



Fishing for Influence: Fisheries Science and Evidence in Water Resources Development in the Mekong Basin

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ABSTRACT: During the last decade there has been a concerted effort in the Mekong basin to research the capture fisheries in an attempt to influence national and regional water resource policy and practice, particularly hydropower development. As a result of this research effort, the Mekong capture fisheries are better documented than ever before. There is broad consensus on the key conclusions of this research – on the scale and value of production, its importance to local livelihoods, and the ecological drivers of the natural productivity. Despite this research success the agendas of water resources management have not changed, and the pace of hydropower development has accelerated. This presents a dilemma for fisheries science and research in its efforts to influence policy.

This paper considers the models and assumptions of policy influence that have underpinned this fisheries research effort, and presents alternative approaches for fisheries science to better engage in influencing policy. The paper argues that addressing the neglect of capture fisheries in the Mekong is fundamentally a governance challenge of setting development values and pathways. Meeting such a challenge, in the context of the Mekong, requires a democratising and civic science that broadens the decision-making arena as much as it produces new evidence and arguments.

KEYWORDS: Policy analysis, science, fisheries, hydropower, Mekong

INTRODUCTION

The freshwater capture fisheries sector has long bemoaned its lack of influence both within the fisheries world, and in the broader development policy arena. Within the fisheries sector it has felt itself to be a poor cousin to aquaculture and marine fisheries while in the development arena it has been overlooked by commitments to infrastructure-led approaches to water resources development, in particular hydropower generation, irrigation and agricultural intensification. In the Mekong basin, this sense of neglect has been particularly acute in the face of an established state-led hydropower agenda, and has resurfaced over the last two years with the rapid acceleration of controversial hydropower development (Molle et al., 2009b; Middleton et al., 2009).

From the late 1990s, a concerted research effort has been directed towards generating improved information on the scale of production and value of capture fisheries in the Lower Mekong basin to address this policy neglect, particularly with regard to regional water resources development. It was argued that the lack of credible science-based information was the main cause of this neglect, and that generating such information would lead to greater attention to capture fisheries in policy outcomes, both within the fisheries sector itself and in the broader policy sphere of water resources management (MRC, 1998; Welcomme and Petr, 2004).

As a result of this research drive, the capture fisheries of the Mekong are now better researched and documented than ever before. Various estimates of production and value have been presented in recent years (e.g. Baran et al., 2006; Barlow et al., 2008; Hortle et al., 2008). For several years, the figure of 2.5 million tonnes with a value of US\$2.5 billion has been widely cited (Baran et al., 2006).

More recently, estimates of first sale value have increased to US\$3 billion (Barlow et al., 2008). The overall sense of scale and value of production of Mekong fisheries, and their importance for rural livelihoods, remain broadly acknowledged by a range of actors and have so far not been seriously challenged (ADB, 2004; WB/ADB 2006; Hirsch et al., 2006). Yet these 'facts' have so far had limited influence. Ultimately, current fisheries and water resources management and policy do not differ from those that arose during the previous period, when inland fisheries were less well researched.

This situation poses a dilemma for fisheries scientists and managers in the Mekong. At one level, the recent effort to generate improved information has been demonstrably successful. High-quality information has been generated, publications produced and general evidence widely acknowledged. Despite this research and information flow, very little has changed in the overall picture. The capture fisheries sector finds itself in the same situation as it started from – acknowledged but ultimately overlooked (cf. Friend et al., 2009).

A number of factors influence the setting of political and development agendas. As many commentators have argued, hydropower in the Mekong is driven by a range of political and economic influences (Bakker, 1999; Sneddon and Fox, 2006; Molle et al., 2009b). These dimensions of hydropower development have received a great deal of attention in the literature (e.g. Lohmann, 1998; Bakker, 1999; Hirsch et al., 2006; Sneddon and Fox, 2006; Molle et al., 2009b; Middleton et al., 2009). This is the context in which fisheries science has operated. There is something in the very nature of fisheries, as a resource that is under water and largely hidden from view, that lends itself to scientific enquiry. But the relationship between such enquiry and policy outcomes has not been considered in the Mekong. The interest in this paper is to focus specifically on how fisheries science and research could influence policy outcomes, and to consider how science can engage with development challenges in politically volatile environments characterized by weak governance.

This paper draws on a range of anthropological and sociological approaches to development policy analysis in order to address this dilemma for capture fisheries research. In developing this analysis of policy, science and information the paper contrasts formal capture fisheries science and research with hydrological and water resources modelling. The final section contrasts two research-based attempts at raising fisheries concerns. The first example attempts to do so by expertising the problem of fisheries and dams through the creation of a Fisheries Expert Working Group by the Mekong River Commission. The second example considers attempts to use research by local people as an empowering process to better engage in policy debates. This approach is represented by villager-led research in Thailand (known as Tai Baan research or 'villager research') and Cambodia (where it is known as Sala Phoum research – or 'village school'). The paper addresses the assumptions of research leading to policy change that has underpinned the strategies of formal capture fisheries research of the last decade. In conclusion, the paper considers the options for repositioning fisheries science within an alternative research framework based around science as a transformative social process that might exert more influence on regional water resources development policy by broadening policy arenas.

