Draft paper for the Africa Knows! Conference; panel D18

Janwillem Liebrand, Kei Otsuki, Eggo Müller, Gert Jan Veldwisch, and Romy Santpoort

Decolonizing the mind in debates on water and technology in Africa: Exploring new ways of framing agricultural and food innovations

Abstract

This paper addresses the challenge of decolonizing the conceptual framework in research-policy debates on water science and technology in Africa, and the need to articulate new forms of communication on agriculture and food. Research shows that African households in rural, and especially peri-urban areas, are driving the establishment, improvement and expansion of irrigated agriculture in an unprecedented manner, a process referred to by Western academic researchers in agriculture and irrigation as African farmer-led irrigation development (Beekman *et al*., 2014; Woodhouse *et al*., 2017). This 'African' development has the characteristics of what is today discussed as food sovereignty (Patel, 2009). It potentially embodies new, 'de-colonial' social relations 'in the making', in a relatively bottom-up way, and in circumstances that are potentially less oppressive and more equal between men and women, social classes and generations, than globally promoted models of corporate trade and food regimes. Therefore, it deserves our attention as a place to challenge the colonial mind-set in agriculture and urban planning which tends to undermine farmer-led innovations and use of water, and explore new ways of discursive framing of promising small-scale bottom up innovations in the agricultural and food sector.

Key words: food communication, framing, bottom-up innovation, farmer-led irrigation development, water science and technology, Sub-Saharan Africa

	Janwillem Liebrand, j.liebrand@uu.nl, www.uu.nl/staff/jliebrand Assistant Professor, International Development Studies Utrecht University, the Netherlands
	Kei Ostuki, k.otsuki@uu.nl, www.uu.nl/staff/KOtsuki Associate Professor, International Development Studies Utrecht University, the Netherlands,
	Eggo Müller, e.mueller@uu.nl, www.uu.nl/medewerkers/EMueller Professor Media and Communication Utrecht University, the Netherlands

	Gert Jan Veldwisch, gertjan.veldwisch@wur.nl, www.wur.nl/en/Persons/Gert-Jan-dr.ir.-GJA-Gert-Jan-Veldwisch.htm Associate Professor, Water Resources Management Wageningen University, the Netherlands
	Romy Santpoort, r.m.santpoort@uu.nl, www.uu.nl/staff/RMSantpoort Researcher, International Development Studies Utrecht University, the Netherlands

Introduction

The dominant focus in global research-policy debates on food, and water science and technology in Sub-Saharan Africa (hereafter SSA) is on the question of whether SSA can feed itself and how irrigation development can contribute to this objective (You *et al*., 2011; Xie *et al*., 2014; 2018). In these debates, there is a particular preoccupation with the technical potential of irrigation development, in relation to ideas of *water use efficiency* and the *regulation of water scarcity*, as well as to ideas that African agriculture is *unproductive and poor of nutritious quality*, *inefficient and wasteful of resources*. Such an articulation of the problem in SSA, of African agriculture and food production as being unproductive and inefficient in terms of water use, persistently produces a familiar stereotypical image of Africa – of a poor and hungry continent that needs external, Western, aid, technology and expertise (cf. Ferguson, 2006). It is a deeply familiar and very colonial – and arguably global capitalist – articulation of the problem: it relies on particular global hierarchies of 'knowing Africa' – in favour of science and engineering knowledge in control of 'global' experts, and in favour of projects of state-building – and at the cost of innovation practices in irrigation and agriculture in the hands of farmers. This 'global' colonial, modernist mind-set – years after the imperial powers have formally left the continent – continues to neglect or belittle local development practices and farmers' activities in their everyday irrigation practices in rural, and especially (peri-) urban areas. We observe that such bottom-up initiatives are *invisible* in policy documents, or are, at best, presented as *wasteful* and *harmful* for the broader agenda of food security, thereby they need to be 'modernized' (see for instance: FAO 2020). As a result, 'Westernized' professional experts in agriculture and urban planning tend to overlook, neglect or disdain promising developments 'on the ground'.

