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On the Sidelines: Social Sciences and Interdisciplinarity in an International Research Centre

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ABSTRACT: This paper reflects on the notion of interdisciplinarity in the research for development sector from a specific vantage point, that of social science researchers at the International Water Management Institute (IWMI). Drawing from first-hand experiences of doing research at IWMI, a member of the Consultative Group on International Agricultural Research, and a series of interviews with former and current staff, we highlight the disputed nature of social science research within the institute and link it to major challenges to interdisciplinary research practice. For research managers and non-social science researchers, social science research has always been, and still is, central to IWMI's mission and current activities. Social science researchers, on the other hand, tend to think their work has progressively been sidelined from a core to a peripheral concern; they feel they are underrepresented in management and hence have little influence on strategic orientation. This reinforces a tendency to work in isolation and not engage in the unavoidable negotiations that characterise the workings of an organisation. The uneasiness felt by IWMI social science researchers is largely grounded in the fact that many do not share the view that IWMI's objectives and research practices are value-neutral and that the purpose of social science research is to add human dimensions to natural science projects rather than lead to knowledge creation.

KEYWORDS: Social sciences, interdisciplinary research, international agriculture research organization, IWMI-International Water Management Institute, coupled human-natural systems, water resources management

INTRODUCTION

There is an increasing recognition that the study of environmental issues such as natural resources management and ecosystem services requires interdisciplinary approaches due to their complex and multifaceted nature (for instance Brewer, 1999; Mollinga, 2010).

Interdisciplinarity (as a process combining knowledge from multiple disciplinary fields; Brewer, 1999) occurs at the interface between disciplines (Castán Broto et al., 2009). As such, it would allow a better understanding than can be derived from single discipline work, not only of the individual components of the subject or system of enquiry, but also of the ways the components interact and influence each other. Calls for interdisciplinarity go together with the changing position of science and of the providers of scientific knowledge within society in which there is both an increasing expectation that research should be 'socially relevant' (that is, geared at solving problems) and a recognition that disciplinary

research alone is ill-adapted to provide answers and practical solutions to real-world 'wicked problems' (Rittel and Weber, 1973).

If the discourse on the need for interdisciplinarity has imposed itself among researchers, practitioners, and not the least, research and development funding organisations, many scholars continue to highlight the challenges of practicing interdisciplinarity. Disciplines are institutional artefacts that structure the production of knowledge (Lélé and Norgaard, 2005; Castán Broto et al., 2009); they work as labels. On the one hand, they allow for an intuitive differentiation among different fields and practices of research; but on the other, they create boundaries where there might be none, or conversely, provide an image of cohesion where there is none.¹ We therefore use the term 'discipline' with caution and consider interdisciplinarity to be about 'crossing boundaries'.

Beyond disciplines, Lélé and Norgaard (2005) identify four interconnected paradigmatic fault lines and challenges to practicing interdisciplinarity: (1) potential differences in value judgments about science and its place in society (notably whether there is an absolute truth that can be unravelled and whether science is value-laden or not); (2) differences in theories or explanatory models (and their underlying assumptions) of real-world processes (these are ontological differences on 'how the world works', for instance, in relation to causality); (3) differences in epistemology and methods derived from it (e.g. through which means can real world processes be best described?); and (4) differences in the way society values specific lines of enquiry or approaches and how this translates in the institutional arrangements that govern research.² They further highlight that the natural/social sciences divide is the most difficult to bridge, notably because the latter are themselves divided along the four lines identified above. The first step towards practising interdisciplinarity, scholars argue, is to self-reflect about one's own values and practices (Lélé and Norgaard, 2005; Riaux, 2013). Reflecting on his experience in the study of natural resources management, Mollinga (2010) highlights that whether interdisciplinary research endeavours flourish or not hinges on internal dynamics (the organisation and dynamics of research activities or organisations) and external factors (the environment in which the research is done).

This is on the basis of such premises that we, as social science researchers, specifically look into the structural conditions and practices of social science research and its contribution to interdisciplinarity at the International Water Management Institute (IWMI), a member of the Consultative Group on International Agricultural Research (CGIAR). By doing so, we contribute to the debate on interdisciplinarity from a vantage point outside of academia, namely the research-for-development sector, and participate in another long-lasting debate on the disputed nature and potential contribution of social science research to international agricultural research for development.

In the next section, we briefly describe the context of the study, that is, the increasing recognition and repeated calls that social science research should play a pivotal role in the research-for-development portfolio of the CGIAR centres. We then describe the methodology of the study and give an historical account of IWMI research, with specific attention to the contributions of social science researchers. The paper then provides a structural picture of social research at IWMI on the basis of common indicators and use first-hand accounts to delve into the issues of institutionalisation, legitimation and interdisciplinarity work – which appear to be grounded in daily practices and broader cultures of research. In the discussion we recap our findings and stress the challenges faced by social

¹ Lélé and Norgaard (2005) for example highlight that divisions within the social sciences might be harder to bridge than between certain natural sciences and particular social sciences.

² Mollinga (2008) highlights three types of boundaries that recoup the four challenges of Lélé and Norgaard (2005): (1) syntactic boundaries that are grounded in the use of different (disciplinary) languages; (2) semantic boundaries linked to ontological and epistemic differences that translate into differences in theories, explanatory models, and methods; and (3) pragmatic boundaries linked to the institutional structure of science and research.

science researchers in meaningfully contributing to an interdisciplinary research agenda on water resources management at the International Water Management Institute.

CONTEXT OF THE STUDY: THE CGIAR

International agricultural research emerged in the aftermath of the Second World War with the explicit objective of increasing food production in what were then called non-industrialised countries. The CGIAR was formed in 1971 to coordinate policy and funding for a growing number of international agricultural research centres and has been "a key mechanism by which the international community has deployed agricultural research for international development" (Hall et al., 2003). As such, CGIAR centres have always positioned themselves as 'boundary organisations' aimed at bridging the gap between research and policy.

In 1988, Anderson et al., stated that all CGIAR centres shared the common goal of "increasing agricultural productivity, thereby raising farm incomes, reducing food costs, and improving human nutrition" and that their *raison d'être* was the development of new technologies that could be used to grow subsistence food crops in the developing world. At the time, "the dominant agricultural research paradigm was not exactly calling for social research" (Cernea, 2006: 11).³ This started to change as researchers and development actors realised that adoption of technologies was sometimes slower than expected, that farmers had objectives other than maximising yield or output, and that more production did not necessarily translate into reduced poverty or less hunger.

As a result, increasing importance was placed on farming system research and repeated calls were made for participatory and need-based research, and for putting the 'farmers first' (for instance, Chambers et al., 1989), elements that several CGIAR centres incorporated into their strategies (Thiele et al., 2001). It is in this context that the International Irrigation Management Institute (IIMI), created in 1984, joined the CGIAR in 1991 (IIMI would be later renamed IWMI – International Water Management Institute in 1998).

