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The 'Farmer Lens': A Gender Blinder? Considering Farmer Diversity in Research and Policy on African Farmer-led Irrigation Development

CONFLICTS, POWER AND TRANSFORMATIONS IN IRRIGATION SYSTEMS (GUEST EDITORS: J. HOOGESTEGER, A. MIRHANOGLU, M. LOOPMANS)

JANWILLEM LIEBRAND
GERT JAN VELDWISCH
VICTOR DE SANTOS HERRANZ
NICKY SCHEPERS
WOUTER BEEKMAN

*Author affiliations can be found in the back matter of this article

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ABSTRACT

In research-policy debates on food and agriculture in Africa, the phenomenon of farmer-led irrigation development is now receiving wide attention. This can be seen as the adoption of the 'farmer lens' in research on the use and management of common pool land and water resources for irrigation. While it emancipates a farmer's perspective in irrigation, we also observe that the farmer lens obscures attention for inequities and gender and social diversity in debates on African smallholder farming. Therefore, we reflect in this paper ex-post on survey data and field observations from two of our finalized research projects in Mozambique on farmer-led irrigation development, and we scrutinize the assumptions that we made in the design of these projects. Based on our reflections, we come to the conclusion that an emphasis on farmers' agency in general indeed has the effect of a gender blinder, because it invokes an image of the 'African farmer' that is one-dimensional – agential but gender-less – and we suggest that a stronger focus in research on (irrigated) plot use, virilocality and flows of mobility could produce more accurate representations of inequities and gender and social diversity in irrigation. Such data, in turn, can critically inform the design of more grounded, human-oriented irrigation policies in Africa.

CORRESPONDING AUTHOR:
Janwillem Liebrand
Assistant Professor, International Development Studies, Utrecht University, the Netherlands
j.liebrand@uu.nl

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INTRODUCTION

In this paper, we reflect on the question of 'gender and social diversity in farmer-led irrigation development'. In research-policy debates on food and agriculture, and common pool land and water resources use in Africa, the phenomenon of farmer-led irrigation development is now receiving wide attention (Woodhouse et al., 2017; de Bont et al., 2019; Liebrand, 2019). It describes a process of 'farmers' who 'lead' the growth of irrigated agriculture in Africa by applying new cropping methods and using available labour, and local materials and ideas (de Fraiture and Giordano, 2013; de Fraiture et al., 2014; Lankford, 2009; van Koppen et al., 2013). Central Mozambique, the focus in this paper, is one place where it occurs. There, farmers are driving the expansion of irrigation for both subsistence and commercial purposes, using furrows, pumps and buckets to water their crops, and selling their produce at the market or to traders (Veldwisch et al., 2013; Beekman et al., 2014; Beekman and Veldwisch, 2016; Liebrand et al., 2021). Characteristically, as elsewhere in Africa (Funder and Marani, 2015; Schnegg and Linke, 2016; Washington-Ottombre and Evens, 2019), much of it takes place in conditions of informality and common pool resources, meaning that farmers use land and water without de jure rights or title deeds (Buur and Kyed, 2006), and mobilize labour and financial resources without formal contract agreements or registration.

The term farmer-led irrigation development exemplifies the adoption of the 'farmer lens' in research and policy on the use of common pool land and water resources for irrigation. This is not a coincidence. European scholars – including some of the authors of this paper – in collaboration with African researchers from Malawi, Mozambique and Tanzania strategically started using the term in the course of the 2010s in an attempt to reframe the policy debate on agriculture in Africa (Nkoka et al., 2014; Beekman et al., 2014). There, starting in 2003 with the Comprehensive Africa Agriculture Development Programme of the African Union, the focus in the debate was heavily on new public and private investments for irrigation development, to be led by the state and experts, and there was little recognition of initiatives undertaken by farmers themselves (Woodhouse et al., 2017). Aiming to bring observations on farmers' practices in the global space of expertise in food, agriculture and irrigation (Liebrand, 2019; Veldwisch et al., 2019), the adoption of the farmer lens in research was thus meant to challenge the stereotypical image of African farmers of being in need of development, and remind donor officials and policy makers that farmers are agential actors, capable of developing irrigation and using common pool resources themselves (cf. Shivakoti and Ostrom, 2001; Ostrom, 2015).

Since then, research on farmer-led irrigation development has picked up pace, and we observe that the farmer lens helps generating visibility to farmers as actors who strategically use land, water and labour resources. Illustratively, SNV/Kenya developed guidelines for 'accelerating farmer-led irrigation development' as part of its country programming on Smart Water for Agriculture (Muturi et al., 2019); the African Union identified 'farmer-led irrigation development' (p.21) as one of the four key pathways for development interventions in its Framework for Irrigation Development and Agricultural Water Management in Africa (UA, 2020), and the World Bank published a guide on 'farmer-led irrigation development' with a view to support project implementers: 'A what, why and how-to for intervention design' (Izzi et al. 2021).[1] At the same time, however, we observe, farmers' activities are disqualified in irrigation policy thinking as a form of development and rural modernization, being portrayed as unregulated, wasteful and falling short of potential in terms of water use efficiency (cf. van Koppen and Schneider, 2019). With deep concern, we also observe that the whole issue of inequities and gender and social diversity *among* African farmers is obscured in the debate on farmer-led development of irrigation in Africa. There is recognition that 'the distribution of burdens and benefits may (…) be differentiated across gender, ethnicity, or length of residence, or (…) access to capital' (Muturi et al., 2019: 8), and that 'wider cultural and social changes, including urbanization and outmigration impact the gender balance in farming' (AU, 2020: 11), but there is little discussion in research-policy debates on how such wider changes in Africa, and say, the distribution of benefits in the use of the commons, determines the make-up and pace of irrigation development led by farmers. The World Bank guide has most attention for farmer diversity, emphasizing that 'women – as with men – do not represent a homogenous group' (Izzi et al., 2021: 26). However, the general tendency is to discuss the context, including inequities and dynamics of gender and social diversity among the rural population, as relatively separate from farmers' initiatives in irrigation. Illustratively, 'the feminization of farming and agricultural water management practices' and 'the rapid expansion of farmer-led irrigation development' are separate headings in the earlier-mentioned framework of the African Union (AU, 2020: 11).