INFORMATION, EVIDENCE AND ARGUMENT

Much of the effort in the sphere of development projects aims to influence policy but there is often a poor understanding within such projects of what policy is and how it works. Nonetheless, various efforts at influencing policy are based on implicit models of how policy works, and of the linkages between research and policy change. To address the current dilemma facing the fisheries sector this paper will draw on recent approaches in policy analysis in order to consider the relationship between science, research, information and policy change.

Policy processes and changes, particularly in the field of 'development' and 'environment' have become the focus of attention of a range of disciplines (e.g. Grindle and Thomas, 1991; Gasper and Apthorpe, 1996; Grillo and Stirrat, 1996; Shore and Wright, 1997; Apthorpe, 1997; Keeley and Scoones,

1999; Sutton, 1999; Hajer and Versteeg, 2005) in an attempt to understand what policy is, how it is constructed and implemented, and how policy and practice change.

Understanding the language and ritual of development policy making has been a central interest for social sciences (Gasper and Apthorpe, 1996; Grillo and Stirrat, 1996; Shore and Wright, 1997; Apthorpe, 1997). The discourse/narratives approaches to policy analysis provide analytical insight into why certain policy arguments and courses of action prevail despite contradictory evidence and arguments. Much of this work has addressed the construction of development narratives (Roe, 1995; Hajer and Versteeg, 2005) and the ways in which such narratives simplify the complex taking on an air of the commonsense and conventional wisdom in such a way that the assumptions, arguments and evidence on which they are based are rarely scrutinized (Fairhead and Leach, 1997).

These analyses of policy also consider issues of power in setting policy agendas, legitimizing agents and actions of policy, and in legitimizing and de-legitimizing certain types of knowledge (e.g. Keeley and Scoones, 1999). But development policy and practice are also presented as a process of dialogue and negotiation, and at times, confrontation between competing political interests and actors with these processes determine policy outcomes and policy changes (Arce and Long, 2000; Lewis and Mosse, 2006). Such processes of contestation may occur even within the same institutions.

A particular focus of attention in the literature has been on the role of science, research, and information in influencing policy outcomes. Within development studies an established body of literature has examined how development actors, whether they be states, development organizations or projects, legitimize the agendas, institutions, spaces and practice of development by recourse to a putatively superior knowledge of science and development expertise (Marglin and Marglin, 1990; Hobart, 1993; Chambers, 1997). These analyses of policy have contributed to a reassessment of the linear models of research to policy outcomes that underpin much research in which policy challenges are presented as information gaps (cf. Brock et al., 2001). Research itself can have a self-justifying version of policy processes. If the argument that policy requires research holds, then better policy (i.e. more significant policy change) requires more and better research. This becomes a self-perpetuating and self-serving approach in which the value of research effectiveness is laid at the feet of the policy makers and decision makers, no longer the responsibility of the research community itself. This is similar to earlier analyses of policy failure that focused on the implementation side of a policy cycle. The failure of policy is argued to lie with a failure of implementation rather than with the design of policy (Grindle and Thomas, 1991).

An additional literature grounded in the Sociology of Scientific Knowledge (SSK) focuses more specifically on science in policy making as a discourse and social practice, and the role of experts and citizens in deliberating scientific evidence as the basis of policy decisions, and on the framing of policy problems as scientific problems (Yearley, 1988; Pickering, 1992; Collins and Evans, 2003; Berkhout et al., 2003; Pielke, 2007). As with the development policy literature, there is an interest in how framing policy problems, as lying within the sole realm of science and thus as being politically neutral, constrains the scope for debate and depoliticizes policy processes (Collins and Evans, 2003), or as Habermas (1971) notes, the scientization of policy. While some policy questions might be technically specific and be legitimately settled by some recourse to scientific analysis, other policy choices are broader and more inherently concerned with social, cultural and economic values, and can thus be more appropriately settled by public debate. Framing fundamentally value-based policy challenges as questions for scientific deliberation is itself a mechanism to depoliticize policy by removing debates from the public sphere and transferring them to the expert arena.

Increasingly this SSK literature raises the potential for a more engaged political process of consultation that takes on board disparate views and multiple realities. Authors such as Cortner (2000) and Brand and Karvonen (2007) call for a "civic science" and "civic expertise" in which science and experts become more engaged in, and accountable to, citizen-led science and knowledge generation. McCormick (2007) argues for a "democratising science", described as a "process through which lay understandings are taken into account when scientific knowledge production is used to make political

decisions". But Collins and Evans (2003) argue for a need for a balance between expert and lay science, cautioning against policy becoming the exclusive territory of either the layperson or the expert.

Other authors argue the need for a deliberative democracy to deal with the kinds of policy challenges associated with the environment. As Munton (2003) argues, there is something in the nature of environmental issues that requires a deliberative process founded on an informed and engaged civil society. Environmental issues are uncertain, complex and with long-term consequences for future generations and thus require a range of knowledge and principles of justice in their deliberation (*ibid*).

In addressing the role of science, research, and information in policy processes it is important to consider how evidence and arguments are presented, and who is involved in the policy-making arena. Majone (1989) compares policy to the legal process in which both evidence and the arguments constructed around evidence are influential in determining policy outcomes. But the arena in which policy is made and the interests that are represented also influence policy outcomes. For Majone, broadening the policy arena is a necessary mechanism for allowing new voices to enter policy debates and thereby encouraging innovation. For several authors, the greater the diversity of knowledge represented in these processes the greater the likelihood for innovation (Majone, 1989; Munton, 2003).