This growing concern towards conducting socially-relevant agricultural research led the CGIAR to incorporate poverty alleviation and sustainable food security into its goal in the mid-1990s and to adopt a new vision and strategy in 2000, 'A food-secure world for all' (CGIAR, 2000a). The 2000 strategy explicitly recognised the need and advocated for expanding social research in the CGIAR system, statements that are reiterated in the most recent CGIAR strategies and results frameworks (CGIAR, 2011, 2015). Despite the recognition that social research has a key role to play in CGIAR centres and the repeated calls to strengthen its position in the system, notably from the External Program and Management Review Mechanism (EPMR), scholars believe that social research is still incompletely and insufficiently institutionalised and financed. This leads one of the most fervent advocates of social research in international development organisations to say that

within the organisations [World Bank and CGIAR], we [social researchers] were without 'rights of citizenship' and had to go through rites of entrance and confirmation, to struggle for a place under the organisational roof and to gain the privilege to make a contribution. Challenges of a similar nature, surely less crude in form but comparable in content, are still to be fought today as well by new generations of social researchers (Cernea, 2006: 27).

³ For Cernea (2006), the term social research encompasses non-economic social science such as anthropology, sociology, human geography, public administration, and political science. We adopt a similar terminology in the following sections of this paper: we use the term social research to refer to non-economic social science. Such categorisation illustrates that the divide is not across disciplines per se but rather, and among others, about differences in ontologies and perceptions about the nature of scientific knowledge. Economics is then singled out from other social science fields on the ground that economists would be more prone to believe in the value-neutrality and objectivity of scientific knowledge than, say, anthropologists.

This diagnosis echoes our first-hand⁴ experiences and perceptions of conducting social research at the International Water Management Institute (IWMI) and constitutes the starting point of our study. We are notably interested in understanding why such a sentiment as the one expressed in the above quote remains pervasive among many social researchers in a 'second generation' CGIAR centre, established at a time when the need for and contributions of social research appeared to be discursively recognised.

METHODOLOGY OF THE STUDY

This study was triggered by a wish to understand the roots of what seemed like contradictory sentiments regarding the position of, and consideration given to, social research at IWMI in the late 2000s. In daily interactions among researchers and research managers, it was striking that, on the one hand, many social researchers seemed to think that IWMI provided a wealth of opportunities to develop and implement stimulating social research activities. On the other hand, they also grew frustrated as they felt that their objectives, approaches, centres of interest, and activities found little echo and traction at an organisational level and that the terms of interdisciplinarity, when it happened, were largely set by natural science researchers. Castán Broto et al. (2009) highlight that this tension between intellectual freedom and experiences of constraints is a widely spread feeling among social researchers in academia.

To better understand this duality, we reviewed the type of social research that had been conducted at IIMI/IWMI since its creation and how it was embedded in broader organisational dynamics. To do so, we reviewed the existing literature about IWMI, including Centre Commissioned External Reviews (CCERs) and External Program and Management Reviews (EPMRs), Annual Reports from 1984 to 2012, medium-term and other Strategic Plans (IWMI, 2001, 2004, 2009); the organisation's website, as well as key research publications including reviews of IWMI's first (Merrey, 1997) and second (Giordano et al., 2006) decades. This literature review was complemented by phone or email interviews with past and present staff conducted from August 2012 to January 2013.

Forty potential respondents were purposefully selected based on our view that they would be in a position to discuss the place of social research at IWMI across its two and a half decade of existence. These individuals were contacted via email; the email listed the topics we were interested in and clearly stated that answers would inform the writing of a research report and, potentially, of a journal article in a way that would preserve the anonymity of the respondents. Out of the 40 people we contacted by email, 30 responded (17 in a written format and 13 by phone) and none specified they did not want their answers to be included in our analysis and subsequent writing.

Respondents represent a broad range of disciplines (soil and agricultural scientists; civil, irrigation, water resources and environmental engineers; hydrologists; and economists account for 17 people; geographers; anthropologists; and political scientists account for 13) and experience levels (from early career researchers to senior managers including the managing directors of IWMI research programmes). All but one had worked at least 4 years at IWMI, meaning the sample is biased towards more experienced researchers and research managers, who could shed light on how social research evolved with time. About half the respondents were staff members at the time of the study, including the four women interviewed,⁵ the Deputy Director General, and the four Theme Leaders⁶ responsible

⁴ The first author was affiliated with IWMI from 2004 to 2012, including 4 years as a PhD scholar. The second author worked with IWMI for 11 years beginning in 2002; he led the 'Water and Society' Theme and was a member of the Management Team from 2007 to July 2013. The third author worked with IWMI for more than 20 years until 2006, and, amongst other roles, was Deputy Director General for Programs (1998-2000) and the first Director for Africa (2000-2005). He continues to work for IWMI as a consultant.

⁵ The absence of women among former IWMI staff who were interviewed is linked to the fact that, until 1995, IWMI only had between 1 and 3 female researchers.

for defining the research strategy of the institute. Table 1 summarises the respondents' disciplinary background, levels of experience, and periods (past/present) during which they worked at IIMI/IWMI.

The interviews focused on assessing the perceptions of researchers and research managers regarding (1) the role and importance of social research within IWMI and how it has evolved with time; (2) the role that social researchers play in setting research priorities and the constraints they may face; and (3) the practices and difficulties of conducting interdisciplinary research.

Table 1. Numbers and main characteristics of respondents.

	Junior researcher	Senior researcher	Research managers	Total
Social researchers				13
Former staff	0	4	3	7
Current staff	1	3	2	6
Non-social researchers				17
Former staff	0	3	6	9
Current staff	1	2	5	8

All 13 phone interviews were transcribed and respondents given an opportunity to review the transcript – which seven of them did. The transcripts and emails were analysed so as to identify cross-cutting themes across individual responses. We use quotes from these interviews and from respondents' emails. While quotes can be caricatures that do not fully reflect the more balanced positions of their auth-20801753()-436(alys)10-5(f22(p)EMC /r5(siti)1EMC /oriti)-4ew o sig34(-5(n17(g)14(d)b5(lv)

When IIMI was established in the mid-1980s, it had the specific objective of improving the management and performance of irrigation systems at a time when it was becoming apparent that these systems were not delivering the anticipated benefits (Samad and Merrey, 2006). The Ford Foundation was instrumental in the establishment of IIMI and, according to individuals closely involved in the process, supportive of the idea that social research should be at the core of the institute's activities, notably because irrigation had long been seen as the exclusive domain of engineers (interview on September 9, 2012).⁷

In the mid-1980s, IIMI engaged in action research in close collaboration with irrigation agencies. At the time, IIMI's social research focused on irrigation institutions with significant work being done on Farmer-Managed Irrigation Systems (FMIS), participatory irrigation management in large-scale government-managed schemes, and the cultures and structures of irrigation bureaucracies in countries such as Sri Lanka, Bangladesh, Indonesia, Pakistan and The Philippines. The importance given to the 'soft issues' of irrigation at IIMI would even be one of the contributing factors behind the establishment of a more technical International Program for Technology and Research in Irrigation and Drainage (IPTRID) by the International Commission on Irrigation and Drainage and the World Bank in 1990, reflecting the dissatisfaction of the latter at the direction IIMI was taking (interviews on October 23 and 25, 2012).

