can maintain its image of objectivity that has been the very source of its political value" (Nelkin, 1987, 293 cited in Strassheim and Kettunen 2014; for similar discussions see Weinberg 1972; Collingridge and Reeve 1986; Yearley 2005, 160ff). The paradox noted by Nelkin has become a central research issue for STS scholarship. For example, Bijker et al. (2009), in exploring the context of applied science, coined the notion of a 'paradox of scientific authority' relating to the basic question "how can scientific advice be effective and influential in an age in which the status of science and/or scientists seems to be as low as it has ever been?" (Bijker et al. 2009: 1). And "how can scientific advice still have some authority when developments in political culture have eroded the stature of so many classic institutions, and when STS research has demonstrated the constructed nature of scientific knowledge?" (ibid, 6). Departing from such observations, these authors raise a fundamental research question pertaining to the new governance perspective of our times: "How can scientific advice still play a role in the democratic governance of technological cultures, where participation by citizens and by stakeholders increasingly complements the old institutional mechanisms of democracy? What is the *new 'place for science advice'* within such new arrangements for governance?" (ibid: 6, our emphasis).

The GAP project invites us to explore this 'new place for science advice' in the context of collaborative knowledge production between researchers and fisheries practitioners. As we discuss further in Chapter 17, the fisheries governance transition of which GAP is part of also represents a move towards a nested system design, where the top-down features of the TAC machine (like the CFP) are kept but can be extended with layers of localized units that allow capturing the diversity and complexity at the local level (Wilson 2009, p. 267). This is in fact the knowledge gap, which the collaborative research approach of GAP intends to fill, by activating the fine-grained, locally situated knowledges "from the ground" for applications at higher scales. How governance systems and their partly international jurisdiction can be attentive to local levels and issues of scale are important parameters for whether institutional frameworks are conducive to bridge these knowledge gaps. As highlighted by Degnbol and

Wilson (2008), this handling of complexity requires nested institutional structures that are linked across scales to enable possibilities for negotiation between actors at different levels. Important case study research, both from fisheries (e.g. Wilson et al. 2003) and other areas (e.g. Wynne 1996), have revealed the failures of ignoring local, situated knowledges and hence showed the limitations of exclusive scientific management approaches. The transition clarified with the GAP project and specifically with the "scientific fisherman", represents a move beyond such knowledge divisions and allows to explore and authorize the situated knowledge of fishermen (see Chapter 17 for further discussion).

How then can such collaborations improve the knowledge base for decision-making in fisheries management? Through the case studies of participatory knowledge production in the GAP project, we aim to connect empirical observations to the wider questions raised in this chapter about democratising expertise, knowledge integration and participation in contemporary society. We are interested in how these processes work in practical applications, and how they may impact on the robustness of the resulting knowledge-base, intended for use in management and decision-making. In other words, we want to probe the processes as well as the outcomes of the participatory research exercises conducted in the 14 GAP case studies presented in this volume: *What are the knowledge gaps that the GAP case studies are constructed to fill? Why are they not addressed by conventional designs? Can they be bridged through collaborative research? What characterizes the relationship between scientists and stakeholders within the collaborative research projects? To what extent can collaborative research remedy the legitimacy deficits created by unresponsive management practices? Do the GAP case studies represent new modes of science-society relations, or do they reproduce a conventional and deferential relationship between science and lay clients? Are the case studies sites where scientists get access to new platforms for pursuing scientific research? Or are they arenas where fishers get access to the resources of science for their own purposes?* The overall GAP approach leads us to think that both of these alternatives can be fulfilled in practice – i.e. that collaborative research sometimes proves to be beneficial to both the scientists' as well as to the fishers' interests. At the same time, it is relevant to assess how and at what degree these processes construct their specific subjects, like e.g. the "scientific fishermen" (see above and Chapter 17).

On the one hand these questions are of a more overarching nature, relevant for pursuing research on co-creating knowledge, governance transitions and science-society relations in general. However, on the other hand the questions are pertinent to the overall GAP project

and its case studies – and will therefore be taken up and to some extent answered in Chapter 17, while a lot of more analytical research of course remains to be done in this domain.