The challenges for broadening policy process are all the greater in the political context in which governance structures and political participation are weak. While science can provide a neutral critique, the political context in which scientific 'truth' is interpreted and in which science-related institutions operate needs also to be considered (*cf.* Yearley, 1988). In circumstances of weak governance, recourse to science can further close space for public debate, and deny opportunities for the layperson and civil society to engage on a level playing field. These are very much the challenges that characterize the Mekong (Hirsch et al., 2006).

In examining the case of fisheries and hydropower policy in the Mekong basin many of these theoretical discussions will be drawn on as part of an analysis of current debates, and as the basis for future recommendations.

GENERATING FISHERIES INFORMATION FOR POLICY OUTCOMES

The efforts by fisheries researchers and institutions to place capture fisheries on the development agenda have been focused on the generation of scientific information, with an expectation that this information would itself lead to some policy change.

For fisheries scientists and researchers, the starting point for engagement in research was a sense that capture fisheries were being overlooked in regional development agendas. Since the 1950s, the Mekong river has largely figured in regional development as a water resource to be harnessed and managed principally for generation of hydroelectricity (Bakker, 1999; Sneddon and Fox, 2006). The river was presented as "underutilised and unproductively variable" (Bakker, 1999), unmanaged and hence unpredictable, with too little water in the dry season and too much in the flood season. The discourse of taming the vagaries of a natural river system was employed together with arguments promoting hydropower as an engine of regional cooperation and economic progress. Water resources development has enjoyed an established political support.

There is an inevitable tension between the agendas of hydropower development and capture fisheries management as the refashioning of flood-plains and hydrological regimes constitutes a major threat to the viability of fisheries that depend on natural flood patterns and flood-plain connectivity (Dudgeon, 2000). Dams block fish migrations and alter the natural flood pulse when managed according to the needs of electricity production to meet market demand. In the Mekong basin, as in other tropical fisheries, major fish species are highly migratory and their migration patterns, breeding and spawning behaviour are intimately linked to seasonal dynamics of hydrological flows and the connectivity of flood-plain habitats (Welcomme and Halls, 2004; Baran, 2007).

Capture fisheries have had an interesting role in this regional hydropower narrative. Historically, fisheries have generally not been influential in shaping this hydropower-based development narrative.

But while the potential for negative impacts on inland capture fishery have long been acknowledged across the world (WCD, 2000) and also within the Mekong (Tubb, 1966; Hill and Hill, 1994; Bakker, 1999), the debate about policy choices in the Mekong has consistently drawn on an enduring narrative in which the capture fishery is presented as a doomed, marginal resource with limited potential for economic development (Sneddon and Fox, 2007; Friend et al., 2009). This representation of capture fisheries is well established both within the institutions of the state fisheries sector and within the hydropower sector.¹ Within the fisheries institutions of the region, the main focus has been on developing technical and extension capacity to promote aquaculture and the stocking of reservoirs. Efforts to manage the capture fishery have tended to focus on an essentially conservation or mitigation approach of reducing pressure from fishing effort.

Within the hydropower narrative itself, impacts on capture fisheries, where recognized, have been presented as the unavoidable, if regrettable cost of necessary development. Until the 1990s, very few detailed formal scientific studies had been undertaken on the capture fisheries of the Mekong. Yet a rather paradoxical situation emerged in which it was recognized, on the one hand, that there had long been a lack of scientific information on some of the most fundamental aspects of capture fisheries (stock assemblage, production, yield), while, on the other, it was also widely asserted – at least since the 1960s – that fisheries production had somehow peaked and was already in decline (e.g. Tubb, 1966). Despite the lack of information to justify such an assessment, this interpretation has endured. Even interest in generating information on the fishery was largely driven by disciplines of fisheries biology and fisheries management, and a political-institutional framework that focused on identifying the scale of impacts, rather than shaping an alternative fisheries-based agenda for meeting development objectives, such as poverty reduction and food security. It has been common for fisheries departments and regional researchers to dismiss the capture fisheries as being in terminal decline with limited development potential.

By the late 1990s, capture fisheries began to arouse renewed interest in the region. Several factors contributed to this shift. Certainly, the experience of hydropower projects in Thailand and the intense social conflict they created as a result of impacts on fishery livelihoods had a widespread effect (Bakker, 1999; Amornsakchai et al., 2000; Molle and Floch, 2008). The opposition to dams in Thailand grew and was increasingly framed by dam opponents in terms of fishery impacts creating local social upheaval. Hydropower projects within Thailand were no longer considered viable due to concerns for the level of political unrest and conflict that had been created earlier (Molle and Floch, 2008). The World Commission on Dams, including the Pak Mun case study, had also begun to highlight the impacts on fisheries and fishery-based livelihoods, and put the hydropower agenda in the political spotlight (WCD, 2000).