The fact that attention for inequities and gender and social diversity in debates on farmer-led irrigation development in Africa is not obvious and remains a point of attention in research and the operationalization of governmental support programs, concerns us. The farmer lens clearly creates visibility for the human dimension of irrigation, for farmers' agency, but it simultaneously obscures critical aspects of it. Feminist scholars were the first to observe

this problem. Since the 1980s, they have critiqued that the European concept of 'farmer' is problematic for Africa (Dey, 1982; Carney 1988; Zwarteveen, 1996; Brandt, 2002), and they have argued that the farmer lens can operate as a gender blinder in the space of agricultural expertise (Bryceson, 1995), and by implication, as a racial blinder (White, 2006). Alternatively, they have proposed new concepts such as hearth-holds (Ekejiuba, 1995), and female – and dual-headed households (Deere et al., 2012), and new gender methodologies such as case studies on intra-household labour division and land rights (Zwarteveen, 1996), and surveys on household assets and the collection of gender disaggregated data (Meinzen-Dick et al., 2011). By now, many of these concepts and methodologies are standard practice in (gender) development research and policy data collection, but it remains challenging – practically and conceptually – to fully integrate them in agricultural development research that aims to challenge the mainstream. Using the farmer lens may thus not be ideal because it can lead to 'gender blindness' but doing away with it all together is neither a solution. It is throwing out the baby with the bathwater. Rather the question is: how to use it in research so that it can produce more accurate representations of farmers' agency in irrigation?

Aiming to identify a research strategy that could lead to more accurate, 'inclusive' representations of smallholder irrigated farming in Africa, we present in this paper our reflections *ex-post* on survey data and field observations from two of our own research projects in Mozambique, and we scrutinize the assumptions made in the design of these projects. The adoption of the farmer lens was key to the conceptualization of the projects. We – the authors of this paper – were involved in these projects, as (lead) researchers, consultants or students. The projects were funded in the above-described context of the research-policy debate on irrigation development in Africa. These projects were:

- *Assessing the growth potential of farmer-led irrigation development in Sub-Saharan Africa* (2015–2018), led by Manchester University in collaboration with Wageningen University (second author) and the Instituto Superior Politécnico de Manica (ISPM) in Mozambique; and funded from the British DFID-ESRC Growth Research Programme.
- *Exploring the potential of farmer-led irrigation development in the Beira Agricultural Growth Corridor (BAGC), Mozambique* (2016–2019), led by Resiliençia Moçambique (fourth and fifth authors) in collaboration with ISPM and Wageningen University (first, second and third authors); and funded from the Applied Research Fund of the Dutch NWO.

In the following section, we present theory and literature that informed our research project designs. This is followed by a brief description of two research sites in Mozambique, respectively Macate and Messica, and the methodology of data collection. Then, we present the results of our research, followed by our reflections on how gender and social diversity among farmers is represented in these results. In the conclusion, we discuss the implications of using the farmer lens in research on irrigation.

THEORY: EXPLORING 'GENDER AND SOCIAL DIVERSITY IN FARMER-LED IRRIGATION DEVELOPMENT'

In studying farmers' initiatives in irrigation and the use of common pool resources in Mozambique, we engage with the debate how to best represent (scientifically and politically) African smallholder farmers. This debate can be considered a sub-debate in both the peasant debate (Borras, 2009; Cousins, 2013; van der Ploeg, 2014; Friedmann, 2019) and the commons debate (van Laerhoven and Ostrom, 2007; McCay and Delaney, 2010). Compared to European or Asian smallholder (or peasant) farmers, they tend to display characteristics that make them 'behave' very differently – particularly in how common pool land and water rights and responsibilities are distributed among farm household members (Momsen and Kinnaird, 1993; Bryceson, 1995). These different distribution patterns provide rationales for common pool resources use and irrigated farming practices that diverge from those assumed as 'normal' – those that are theorized on the basis of experiences elsewhere, notably in Europe or Asia (Shivakoti and Ostrom, 2001; Brandth, 2002; Zwarteveen, 2006; Liebrand, 2019).

The relevance of studying gender and intra-household relations in African rural households is well established in irrigation and agriculture literature (Dey, 1982, Carney, 1988; Zwarteveen, 1996; van Koppen *et al*., 2013; Meinzen-Dick *et al*., 2011; Doss *et al*., 2017). This body of literature, when looking with a bird's eye view, basically tells two stories on gender and farming in Africa. The dominant story holds that men in agriculture in Africa are dominant in landholding (Peters, 2004); they have a strong say over the use of produce, including of women-owned (or women-tilled) plots (van Koppen *et al*., 2013); they control the allocation of their wives' labour for cultivation through marriage (Yngstrom, 2002), and they act as the primary targets in the public sphere of agricultural development projects (Fisher et al., 2017). This representation also holds that men dominate in technology use and manufacturing, artisanal workshops, formal and informal technical training, and fuel stations and contracts with electricity companies

(van Koppen *et al*., 2013). It often also holds that African societies function as hydropatriarchies in the sense that rights to water and other common pool resources, and water for productive purposes are in the hands of men (Sheridan, 2002; Caretta, 2005). The other, more marginal story in this body of literature is that farm women are, in fact, the most active farmers; they negotiate with farm men for crop and labour rights, and for access to water and benefits of irrigated agriculture (Carney, 1988; Zwarteveen, 1996; Doss *et al*., 2017) – not necessarily within the boundaries of the household but in larger kin-ship structures (Ekejiuba, 1995) – and they proactively adopt irrigation technologies (van Koppen *et al*., 2013). It also holds that they work as wage labourers in irrigated agriculture (Fischer *et al*., 2017); they are more productive than male farmers, and they are making the market, handling cash and doing exchanges (Quisumbing et al., 2001; Vijfhuizen, 2003; Doss et al., 2017).

Most agriculture and gender research projects today on Africa – and the policies that are informed by them – seek to reconcile the two readings, of women-as-victims and women-as-agents (Farnworth et al., 2013; Manyire and Apekey, 2013; Sachs, 2019). They identify women and youth as specific target groups, seeing them both as marginalized *and* entrepreneurial, and in recognition of customary land tenure in Africa and intra-household organization, it is now 'good practice' to emphasize that African rural households consist of production sub-units (say maize planting, tomato cultivation, livestock keeping) in which women and men are both producers, providing for their dependents, sometimes individually and sometimes jointly (Meinzen-Dick *et al*., 2011). Many agriculture research projects involve today the collection of some form of gender disaggregated data with a view to accurately represent diversity among African farmers, and based on them, steer targeting approaches.