2.3 Institutional reforms: from top-down control towards recursive interaction

Just as the two previously mentioned themes require substantial institutional reform in order to take effect, they have concurrently also impacted on fisheries management discourses and the institutional reforms conducted over the last decades. Fisheries management structures and institutions have adapted to requirements of public participation and stakeholder involvement in policy, management and decision-making (Jentoft and McCay 1995; Kaplan and McCay 2004; St. Martin et al. 2007; Griffin 2013). A growing research agenda of 'fisheries social science' investigates these shifting governance perspectives by focusing on the consequences of ongoing transitions from top-down towards more participatory arrangements (e.g. Urquhart et al. 2014; Symes 2006; Symes and Hoefnagel 2010; Mackinson et al. 2011; Griffin 2013; Linke and Jentoft 2016). A part of this scholarly work focuses specifically on the social and institutional dimensions of knowledge interaction, the practices of knowledge inclusion and stakeholder's contributions to fisheries governance (e.g. Holm 2003; Holm and Soma 2016; Linke et al. 2011; Linke and Jentoft 2013; 2014; Griffin 2013, Mackinson and Middleton 2018).

In the EU, the turn towards increased participatory governance appears most pronounced with the establishment of EU Advisory Councils (ACs)[2] as a product of the 2002 CFP reform (Penas-Lado 2016; Linke et al. 2011; Linke and Jentoft 2016; Hatchard and Gray 2014). This governance shift takes place simultaneously with a stated wish for a transition from a single fish stock management approach towards an ecosystem perspective aiming to implement the Ecosystem Based Approach to Fisheries (EBAF; cf. Garcia 2010). Connected to the EBAF we find a new emphasis on maritime spatial planning (MSP), the tool which has been employed to organise the increasing interests for the use of the marine realm such as renewable energies or offshore oil and other mineral explorations as well as the expansion of aquaculture, interests which are expected to be augmented by the further establishment of the political agenda of "Blue Growth" (EC 2017; see Arbo et al. 2018). While these new and emerging industries hold great potential for economic prosperity, they also bring about new conflicts for

[2] Previous to the most recent CFP reform in 2013 they were called *Regional* Advisory Councils (RACs).

fisheries with regard to environmental and social challenges (Jentoft 2017). The joint trajectories of the CFP reform process to open up science-policy interactions for stakeholder involvement, the implementation of an EBAF, and the movement towards MSP under the Blue Growth paradigm expose new complexities for producing socially robust and relevant knowledge for policy- and decision-making (Ramirez-Monsalve et al. 2016a&b; Röckmann et al. 2015; Ballesteros et al. 2017; Mackinson and Middleton 2018). Shifting from the narrow management object of single fish stocks towards the more holistic management objectives of an EBAF requires a revision of the traditional, linear, annual management approach of fisheries, described earlier in this chapter as the 'TAC machine' (Holm and Nielsen 2004). The linear conception of science and policy-making in fisheries management, implying a clear boundary between the two domains, has today come under pressure with the shift to participation, and the democratisation of expertise, adding additional layers of complexity on the traditional science-policy interface. As mentioned above, these complexities are inserted from a broadening ecological perspective (instead of a single fish stock approach) as well as by a stronger commitment to the economic and social dimensions of sustainability under the new governance modes of fisheries. The shift therefore requires a linkage between the established science-policy procedures of the TAC machine, and new, more *'recursive interactions'* (Weingart 1997) between science and other societal actors including their respective interests (Schwach et al. 2007; Ramirez-Monsalve et al. 2016a). As suggested above, this linkage can be envisioned with a so-called nested-system approach, as described by Doug Wilson. It would imply an arrangement of different spheres, organised like a Russian doll, in order to deal more appropriately with the layered dimensions of social, economic and ecological complexities (Wilson 2009, 276-79).