At this time, the capture fisheries of the Mekong were becoming the focus of several research efforts. This coincided with the global development discourse shifting towards the recognition of environmental concerns and sustainability, and a greater emphasis on poverty reduction and sustainable livelihoods. With the signing of the Mekong Agreement between Cambodia, Lao PDR, Thailand and Vietnam, and the resurgence of the Mekong River Commission in 1995, the development of water resources was back on the agenda, having been stalled by decades of political instability and conflict (Sneddon and Fox, 2006). There was also an internal drive within the Mekong River Commission to, at least, scope out the kinds of issues that might require further attention (Hill and Hill, 1994; MRC, 1998). This then became the basis for the formulation of a regional research effort within the Mekong River Commission (MRC) to assess the fisheries of the Mekong, identify possible impacts and recommend mitigation measures (MRC, 1998). The MRC launched a regional project to assess the capture fisheries of the Mekong with the goal to achieve "improved information on fisheries ecology

¹ In interviews and informal conversations with the author, senior officials within departments of fisheries, particularly in Thailand and Lao PDR, have commonly referred to the terminal state of the capture fishery and the future of fisheries lying solely in the development of aquaculture.

and socio-economics (a) taken into account in fisheries management practices, and (b) incorporated into planning of water management projects in order to sustain and optimise fishery productivity and socio-economic [benefits of the fisheries]".

The assumption underpinning this approach was straightforward – that better scientific information on capture fisheries in itself would address the policy neglect.

This concern for the neglect of fisheries in regional policy spread across a network that incorporated the MRC, the fisheries agencies of the four lower Mekong countries (Vietnam, Cambodia, Laos, Thailand)), regional bodies such as the FAO, research institutes such as ICLARM (since then renamed the WorldFish Center), and a number of donor-funded research projects. The situation in Lao PDR is explained as "a lack of information and statistical data; and inland fisheries has undermined their importance and subsequent management of the resources" (Souvannaphanh et al., 2003).

This position was elaborated by an FAO review of information on capture fisheries, arguing that:

... inland capture fisheries activities are often under-valued by decision-makers and development agencies. Development activities may then inappropriately focus on other sectors such as agriculture, aquaculture, water extraction, hydroelectric development, navigation and land conversion at the expense of inland capture fisheries and rural communities. This results in a vicious circle that continues to impact on the poorest people (FAO and MRC, 2003).

The situation outlined above has been based on a number of assumptions about the nature of policy, about how decisions are made and by whom, and on how science, research and information influence these processes. At the heart of these approaches lie a linear model of policy change and a depoliticized understanding of how decision-making operates. As with the discussion of poverty research (Brock et al., 2001), it combines an identification of policy neglect and an information gap necessitating further research, with a policy cost identified in terms of impacts on poor people. It is an argument that has an immediate logical appeal in its simplicity, but one that is nonetheless flawed.

The perspectives, motivation and interests of actors involved in these efforts on fisheries research provide some insight. From interviews conducted with regional projects on fisheries research of the period (2000-2001), there is no evidence of any serious assessment of policy processes, of how institutions work, and how decisions are made (Friend, 2001). While there was much talk of influencing decision-makers and presenting information in forms that would be accessible to these decision-makers, research projects of the time had not undertaken any analysis of the policy context, or of the institutions with which they were partnered. There was a sense that even though the objective of the fisheries research was in terms of influencing policy these processes were too political and messy. Policy was seen as 'political' as if this were an unpleasant interference rather than a defining characteristic. The involvement of science in influencing decisions was generally considered to end at the presentation of research. What happened beyond this was beyond the role of science and scientists. The extent of the discussions on influencing policy was in terms of communications approaches, to ensure the findings and recommendations from scientific research were presented in an accessible form to a loosely conceived group of 'policy makers'. One of the outcomes of this kind of thinking was the growing emphasis on generating science-based evidence on economic values of fisheries, working on a hypothesis that such information is what decision-makers take most seriously (see Welcomme and Petr, 2004 – LARS 2 Summary Conclusions²).

This essentially managerial and rational approach to policy engagement implicitly recognizes the politics and power that underpin the regional development agendas of water resources development across four nation states but not in such a way that the approach and institutional arrangements of research should be called into question. But there has been no attempt within fisheries science to

² The Second International Symposium on Managing Large River Systems for Fisheries (LARS 2) was jointly organized by the MRC, FAO and Cambodian Department of Fisheries with support from a number of international and regional organizations, and was held in Phnom Penh in February 2003.

develop or even draw from the kinds of political economy analyses of water resources development emerging from other disciplines (cf. Mehta, 2001; Molle and Floch, 2008; Molle et al., 2009b). Indeed fisheries research and water research have been noteworthy in their isolation from each other.

THE CONSENSUS OF CAPTURE FISHERIES RESEARCH

After the comprehensive research effort of the last decade the position of fisheries has certainly changed in some senses. The main findings of the research have been widely disseminated, and largely accepted. The most significant of these is perhaps the increase in both the volume of fisheries production and their value. Within the last decade, estimates for fisheries production in the Mekong basin have been adjusted dramatically. As Baran et al. (2006) discuss, in the early 1990s total production of the lower Mekong basin was assessed at 357,000 tonnes, rising to 620,000 in the mid-1990s, 1 million in 2000, and 1.53 million in 2002. From 2006, estimates of production were widely cited as standing at 2.5 million tonnes with a value of US\$2.5 billion (Baran et al., 2006). More recently, public debates referred to a first sale value of US\$3 million (Dugan, 2008; Barlow et al., 2008). These adjusted figures continue to be widely cited, with an overall conclusion that production is huge and extremely valuable. Interestingly, there has been no serious attempt by the hydropower lobby to challenge or critique these estimates even though as Bush (2004) argues, the generation of production figures has been influenced by the advocacy agendas of the institutions involved.