Research shows that African households in rural, and especially peri-urban areas, are driving the establishment, improvement and expansion of irrigated agriculture in an unprecedented manner, a process referred to by Western academic researchers in agriculture and irrigation as African farmer-led irrigation development (Beekman *et al*., 2014; Nkoka *et al*., 2014; Woodhouse *et al*., 2017; de Bont *et al*., 2019; Liebrand, 2019; Veldwisch *et al*., 2019).[1] This 'African' development has the characteristics of what is today discussed as food sovereignty (Patel, 2009). It potentially embodies new, 'de-colonial' social relations 'in the making', in a relatively bottom-up way, and in circumstances that are potentially less oppressive and more

[1] Both Western and African researchers participated in the production and writing of these publications, but the initiative generally was with Western, European-based researchers, controlling research funding.

equal between men and women, social classes and generations, than globally promoted models of corporate trade and food regimes. Therefore, we argue in this paper, it deserves our attention as a place to challenge the global, colonial mind-set in agriculture and urban planning which tends to undermine farmer-led innovations and use of water, and explore new ways of discursive framing of promising bottom-up agricultural and food innovations.

The perception and framing of African farmer-led irrigation development

To illustrate what we mean with African farmer-led irrigation development and how this is perceived in mainstream, donor-dominated science-policy debates, we take an example from fieldwork conducted by the first author in 2016. This example describes activities of the household of Davide. The house and land of Davide's family is located in the Godi river catchment, Messica district, Manica province, an area falling in the Beira Agricultural Growth Corridor (BAGC) in Central Mozambique. The BAGC is a foreign-supported agricultural modernisation initiative in SSA (see for BAGC: Kaarhus, 2018):

> The household of Davide (38 years) consists of his wife and four children. Davide's father was born in Bárue District, about 100 kilometer north of Chimoio. He fled to Zimbabwe during the civil war and returned to Mozambique in 1989, looking for suitable land for agriculture. Mr. Davide's father came to know about Messica, an area with *mudimba* (wetlands, water flows due to artesian pressure) through a friend, and he approached the *regulo* (tribal leader) with a request to settle on the land. This request was granted on the condition that existing farming and irrigation practices were respected by him. At that time, the Godi catchment was relatively sparsely populated because people had fled from the area during the civil war, to escape violence and insecurity.
>
> Davide's father soon made an agreement in 1995 with a neighbouring farmer, who was constructing a furrow at that time, to use water for irrigation. This was an easy solution because the furrow passes his land. Today, the furrow is known in the area as 'canal Richard', after the farmer, Richard, who is the *dono de canal* (canal master/owner). The source of the furrow is a *mudimba* wetland. In 2016, twenty years after its original construction, the furrow was supplying irrigation to the plots of eight families in total, including the land of Davide's father and the land of Richard and his son.
>
> Davide arrived in 2004, got married and started his own household, on the land of his father. He also dug a new furrow, and this made him the *dono de canal* of 'canal Davide'. Davide and his wife cultivate about 3 ha in the Godi catchment, and another 3 ha in a neighbouring catchment. In the rainy season (December to April), they jointly manage the cultivation of maize for household subsistence. At the same time, and in the dry season (May to October), they cultivate a number of smaller plots, mainly for commercial purposes: tomatoes, onions, sweet potatoes, capsicum, chili peppers. Davide and his wife both take care of the crops and both practice irrigation. They also regularly hire labourers for the job whom they pay cash. They aim to maximize production in the end of the dry season (September/October).
>
> The task of purchasing agricultural inputs, such as seeds, fertilizer, pesticides, and irrigation equipment; and dealing with traders at the farm gate is the responsibility of Davide. Recently, for instance, in 2015, he purchased three sprinklers and 200 meters of plastic pipe in

Zimbabwe (100 m of 15 mm, 100 m of 25 mm), spending in total about USD 70. His wife usually travels to the Messica markets to sell smaller quantities of produce (e.g. 2-3 boxes of tomatoes). Both Davide and his wife deal with cash, making joint decisions on how to spend it. By 2016, Davide and his wife had started to divert cash away from agriculture, building a second house in Messica town (about 15 kilometers away). For this, David had acquired a personal' DUAT of 1800 m2, spending about USD 170 on fees.