One example of an attempt to adapt fisheries management to these multifaceted transition requirements is currently pursued through the tool of Multiannual Plans (MAPs), inscribed in the recent CFP reform (Articles 9,10, cf. Ramirez-Monsalve et al. 2016b; Penas Lado 2016). MAPs are intended to include and achieve at least some objectives of ecosystem-based management whereas a more fully developed EBAF framework faces more serious institutional challenges (Dickey-Collas 2014; Ramirez-Monsalve 2016b, Mackinson and Middleton 2018). However, one procedure facilitating the establishment of MAPs via recursive interactions is emerging with the participatory research practices between fishers and scientists as conducted in the GAP project. Such collaborative exercises have multiple roots linked on the one hand to the idea of participatory governance in general as fetched out

above and on the other hand linked to processes of including fisher's knowledge more thoroughly in policy and decision-making (cf. Hegland and Wilson 2008; Stange 2016; 2017; Röckmann et al. 2012). Another distinct root of participatory governance in fisheries lies in the concept of co-management. While we find a range of experiences and changing approaches to co-management in Europe (Linke and Bruckmeier 2015), the concept has perhaps most clearly been defined by Symes (2006, 113) as: "systems in which responsibility for management is shared between the state and user groups, usually at the local level".[3] In bringing together the issues of stakeholder participation, co-management and the inclusion of fishers' knowledge, the GAP approach both exemplifies and explores new types of questions that ought to be addressed to interactions between different actors under the reformed governance context.

One such a question is: *How do the traditional formalised roles and functions of the three knowledge credentials, credibility, legitimacy and saliency, play out under the new recursive modes of interaction within a reformed management system*. In a traditional (linear) view of science-society relations they represent separate sources of authority (Bijker et al. 2009, 24ff; Cash et al. 2003; Wilson 2009). Under a new governance context, as explored in the GAP project, however, the boundaries between the three criteria become increasingly blurred and open to negotiation and interpretation among an increased number of actors. This makes a clear separation of their specific effects and functioning more difficult and requires trade-offs between them (Sarkki et al. 2014).

With respect to the nested system perspective mentioned above, we can imagine a layered approach of knowledge activation that includes the new challenges relating to the different scales which the overall GAP project approach exemplifies (for the span of the GAP cases see Fig. 2.2 and 2.3 below): *First*, at the local level, scientists are brought in to explore and authorize local knowledge claims (ensuring credibility). Since this knowledge would need to be acted upon at some higher level (for legitimacy reasons), however, this may introduce new tensions. This can be referred to as a "management wall" problem, i.e. that agreed credible and legitimised knowledge from lower levels does not lead to improved management actions because the higher order system (e.g. TAC machine/CFP) is not capable of utilizing such 'best available knowledge'. This might increase legitimacy problems because the local knowledge claims are becoming more potent from being authorized by science e.g. though

[3] For further explanation of co-management in the GAP case studies see chapter 17.

participatory research. This can also imply a problem of saliency in reverse since there is currently no obvious and predefined policy use for the activated local knowledge claims in the higher order system of the TAC machine (see Chapter 17 for further elaborations on the "management wall" problem).

The reformed CFP has been questioned with regard to the extent to which the ACs fulfil the purpose of such a layered knowledge activation process and for empowering stakeholders for participating in responsible ways in management and decision-making (Griffin 2013; Hatchard and Gray 2014; Linke and Jentoft 2013; 2014; 2016). The management wall appears to be made quite of concrete here. Emerging practices of participatory research on the other hand imply novel stages of stakeholder *interactions* and *communication* (Röckman et al. 2015), and can hence reveal the dynamics of knowledge production and interaction as they unfold. This calls for a new examination of how credibility, legitimacy and saliency of knowledge are co-produced, re-negotiated and newly aligned under the recursive dynamics of participatory research.