However, in spite of these strategies, 'gender and farming' in Africa remains a difficult topic in agricultural policy and research. In the post-colonial, liberal tradition of international development cooperation, gender studies often conceptualise men and women as individuals whose participation in development is hampered (or enabled) by their identities, thus problematizing women instead of agriculture, technology or men (Lohan and Faulkner, 2004; Liebrand, 2022). Neoliberal policies of privatization (Cunguara and Hanlon, 2012; Wuyts, 1996), pursued for instance through the registration of water use and ownership titling of land, lead to the commodification of common pool resources and keep gendered dualisms alive by assuming that African rural household members pool resources under control of a male head (van Koppen and Schneider, 2019). And furthermore, agricultural project design and irrigation research continues to focus on technology and rely on (forms of) conventional economic feasibility studies, supporting the view that farm men act as producers of cash crops and marketable vegetables, and farm women as producers of food crops for home consumption (Fischer *et al*., 2017).

The design of our research projects, being articulated and funded in the international context of research-policy debates on irrigation and common pool resources use in Africa, obviously, did not escape the conceptual narratives on gender and social diversity in African agriculture. We discussed that 'smallholder' and 'irrigation' are contested concepts, and we considered at the design stages that the adoption of the farmer lens in research could lend support to the frame of a homogenous category of 'farmers', despite their diversity and different ways of practising irrigation (Veldwisch et al., 2019). At the same time, we realized that any given conceptualization – 'farmer', 'user', 'gender', 'commons' – would produce simplifications of the complexity of social life (Latour, 2005; Law, 2009), and the main challenge at the time in our view was to re-frame agricultural investment policies (Woodhouse et al., 2017), and create space for supporting farmers' practices in irrigation, for supporting the 'right irrigation' – to use the words of long-time irrigation scholar Bruce Lankford (2009). Eventually, we adopted the farmer lens in research and aimed to integrate in it a focus on gender and social diversity. For this purpose, specific strategies were designed including a survey among irrigating and non-irrigating farmers in the research areas, with questions on household headship and plot management, and the recruitment of female enumerators; and selected case studies on farmers' irrigation initiatives and student-thesis-research on intra-household organization (see below for elaboration).

RESEARCH AREA AND METHODOLOGY

Research in Mozambique indicates that over 100,000 hectares of irrigated agriculture have recently been initiated by farmers, without much external support (Beekman *et al*., 2014). Manica Province, Central Mozambique, is one of the places where it can be seen. There, methods of irrigation vary from furrow irrigation along the slopes of the mountains to pumped irrigation in the valleys and bucket irrigation along the rivers. Here, we focus on two sites, covering four *communidades* (lowest administrative unit in Mozambique) in two districts, respectively Macate and Messica districts (two *communidades* in each district).[2] The research sites were selected because they represent the variation mentioned above, in terms of hydrological (small valleys in Macate, mountain slope in Messica), technical (lift irrigation in Macate, gravity irrigation in Messica) and cultivation (both subsistence and commercial production) characteristics. Macate district falls in the Muenedzi river

catchment and Messica district in the Godi river catchment, and the districts respectively are located 20 km south and 50 km west of Chimoio, the capital of the province. Hereafter, we refer to these research sites as 'Macate' and 'Messica'. Figure 1 shows the research locations, and Figure 2 presents two examples of cropping calendars in the areas, illustrating that farmers practice a mix of rain-fed and irrigated farming, and cultivate both subsistence (maize) and commercial crops (horticulture).

Our analysis of farmer-led irrigation development in Macate and Messica is based on data collection in the period 2016–2019. We did a survey and developed case studies by means of field observations and in-depth interviews with farmers who irrigated their crops with commercial intent. In Macate, we selected farmers that were taking water directly from the Muenedzi River, using pumps or buckets to water their crops; and in Messica, we selected farmers that had constructed furrows for irrigation.

Figure 1 Location of research areas in Mozambique.

Source: https://www.globecountries.com/country/mozambique.html (visited 20 June 2022)

The objective of the survey was to obtain a quantitative estimate of the scale and benefits of irrigated agriculture and their distribution among households in rural communities. It was designed to allow for a comparison between 'irrigating' and 'non-irrigating' households. These were randomly selected, using available population lists, and therefore, the numbers can be treated as statistically representative at the case study level, respectively Macate and Messica. It also was designed to assess 'particular constraints' that are limiting the expansion of irrigation practices. These constraints were conceptualized in terms of access to land and water for irrigation (land located far away from water source, conflicts, lack of money, network, labour), and in terms of technology (lack of previous experience with irrigation, lack of resources to invest in irrigation, difficulty to adopt irrigation methods). To integrate a focus on gender and social diversity, the survey collected both household-level (composition, assets, income, input use) and plot-level data (water source, irrigation technology, plot management), enabling, in theory, the generation of gender-disaggregated data at household level (in terms of female – and male headed households) and plot level (crop production sub-units within the household). However, the reality of multiple crops being irrigated by household members within one year, involving the same or different plots, and adjusted plot sizes depending on water availability (often smaller plots in the dry season), made it difficult, in practice, to obtain numbers on agricultural productivity based on the survey, be it on household or plot level (see below).

The objective of the case studies was to obtain a deeper understanding of the dynamics of farmers' practices in irrigation – in the broadest sense of the word. It was to obtain a basic understanding of land and water rights, gender dynamics and intra-household organization. It also was to gain observations directly from the field for the interpretation of survey results. Based on the information that was collected by researchers and students, we developed descriptions of selected households in the research areas. The key criteria for selection was that they provide observations on the gendered dynamics of irrigation development in the areas and exemplify processes observed beyond the cases itself. Three excerpts of such detailed case descriptions are used in this paper (see below).