In the late 1980s and early 1990s, IIMI social research expanded to the study of policy though no programme specifically addressed the topic until 1995 (Merrey, 1997). That IIMI started to tackle broader policy issues was fully in line with its integration into the CGIAR system in 1991. Social researchers were particularly active in conducting research on Irrigation Management Transfer (IMT; defined as the shift in responsibility for irrigation scheme management from government to non-governmental entities) and other institutional reforms. Joining the CGIAR system was soon followed by an evolution in IIMI's mission, from "improving the management of irrigation systems" to "increasing the productivity of irrigation systems" (Merrey, 1997).

This would have long-lasting consequences. Beyond the wording, this indeed marked a shift in the entry point from 'the people' (i.e. management) to 'the resource' (i.e. water), which, in effect, changed the position of social research from a strategic to a supportive function.

The mid-1990s marked another turning point with the publication of the first 'IIMI research report' that called for framing irrigation research in a broader context – that of the river basin (Seckler, 1996). The report, authored by IIMI's new Director General, initiated the metamorphosis of the institute and the broadening of its mandate. This metamorphosis became tangible in 1998, when IIMI became IWMI – the International Water Management Institute. The change in name reflected broader debates around the notion of water scarcity (which had started to take centre stage in the international arena) as well as the global trend towards decreasing investments in the irrigation sector. As commodity prices continued to fall, irrigation benefits were being questioned and irrigation was becoming increasingly controversial. Despite the establishment of a Policy, Institutions and Management (PIM) programme in 1996, which provided the opportunity to investigate the relationships between water and poverty (including from a gender perspective), social research started to fade away as pointed out by one respondent, who managed the PIM programme for a time:

IIMI considered management improvements in public irrigation system as its core mandate. Between 1985 and 1998, IIMI was mostly about institutional reform in the irrigation sector. At the time, social research

⁷ In 1982, the Technical Advisory Committee of the CGIAR commissioned a three-person study team comprising F.E. Schulze (soil scientist), Robert Chambers (social scientist) and Philip Kirpich (irrigation engineer) to report on water management research and training needs. This report and several consultation workshops with donors, among which the Ford Foundation, USAID, and the World Bank, laid the ground for the establishment of the institute in 1984 (for further information on the build-up towards the creation of IIMI, see IWMI, 1986).

had to have a high profile. Since then, the new-look IWMI is increasingly about the resource (water, land, etc) (...) As a result social research and social researchers have got marginalised (interview on January 22, 2013).

Several former research managers highlighted that, as the institute's mandate widened, the research agenda was re-centred on a few key issues including water productivity, health, and (modelling) river basin management. Engaging with the global debate on water scarcity also meant that the earlier participatory field research, which had provided significant insights into the ways irrigation policy-makers work at country level, became peripheral. The work on irrigation institutional reforms continued but in a different way – less engaged with field/system-level irrigation managers.

The transformation initiated in the mid-1990s would be further accentuated in the early 2000s as the 2000 World Water Forum helped to develop a global water crisis discourse. The 'water issue' became framed as a tension between the environment and agriculture in a context of growing scarcity and competition over water. Under the impetus of a newly recruited Director General (who had co-organised the 2000 World Water Forum), this nexus provided the entry point for much of IWMI's work in the 2000s as the institute aimed at addressing the water-food-environment nexus (IWMI, 2004; Giordano et al., 2006). The shift away from irrigation was completed as IWMI engaged with improving water *and* land management, engaging also in rain-fed ecosystems and using a natural resources perspective.⁸ It was also during the 2000s that IWMI expanded its presence in Africa and invested significantly in remote sensing techniques. According to one of our respondents and member of the management team at the time, "this period provided the opportunity for rich interdisciplinary debates. These mostly took place between environmental specialists, engineers and hydrologists (...) Less attention was given to social and institutional aspects" (Interview on November 15, 2012).

This does not mean that social research was abandoned (how could it have been as the water crisis was increasingly seen as a 'crisis of governance'? UN-WATER, 2006). Rather, social researchers began working with much less coordination in part due to the discontinuation, in 2004, of a research programme specifically devoted to institutional and policy research (see below). Poverty and gender dynamics continued to be on the agenda though they attracted less attention and enthusiasm from both donors and researchers, and were increasingly the remit of more junior staff (interview on November 3, 2012; CGIAR Science Council, 2006). Other individual social researchers looked at water rights (especially in Africa), groundwater governance and the related connection with energy in South Asia, and at the institutions, policies and politics of river basin management.

By the mid-2000s, IWMI's social research agenda was broad in scope, and it has remained so since, though with an increasing emphasis on political economy/ecology issues following the recruitment of several young social researchers in the late 2000s. This is clearly illustrated by the business plan that supported the reestablishment of a social research programme under the name Water and Society in 2007 (Giordano, 2008). By 2013, this business plan was still guiding the Water and Society theme, articulated around the four broad issues of water governance, water economics, water poverty and equity, and impact assessment (of IWMI's research).⁹

In the 2010s, and in relation with a renewed interest of major development agencies in the irrigation sector notably in sub-Saharan Africa, social researchers have reengaged with historical themes in irrigation research such as water user associations, irrigation management transfer and irrigation bureaucracies, and proposed ways to revitalise irrigation in Asia also looking at the trade-offs around

⁸ The inclusion of land management to IWMI's research mandate is linked to the merger of its programme with that of IBSRAM, the International Board for Soil Research and Management, in 2001.

⁹ IWMI has a new Strategy 2014-18, 'Solutions for a water-secure world', which we do not address.

the building of large dams. In Africa and South Asia, they also study small-scale, farmer-led initiatives and multiple- use water systems known under the rubric 'agricultural water management'.