Source: Field notes Liebrand, 2016.

The story of Davide and his family is just one of many comparable stories (Beekman *et al*., 2014; Nkoka *et al*., 2014; Woodhouse *et al*., 2017; de Bont *et al*., 2019). More and more African farmers are active in using water for irrigation to improve local food production; they are-responding to opportunities that arise – in this case the growing demand for vegetables in the (peri)urban area of Chimoio and region. Davide and his family are an example of farmers who are commercially oriented entrepreneurs that make investments to develop their businesses together with their families. They explore available resources and technologies, tinker with these to adapt them for solutions that fit their circumstances best.

Identifying dominant conceptual frameworks in agriculture and water science/policies

The practices of members of Davide's household embody innovation in the broadest sense of the word: they do things differently. Switching from subsistence agricultural production to irrigated agriculture and commercial production requires knowledge on crops (quality of seeds, plant spacing, crop diseases etc.), water application techniques (control of flows, volumes, velocity, digging canals along contour lines, operating pumps etc.), agricultural inputs (fertilizer use, pesticide use etc.), and access to markets (network of traders, transport, access to credit). And because these innovations result in agricultural intensification and increased levels of food security, the practices of Davide's household can be conceived to entail a process of agricultural modernization – but it is clearly one in which neither 'westernized' professionals (expats, donors) nor state actors (agriculturalists, engineers) play a prominent role (see de Bont *et al*., 2019 for an elaboration of this argument).

Such innovative, pragmatic, low-cost 'local' solutions are far from 'primitive', however, they are rather different from Western engineers', investors' and policymakers' imagination of large scale based on imported irrigation and food production systems. The latter would probably recommend that farmers should develop a system of lined canals and motorized pumps to improve water irrigation on a larger scale, but also requiring larger investments, the help of engineers and thus Western support. To their perception, the small-scale local, 'African' solutions seem unsustainable, inefficient and often even illegal.

This becomes evident from an initial analysis of policy documents written by policymakers and donors in which smallholder farmers, particularly African farmers, are often framed as passive actors. Repeatedly, farmers are characterized as vulnerable and in need of better, modern inputs and technology than 'traditional' farming systems. Most of all, African farmers are considered unproductive. These concepts can be found for instance in policy

reports of the UN's Food and Agriculture Organization (FAO), that emphasizes the need to include smallholder farmers in 'modern' value chains:

> We [donors, experts in agriculture and irrigation] need to redouble efforts to include smallholder farmers in modern food value chains, thus securing rural incomes and food security in both rural and urban areas. (FAO, 2020, p. v).

In addition, authors of the document, *the State of Global Commodity Markets 2020,* assume a linear growth model in transitioning towards modern value chains, stating that all countries follow western models of development:

> While the transformation from traditional to modern value chains was initiated with the Industrial Revolution, and took almost a century in North America and Western Europe, in many developing regions it set in later and has been much faster. […] The process also started in Southern Africa (Zambia), East Africa (Kenya) and West Africa (Ghana, Nigeria and Senegal) in the 2000s. (FAO, 2020, p. 25)

This is in line with the framing smallholders by individual donors. The following citation, that emphasizes the lack of production, was drawn from the key policy note *Investing in Global Perspectives* by the current Dutch government in 2018, illustrates this well:

> Worldwide, however, more than 500 million commercial and family farms have to contend with very low productivity and revenues, owing to a lack of means of production, knowledge and market access, particularly in Sub-Saharan Africa. (Ministry of Foreign Affairs of the Netherlands, 2018, p.36)

As a solution, "The Netherlands wants to double the productivity and revenues of at least eight million farms by 2030" (Ministry of Foreign Affairs of the Netherlands, 2018, p.37).