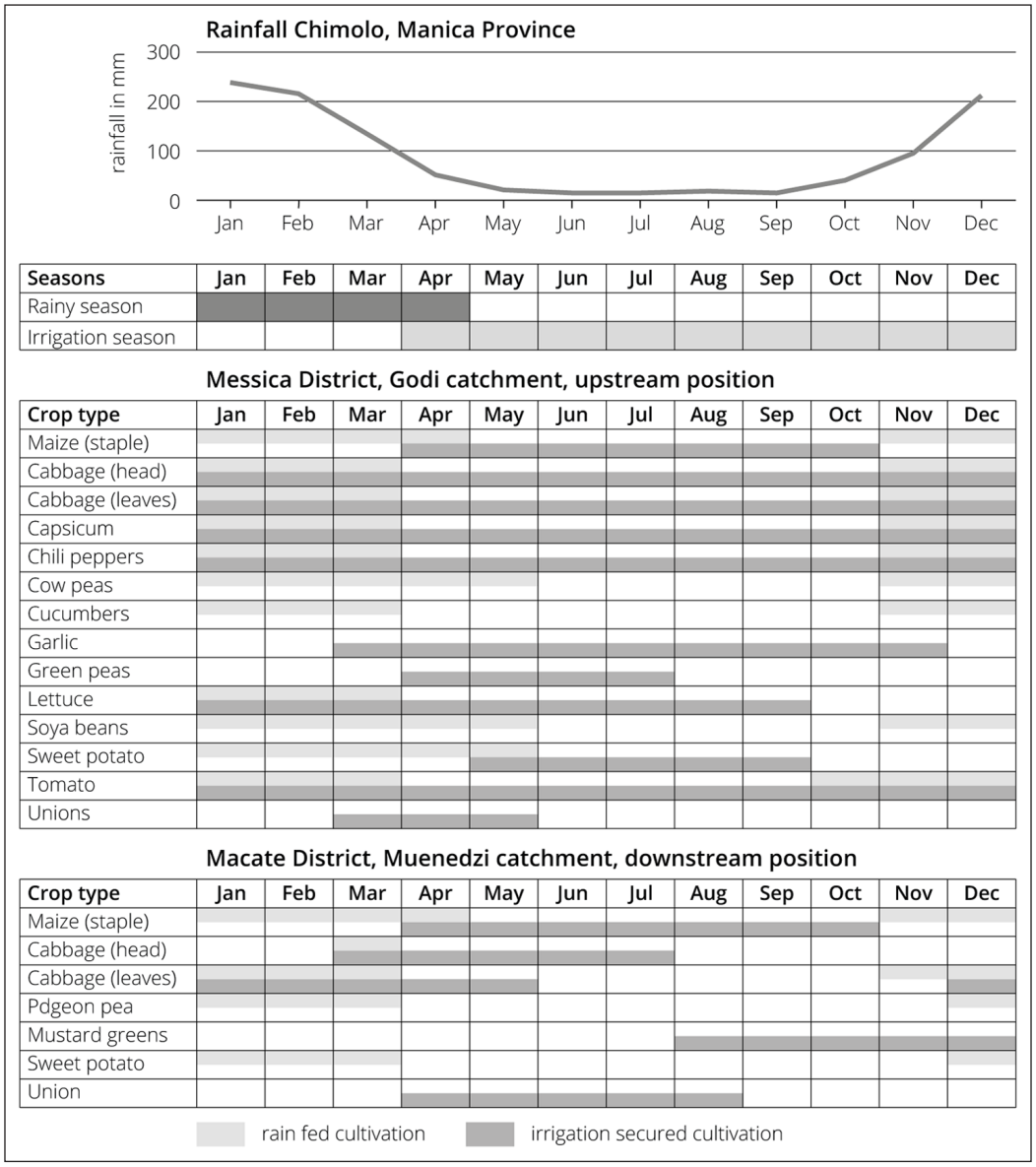

Figure 2 Examples of cropping calendars in the research areas.

Source: Compilation based on field work; see INAM (2017) for rainfall data.

RESULT I: SURVEY ON FARMER-LED IRRIGATION DEVELOPMENT IN MACATE AND MESSICA

Table 1 summarizes key survey data of the research areas (622 households in total). In total, about 62% and 58% of the households in Macate and Messica respectively have access to some form of irrigation, using mainly surface water (river, lake, floods after heavy rains) as a source, and buckets and furrows as a means of transport. Groundwater use by means of wells and pumps is relatively uncommon. It shows that about one-third of the farmers with access to irrigation are using inputs like improved seeds, fertilizer, pesticides, and hired labour compared to low use of these inputs among farmers who do not have access to irrigation. The numbers in Table 1 make clear that irrigated agriculture is an important source of income for households that have irrigated plots and for these households, it can be considered their main economic activity. In total, 71% and 84% of the households with irrigation reported that income from irrigated crops provide about half or more for their income, respectively in Macate and Messica. About one-third of the irrigating households obtain (additional) income from working elsewhere. On average, irrigating households practice irrigated crop cultivation on about half of the area of their holdings, reporting landholdings of 5.6 ha and 6.6 ha respectively for Macate and Messica, of which 2.3 ha and 3.3 ha were irrigated. The area cultivated per adult-equivalent

of the irrigating households was on average 0.6 ha in both research areas.[3] The higher asset indexes of irrigating households in both locations, and less months of food shortages, indicate that these households are markedly better off than households without access to irrigation.

Table 2 shows that a significant portion of the households in the research areas are female-headed. In total, 16% and 19% of the irrigating households fitted in this category respectively in Macate and Messica. On average, these households are smaller in size compared to the male-

RESEARCH AREA		MACATE	MESSICA
Households in sample (n = 622)		377	245
Average landholding (ha)		4.43	5.93
Households with access to irrigation		*(58% of total)* 217	*(62% of total)* 152
Inputs	Use of improved seeds	*(36%)* 78	*(39%)* 59
	Use of fertilizer	*(26%)* 56	*(48%)* 73
	Use of pesticides	*(28%)* 61	*(42%)* 64
	Hiring farm labourers	*(57%)* 124	*(42%)* 64
Household income from irrigated crops	More than half	*(38%)* 82	*(61%)* 92
	About half	*(33%)* 72	*(24%)* 36
	Less than half	*(29%)* 63	*(16%)* 24
Other income	Labouring for others	*(32%)* 69	*(34%)* 52
Average indicators	Asset index	15.6	25.3
	Livestock index	0.2	0.7
	House quality index	5.2	5.8
	Month food shortage	2.0	2.0
Households without access to irrigation		*(42% of total)* 160	*(38% of total)* 93
Inputs	Use of improved seeds	*(5%)* 8	*(13%)* 12
	Use of fertilizer	*(0%)* 0	*(1%)* 1
	Use of pesticides	*(1%)* 2	*(1%)* 1
	Hiring farm employees	*(24%)* 38	*(23%)* 21
Income	Labouring for others	*(39%)* 62	*(49%)* 46
Average indicators	Asset index	9.4	14.5
	Livestock index	0.1	0.5
	House quality index	4.6	5.0
	Month food shortage	2.8	2.8
Total irrigated fields (n = 458)		243	215
Source of water	River	*(68%)* 166	*(99%)* 212
	Lake	*(5%)* 11	*(0%)* 0
	Floods	*(14%)* 35	*(1%)* 3
	Well (ground water)	*(13%)* 31	*(0%)* 0
Irrigation transport technology	Furrow	*(23%)* 56	*(94%)* 203
	Bucket	*(62%)* 151	*(5%)* 11
	Pump (motor)	*(12%)* 30	*(0%)* 1
	Pump (electric)	*(1%)* 3	*(0%)* 0
	Pump (treadle)	*(1%)* 3	*(0%)* 0