As this suggests, the GAP approach features a model of interaction that fits nicely with key principles and perspectives driving the current reform trend in fisheries governance. The GAP project is a practical exemplification of the turn towards participation and knowledge inclusion described above. However, while this conclusion is an important starting point for analysing the GAP case study experiences, it does not guarantee a successful outcome. To make such a judgement, we must return to the questions with which we started and try to examine them from the perspective of nested-systems*: At which level can the knowledge gaps between science, policy and stakeholders be bridged appropriately through the collaborative research practices? And how can these practices, judged by the practical experience in the case studies, help solving problems of unsustainable management and/or legitimacy deficits created by separating science, policy and stakeholders at higher levels? More specifically, do the case studies represent recursive knowledge practices, as the theoretical discourses reviewed above lead us to expect? And if so, at which level do they unfold and where in the system do they make (most) sense? Or do they merely end up reproducing a conventional assignment of roles between scientists, stakeholders and policy-makers? While some of these questions are addressed again in Chapter 17, they urge us, particularly in those cases where the answers will begin with "it depends…", to focus on the conditions that make a difference. How exactly are the case study projects related to reform processes? Are they directly linked to and/or informed by the reform? Or do they remain peripheral to such efforts?*

3. The GAP approach and its variability

In recent academic and policy discussions about fisheries management we find a strong normative commitment to the issues discussed above, namely that fishermen's knowledge has been ignored while it should be included, that participation has been too weak while it should be improved and that reforms, while pointing in the right direction, are too slow and too weak. The GAP project as such is centrally embedded in this normative discourse rather than strictly explorative. Its purpose was not primarily to analytically explore, understand and qualify the 'gap', but rather to demonstrate and challenge it in actual practice. While we as GAP participants share this view, the sentiment of this book is somewhat different. For the purpose of this book, the main focus is to suspend the normative commitment and attempt to be more analytical by relating to the three conceptual pillars and the resulting research questions fetched out above. *What can the experiences from the GAP project tell us about participation, knowledge inclusion, and institutional reform?* The main empirical sources on which this book draws are the 14 GAP case studies (Table 2.1). In order to understand the outcomes and significance of them, we need to explore the process by which they were developed and look at the institutional context in which they are embedded in (this is done in Chapter 17).

All the GAP case studies are about collaboration, and although they express great variation in scope and maturity, they all aim to establish bridges across important divides, in particular those of knowledge between fisheries scientists and fishermen.

The process of initiating participatory research can have important bearings on how the details of the work materializes (Chuenpagdee and Jentoft 2007). With acute awareness of this, GAP was organized in two phases: GAP 1 identified shared needs for research and mobilised regional teams of researchers and fisheries stakeholders, and GAP 2 designed and carried out the research. This process has important consequences for the cross-cutting analysis of the knowledge dynamics of co-construction and delivery process among the case studies because they were not strategically designed to study these processes as a single collective. Nevertheless, the emergent features and dynamics sit comfortably in the theoretical framework presented above with the three pillars and bring it to life with practical meanings, as portrayed most remarkably with the "scientific fisherman" (see above and Chapter 17).

The case study selection process emphasized that the teams themselves identified and designed their project, a process which for many began in 2003 when the GAP idea was first conceived and scientists reached out to fishermen to form the embryos of collaboration through a co-design process. The 'selection' and formation of the case studies were initiated during the proposal writing stage and were sufficiently strong to withstand several knock-backs before funding finally came in 2008.

From the perspective that we study these process dynamics throughout the active life of the case studies, this implies some 'bias' that is important to acknowledge. For most of the cases, scientists took the initiative to instigate the joint research activities. Project development and review processes are hence deeply rooted in scientific culture and practice. At the same time, the case studies were challenging conventional approaches through their efforts to involve non-scientists in roles normally reserved for scientists. In the absence of institutionalized models for doing participatory research, the science partners were forced to take on chief roles for conducting the projects, being case-study leaders and serving as writers, rapporteurs and communicators of the results. Thus, while the GAP project certainly is committed to the values of equal partnership and collaboration, such ideals are to some extent contradicted by the basic requirements on GAP as a research project as such.