The ecological dimensions of fisheries are also well documented and widely acknowledged (Coates et al., 2003; ADB, 2004; Baran, 2007). Widely cited estimates of species diversity refer to the number of species as being over 1000, most typically between 1200 and 1300, representing one of the highest fish species diversities in the world. Equally, the ecological drivers of fisheries productivity are also more widely acknowledged. The fundamental importance of hydrology, floodplain connectivity and habitat diversity to fisheries productivity has been extensively researched and documented in recent years (Van Zalinge et al., 2004; Coates et al., 2003; Baran, 2007). This understanding of the ecological drivers of fishery productivity has also had some influence on the debates on the threats to the fishery with the recognition that blocking migration paths and altering flow regimes will have a potentially enormous impact (ADB, 2004; WB/ADB, 2006).

The capture fisheries of the Mekong are also more widely acknowledged as playing important roles in local livelihoods. Fisheries and aquatic resources are widely argued to be an important component of rural livelihood strategies providing the main source of animal protein in rural diets, with estimates ranging from 27 to 78 percent, and average annual per capita consumption in the range of 35 kg/yr (Hortle and Bush, 2003; Baran et al., 2006; Hortle et al., 2008). Significantly, it is widely stated that capture fisheries are of particular importance for poorer people – especially in terms of being a common property resource for the resource-poor, and as a safety net and coping strategy for periods of crop failure and economic shocks (Meusch et al., 2003). The livelihoods and food importance of capture fisheries, and the particular importance for poor people are, again, well established.

There is a broad consensus on these key areas of evidence – the level and aggregate economic value of fisheries production, the ecological drivers of that production, and the livelihoods importance of capture fisheries. This evidence is now widely cited in the documents, reports and speeches of national governments, in regional bodies such as the MRC, and in international finance institutions such as the World Bank and ADB, as well as by a range of international, national and local NGOs with both conservation and development agendas. In contrast, there is divergence between these actors' interpretation of the evidence and construction of the arguments around these 'facts' particularly in the context of future development potentials. This becomes most clearly illustrated in the intense conflict over water resources development that has begun to emerge with the recent renewed agenda on mainstream hydropower development. The current importance of fisheries gives way to a narrative of impending and inevitable doom (Friend et al., 2009).

THE SCIENCE OF HYDROLOGICAL MODELLING AND THE NEW HYDROPOWER NARRATIVE

Capture fisheries and hydropower in the Mekong have been unavoidably entwined for several decades. Policy approaches to one cannot be analysed without considering the other. At the same time that the fisheries research effort was producing a significant shift in the evidence of the importance of capture fisheries, the hydropower narrative which had been dormant suddenly re-emerged more strongly (WB/ADB, 2006; Sneddon and Fox, 2007).

As hydropower reappeared on the development agenda in 2004, supported by the World Bank, Asian Development Bank (ADB) and the MRC, the scientific and technical hydrological modelling of the river played a central role. Certainly at a discursive level, the confidence that is now being placed in the technical capacity to model the hydrological changes that would be brought about by planned water resources development, and then to assess and manage their impacts, making necessary trade-offs has been central to legitimizing a particular development pathway. Hydrological modelling of the Mekong has been attempted for many years (Adamson, 2001; Sneddon and Fox, 2006) but, by 2006, a model based around scenarios of development had been developed by the MRC with financial support from the World Bank (WB/ADB, 2006). This contributed to the World Bank and ADB's joint development of a regional water resources programme (known at the time as the Mekong Water Resources Assistance Strategy). The significance of this modelling exercise is explained thus:

The bottom line message of this Mekong Water Resources Assistance Strategy is that the analytical work on development scenarios has for the first time provided evidence that there remains considerable potential for the development of Mekong water resources... The Mekong basin has flexibility and tolerance, which suggests that sustainable, integrated management and development can lead to widespread benefits. This may contrast with the more precautionary approach of the last decade that tended to avoid any risk associated with development, at the expense of stifling investments (WB/ADB June, 2006).³

The technical hydrological assessment soon became the basis for arguments made by key individual actors for "rapid hydropower development" (Cogels, 2006) and downplaying the social and environmental impacts of hydropower. For example, drawing on the modelling exercise, the previous CEO of the MRC argued that the "overall downstream impact of hydropower dams on the Lancang in China is often exaggerated in the public opinion" (MRC CEO Olivier Cogels, Postbag, Bangkok Post, 9 January, 2007). This kind of interpretation of future development scenarios and impacts based on one particular hydrological model has continued. In recent public consultations on hydropower development, presentations by the MRC have summarized the scenarios as indicating that hydropower development along the mainstream will not cause changes to the flow regime, and will have only small and largely positive impacts on the hydrograph (MRC, September, 2008). This interpretation of the hydrological model does not necessarily fit with more cautious interpretations also within the MRC, but does demonstrate how a scientific analysis of hydrological regime change can become a justification of certain values of development choices.