Table 1 Characteristics of farmer-led irrigation development.

Source: Survey data of the DFID-ESRC-supported research project, collected in 2017.

RESEARCH AREA		MACATE	MESSICA
Households in sample (n = 622)		377	245
Households with access to irrigation		*(58% of total)* 217	*(62% of total)* 152
Female-headed household	Total number	*(16%)* 35	*(19%)* 29
	Household size (persons)	5.0	6.8
	Total land area (ha)	3.62	5.73
	Irrigated land area (ha)	1.25	2.14
	Unirrigated land area (ha)	2.37	3.59
	Area cultivated per adult (ha)	0.46	0.56
Male-headed household	Total number	*(84%)* 182	*(81%)* 123
	Household size (persons)	6.0	7.4
	Total land area (ha)	5.93	6.64
	Irrigated land area (ha)	2.41	3.35
	Unirrigated land area (ha)	3.52	3.29
	Area cultivated per adult (ha)	0.60	0.56
Households without access to irrigation		*(42% of total)* 160	*(38% of total)* 93
Female-headed household	Total number	*(29%)* 46	*(9%)* 8
	Household size (persons)	4.6	4.0
	Total land area (ha)	2.14	2.63
	Area cultivated per adult (ha)	0.64	0.92
Male-headed household	Total number	*(71%)* 114	*(91%)* 85
	Household size (persons)	5.2	5.7
	Total land area (ha)	2.97	5.35
	Area cultivated per adult (ha)	0.68	0.94
Total irrigated fields (n = 458)		243	215
Means of allocation	By tribal authority	*(6%)* 15	*(25%)* 54
	Inherited	*(68%)* 165	*(47%)* 101
	Purchased	*(12%)* 29	*(20%)* 43
	Rented	*(6%)* 15	*(6%)* 13
	By irrigation association	*(9%)* 22	*(2%)* 4
Irrigation manager	Head of the household	*(56%)* 136	*(48%)* 103
	Head & spouse	(11%) 27	*(21%)* 45
	Spouse	*(1%)* 2	*(4%)* 9
	Head, spouse, children	*(4%)* 10	*(4%)* 9
	Head & children	*(2%)* 5	*(1%)* 2
	Children	*(5%)* 12	*(3%)* 6
	Other combinations	*(8%)* 19	*(19%)* 41

Table 2 Characteristics of gender in farmer-led irrigation development.

Source: Survey data of the DFID-ESRC-supported research project, collected in 2017.

headed ones, say consisting of 5 to 6 members instead of 6 to 7 members; and they hold smaller land holdings, 3.6 ha and 5.7 ha respectively in Macate and Messica, compared to 5.9 ha and 6.6 ha among the male-headed. In terms of irrigation, female-headed households tend to irrigate smaller areas, respectively 1.3 ha and 2.1 ha in Macate and Messica, compared to male-headed households, respectively 2.4 ha and 3.4 ha. This trend is also visible in the 'area cultivated per adult', on average 0.5 ha for adult-equivalent of female-headed households in the research areas compared to 0.6 ha for male-headed ones. In principle, all land and water resources in the research areas were common pool resources in the sense that the land falls under tribal authority. Yet, the data on purchased and rented irrigated plots indicate that commodification of common pool resources is occurring in the research areas whereby (irrigated) land is appropriated by its owners/users as a form of private property. Overall, the data suggest that both male and female members of the household are actively involved in irrigated field management, respectively in their roles of head of the household, spouse, or children.

RESULT II: CASE STUDIES ON FARMER-LED IRRIGATION DEVELOPMENT IN MACATE AND MESSICA

THE INITIATIVES OF MEMBERS OF RICHARD AND PATIENCE'S HOUSEHOLD (MESSICA)

This household consists of Richard (husband), Patience (wife), and five children. Patience is Richard's second wife and three children belong to them. The two oldest children are from Richard's first wife with whom he got divorced. In the Portuguese colonial time, Richard's grandfather, Jackson was a landholder in the Messica area, owning a tractor. Richard was born in Zimbabwe in 1973 and later, he met Patience there. In 1994, he returned to Messica, with his father and Patience, to get married and settle on the land of his grandfather. By 2016, his father had passed away and Richard held land in both the Messica area (under tribal authority) and Zimbabwe (his father's land).[4]

The land of Richard's family is receiving water from two furrows, respectively 'canal Jackson' and its branches, and 'canal Richard'. The plots of Richard are supplied by both furrows; the plots of Patience are supplied by one furrow, canal Jackson. The Jackson furrow, as the name indicates, dates back to colonial times and was constructed under supervision of Richard's grandfather. Since then, the furrow has been extended and branches added ('canal Jackson B'), under supervision of Manual, a male relative from the Jackson's family. By 2016, the Jackson canal was used by ten users, including Richard and Patience. The Richard furrow originally was dug in 1995, under initiative of Richard's father. When his father passed away, Richard inherited it, becoming the *dono de canal* (canal owner).

The users of the Jackson and Richard furrows have simple verbal agreements. The source of both canals are *mudhimbas* (wetland in hills). In the rainy season, every user can take water whenever they want. In case, water is not flowing to the tail-end, downstream users approach upstream users to ask for a turn of water. In the dry season, the schedule is typically as follows: downstream users get one day of water, followed by upstream users, or alternatively, downstream users get water in the morning or the night, and upstream users in the afternoon or the day time. In the Jackson furrow, there is a division box in place, allowing the users to open and close a branch of the furrow. This box was put in place by downstream users, sanctioned by Jackson, who was the-then *dono de canal*.