Another illustration of the conceptual framework – or mind-set – of Western policymakers and investors, and how it relates to projects closer to the ground, is taken from a World Bank (2011) document: *Project appraisal document on a proposed credit in the amount of SDR 44.90 million (US$70 million equivalent) to the Republic of Mozambique for the PROIRRI-sustainable irrigation development project*. This particular project (PROIRRI) focusses on state-led irrigation development in Manica province – in the same region where Davide and his household are practicing irrigated agriculture. It states that "the development objective of the PROIRRI project is to increase *agricultural production* […] and raise *farm productivity* in new or improved *irrigation schemes* in the Provinces of Sofala, Manica and Zambezia", mentioning, in addition, that "'smallholder farmers […] will benefit from the adoption of: (i) improved production *technologies* and know-how related to irrigation; [and] (ii)

complementary *technical skills* required to harness the full potential of water for agriculture" (WB, 2011: 5; emphasis added).[2]

As the quotes above reveal, 'irrigation' is conceived in both the donor world of agriculture and planning circles in Mozambique as something of 'agricultural production', 'farm productivity', 'schemes', 'technologies' and 'technical' skills – as an engineering subject in the domain of agriculture.

Based on these policy documents on food, agriculture and irrigation in Africa, and a preliminary analysis of policy documents in other sectors that are interacting with cultivators in their domain of jurisdiction, such as Urban Planning – and Health departments in city and peri-urban areas, we reconstructed the central key frames and wordings used to signify the bottom-up practices of small scale local water irrigation by local farmers (see Table 1 below).

Table 1: Dominant conceptual frames for small-scale local water irrigation development

Communication frames/ disciplines	**Shared meanings**	**Policy and professional 'responses'**
Agricultural – and irrigation development	Unproductive, unsustainable, inefficient, small	Replace it, rehabilitate it, erase it
Water – and environmental planning	Illegal, unregulated, exacerbating scarcity	Penalize it and/or stop it
Health development	Dangerous, health risks, pollution, sickness	Threat it, penalize and/or stop it
Urban planning	Non-existent, informal, unplanned	Ignore it, offer compensation
Economic analysis	Unproductive, low value, subsistence, informal markets	Not worth studying
Food transition – and agri-business	Food & nutrition insecurity, poverty, unhealthy, degradation of environment	Adjustments, innovations, new technology, scientific agriculture

As can be surmised from the language and concepts in Table 1, the traditional Western bias towards modernist concepts of a technological rationality, scientific engineering, central control and large-scale economic efficiency is obvious in the analysed accounts on communication frames. This is not to say that, for example, productivity is not an issue for many farmers, and a potential solution for food insecurity in many contexts. However, none of these documents explicitly includes farmers' own initiatives and innovations that can contribute significantly to a more sustainable and resilient food system and from which many

[2] PROIRRI can be considered a key national development programme in Mozambique, with a budget exceeding USD 70 million.

lessons can be drawn. This preliminary finding probably mirrors what critical experts working in these disciplines might expect. For more robust evidence, this research will be carried out with larger, representative data sets.

Challenges in decolonizing dominant frameworks

However, while the need to decolonise the dominant conceptual frameworks in debates on water and technology in Africa is obvious, the challenges of such an endeavour are numerous. Not only do powerful Western investors, policy makers and funding bodies still tend to be – explicitly or implicitly – in favour of traditional modernist, techno-rational and colonial frameworks. Also the local practitioners 'on the ground', local authorities, engineers, advisers, and last but not least the farmers themselves, are often 'infiltrated' by a 'colonial mind-set', as the example quoted above demonstrates. These mind-sets have been historically nurtured through the globalization of food trade system as we suggest below.