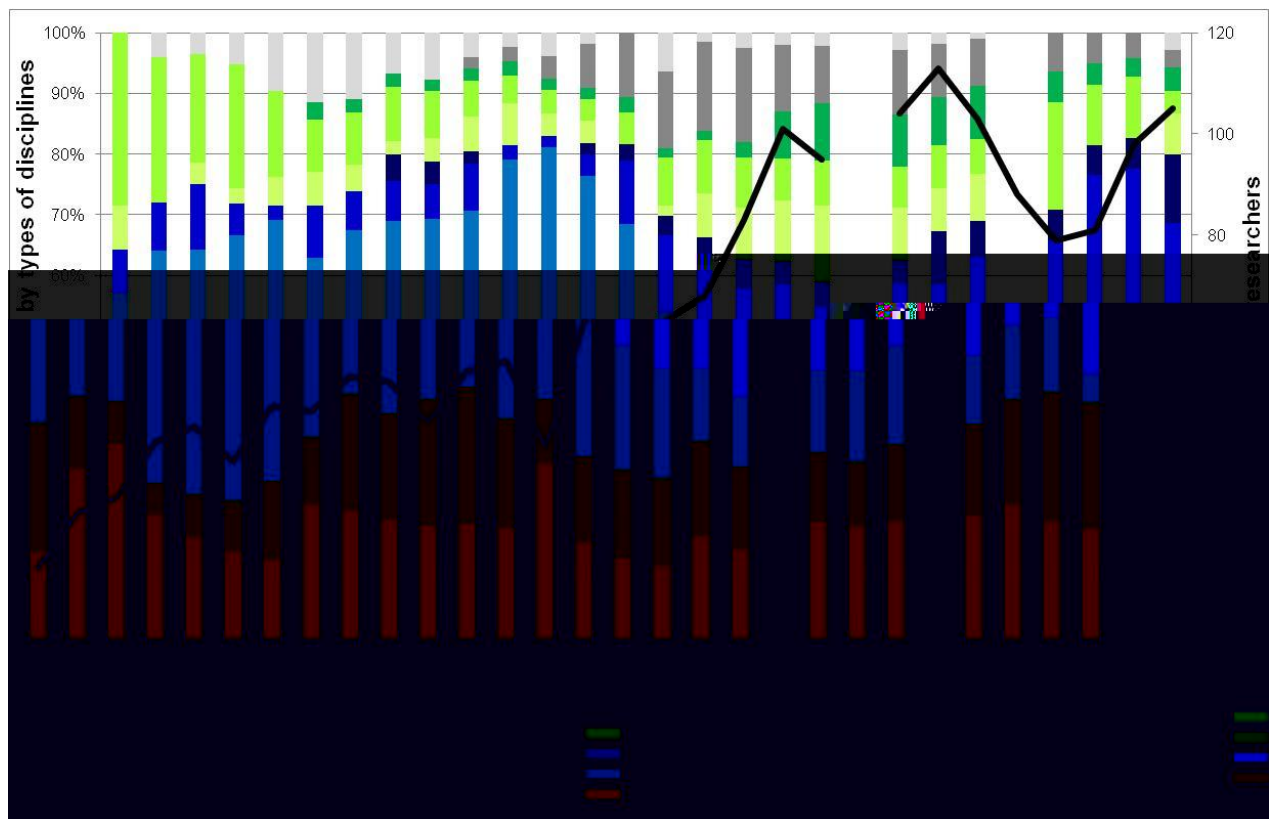
A STRUCTURAL PERSPECTIVE ON SOCIAL RESEARCH AT IWMI

In relation to the 'pragmatic' challenges to interdisciplinarity we highlighted in the introduction (which relate to the institutional arrangements that govern research practices and organisations), several of our respondents, as well as centre and externally commissioned reviews tended to link the position of any given field of research within the organisation to structural indicators such as (1) the number of staff of the corresponding background, (2) their inclusion in managerial bodies, (3) the existence of a dedicated programme and budget, and (4) the network of partners in which the organisation operates. These are investigated below in the case of IWMI.

Historical staffing patterns at IIMI/IWMI

Figure 1 presents the evolution in the number of research staff since the establishment of IIMI in 1984/85 and their partition by discipline. A few significant trends can be highlighted. First, the total number of staff at IWMI steadily increased between 1985 and 2006. The increase is particularly sharp from 1998/99. The number of staff then sharply declined from 2006 to 2009, before increasing again as new researchers, mostly in the fields of hydrology/water systems and economics were recruited.

Figure 1. Evolution of staff per discipline since the creation of IWMI in 1984/85.



Source: This study, based on IIMI/IWMI annual reports (1985-2012) and IWMI website (as per October 2012).

Notes: ‡ No detailed information available for 2004 and 2008. Data for 1994-1998 only include senior international staff. ¥ Include soil scientists in 2009-2011.

In terms of subject expertise, the most notable change is the decline in importance of the 'irrigation and water engineering' field from over 30% of staff to less than 10% over the lifetime of the institute (light blue in Figure 1). In parallel, researchers in 'hydrology, modelling, and water sciences' (dark blue in Figure 1) increased in numbers as the mandate and name of the institute changed in the mid-1990s. Taken together, and in keeping with the thematic focus of the institute, these two categories have consistently represented 25 to 50% of all staff since the mid-1980s.

The proportion of social researchers (orange in the figure) and economists (yellow in the figure) in IWMI is higher than in most CGIAR centres (see Rathberger, 2006 for CGIAR-wide data). In the institute's first 15 years, social researchers and economists (who tend to be pooled together by non-social researchers), taken together, consistently accounted for 30 to 40% of all staff. Social researchers dominated the early years of IIMI while economists were particularly well represented in the mid-1990s as well as over the last five years. The relative importance of social researchers has varied with time: (1) a sharp increase during 1985-87; (2) a steady decline from 1987-1991; (3) a pick-up in 1992, followed by a steady decline until 2003 (apart from the year 1998); and (4) since 2005, a move up towards 20%. In absolute terms, this means that, since 2005, there have been around 15 social researchers at IWMI (with a dip to 8 and 11 individuals in 2008 and 2009, respectively). This makes social researchers the third biggest group after the hydrologists/water system scientists and the economists. At the time of the research, typically, there were between 1 and 3 social researchers in each of IWMI's 11 offices, most of whom were early career scientists recruited over the 2008-2013 period. These numbers clearly indicate that social researchers, as a broad category, are not a minority within the institute, though many of them do think they are underrepresented. This perception might be related to the fact that IWMI social researchers belong to a wide array of disciplines (anthropologists, geographers and political scientists are the most common) and might not share the same paradigms, making the establishment of a dialogue among them difficult, an issue identified by Lélé and Norgaard (2005). For instance, in approximately one-fourth of the cases in which a researcher is categorised as a 'social researcher' in the annual reports, no further information on his/her specific disciplinary background is given. Exploration shows that this group pools together researchers who have a formal academic background in social research and others who have progressively come to consider themselves (and/or be considered by others) as social researchers. This was illustrated during several interviews, for instance when a former senior researcher stated that "in fact, there have been several occasions when people have assumed I was an economist or policy and institutions specialist; they expressed surprise when they learnt that I am an engineer by training" (interview on October 25, 2012). This echoes an observation of Rathberger (2006) and CGIAR Science Council (2009) who highlight that many researchers engaged in social research in the CGIAR have actually been trained in other disciplines but it also shows that the notion of discipline does not allow to fully comprehend researchers' values and identities.

Organisational and financial considerations

Though its name and content changed over time, IIMI/IWMI has almost always had a social research programme whose primary focus was the study of the institutional and policy dimensions of irrigation/water management. The only exception was 2004-2007 when an attempt was made to make social research cross-cutting and supportive of, or integrated with, research in other fields. From 1995 to 2000, the social research programme was called Policies, Institutions and Management (PIM), then Water Resources, Institutions and Policy (WRIP for the period 2001-2004). After its rebirth in 2007, it was called Water and Society.¹⁰

¹⁰ Refer to Merrey (1997) for an analysis of earlier IIMI research programmes, which were less circumscribed along disciplinary lines and section 2 for a description of the social research conducted at IWMI since 1984.