There are no strict arrangements in place for maintenance. In practice, every user maintains the section of the furrow that passes the plot, but this is not always sufficient. Before the dry season, in the advance of the irrigation season, the furrow collectively is cleaned and repaired (February/March). It is collectively cleaned a second time during the dry season (September/October). For these events, the *dono de canal* calls for labour. Usually, all users show up for the pre-season cleaning (February/March), both male and female users, but this is not the case for the second round of cleaning, in the hot dry season (September/October). In this season, downstream users claim that they are continuously doing 'repair' work to assure that water is flowing to their plots, because upstream users 'break' the furrow embankment to fill up small reservoirs. Both regular and emergency maintenance is carried out with bare hands, hoes and shovels, and sometimes by paid workers.

Richard's status of *dono de canal* enables him to call for meetings, but he is not in a position to penalize 'defaulters'. Most of the furrow users belong to the larger Jackson family and being kin-neighbours and part of gift and social exchange networks, they value good relations. One potential conflict is that some furrow users have started to cultivate plots in the *mudhimba* wetland. There, plots need to be drained, while irrigation downstream ideally requires the 'storage' water in the *mudhimba* area.

In the rainy season, Richard and Patience work together in the cultivation of maize, making sure that subsistence needs of their household are met. Throughout the year, Patience cultivates a small 'garden' plot adjacent to a small river stream (*matoro* soils) for household consumption. In addition, and throughout the dry season, they cultivate separate plots for commercial purposes: tomatoes, cabbage (leaves), onions, beans and green peppers. Both

Richard and Patience use fertilizer, pesticides and sprinklers at these plots. They learned about the use of them in Zimbabwe. Patience explained that she uses sprinklers at her plots, because she feels it results in labour and time savings. She is managing the sprinklers herself and takes care of irrigation, including at night if required.

Richard and Patience sell produce of their plots to traders and petty salespeople at the farm gate, or alternatively, Patience travels to Messica town to sell produce of either or both plots at the market (Tuesday and Friday). With tomatoes, Chimoio-traders provide Richard and Patience with seeds in advance. Richard prefers to sell his produce at the market; because the market prices are higher than at the farm gate. In contrast, Patience prefers to work with traders, because its saves her the trouble of arranging transport. She explained about tomatoes: the price is MZN 100–150/box at the farm gate; MZN 200–350/box at the Messica town market; and MZN 500/box in Chimoio. The transport of tomatoes to Messica town can be individually arranged, taking about 2–3 boxes and using *chapas* (privately operated mini-buses). The transport to Chimoio requires a truck and the services of traders. Patience also sells to petty salespeople, to women who come to her farm and return to the Messica town market. These women are often members of the extended family, and in these terms, her family relatives. In case, she has sold tomatoes of her husband, she gives the cash to him; in case, it is her tomatoes, she keeps it.

THE INITIATIVES OF MEMBERS OF FERNANDO AND CONSTANTIA'S HOUSEHOLD (MESSICA)

This household consists of Fernando (about 60 years old), a polygamist, three wives and children. His first wife, Constantia, has four children; three of them are already married; and one son is staying with her. Fernando's family has already been in the area for a long time, holding land under tribal authority. The wives have separate dwellings. The four cultivate and irrigate separate plots throughout the year. Fernando and Constantia have the largest and most fertile plots. In 2003–2004, Fernando dug a new furrow by himself, diverting water from the Godi River at an upstream location in the watershed. Since then, the furrow has been expanded by downstream farmers, and by 2016, Fernando shared it with his wives and a few other users. He is recognized as the *dono de canal* of 'canal Fernando'.

In the rainy season (December to April), the wives of Fernando focus on the cultivation of maize for household subsistence, with the aid of their husband. In the meantime, especially in the dry season (May to October), Fernando and his wives cultivate a number of smaller plots, mainly for commercial purposes: tomato, onions, sweet potatoes, capsicum, chili peppers. Constantia, for instance, cultivates maize, tomato, cabbage, banana and mangos in the dry season. In addition to cultivating his own plots and dividing the fields among his wives, Fernando assists his wives with the purchase and application of pesticides in their plots, particularly in tomato cultivation. Traders place 'orders' with him, and Fernando usually takes care of the sales of the produce of his wives, collecting the cash payments. In case, he has provided labour to fields of his wives, the cash is divided; in case the wives have worked independently, the cash is for them. The first and third wife regularly help each other in cultivation, exchanging gifts and in-kind payments (share of produce). There was no such an exchange with the second wife. Reportedly, Fernando had given Constantia a goat and she was to give a female lamb to the second wife, who in turn, was expected to give a female lamb to the third wife. The first and second wife both had goats, but allegedly the third wife never got a lamb from the second wife.

THE INITIATIVES OF MEMBERS OF SAÍCE AND ÂNGELA'S HOUSEHOLD (MACATE)

This household consists of Saíce (husband) and Ângela (wife), and children. Saíce's inherited land at the foothills of a small mountain, along a tributary of the Muenedzi River. In the rainy season (December to April), all family members work together on the same plot of land to cultivate maize for subsistence needs. In the dry season (May to October), Saíce and Ângela cultivate separate plots. Saíce focusses on vegetable production (okra, tomatoes, beans), selling produce to traders or at the nearby main road for cash. He built a few small earthen reservoirs to contain water, using hand-dug furrows, tubes and buckets to irrigate his crops. Ângela cultivates crops on a small 'garden' plot for household consumption (maize, beans). They assist each other; Saíce irrigates her crops, and Ângela lends him a hand with harvesting. The cash obtained through vegetable sales – the only source of monetary income for them – is used by Saíce and Ângela for household needs, agricultural inputs and personal use.