The description of Davide and his family's reproduces some of the frames that we above have characterised as a typical Western techno-rational discourse on small-scale, local irrigation development. First of all, the description focuses on water and technology and emphasises aspects that help to portray Davide and his family as 'active farmers' - implicitly rejecting the stereotypical, stigmatizing idea of African farmers being lazy, inactive, and disinterested in developing their business beyond subsistence. At the same time, the description of this farmer family's engagement might also reflect internalized Western frameworks that shape Davide's and his family's local approach himself: an internalized faith in science and technology. However, this could at the same time just be a reproduction of the supposedly socially expected reaction to Western field researchers' questions, stating immediately in interviews, that he is definitely in need of support and technology.

Another point, where it is difficult, if not impossible, to identify on what layer the remainders of traditional colonial frameworks are at work, is the gender relations that define the field note. It should not have escaped the attention of critical readers, that though 'the wife of Davide' seems to play a crucial role in this family's development of their farm and their businesses, she remains throughout the description just 'the wife of Davide', but is never referred to by her own name. This might tell us something about traditional gender relations on the spot, but tells probably more about a blind spot of the Western field researcher (in this case Liebrand), and the 'masculine' professional environment in which he is operating.

To complicate things, next to the different layers on the ground, where the conceptual frameworks of local farmers are already shaped by colonial discourses, the Western researchers concepts might themselves be linked to these discourse, even and particularly when the objective is to decolonize the frameworks and mind-sets that structure the interaction between local farmers, engineers and policy makers on the on hand side, and Western investors, engineers, policy makers, and funding bodies on the other (see Liebrand, 2019 for reflections and elaborations on this point). On top of that, our own approach as Western researchers – all located at universities in the Netherlands – adds another layer of perceptions and frameworks to our analysis, asking to be decolonized themselves.

Ways forward for research

Dealing with the challenges of decolonizing the mind-set of 'global' expertise on agriculture, irrigation and development planning, and explore new ways of discursive framing of promising bottom-up innovations in the agricultural and food sector, we propose, as a first step, two ways forward. First, we consider a conceptual methodology ('studying up') to critically investigate the 'colonial' world of water – and irrigation expert thinking, seeking to articulate possible scenarios or working hypothesis for further research. Second, we contextualise the debate on decolonizing the mind in water science and technology by discussing the concept of 'food regimes'. We see this as a potentially promising way because the domain of water science and technology – in relation to irrigation – is embedded in the historical development and political-economy of global food production.

Decolonizing the mind: considering the methodology of studying-up.

As illustrated with the example of Davide's household in the beginning of this paper, we propose to use field studies of 'local' irrigation in SSA as a starting point for 'studying up' irrigation expert thinking. Anthropologist Laura Nader (1972) defined studying up as a research strategy to address 'the facelessness' of a bureaucratic society and the major institutions that affect everyday lives (p.288). Feminist scholar Sandra Harding (2004) articulates studying up as doing research from the standpoint of marginalized people in society (women, people of colour, lower classes etc.), taking their location in society in consideration and questioning (scientific) 'objectivity' and 'truth'. With the objective to analyse the dynamics of irrigation, at the 'local' level and at the level of expert thinking, we use studying up to give a face to the knowledge of irrigation and agricultural experts, and focus on some of the ideological preferences and conceptual frameworks that they use to promote science and technology in relation to water.

In exploring this pathway, we conceptualize 'irrigation expert thinking' as an arena where various institutions and actors interact and integrate in terms of knowledge and policy making – as governance (Nuijten *et al*., 2004). We take from 'governance' that the state or the World Bank for instance, or universities for that matter, are not the sole institutions to produce knowledge, and initiate policy and projects, and that interventions in the field are the result of partnerships and negotiations between various national and foreign institutional actors (e.g. the state, donors, private companies, NGOs, universities, farmer leaders).

The knowledge practices of professionals of various institutions who engage in the governance of irrigation expert thinking can be considered to fall under one or multiple and overlapping 'interpretative communities' (e.g. engineers, agriculturalists, social scientists). An interpretative community can be considered to function as a relatively coherent group of people that share norms and values through social participation – as a community of practice (Lave and Wenger, 1991). Mosse (2005) defines an interpretative community in development practice as a group of (professional) actors or policy elites that pursue a multiplicity of interests and which support the established order and presentation of knowledge. This conceptualization avoids identifying one actor (e.g. government, donors) or one professional community (e.g. engineers), as the culprits of promoting 'bad' development.