IWMI's social research programme was put in question by the 2000 External Programme and Management Review (EPMR). The EPMR indeed highlighted the discrepancy between human and financial resources and the broad mandate of the PIM programme. It called for priority setting and developing partnerships with other organisations having capacities in the field of policy and institutional research. CGIAR (2000b: xii) notably recommended building on the work done on gender and poverty in the 1990s when it called for "investigating more precisely the relationship between poverty, gender and access to water and incorporating more explicitly poverty and gender concerns in the design and conduct of research activities in programs other than PIM".

The EPMR took place just prior to the arrival of a new Director General (in October 2000) and a strategic planning exercise that both acted on and further reinforced the broadening of IWMI's mandate towards the "integrated analysis of water and land uses, particularly in agriculture, in a natural resources management framework" (IWMI, 2001: 2). In line with this strategic orientation, the broad mandate of the PIM programme (whose name was changed to WRIP) was maintained and partnerships and policy dialogues were identified as key activities. However, this way of structuring IWMI's research would be short-lived as, "in late 2002, the Strategic Plan 2000-2005 was running out of steam. The bulk of its ideas had been implemented; it no longer provided clear guidance. It was a good time to refresh our thinking" (IWMI, 2004: 2).

A new IWMI Strategic Plan for 2004-2008 was adopted in early 2004. It marked the discontinuation of the WRIP programme and established gender and poverty as cross-cutting issues. This happened at a time when IWMI witnessed tremendous changes, including in staffing patterns (see Figure 1). Several senior researchers left the institute and many young scholars joined. The renewal of staff affected all disciplines alike and the lack of senior staff to mentor young researchers and provide strategic guidance would eventually be pointed out by the 2006 EPMR (CGIAR Science Council, 2006).

That gender and poverty were instituted as cross-cutting issues meant that, in practice, social research would be largely dependent on the direction chosen by individuals from other backgrounds, who led the remaining IWMI research programmes. The dissolution of a social research-oriented programme was widely perceived as a major blow by social researchers who, at the time, ironically noted that making social research 'cross-cutting' actually resulted in 'cutting (social research), without the cross'. As stated by a senior social researcher:

it is really important to have a theme [programme]. If you do not have your theme, you cannot get a critical mass and you cannot define a research agenda from the onset. It is important to have your own reporting line. There was a moment when there was no theme; the funding for social research declined (interview on November 3, 2012).

The dwindling capacity of IWMI to conduct social research was noted by the 2006 EPMR. It recommended the reestablishment of a programme focused on the study of institutions and policies:

The Panel is concerned that by dropping the Theme area of Policies, Institutions and Management, IWMI has lost its concentration of research into a key niche area and with it, experienced senior social scientists (...) The Panel recommends that IWMI re-establish its theme on Institutions and Policies (CGIAR Science Council, 2006: 49 and 7).

The external review strengthened the position of senior social researchers who had unsuccessfully advocated for the same approach over 2004-2006. The arrival of a new Director General (in October 2007), and the support of the then Deputy Director for research, provided the opportunity to re-establish a *Water and Society* theme that would bring social researchers together. The research manager who would lead the theme however noted that:

we did not really develop an overall research strategy (...) It would have been difficult given the lack of staff and unrestricted funding available. The main element was to get social research staff back (...) We had ideas of the topics they would work on but not a real strategy. Rather I considered that, once the staff

would be there, they would begin developing things in a positive direction. I think this has happened (interview on September 10, 2012).

The above quote suggests the largely ad-hoc nature of IWMI's social research (this is further developed below) and also the importance of funding for its institutionalisation. Like the CGIAR system as a whole (Cernea, 2006), IWMI has witnessed a dramatic change in its funding pattern, with an increasing importance taken by project-based funding versus what is known in the jargon as 'unrestricted' funding, that is, funds whose use is entirely at the discretion of the institute. In 2011, unrestricted funding in IWMI accounted for less than 30% of the institute budget (against 35% on average from 1996-2010). This is significant but it is mostly used for non-research purposes (such as operational costs and administrative and support staff time) and as a coping mechanism to secure staff positions "by covering the time of researchers who could not find project-related activities rather than to support the development of great ideas" (interview on September 10, 2012). In the project-based approach to research, everything revolves around the time that researchers are 'allocated' to work on specific activities. Staff positions are indeed secured through project funds (that take the form of time allocation as donors are billed for each day an individual researcher contributes to the project they fund). The project-based approach to research also means that researchers, especially senior staff, work under a substantial time pressure, meaning they often focus on day-to-day project and staff management activities rather than on research per se. According to the then Water and Society theme leader, the problem is especially acute for social researchers as they are in disproportionately high demand to contribute to donor-funded restricted projects (which invariably have a policy/institution component nowadays). This is further evidence that social researchers contribute to IWMI's research but not always on their own terms (see below regarding the dynamics of project development). It also means that they are less likely to be allocated 'unrestricted' time to define their own projects, nurture their networks and develop strategic ideas or programmes, exactly because they are in demand for and funded by restricted projects, which, according to many social researchers (especially those trained in critical social sciences), do not provide them with the opportunity to pursue the questions they would like to investigate given funders' expectations and the way research projects are structured.

Representation and participation in decision making

During our interviews, most social researchers stressed that they felt underrepresented among management and that this limited the extent to which they could contribute to the strategic orientation of the institute. This claim was generally discounted by non-social researchers on the ground that every member of the management team has his/her own specific academic and professional background. Maybe more importantly, the latter considered that identifying management team members along disciplinary lines was not useful or relevant; it also created boundaries and reinforced silos instead of fostering a much needed interdisciplinary dialogue.

Whether disciplinary backgrounds among management do matter or not is a much debated issue. For most of the last ten years it has been the case that only one out of the ten to 13 members of the management team (seven of whom are closely involved in research management; see www.iwmi.org for a comprehensive list), has had formal training in social research.¹¹ Further, at the time of the writing none of the 11 office heads (who also have a key role in setting research agendas) had a social research background.

Like any human group, the IWMI management team must contend with power plays and work through continuous negotiations and shifting alliances carefully building an equilibrium in which decisions are made. All research managers, for instance, have to balance efforts between ensuring a

¹¹ The composition of the management team has varied with time in relation to IWMI's organizational structure. At most, and only before 2005, the management team comprised 2 persons trained in social science research.

critical mass of researchers in their programme at any given point in time, devising forward-looking thematic research projects and strategy (on the basis of which new hires can be justified), and ensuring that their colleagues have the opportunity to do the research they value. In the wake of the re-establishment of a social research-oriented theme in 2007, the first exercise for the management team newcomer, the Water and Society theme leader, was one of (personal and programme) legitimacy building rather than agenda setting. Having a critical mass of social researchers at a time when social and total IWMI staff was at its lowest, in almost ten years, appeared to be central in his search for legitimacy. In order to avoid potential pushback from other research managers who also aimed at strengthening their own programmes, new social researcher hires were often presented and justified on the ground that they would support the implementation of natural science-oriented projects (which had been the case in 2004-2007 in the absence of a dedicated social research programme). This strategy led to scattered social research efforts and weakened the position of social researchers to develop proposals with a clear social entry point.