REFLECTIONS *EX POST*: SEEING 'GENDER AND SOCIAL DIVERSITY' IN THE SURVEY AND CASE STUDIES

In regard to the survey, as can be seen in Table 1 and 2, the visibility of gender and social diversity in irrigation closely relates to the assumptions that were made in the survey's design. Three major assumptions stand out. The first critical step was to define 'households' as the starting unit of analysis, based on the assumption that it is these institutions that function as the basic production unit in African agriculture. Hence, the objective of the survey was

to assess the distribution of benefits of irrigation *among rural households within a community*. In this thinking, reflecting the discourse of the European family farm, we conceptualized a single household or domestic unit as everybody living within the same residence, in which both consumption and production are organized (see de Bont *et al*., 2019, footnote 10). We did thus not fully consider how exactly production and consumption is organized within the boundaries of household relations. By implication, intra-household dynamics and the participation of individual members in irrigation, and the relations between these members were thus obscured in the adoption of the farmer lens (cf. O'Laughlin, 1995). Being aware that agricultural production in many places in Africa, rather than in households, takes place in 'hearth-holds' – units of production and consumption within larger kinship structures that have women at their center and of which men can be members (Ekejiuba, 1995), we opted to address the issue by collecting plot-level data in addition to household-level data (see Table 1 and 2). We hypothesized that plot management dynamics – say the cultivation of maize on a plot by a senior woman in the household and the processing of the harvest of that plot – would represent the organization of a particular sub-unit of production and consumption in the household, in this case maize. The approach of the survey nevertheless was: households > irrigation/non-irrigation > irrigated plots. In so doing, key gendered dynamics of irrigation – why it is that certain plots are irrigated and others are not, and why it is that certain family members are actively involved and others are not, – remain under-lighted.

The second critical step relates to the conceptualization of households and is about the concept of headship. As can be seen in Table 2, the survey generated gender-disaggregated data by adopting the dual strategy described above. Thus, reflecting the idea of the European family farm in which there is the 'head' (usually the 'husband', sometimes the 'wife'), the survey collected household- and headship-level data by using the concepts of 'male-headed' and 'female-headed' households. *And*, seeking to circumvent this idea, the survey collected plot-level data hypothesizing that individual members within the household control their own plots and labour during parts of the year. However, by taking headship and the relation to the head ('spouse', 'children') as the defining characteristic of intra-household organisation, and asking respondents to self-identify either as being part of male- or female-headed households, gendered dynamics such as variations in the relation of women with male family members – sister, daughter, aunt, niece, wife, sister-in-law etc. – and how male and female family members' land and labour rights in irrigation differ are made less visible in the data (cf. Peters, 1995). Here, with hindsight, the survey breathes life into interpretations of irrigation that hardly reflect gender dynamics in the life worlds of farm women and farm men in Africa (see for discussion in comparison with Latin America: Deere et al., 2012). Rather than perceiving that irrigation is enabled by *heads* of either male or female households, a focus on *rights* to land within larger kinship structures would have been more useful. In total, 74% and 72% of the irrigated plots in Macate and Messica respectively were reportedly 'allocated' by tribal authority and inheritance (see Table 2). Hence, these numbers indicate the significance of understanding *rights* to land within larger kinship structures.

The third critical step in the design of the survey was to conceptualize constraints for irrigation in terms of (lack of) access to resources, i.e., land, water, agricultural inputs, capital, labour, irrigation technology. Here, the assumption is that irrigated agriculture in Africa primarily is 'constrained' by resources. It is a familiar and particularly resilient one; it is the foundation of the engineering tradition in irrigation development (Liebrand, 2019; 2022), and it reflects that agricultural expertise with its base in plant sciences has difficulty to escape its disciplinary boundaries (Woodhouse, 2012). In the field of irrigation and agricultural development research, the view is that farming is about resources and the farmer lens brings thus a focus on them. Hence, the selection of sites for the survey (and case studies) was based on hydrological, technical and cultivation criteria, and the survey itself is marked by questions on irrigated land area, crops, water sources, inputs, labour hiring, assets, income, and technology. We contend that a focus on resources goes far in explaining why some farmers adopt irrigation and others are not, because the numbers on the increased use of improved seeds, pesticide and fertilizer inputs (see Table 1) hint at a process of labour commoditization and bottom-up agricultural modernization (de Bont et al., 2019; Veldwisch and Woodhouse, 2022). Yet, with hindsight, we also observe, the farmer lens tends to reduce 'resources' in the debate to 'factors' or 'elements' metaphorically speaking that are required for the chemical formula called 'irrigation'. In so doing, the farmer lens provides weight to interpretations of constraints that are relatively narrowly conceived, and more complex forms of constraints gain less visibility. Notably, gender dynamics and how it relates to labour distribution and obligations in irrigated agriculture, and in turn to land, water and crop rights, can be considered such a more complex form of 'constraint'.[5]

The case studies that we purposefully developed to help design and complement the survey results only partially lay bare some of these more complex constraints. In fact, as can be surmised from the three case excerpts above, the assumptions on households, headship and constraints

underlie the descriptions of the farmers' initiatives similarly to how they underlie the outcomes of the survey. In approaching farmers for interviews, we made efforts to speak to both male and female farmers, conceiving them as actors in joint or separate (crop) production sub-units, but we nevertheless treated 'households' as the basic institution of production and consumption, and we usually spoke first with the most senior male farmer who we understood as the head. Hence, our descriptions consistently refer to households, and the roles of 'husband' and 'wife', but variations in the relations between, and among, men and women within kinship structures, and how these relations define land, water and labour rights in irrigated agriculture are hardly explored. Notably, the kinship structure of the Jackson family (first case), polygamist relations (second case) and labour exchanges among family members (third case) are only superficially mentioned. Similarly, in focusing on constraints, the descriptions overwhelmingly focus on water sources, irrigation methods, type of crops, and access to inputs and markets. In so doing, the view on actual plot dynamics, and how inheritance rights and intra-hearth-hold organization can determine crop cultivation and irrigation become background matter.

In addition, the case excerpts hint at two more assumptions that underlie the farmer lens and help frame farmer-led development of irrigation in particular ways. These are respectively the labelling of 'women' in research and the sedentarist assumptions embedded in the analysis. In regard to women, for instance, the descriptions fail to mention that the population in the research areas mainly originate from the Shona-speaking people who historically live in Central and Southern Mozambique, as well as the Zimbabwe central plateau (Newitt, 2017). One of these groups is the Ndau. In Messica, we superficially estimated at one occasion that the Ndau form an estimated 10% to 20% of the population, alongside Tewe, Barwe, Nyungue, and Manyika groups. Shona tribal groups can be cultivators and pastoralists relying traditionally on a combination of shifting dry land, and permanent wet land, agriculture (Bolding, 2004). Generally, the Shona have a patrilineal family structure, regulated by the institution of *lobolo* (dowry or bride wealth). This means in Mozambique that women with marriage move to the husband's family in exchange for *lobolo* (virilocality) and that polygyny is permitted without any limit to the number of wives (Arnaldo, 2002). There is thus a critical distinction in how women are tied to the patriarchal family – as 'wives' women can acquire rights and obligations to cultivate land through marriage (*lobolo*), but as 'daughters' they can have access to land and rights to cultivation through inheritance and patrilineal kinship (cf. Yngstrom, 2002). Married women, in turn, because of *lobolo* can 'opt out' of marriage when her matriarchal family returns dowry payments. Yet, such 'cultural' or 'ethnic' dynamics are grossly overlooked in the case excerpts by treating women as a homogeneous group; it makes the farmer lens both a gender and racial blinder (White, 2006).