In the view of actor-network theory (Latour, 2000; Latour and Woolgar, 1986), irrigation expert thinking exists because it is stable and durable, and therefore, it has to be supported, protected, safeguarded etc. It has to meet certain interests or shared ideas about what is 'good' knowledge. In other words, various reasons can be thought of why irrigation expert thinking is 'protected' or 'safeguarded' from alternative, potentially de-colonizing streams of practice and thought. We list some of them here as possible scenarios or working hypothesis. We are aware that these scenarios might overlap in reality. In fact, we acknowledge that they might, in fact, operate as one whole; the interactions itself providing for an explanation.

(1) *Business-as-usual scenario*: The political-economic interests of different actors in irrigation expert thinking do not match beyond technology/infrastructure development, and this is why farmers' innovations are ignored/excluded.

(2) *Evidence and fact-based analysis scenario*: Irrigation expert thinking relies on engineering and (classical) economic knowledge and research methods to define 'evidence' and 'facts'. It has a particular understanding of what is considered 'rigorous analyses', calculated volumes of water use and water use efficiency for instance (see Mollinga and Gondhalekar, 2012). In this view, farmers' innovations – and case studies and surveys which map these innovations but do not necessarily calculate volumes of water use and water use efficiency – are characteristically disqualified as 'anecdotal'.

(3) *Modernization scenario*: Irrigation expert thinking is based on world view that sees the world as universal, manageable and makeable. In contrast, arguably, 'de-colonial' world views implicitly reject modernist world views, making insights and findings derived from farmers' innovations incompatible/incommensurable with planned development.

(4) *Professional culture and/or masculinity scenario*: Irrigation expert thinking is part of cultural life. Professionals have status, credibility and reputations in society. Put differently, irrigation expertise might well be one domain in society in which power and 'being professional' is validated with status and masculinity (Liebrand and Udas, 2017). If this is true, farmers' innovations may not help irrigation professionals to maintain authority and secure a voice for themselves. In other words, farmers' innovations pose a threat to the knowledge of experts, and arguably, doing research on farmers' innovations is conceived as threatening (or risky) in the world of irrigation expert thinking, beause it is identified as 'soft' of 'feminine' knowledge vis-à-vis 'real' engineering knowledge.

These scenarios or working hypothesis can be conceived as various layers on which colonial frameworks are 'at work' in the world of water science and technology.

Decolonising food regimes in globalizing Africa

Food production systems have historically been altered and fragmented in such a way that different actors from different geographical locations and backgrounds have varied access to land and other production resources. In conceiving these changes, it is useful to think in terms of global 'food regimes'. The concept of 'food regimes' was introduced by McMichael and Friedman in the late 1980s. They can be defined as "identifying stable periods of capital accumulation associated with particular configurations of geopolitical power, conditioned by forms of agricultural production and consumption relations within and across national spaces" (McMichael, 2009: 139). The first food regime is dated from 1870 to the 1930s and is characterised as the "British-centred imperial food regime" and includes colonial tropical

imports of luxury foods and upper-class consumption goods to Western countries (McMichael, 2013: 26). The trade of these goods enabled Britain's rise of empire (also called "the workshop of the world") and accumulation of wealth, while outsourcing staple food production into the soon over-exploited colonial states (McMichael, 2009: 27). It was in this first phase that global value relations were created, more specifically "the integration of a world industry and world agriculture via the price form, with significant class effects" (McMichael 2013: 28). The mind-set that accompanied this development was the establishment of water science and technology as a domain of applied engineering.