The shift from evidence to interpretation has occurred despite the cautions and caveats of scientific experts within the same institutions, and from alternative approaches from outside. Criticism has emerged from civil society organizations that have challenged the basic science, calling for peer review of methods, data and analysis and further public consultation (IUCN et al., 2007) while also highlighting the significance of potential impacts on fisheries, particularly in the Tonle Sap (Sarkkula et al., 2009).

This recourse to the science of hydrological modelling has important implications. By framing development options in terms of modelled scenarios only a limited number of choices are presented. By wrapping the debate in a science that is often impenetrable to the layperson, the political dimensions of development policy processes, and political choices of access to, and control over, resources become matters for science to assess, and for policy makers alone to make scientifically

³ This section also appears in the Mekong Water Resources Partnership (MWARP) dated February 2007.

informed choices. If an impact appears small or manageable the inference is that development that causes such an impact is beneficial or desirable. In this way, political choices become the exclusive domain of technical experts as if such technical approaches were the only basis for framing and making policy choices. But this particular modelling exercise has occurred within specific institutions, and within a pre-established development narrative based around the promotion of hydropower to meet fixed, if poorly defined, development objectives. It is not an exercise in assessing alternative development options that exist outside of this agenda.

Hydrological modelling also creates its own narrative of a river in which water is the main resource (either for irrigation or hydropower) and in which the river is represented as a set of hydrographs. Changes to the hydrograph, as revealed by the modelling exercise, come to represent what the river is (and what it is not) and how it could, and ultimately should, be managed. But this is a specific and partial representation of a river (IUCN et al., 2007). Alternative representations of the river and the knowledge that might contribute to these representations are excluded. Impacts become 'collateral', justifying a 'damage-control', or 'damage mitigation' approach. Fisheries concerns in particular enter the exercise as impacts to be dealt with through mitigation strategies and trade-offs. While fisheries issues are not completely ignored, they fail to shift the overall agenda.

FISHING FOR INFLUENCE

Capture fisheries certainly make an appearance within this hydropower narrative, but largely as resources with limited future development potential, and as an unfortunate but unavoidable cost. Additionally, it is argued that the hydrological change, even before it is fully analysed, will have negligible and manageable impacts. But intriguingly, the central argument that fisheries research has attempted to establish – that Mekong fisheries are hugely important – is itself not questioned, despite uncertainties in the fisheries science (cf. Bush and Hirsch, 2005). Acknowledgement of current importance has failed to shift narratives of future doom.

In this section we will examine two contrasting efforts to place fisheries on the policy agenda. The first derives from the MRC itself and the establishment of a loose Expert Working Group in 2008 to consider dam impacts. The second, with a longer history founded in political struggles by civil society against dams, is based on supporting fishers to conduct their own research by applying their 'local wisdom' and using research as the basis to represent their own interests.

Expert working group

As part of the preparation for an MRC-hosted public consultation on mainstream hydropower development, the MRC established an Expert Working Group to consider the barrier effects of dams on fish migrations. This group consisted of invited international expert scientists, identified as such by the MRC itself. This group of 17 scientists all had a background in the sciences of fisheries biology and fisheries management, with experience working in North America, Europe and Africa, and some with experience working on dam issues in the Mekong. The experts met in closed session and were asked "to bring their experience and knowledge to assess the possible impacts of mainstream dams on the fisheries of the Mekong, and to see what mitigation activities could be relevant to this region". The conclusions of the Expert Working Group were then to be presented for public consultation on hydropower.

In reporting back to the public consultation, the group did not prepare a joint statement reflecting agreed positions of the individual scientists. Rather a presentation by one scientist representing the group was made but in doing so, he did not refer to the scope and scale of any internal debate within the group, or of the different analyses and interpretations of the individual scientists (Dugan, 2008). The presentation was designed for a public consultation, and as such was at least partly shaped by the institutional context of engaging in such a forum – attempting to present simple balanced messages.

This presentation made some basic conclusions (Dugan, 2008) the most striking of which is that current mitigation strategies and technologies from around the world are not able to deal with the scale of fish migration in the Mekong. But the level of impact of dam development in the Mekong on fisheries was also argued to differ between the upper and lower parts of the basin, with few impacts on the upper stretches of the basin. This interpretation led to the suggestion that construction of dams in these upper reaches would be a better policy choice. Finally, although current mitigation technologies could not be utilized in the Mekong, this does not preclude the possibility of advances in mitigation science some time in the future.