Institutional path dependency and existing networks

We do not have enough entry points to tap into social research funds. If you look at IWMI's bilateral donors, they fund water research. Historical partners of CGIAR centres are little interested in social research. You also get involved in projects through partners; if they are less involved in social research, then you get less involved too (interview on November 19, 2012).

International and bilateral development agencies, development banks and private foundations are the major donors of IWMI. These organisations recognise that the scope for agricultural research to contribute to poverty alleviation and food security largely hinges on social, institutional and political factors. Yet, they see human dynamics as 'levers that need activation' rather than research objects per se. They also, for the most part, still hold a positivist paradigm whereby research is value-neutral and a trigger of change; and they put forth normative values such as 'sustainable intensification' as being the goal of research, while this understanding of research and its goals proved to be disputed, at least among critical social science researchers. IWMI has few institutional linkages with organisations for which social science research is a core business (these are often national research agencies of European and North American countries). This means that the brunt of developing such partnerships lies on individual social researchers, not on the organisation as a whole. Creating or keeping a network active and convincing potential partners of the legitimacy that IWMI may have to conduct social research requires significant time involvement, which only adds to the time pressure that researchers face.

THE DAILY CIRCUMSTANCES OF SOCIAL RESEARCH AT IWMI

Social research plays a very significant role within IWMI and social researchers are represented throughout the organisation, including in leadership (interview on October 16, 2012).

Social research is seen as an add-on. Water issues are conceived and thought in biophysical rather than in social terms (interview on January 17, 2012).

The above two quotes are representative of the opposed perceptions and disputed nature of social research at IWMI. The first quote from a senior non-social researcher clearly expresses the view that social research is central to IWMI and valued as such. It is in stark contrast with the second quote from a senior social researcher who feels (s)he is seen as an 'add-on' whose contribution is not really understood. We argue differences in perceptions are grounded in broader research cultures and in the difficulties of designing and implementing interdisciplinary research projects.

Research styles and research cultures

Social scientists, biophysical scientists, engineers, economists have different modes of thinking. The requirements to undertake research can also be quite different, in terms of methods, timing, resources, publications, etc (interview on October 16, 2012).

The above quote echoes the semantic and pragmatic fault lines identified by Mollinga (2008) as potential challenges to interdisciplinarity. It reminds us that disciplines may be grounded in different paradigms and, consequently, have their own codes and methods, which define what is legitimate and what is not in that specific field. These codes and cultures of research also have a bearing on whether and how different fields and methods of research are institutionalised within an organisation. The structure of IWMI, with its limited number of programmes, gives individuals who are in a leadership position the opportunity to set up teams to address a specific set of research questions, and consequently shape the strategy of the institute. This also means that senior researchers de-facto hand-over their research activities to other more junior team members (who themselves may rely on post-docs, students and external consultants) and rather assume a research manager role.

Many social researchers we interviewed stated they found it difficult to let go of their research in such a way. The uneasiness to 'let go the field' or devolve research to other individuals, and the creation of niches is partly linked to a broader academic culture (and modes of evaluation), which emphasise individual practice and single-authored articles or books (while in non-social research fields publishing in large teams is common). This concern for evaluation by academic peers is particularly marked among early career researchers and a rather recent phenomenon according to former staff – clearly highlighting that IWMI is affected by broader changes in the public research sector.

IWMI social researchers also linked this willingness to conduct their own research (as opposed to relying on a third party) to their working culture and heavy reliance on qualitative data collection, which they argued, always includes a subjective dimension. They also stressed that they were often more interested in understanding *how* things had been said (and what had been omitted) rather than *what* had been said, which requires an intimate connection to the place where the research is conducted. There seems to be a shared perception among all researchers that social science research does indeed call for a long-term presence in specific contexts. What is interesting is that natural science researchers articulate a specific view of social research at IWMI, one that is interpretative and mostly based on qualitative data collection (a view rather similar to the one expressed by the social researchers we interviewed), as expressed in the following quote:

in biophysical research, you can use secondary data. If you have long time-series data, you can do a lot. It is more difficult for social research. You need time to understand a social system. The longer you are involved in a place, the better it is (interview on October 18, 2012).

As clearly stated by one respondent, "social researchers are torn between two demands: on the one hand, spending time in the field and, on the other, realising that it is important for them to get involved in managerial decisions [so as to influence the agenda]" (interview on October 25, 2012). Since 2000, most senior social researchers seem to have chosen to focus on the first of the two options, often creating and protecting niches as expressed by one of them: "there is quite a lot of social research taking place but we all work in our little silos" (interview on November 3, 2012). These niches do not need to be disciplinary and there has been, and still are, several instances where social researchers work with 'sympathetic others' in interdisciplinary ways.

Designing interdisciplinary projects: Where is the social research?

When conducting this study, and in close relation to the broader debate on the type of research needed to understand water resources management dynamics, many informants (especially non-social researchers) highlighted that the focus should not be on one discipline versus another but rather on

how to develop an interdisciplinary approach (interviews on September 16, 19 and November 15, 2012).

There is an agreement among all early IIMI researchers we interviewed that most IIMI research in the mid-1980s was 'field focused', 'action-oriented' and 'interdisciplinary' (interviews on September 9, 16, 25 and October 25, 2012), which sometimes led to claims that IIMI was providing technical assistance rather than conducting research of excellence as expressed in the first external review of IIMI's activities (CGIAR, 1995). Interdisciplinarity was facilitated by the clearly defined mandate of the institute at the time, the relatively small size of IIMI and the fact that many non-social researchers had the same background (many had been trained as agricultural and/or civil engineers at Cornell University, which was known for training interdisciplinary graduates open to social research). Joint fieldwork was also a common *modus-operandi* at the time and played a critical role in fostering mutual understanding between individuals from different backgrounds. However, there were practical difficulties that are still relevant today to achieve interdisciplinarity; examples are ensuring a mix of staff in every office and putting in place mechanisms that would allow researchers to exchange across offices and continents (when web-based communication was not as common as it is now).

When IIMI joined the CGIAR system in 1991, the incentive structure and the focus of work shifted towards the production of international public goods (publications and other outputs of universal rather than location-specific relevance) through multi-country research efforts. The expansion of IWMI's research mandate and the growth of the institute since the mid-1990s also mean that IWMI is much more diverse today than it was in the early years. This is both an asset and a challenge to practise interdisciplinarity.

Ultimately, as was expressed by a former research manager, research design determines the relative importance of, and interactions between, different disciplines. Indeed, "one can never achieve true interdisciplinarity. There is always a departure point. It is not the same if a social or a biophysical researcher initiates things. What will come out will eventually differ" (interview on October 26, 2012).