The second food regime stretches from the 1950s until the 1970s and is characterised as the "U.S.-centred intensive food regime" and entails a period of "re-routed flows of (surplus) food" from the United States to an informal empire of postcolonial states in times of a post-war human rights crisis in which strategies such as food aid subsidies were used for political purposes (McMichael 2009: 140). It included the idea of spreading economic growth from the U.S., as well as models of agroindustrialisation, land reforms, Green Revolution technologies and military and economic aid programmes for so-called developing countries in 'The Third World' (McMichael, 2009; 2013). The mind-set that accompanied this development was the growth of influence of global (read: US-based) models of irrigation – and water management, and agricultural development, based on engineering principles, and the application of Western science and technology.

Following these two distinctive periods of time, the 1970s food crisis raised new questions regarding food security and world hunger and eventually led to a growing private regime of global trade in the hands of transnational corporations – the "corporate food regime". This third food regime, started in the late 1980s, is on-going, and is characterised as a phase of differentiated supply chains and a so-called "supermarket revolution" for privileged customers who have access to a variety of products at any time (McMichael 2009: 142). The abundance of goods comes at a price for a large number of producers in the Global South, as it includes "populations of displaced slum-dwellers as small farmers leave the land" (McMichael, 2009: 142). The third food regime differs from the two previous ones as it characterises a "new moment in the political history of capital, more precisely the neoliberal 'globalization project'" (McMichael 2005: 273). While the second food regime can be seen as a development project, where states managed markets; in the third food regime the states now serve the market. The mind-set that accompanied this development was the growth of market-based models in promoting modern agriculture and irrigation management, whereby highly differentiated, 'globalized' Western markets were implicitly taken as a reference (think about the development by companies of irrigation technologies such as drip and sprinkler irrigation, and how they approach farmers as 'customers').

Today's industrial agriculture is referred to as "transnational space of corporate agricultural and food relations of production and reproduction integrated by commodity circuits" (McMichael 2006: 286). Thus, the global interconnectedness of actors on a transnational level is crucial, as well as the role of large corporations and the involved power structures. Particularly, farm workers are experiencing more inequalities as they tend to be exposed to

dangerous workplaces and usually employed under exploitive conditions (McMichael, 2013). In this food regime, we witness the hegemony of 'global' water science and technology.

More importantly in the context of our project, is the fact that within today's corporate food regime small-scale local farmers became disempowered and neglected, as McMichael explains:

> Subsequent universal imposition and/or adoption of industrial agriculture marks the deepening of global capitalist markets, with decolonization encouraging the extension of green revolution technologies followed by a trade regime premised on southern food dependency and specialized agro-exporting, and, consequently, the marginalization of smallholder farming. (2013: 63)

As we have illustrated above, part and parcel of the marginalization of smallholder farming and of small scale irrigation development is a still lasting colonial mind-set of diverse actors in this field: not just Western corporate investors, engineers and policy makers and local actors in farming and agricultural developments, but also scientists engaging with agricultural development in the respective regions of Africa (and beyond). In our project, we address the challenge of decolonizing the conceptual framework in research and policy debates on water science, agriculture and technology in Africa. By focusing on the dominant conceptual frameworks in research and practice, our preliminary analysis shows that these debates are still dominated by top-down modernist perspectives on food, water and agriculture, centered on technical innovation and increased production as the way towards sustainable and climate-proof food production. In other words, a colonial mind-set and thus structural inequality is expressed through language and framing. Farmer's agency and their capability to adapt and innovate are excluded from these discussions, neither are they considered as practices from which can be learned or which can be scaled up. Further analyses of research and policy debates on international, national and local level will be required to find ways to address this and other colonial remnants.

References

Beekman, W.; G.J. Veldwisch; and A. Bolding. 2014. Identifying the potential for irrigation development in Mozambique: Capitalizing on the drivers behind farmer-led irrigation expansion. *Physics and Chemistry of the Earth*, 76-78: 54-63.

de Bont, Chris; Janwillem Liebrand; Gert Jan Veldwisch and Philip Woodhouse. 2019. Modernization and African farmer-led irrigation development: Ideology, policies and practices. *Water Alternatives*, 12 (1): 107-128.

FAO. 2020. *The State of Agricultural Commodity Markets 2020. Agricultural Markets and sustainable development: global value chains, smallholder farmers and digital innovations*. Rome, FAO.