However, this way of 'compromising' was a pragmatic solution to make the partnerships work when faced with barriers that would otherwise prevent stakeholder's participation in EU research projects in any meaningful way (Mackinson et al. 2011). Indeed, the GAP project could only be realized through science partners who were not, or at least not only, acting as gate-keepers of the conventional approach. Instead, they were committed to a different view, open to a more inclusive and responsive science ideal, which also provides opportunities for an educational dimension for scientists. In the same way, the fishermen and other stakeholder partners in GAP are not representative of those on the far sides of the gap, who have already concluded that scientists are biased against them. Hence, whereas one would perhaps wish for a project to explore the gaps in communication and understanding where they are at their deepest, this is not how the GAP project actually was set up and worked out. Instead, the GAP teams comprised partners that were all ready and open to collaborate, and the case studies hence featured situations were bridges were already in place.

As Table 2.1 and Figures 2.2 and 2.3 indicate, the GAP case studies, all representing individual experiments and 'research in the wild' (Callon and Rabeharisoa 2003), vary tremendously in scale, complexity, ambition, resources, effectiveness, issues, financial values

and the grounds being covered. This variation of these case studies is in itself a cause for reflection because even the small sample of cases presented here indicates a massive amount of variability across European fisheries. This is an important message when engaging in fisheries issues, either through the lens of research or governance. We must therefore avoid generalization and simplification, and recognise the specific contexts that influence the performance of each individual case study. This variability will be taken up as an important element in our attempt to synthesise lessons from the GAP project in Chapter 17.

Figure 2.2. The geographical range of the 14 case studies.

Figure 2.3. Relationship between exploited area and yearly landings in each CS.

Table 2.1. Overview of the GAP2 case studies.

Chapter	Short name	Title	Country
Chapter 3	Sustainability of brown crab fishery	Fishers and scientists in the same boat: A story of collaboration in the UK south Devon crab fishery	United Kingdom
Chapter 4	Selectivity in Lake Vättern	Getting choosy about Whitefish in Lake Vättern: Using participatory approaches to improve fisheries selectivity	Sweden
Chapter 5	Mapping habitats and fishing	Understanding common collaboration in Galician small-scale fisheries: Validating a methodological toolbox through a process-oriented approach	Spain
Chapter 6	Management of herring	Information is the jam of the Western Baltic Herring sandwich: Bridging gaps between policy, stakeholders and science	Denmark
Chapter 7	Rare Wadden sea species	Aiming for by-catch: Collaborative monitoring of rare and migratory species in the Wadden Sea	Germany

Chapter 8	Fishing and habitats in the northern Adriatic Sea	The Italian Job: Navigating the (im)perfect storm of participatory fisheries research in the Northern Adriatic Sea	Italy
Chapter 9	Fishery monitoring for coastal cod	Trapped in the TAC Machine: Making a fisheries-based indicator system for coastal cod in Steigen, Norway	Norway
Chapter 10	Management of NW Mediterranean red shrimp	When fishermen take charge: The development of a management plan for the red shrimp fishery in Mediterranean Spain	Spain
Chapter 11	Multispecies and mixed fisheries in the North Sea	Does slow-burn collaboration deliver results? Towards collaborative development multiannual multispecies management plans in North Sea mixed demersal fisheries	United Kingdom
Chapter 12	FADs in Tuna fisheries	Action research in tropical tuna purse seine fisheries: Thoughts and perspectives	Spain/France
Chapter 13	Baltic fisheries and Marine Spatial Planning	From planning for society to planning with society: Integration of coastal fisheries into the Maritime Spatial Planning	Estonia
Chapter 14	Discard sampling for flatfish fisheries	Implementing the landing obligation: An analysis of the gap between fishermen and policy makers in the Netherlands	Netherlands
Chapter 15	The Maltese Fisheries Management Zone	Taking the initiative on Maltese Trawl Industry Management: Industry and science collaboration on identifying nursery and spawning areas for Maltese trawl fisheries target species	Malta
Chapter 16	Bycatch and discards of elasmobranchs	People, sharks and science: What can it take for industry-led research to make a difference to the management of elasmobranchs of conservation concern in UK waters?	United Kingdom

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