Another assumption that appears to gain credibility with the farmer lens is that farmer-led irrigation development embodies a form of 'local development' in terms of 'local people' having access to and control of 'local resources'. This thinking, rather than seeing it as the outcome of networked spaces and positionality, reflects sedentarist assumptions (Zoomers et al., 2021). Notably, histories of mobility (return migration from Zimbabwe to Mozambique) and technology transfer (sprinkler irrigation) are mentioned in the first case but treated anecdotally. Similarly, survey questions were asked about migration but hardly systematically theorized in relation to the growth and spread of farmers' initiatives in irrigation in Africa. Both set of assumptions, of labelling 'women' as one group and seeing farmer's irrigation practices as 'local development', tend to produce a particular, simplified frame of what farmer-led irrigation development is about and how it works, especially how it relates to inheritance rights, intra-hearth-hold labour mobility and uptake of irrigation methods.

DISCUSSION AND CONCLUSION

In this reflexive paper, we examined the question of 'gender and social diversity in farmer-led irrigation development' in an attempt to reconsider the use of the farmer lens in research and policy, and re-think representations of African farming from a feminist perspective. In spite of knowing about inequities in agriculture, and gender dynamics in kinship structures and social social diversity among farmers in Africa, and our intentions to address these differences by means of data collection at household – and plot-levels, and case study analysis, it is clear that the farmer lens can have the effect of obscuring these differences. The analysis in this paper shows that our research strategies reflect all the assumptions that feminist scholars have identified as problematic in research on farming and gender, respectively the focus on (1) households; (2) headship; (3) constraints as resources and technology; (4) the labelling of women as a homogeneous group; and (5) the notion of local development. In this regard, the farmer lens may thus generate visibility to African farmers as agents who use land, water and labour resources, but simultaneously, it breathes life into interpretations of irrigation practices in Africa that are gender-less, that hardly match the complex relations between these practices, and gender and other social differences among farmers. This is particularly true

for how rights and responsibilities are distributed among family members, and how they determine whether a plot is irrigated or not. In so doing, the farmer lens can have shortcomings for thinking about the design of more grounded, human-oriented irrigation policies, because it invokes an image of the 'African farmer' that is one-dimensionally liberal, apolitical, and thus largely non-existent – of acting autonomous and on free-choice basis.

This conclusion summons the question what might be better ways to mobilize the farmer lens in research projects to scientifically and politically represent smallholder (or peasant) farming in Africa, and *what forms* of gender disaggregated data would produce more accurate representations. Our *ex-post* reflections suggest there is no easy answer to this question; they make us cautious and we re-iterate that all research concepts and methods in theory are reductive and produce simplifications of the complexity of social life (Latour, 2005; Law, 2009). Yet, we also showed in the analysis, this question is too important to let it simmer. To quote feminist scholar Donna Haraway: 'It matters what we use to think other matters with; it matters what stories we tell to tell other stories with; it matters what knots knot knots, what thoughts think thoughts, what descriptions describe descriptions, what ties tie ties. It matters what stories make worlds, what worlds make stories.' (2016: 12). For a start, it is thus important to develop and start nurturing a reflexive appreciation in irrigation research and policy discussions that there are many different stories to tell about irrigation and common pool resources use in Africa, of which some are successfully made visible by the farmer lens.

In addition, it is of critical importance to continue exploring how the farmer lens can be used in (mainstream) agricultural research so that it can produce more accurate representations of irrigation in Africa. Concretely, this means in the design of surveys and case studies to take note of the following suggestions: (a) take plot-level dynamics as the starting point of design instead of household-level dynamics, because it brings a focus on (crop) production sub-units; (b) use hearth-holds – a women-centred unit of social analysis (Ekejiba, 1995) – as the concept for design instead of female- and male-headed households, because it puts the issue of virilocality at the centre of analysis instead of headship and patrilineality;[6] and (c) integrate questions on flows of mobility and networked spaces in the design in addition to questions on assets, resources and productivity, because it brings a focus on how farmers acquire knowledge on, and access to, new irrigation techniques and cropping methods. With these suggestions, we contend, the use of the farmer lens in research could produce more accurate, 'inclusive' representations of irrigation in Africa, and inform debates on the design of more grounded, human-oriented policies of irrigation and common pool resources management in general.

NOTES

1 Some of the authors of this paper were involved in co-authoring these documents because of their research.

2 The *communidades* were Macate Villa and Zembe in Macate, and Ruaca and Chirodzo in Messica.

3 The adult-equivalent was calculated as follows: Each person over 15 years scores 1. Each person under 15 scores their age divided by 15. So a 14 year old scores 14/15; a 7 year old 7/15; a 5 year old 1/3 etc. All adult equivalents were added to give a total size per household.

4 The names of the people in the case study descriptions are pseudonyms.

5 At best, the farmer lens provides weight to interpretations of gender that problematizes the gender of women as the 'constraint'. It reproduces the dominant view in development research and policy, that women face more constraints than men.

6 Virilocality is when women physically move to the location of their husband's patrilineage at marriage.

COMPETING INTERESTS

The authors have no competing interests to declare.

AUTHOR AFFILIATIONS

Janwillem Liebrand orcid.org/0000-0001-7379-9026
Assistant Professor, International Development Studies, Utrecht University, the Netherlands

Gert Jan Veldwisch orcid.org/0000-0002-8123-281X
Associate Professor, Water Resources Management group, Wageningen University, the Netherlands

Victor de Santos Herranz
Water and Environmental Consultant, Spain

Nicky Schepers
Hydrological Advisor, Waterschap Rijn en IJsel, the Netherlands

Wouter Beekman
Director, Resilience BV, the Netherlands

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