Ferguson, J. 2006. *Global Shadows: Africa in the Neoliberal World Order*. Duke University Press.

Harding, S. 2004. A socially relevant philosophy of science? Resources from standpoint theory's controversiality, *Hypatia*, 19(1): 25−47.

Kaarhus, R. 2018. Land, investments and public-private partnerships: what happened to the Beira Agricultural Growth Corridor in Mozambique? *Journal of Modern African Studies,* 56 (1): 87-112.

Latour, Bruno. 2000. When things strike back – a possible contribution to science studies. *British Journal of Sociology,* 51 (1): 105-123.

Latour, Bruno; and S. Woolgar. 1986. *Laboratory life: The construction of scientific facts*. Second edition. Princeton: Princeton University Press.

Lave, Jean, and Etienne Wenger. 1991. *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.

Liebrand, Janwillem. 2019. The politics of research on farmer-managed irrigation systems in Asia: Some reflections for Africa. *Water Alternatives*, 12 (1): 129-145.

Liebrand, Janwillem; and Pranita Bhushan Udas. 2017. Becoming an engineer or a lady engineer: Exploring professional performance and masculinity in Nepal's Department of Irrigation. *Engineering Studies*, 9 (2): 120-139.

McMichael, P. (2006). Global development and the corporate food regime. *New Directions in the Sociology of Global Development*, 11, 265–299.

McMichael, P. 2009. A food regime genealogy. *Journal of Peasant Studies*, *36*(1), 139–169.

McMichael, P. 2013. *Food Regimes and Agrarian Questions*. Fernwood Publishing.

Ministry of Foreign Affairs of the Netherlands. 2018. *Investing in global prospects, policy document on foreign trade and development cooperation.* Den Haag: Ministry of Foreign Affairs.

Mollinga, Peter P.; and Daphne Gondhalekar. 2012. Theorising structured diversity. An approach to comparative research on water resources management. ICCWaDS Working Paper No.1.

Mosse, David. 2005. *Cultivating development. An ethnography of aid policy and practice*. London, UK: Pluto Press.

Nader, L., 1972, Up the anthropologist: Perspectives gained from studying up. In: Hymes D., *Reinventing anthropology*, New York, Pantheon Books: 284−311.

Nkoka, Francis; Gert Jan Veldwisch; and Alex Bolding. 2014. Organisational modalities of farmer-led irrigation development in Tsangano District, Mozambique. *Water Alternatives*, 7 (2): 414-433.

Nuijten, M., G. Anders, J. van Gastel, G. van Haar, C. Van Nijnatten and Jeroen Warner. 2004. Governance in action: Theoretical and methodological discussions around a key concept. In: D. Kalb, W. Pansters, H. Siebers (eds.). *Globalization and development:*

Themes and concepts in current research, 103-130. Dordrecht, the Netherlands: Kluwer Academic Publishers.

Patel, R. 2009. What does food sovereignty look like? *Journal of Peasant Studies* 36(3): 663-673.

Sabaratne, M. 2017. *Decolonizing intervention: International statebuilding in Mozambique*. London and New York: Rowman & Littlefield.

Veldwisch, Gert Jan; Jean-Philippe Venot; Philip Woodhouse; and Hans C. Komakech. 2019. Re-introducing politics in African farmer-led irrigation development: Introduction to special issue. *Water Alternatives*, 12 (1): 1-12.

World Bank 2011. Project appraisal document on a proposed credit in the amount of SDR 44.90 million (US$70 million equivalent) to the Republic of Mozambique for the PROIRRI-sustainable irrigation development project. Report no: 59590-MZ. Washington DC: World Bank (WB).

Woodhouse, P., G.J. Veldwisch, J.-P. Venot, D. Brockington, H. Komakech, and Â. Manjichi. 2017. African Farmer-Led Irrigation Development: Re-Framing Agricultural Policy and Investment? *The Journal of Peasant Studies,* 44 (1):213–33.