This experience raises some interesting questions. First, the effort by the MRC as a science-based organization to draw on scientific experience to confront the potential impacts of mainstream dams is commendable, since throughout the period 2005 to 2007 the MRC had constrained internal and public debate on dams and fisheries (Dore and Lazarus, 2009). There are clearly technical issues concerning hydropower development that can be framed as the stuff of scientific enquiry. But 'expertising' these issues of policy choices entails a number of risks. Some questions within policy debates are indeed appropriate questions for science. So, for example, the issues of whether mainstream dams will impact fisheries and whether technical knowledge and experience are adequate to manage these impacts are all within the bounds of science. These are questions that draw on a body of accepted, orthodox science and thus matters of scientific interpretation are transparent, and open for peer review. However, as soon as the science enters the public forum of policy debate it enters an even broader dimension of interpretation and value judgements. In this way, the Expert Working Group's conclusions – that mainstream dams will have a huge impact and that current mitigation technology is not adequate to deal with the scale of migration in the Mekong – are relatively easy to accept as scientific findings. But when the questions shift to those of choice over location of dams – whether they would be better constructed in the upper reaches of the Lower Mekong basin (for example, Lao PDR) or in the lower reaches (Cambodia), or whether on the tributaries or the mainstream, and also speculation about the possibility of developing appropriate mitigation technologies at some time in the future, science slips into highly contentious, and essentially political debates about values of development and choices about distribution of costs and benefits. But in this case, the science does so without warning and perhaps without the scientists themselves being aware of how the debate is shifting.

This experience – of a formal expert panel reporting back to a formal meeting of public consultation – illustrates how scientific 'truth' and interpretation can easily become confused as they enter broader debates. Despite what the scientists in the expert group themselves thought was a clear scientific explanation that there are no known effective mitigation measures against the barrier effects on fisheries in the Mekong, the public forum was soon discussing the importance of developing mitigation measures. The evidence that the scientists perhaps thought would be a powerful piece of evidence against mainstream dam development was easily diverted. Indeed, the debate has continued from this public meeting to focus on mitigation even after mitigation has been argued not to be possible.

Local knowledge and action

An influential example of the way in which research, evidence, argument and empowerment have been brought together comes from the experience of local fishers and NGOs supporting local research led by villagers themselves. In Thailand, where these kinds of efforts began in opposition to the Pak Mun dam,⁴ this became known as *Tai Baan research* (Srettachau and Deetes, 2006). The Pak Mun dam project was specifically presented by the state and developers as a problem to be framed by experts and that, as such, this did not require consultation with local people. The issues of needs, benefits and impacts became the subjects for external experts, to be presented through formal planning processes, impact assessments, and managed public hearings.

⁴ The Pak Mun dam also featured as one of the case studies in the World Commission on Dams report, 2000.

From this perspective the challenge of development was purposively framed by the Tai Baan research as a challenge between competing interests, values and knowledge, with the role of science in formal state-led assessment processes specifically critiqued. The science that was drawn on in dam development was criticised for being partial, downplaying ecological and social considerations, and for merely legitimizing the knowledge and authority of dam developers and thereby excluding alternative voices.

Competing knowledge became a central aspect of the campaign against this Pak Mun. Mistrusting the role of state-appointed academics to represent their knowledge and interests, local people and NGOs began their own research to document the impacts of opening the dam gates for a trial period, and to use their own evidence as part of the campaign to keep the gates open permanently. This *Tai Baan* research is argued to represent a "counter hegemonic approach to the conventional form of research" in which local people "take control over the process of knowledge production" (Vaddhanaphuti, in Srettachau and Deetes, 2004).

On one level this kind of approach has assisted in affirming the extent of what people know about the facts of fisheries – for example, by identifying fish species, fish habitats, and spawning and migration patterns. The local research generated information on such issues that had not been known within the broader scientific community. The importance of local knowledge has been accepted within fisheries science as a source of valuable information, and has even been taken up by the MRC itself (Valbo-Jorgensen and Poulsen, 2000; Bao et al., 2001). On the whole however, such interest in knowledge focused on 'indigenous' or 'local' technical or ecological knowledge to be interpreted and utilised by scientists and experts (Hirsch, 2003). For fisheries science, the credibility of local knowledge has depended on its interpretation and validation by science with less interest in how fishers' knowledge might strengthen their own role in decision-making.

At another level, by undertaking the research themselves and representing their own interests in policy forums and challenging the expertise of academics and development practitioners, conducting research itself has become a tool for negotiation in a struggle of power and political representation (cf. Hirsch, 2003). This has been very much framed by an understanding of development as a contest between different kinds of knowledge (cf. such works as Marglin and Marglin, 1990; Long and Long, 1992; Hobart, 1993; Chambers, 1997).

This approach has been taken up by a number of NGOs and grassroots organizations in Thailand and Cambodia, often supported by international NGOs. From this perspective, fisheries and the wisdom of local people, and their role as custodians of river ecology (Sluiter, 1993; Missingham, 2003) are central to the policy problems of resource management and hydropower development. The challenge is fundamentally one of competing values of development, and of lack of voice and political influence. Research done by local people themselves thus has an empowering and democratising role itself. As it has been taken up in other parts of the Mekong, the aim has been less specifically on campaigning against dam development than on enhancing the significance of capture fisheries in local development, and in strengthening the voice and participation of fishers in decentralized institutions. When development is framed as a process of competing values, the challenge is for different voices to be able to influence the process of decision-making and action.

This encounter between local and scientific research raises several important issues for our understanding of research, science and policy. In many ways, the Tai Baan and Sala Phoum represent a 'civic science' – a consciously framed political effort in which the putative superior knowledge and the 'expertocracy' that lead regional policy are challenged by an alternative research process that, while based on local knowledge, is framed within a scientific research agenda. While hydropower development led by the state has consistently been framed in terms of scientific analysis, recommendations and technical solutions (and such an approach was represented in the Fisheries Expert Working Group), the experience on the ground has exposed both what Yearley (1988) has referred to as the "internal limitations of the science" and the institutional political context in which scientific truth is established. The science applied within the hydropower debate consistently ignored

ecological (including fisheries) and complex socio-economic dimensions, with interpretation of evidence determined by the institutional and political agendas of the government agencies and investors supporting dam development.