As far as designing and coordinating research projects are concerned, in 2013, only nine of the 62 projects implemented by IWMI were led by social researchers. Projects centred on social research remain the exception even though they form the basis of many IWMI 'success stories' and achievements (as expressed by IWMI's Director General in his acceptance speech of the 2012 Stockholm Water Prize). The difficulty to meaningfully contribute to research design was clearly articulated by several social researchers we interviewed, for instance when one of them stated that "I feel social researchers contribute less to project development. I have been at IWMI for almost 5 years and I just started contributing to project proposals. I did not do it before because I thought only senior researchers were involved in writing proposals" (interview on January 17, 2013). This perception, whether grounded or not, appears particularly problematic as most social researchers appear to be in the early stages of their career.

This quote also illustrates another common phenomenon among IWMI social researchers. They tend to 'come along' with their non-social research colleagues rather than to take the lead on developing social-centred projects, partly because they shy away from managerial responsibilities (see above section). This leads social research to be largely sidelined given the reality of project design whereby, and as stressed by a non-social researcher,

project proposals are produced in a rush with little consideration on how things will be drawn together. We just assume it will. This does not happen and we work alongside each other rather than together. We need to spend more time reviewing proposals and thinking about integration at the onset rather than assuming that this will somehow take place (interview on October 18, 2012).

Project and theme leaders then have a key role, that of bringing researchers from different backgrounds together and, as can be expected, "some people do that better than others; at the end of

the day, it is about individuals, not their background. Some people function well in interdisciplinary groups whereas others find it difficult" (interview on October 16, 2012).

Despite the difficulties highlighted above, it is striking that all respondents with working experience in both the academia and IWMI highlighted that the latter was better equipped for interdisciplinarity and rewarded it more. As observed by Thiele et al. (2001: 439) in the case of the International Potato Centre, what is critical for social research to take off in specific contexts is that sympathetic and committed natural scientists are also involved. But beyond individuals, the incentive structure also determines whether people engage in interdisciplinary research. Several senior researchers mentioned that "whether you want it or not, the project-approach to research instils a sense of competition among researchers and/or theme leaders so as to get research funded and supported" (interview on November 3, 2012). This is detrimental to the development of interdisciplinarity as is the rapid turnover of staff whereby "people are focused on making projects productive for them, which makes it difficult to ensure consistency on the long term (...) staff and projects cycles are much shorter than the time needed for research questions to evolve and interdisciplinarity to take place" (interview on October 26, 2012).

DISCUSSION: ASPIRATIONS, IMAGERIES AND PRACTICES

This paper reflects on the notion of interdisciplinarity in the research for development sector from a specific vantage point, that of social researchers at the International Water Management Institute (IWMI). We notably show how IWMI's social research has progressively lost its strategic role and instead acquired a service function – that of supporting other disciplines. This happened even though social researchers always accounted for a rather stable and high share of total staff since the creation of the institute. We link the evolving position of social research in IWMI to a change in the institute's mandate, from improving the management of irrigation to improving the productivity of land and water as a pathway to alleviate hunger and poverty.

We argue that changes in the terminology used in IWMI's strategic plans are not mere rhetoric. They are strategic indeed and reflect a paradigmatic evolution, which makes it increasingly difficult for interpretative/critical social researchers (who constituted the majority of IWMI social researchers at the time of the study) to be central to the research agenda. Changes in the terminology have been paralleled by an evolution in the questions driving IWMI's research from interrogations such as 'how do people make water management decisions, and why?' to 'which decisions and technologies are needed to improve productivity?' In the latter, and despite a socio-environmental rhetoric, sustainability and equity are not core concerns but externalities; institutions and policies are less objects of research than conduits for change. As such, IWMI appears to have fully embraced the ethos that had led to the creation of the CGIAR in the 1970s.

The (perceived) difficulties encountered by social researchers to weigh on the IWMI research agenda and strategy are closely related to the major fault lines of interdisciplinary research. While many IWMI social researchers consider that values are inherently embedded in research practices and stress the non-neutrality of CGIAR objectives (such as that of sustainable intensification), the latter are presented in the most neutral possible way in strategic documents that portray IWMI as a neutral provider of 'objective' evidence-based solutions. This divide, for instance, leads an early career social researcher to state that (s)he "has difficulties identifying with the image and discourses IWMI projects externally [and..] prefers developing her/his individual research than to get involved at an organisational level" (interview on January 12, 2012).

This misfit between personal aspirations (that are grounded in a specific research paradigm) and institutional discourses and imagery has significant consequences on the way research is organised. Many IWMI social researchers for instance tend to work in isolated silos that can be either disciplinary, or interdisciplinary when they work with 'sympathetic others'. Beyond the paradigmatic difference, this

also happens for pragmatic reasons and personal interests. IWMI social researchers tend to prioritise field research activities at the expense of the unavoidable and time-consuming negotiations that characterise project development, strategic decision-making, and agenda setting. This 'niche syndrome' is both a cause and a consequence of what social researchers perceive as their low representation in IWMI's decision-making bodies and, in consequence, the limited scope they have to influence the overall orientation of the institute.

Another point of tension relates to assumptions on, and understandings of, social science research. Many IWMI managers are in line with some of the most fervent advocates of social research in the CGIAR system who see the role of the latter as one of contextualising other more technical research outputs and, on this basis, act "as a multiplier for all that CGIAR does and aspires to do" (Cernea, 2006: 26). The need for such predictive social research was clearly spelt during one of our interviews:

If you want to trigger change, you need social research (...) We are facing what I would call wicked problems; these are complex (...) The fundamental problem is one associated with human beings and behaviours; what we need is social engineering to understand behaviours and trigger behavioural change (interview on October 18, 2012).

The notion of social engineering, however, appears to be very controversial among IWMI social researchers as shown by the following quote (see also Merrey et al., 2007):

The problem with social engineering is that it is grounded in the idea of a simple cause-effect relationship. People and behaviours cannot be characterised and delimited like that. What people are asking from social researchers is to provide social solutions on the same model as technical ones; this does not work like that (interview on October 25, 2012).

Here we touch upon what are ontological (theories and explanatory models) and epistemological (judgements on the features that are relevant to look at) differences between how IWMI social researchers envision their work and what non-social researchers (who are often less shy to provide policy recommendations and largely define what makes 'good' (read useful) social research) expect from them. This misfit is partly grounded in a lack of awareness of the inner diversity of the social sciences and the fact that social research at IWMI, at the time of this study, was dominated by interpretative and critical social researchers (who wished to engage with the problem at hand – often framed in terms of inequity) rather than positivists (who would be quicker to provide options for others to deal with the same problem).