The problem of fisheries, not being able to influence the direction and outcomes of regional water resource policy processes, is not simply a problem of an information gap, to be filled by science. Essentially, this is a governance issue of competing values in which the very people who depend most on fisheries are marginalized from political processes. The challenge is to broaden the knowledge base of decision-making while also providing the political space for these interests to have a voice. There is a real danger in framing the problem solely in terms of research and science where the political space for debate is narrowed, and the rights of certain actors to engage denied. This is particularly the case in a political context such as the Mekong in which governance processes – whether at the regional scale within the framework of the MRC or at the national scale – are weak and science itself beyond the realm of public scrutiny. Where public consultation does take place in the region, it tends to be shaped by the agendas, discourse and knowledge of the state. With a heavy emphasis on science and expertise the space for influencing such processes is tightly constrained. The putatively superior knowledge of developers and experts needs to be opened for public critique, and for that to occur there is a need for a democratising and civic science that opens up space for informed public debate and broader public engagement.

CONCLUSION – DEMOCRATISING SCIENCE

When viewed as a research exercise in identifying and documenting the production and value of the capture fishery of the Lower Mekong basin, the research effort of the last decade is indisputably a significant success. But when viewed through the lens of influencing policy the experience of capture fisheries in the Mekong is so far less impressive. It has yet to achieve what was stated to be its original objective.

While there have been no clear attempts within the fisheries sector in the Mekong to assess policy processes, deeply held assumptions have guided ways of working. The success of the research effort in capture fisheries has been in producing and disseminating evidence and information. But part of the weakness remains in the arguments and narratives constructed around this evidence (Majone, 1989). Essentially, the evidence of the importance of capture fisheries – the species diversity, scale of production and livelihood values – has been widely acknowledged. But the research effort in fisheries has only succeeded in generating a narrative of what not to do – of risks, impacts and mitigation. It is a narrative of what stands to be lost but not what stands to be gained. The importance of small-scale fisheries for rural livelihoods has a potential resonance in terms of economic development, but so far it has only become a poverty-prevention argument highlighting what is to be lost (cf. Béné, 2003). It fails to demonstrate how fisheries can contribute to the stated developmental objective of poverty reduction and food security. While the importance of capture fisheries for poor people has been generally acknowledged, this has been reworked within the hydropower narrative – that it is because people are poor that they fish, and if people were not poor they would not fish. This counter-argument continues further, that providing the poor livelihood options other than through fishing which also contributes to economic development can be argued to address the root problem of poverty (e.g. WB/ADB, 2006). The future of fisheries livelihoods is in moving people out of fishing. Without a narrative that can articulate how capture fisheries can contribute to such development goals as poverty reduction and sustainable livelihoods, the capture-fisheries sector has little to contribute to policy debates.

So how has the research effort of capture fisheries failed to influence policy? Fundamentally, this is the outcome of inappropriate models of how policy works. Regional water resources development brings in many highly politicised dimensions – the control over, and access to, vital economic resources, of the integrity and influence of nation states, and of competing institutional interests within states

(Sneddon and Fox, 2006). The very nature of these political dimensions has never been fully addressed in the regional research on capture fisheries. Where there has been consideration of this broader policy context it has not changed the way in which formal fisheries research has been conducted. Examples of politically aware fisheries research approaches appear more clearly in the cases of Tai Baan and Sala Phoum research.

If we recognise policy as a political process, and take on board Majone's (1989) analysis of policy in terms of a legal argument, there is also a need for conducting research and applying evidence that presents better arguments and broadens the policy arena (cf. Munton, 2003). This is particularly important in the Mekong where weak environmental governance and the credibility and accountability of regional institutions such as the MRC are heavily criticised (Hirsch et al., 2006; Dore and Lazarus, 2009). If science and research have a role to play in policy making in this Mekong context of weak governance, it is important that civil society engages. In terms of research, the challenge is to support a democratising and civic science, as a mechanism for a broader engagement in setting development objectives, identifying options and for agreeing on how these can be met. That is not to say that all research should be handed over to become the responsibility of local people, but rather to reassess the ways in which fisheries scientists engage with civil society, and the ways in which civil society and fishers themselves can engage in science and research. But ultimately, in addition to influencing water resource policy debates, engaging fishers in science and research is essential for meeting the challenges of managing capture fisheries.

For fisheries science to be able to influence policy outcomes the policy context needs to be better understood, and research engagement more strategic. Drawing on notions of 'clumsy policy' (see Verweij and Thompson, 2006) this requires an analysis of regional development policy that deconstructs the narratives and scrutinises the assumptions, evidence and arguments upon which they are based. This should critique 'technical' foundations of the current agenda (e.g. scrutiny of the hydrological model, the experience of mitigation, and planning including impact assessment) while also promoting a political process in which policy objectives and options for meeting these can be debated and assessed. In doing so, it must broaden the arena in which these research issues are undertaken, analysed and deliberated upon through a civic and democratising science.

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