IWMI, like other CGIAR centres, is embedded in the international development arena. This is likely to make it a challenging working context for critical social researchers of Development and the Environment for the foreseeable future. Funders of international agricultural research are indeed rarely keen to fund research whose findings might question their own activities. Several fields of critical social research could, however, have a lot to contribute to organisations that aim to conduct policy-relevant research and provide policy-relevant insights. The *Anthropology of Development* for instance offers important insights on the way development 'works in practice' and development actors make decisions (for instance Olivier de Sardan, 1995; Mosse, 2005); *Political Ecology* advances our understanding of the interplay between society and environmental degradation (Forsyth, 2003; Robbins, 2004), while *Science and Technologies Studies* help us better understand the relationships between technology and society (for instance, Bijker and Law, 1992; Franklin, 1995). These fields have in common the provision of explanatory frameworks to development and environmental dynamics in which research and development actors (and their value systems) are part and parcel of the processes they study and hence contribute to their shaping. Making this positioning explicit is the first step towards a shared understanding of what (critical) social research could contribute to an interdisciplinary approach to water resources management research.

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REFERENCES

- Anderson, J.R.; Herdt, R.W. and Scobie, G.M. 1988. *Science and food – The CGIAR and its partners*. Washington, DC: The World Bank.
- Bijker, W.E. and Law, J. 1992. *Shaping technology/building society: Studies in sociotechnical change*. Cambridge, Massachusetts: MIT press.
- Brewer, G.D. 1999. The challenges of interdisciplinarity. *Policy Science* 32(4): 327-337.
- Castán Broto, V.; Gislason, M. and Ehlers, M.-H. 2009. Practising interdisciplinarity in the interplay between disciplines: Experiences of established researchers. *Environmental Science & Policy* 12(7): 922-933.
- Cernea, M.C. 2006. Rites of entrance and rights of citizenship: The uphill battle for social research in CGIAR. In Cernea, M.C. and Kassam, A.H. (Eds), *Researching the culture in Agri-culture. Social research for international development*, pp. 3-31. Wallingford, UK and Cambridge, MA, USA: CABI Publishing.
- Chambers, R.; Pacey, A. and Thrupp, L.A. 1989. *Farmer first: Farmer innovation and agricultural research*. London: IT Publications.
- CGIAR (Consultative Group on International Agricultural Research). 1995. *Report of the first External Programme and Management Review of the International Irrigation Management Institute (IIMI)*. Rome, Italy: Technical Advisory Committee and CGIAR Secretariat.
- CGIAR. 2000a. *A food secure world for all: Towards a new vision and strategy for the CGIAR*. Rome: Technical Advisory Committee (TAC) secretariat, FAO.
- CGIAR. 2000b. *Report of the second External Programme and Management Review of the International Water Management Institute (IWMI)*. Rome: Technical Advisory Committee (TAC) secretariat, FAO.
- CGIAR. 2011. *A strategy and results framework for the CGIAR*. Montpellier, France: CGIAR Consortium Board.
- CGIAR. 2015. *CGIAR strategy and results framework 2016-2030*. Montpellier, France: CGIAR Consortium Board.
- CGIAR Science Council. 2006. *Report of the third External Programme and Management Review of the International Water Management Institute (IWMI)*. Rome, Italy: Science Council Secretariat.
- CGIAR Science Council. 2009. *Stripe review of social sciences in the CGIAR*. Rome, Italy: Science Council Secretariat.
- Franklin, S. 1995. Science as culture, cultures of science. *Annual Review of Anthropology* 24(1): 163-184.
- Forsyth, T. 2003. *Critical political ecology: The politics of environmental change*. London: Routledge.
- Giordano, M. 2008. Theme 4: Water and Society. Draft Business Plan. IWMI unpublished internal document.
- Giordano, M.A.; Rijsberman, F.R. and Saleth, M.R. 2006. "More crop per drop": *Revisiting a research paradigm. Results and synthesis of IWMI's research: 1996-2005*. Colombo: IWMI and IWA Publishing.
- Hall, A.; Sulaiman, R.V.; Clark, N. and Yoganand, B. 2003. From measuring impact to learning institutional lessons: An innovation systems perspective on improving the management of international agricultural research. *Agricultural Systems* 78(2): 213-241.
- IWMI (International Water Management Institute). 1985-2012. *Annual Reports*. Colombo, Sri-Lanka: IWMI.
- IWMI. 2001. *Strategic plan 2000-2005*. Colombo, Sri Lanka: IWMI.
- IWMI. 2004. *Strategic plan 2004-2008*. Colombo, Sri Lanka: IWMI.
- IWMI. 2009. *Strategic plan 2004-2008*. Colombo, Sri Lanka: IWMI.
- Lélé, S. and Norgaard, B. 2005. Practicing interdisciplinarity. *BioScience* 55(11): 967-975.

- Merrey, D.J. 1997. *Expanding the frontiers of irrigation management research. Results of research and development at the International Irrigation Management Institute 1984 to 1995*. Colombo: IWMI.
- Merrey, D.J.; Meinzen-Dick, R.; Mollinga, P.P. and Karar, E. 2007. Policy and institutional reform: The art of the possible. In Molden, D. (Ed), *Water for food, water for life: A comprehensive assessment of water management in agriculture*, pp. 193-231. London: Earthscan; Colombo: IWMI.
- Mollinga, P.P. 2008. *The rational organization of dissent: Boundary concepts, boundary objects and boundary settings in the interdisciplinary study of natural resources management*. ZEF Working Paper No. 33. Bonn, Germany: Zentrum für Entwicklungsforschung (ZEF).
- Mollinga, P.P. 2010. Boundary work and the complexity of natural resources management. *Crop Science* 5(1): S1-S9.
- Mosse, D. 2005. *Cultivating development: An ethnography of aid policy and practice*. London: Pluto Press.
- Olivier de Sardan, J.-P. 1995. *Anthropologie et développement: Essai en socio-anthropologie du changement social*. Paris: Karthala.
- Rathberger, E. 2006. Who are the social researchers of the CGIAR system. In Cernea, M.C. and Kassam, A.H. (Eds), *Researching the culture in Agri-culture. Social research for international development*, pp. 51-80. Wallingford, UK and Cambridge, MA, USA: CABI Publishing.
- Riaux, J. 2013. Engager la construction d'un regard sociohydrologique: Des archives catalyseurs de l'interdisciplinarité. *Nature Sciences Sociétés* 21(1): 15-23.
- Rittel, H.W.J. and Webber, M.M. 1973. Dilemmas in a general theory of planning. *Policy Sciences* 4(2): 155-169
- Robbins, P. 2004. *Political ecology: A critical introduction*. Oxford: Blackwell publishing.
- Samad, M. and Merrey, D.J. 2006. Water to thirsty fields: How social research can contribute. In Cernea, M.C. and Kassam, A.H. (Eds), *Researching the culture in Agri-culture. Social research for international development*, pp. 140-165. Wallingford, UK and Cambridge, MA, USA: CABI Publishing.
- Seckler, D. 1996. *The new era of water resources management: From 'dry' to 'wet' water savings*. Colombo, Sri Lanka: International Irrigation Management Institute (IIMI).
- Thiele, G.; van de Fliert, E. and Campilan, D. 2001. What happened to participatory research at the International Potato Center. *Agriculture and Human Values* 18(4): 429-446.
- UN-WATER. 2006. *Water: A shared responsibility. The United Nations World Water Development Report 2*. Rome: World Water Assessment Programme (WWAP).

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