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Exploring gender and intersectionality from an assemblage perspective in food crop cultivation: A case of the Millennium Villages Project implementation site in western Kenya

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ABSTRACT

Gender essentialism in development practice has been criticised for more than three decades with little effect. We use gender and intersectionality within the framework of assemblage to analyse the relations, practices, and intersections of both human and nonhuman elements within the context of the Millennium Villages Project (MVP) in Luoland in western Kenya. This framework permits us to tease-apart essentially categorised 'women' revealing changing dynamics of senior and junior women within the Luo polygamous homestead, *dala,* and their implication for food security within. This insight reveals the inadequacy of essentialising representations of Luo women and the relevance of their recognition as social beings who differently construct themselves and their actions, in interaction with both human and nonhuman elements. Gender and intersectionality from an assemblage perspective makes visible the involved human and nonhuman intersecting elements and the changing dynamics within an ongoing process in a specific socio-ecological context that better support development.

1. Introduction

The book *Woman's Role in Economic Development* by Boserup (1970) is a historical marker in the literature on women in agriculture. It highlighted how development policies and processes from colonial times onwards had largely worked against and ignored the contribution of women. Her intervention has created a space for numerous academics, policy makers, practitioners, and activists to comment, critique and broaden the debate from a focus on women to that of gender. Around the 1995 Beijing world conference on women, the substantial consideration given to the multiple dimensions of women within development evolved into gender mainstreaming efforts to integrate gender into theory, policy and practice and, specifically, promoting women's rights to equitably access resources such as land, food, and power (Esterik, 1999; Leach, 2015). Policymakers in the global South claim to have met the goals for mainstreaming gender in most of their (agricultural) programs and international development agencies and individual donor countries make similar moves in discussing their funding, design and implementation of projects (Farnworth and Obuya, 2010).

Feminist scholars and practitioners argue that incorporating 'gender' into development practice, which is done by getting deliberately organized groups of women to transform social, economic and political structures (Cornwall, 2007), is insufficient (Leach et al., 2016). One persistent critique is that this mainstreaming brings forward binary constructions of 'women' and 'men' (Carr & Thompson, 2014; Harcourt, 2016; Hartmann, Hendrixson, & Sasser, 2016; Leder, Clement, & Karki, 2017; Ravera, Martín-López, Pascual, & Drucker, 2016; Sachs, 2019; Tavenner & Crane, 2019; van der Burg, 2019). More than three decades ago Mohanty (1988, p. 78) noted already that "men and women are always seen as pre-constituted whole populations, and relations of dominance and exploitation are also posited in terms of whole peoples-wholes coming into exploitative relations." Such essentialism disregarded heterogeneity within either category which, when ignored, yielded ineffective strategies to combat oppressions, dominance, and exploitations.

To capture the dynamics within which gender intersects with other social and material relations, human and nonhuman elements, practices, and processes that shape crop cultivation, we present an analysis of extended cases from development situations

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in Luoland in West Kenya. Our aim is to contribute to the long standing demand that programming recognizes gender and women as constructed internally heterogeneous categories shaped by the lived everyday experiences of both men and women (Carr, 2008a; Carr and Thompson, 2014; Leach et al., 2016; Leder and Sachs, 2019; Ravera et al., 2019; Ray, 2016; Tavenner and Crane, 2019; Wendoh and Wallace, 2005). We specifically situate our analysis in the context of a Millennium Villages Project (MVP) as it provides a clear example of gender essentialism in mainstreaming in the gender and agricultural domain. The MVP was first implemented in Sauri in West Kenya between 2004 and 2015 which was also the site where a team of researchers, including the authors, have been undertaking longitudinal studies since the mid-1990s till now (Almekinders et al., 2021; Hebinck, 2001; Hebinck & Mango, 2001, 2008; Hebinck et al., 2015; Kimanthi, 2014, 2019; Kimanthi & Hebinck, 2018; Mango, 1996, 1999, 2002; Mango & Hebinck, 2004, 2016). We can thus rely on detailed case material describing how men and women respond to project interventions such as those within the MVP.

The MVP deployed interventions in Sauri that supported the then applicable eight Millennium Development Goal (MDGs). The MVP promoted mainly the use of modern means to enhance food security and is reasonably seen as an extension of previous Green Revolution inspired attempts to boost food production and to reduce hunger through raising the yields of the staple crop maize by promoting the use of improved and high yielding varieties (Hebinck et al., 2015; Sanchez, 2006). In accordance with the MDG 3, the MVP promoted gender equality and the empowerment of women. The gender component of the MVP in Sauri hinged on efforts to include 'women' in leadership positions of the committees formed within the project structure to spearhead project implementation. 'Women' were trained on how to organize themselves and to farm as well as to stimulate group saving and loaning (Mutuo et al., 2006). There was, however, little effort made to pay attention to interlinkages between the diverse interventions or to heterogeneities within groups such as 'women'.

The relevance of our analysis goes beyond the MVP as implemented in Sauri *per se.* The significance of the MVP as a case is that it was launched as a high profile promising instrument to achieve the MDGs (Hulme, 2009). The MDG's and MVPs received substantial financial and political support from international donor organizations and governments and was to be implemented across African countries from 2004 to speed up the achievement of the MDGs. The MVP was subsequently upscaled to 80 villages across Sub-Saharan Africa (Kanter et al., 2009). The conclusions we draw from how the MVP in Sauri conceptualized gender can be extended to (crop) technology intervention programs implemented elsewhere in Africa and beyond.

In his commentary on the problems and potentials of the MVP and African development, Carr (2008b, p. 336) notes that "the villagers in Sauri were lumped together as an undifferentiated group of people with the same concerns; a treatment which goes against the vast literatures on gender and development and pulls along associated problems of disregarding heterogeneity in a village society." Potash (1981), writing almost three decades before the implementation of MVP about the areas that the project covered, highlighted the differences between the mother-in-law versus daughter-in-law relationships in food crop cultivation in Luoland, where the mothers-in-law make most of the farm decisions. Other literature point at programmatically relevant differences across the life cycle. Quisumbing et al. (2014, p. 14) contend that "focusing narrowly on the differences between men and women masks more important differences among women, including those that arise from where they are in their life cycle." They explain how the status women gain when they become senior can be an untapped resource for spreading extension messages due to their status and the importance of investing in youth. Further, cultural reproduction has been found to be relevant. For instance, Francis (1998) notes that junior wives may accept their subordination to senior women within households with prospects of greater domestic power to be exerted over their future daughters-in-law. As documented in previous studies in the area, there are rituals performed before planting (*golo kodhi*) and harvesting (*dwoko cham*) of maize which follows the order of seniority where the first wife (*mikayi*) has to plant or harvest first before the rest of the wives can plant or harvest within the Luo polygamous households (Hebinck et al., 2015; Kimanthi, 2019; Mango, 2002; Musandu, 2012; Nyasimi et al., 2009). All these studies point to the programmatic relevance of social differences amongst and between women and nonhuman elements, such as cultural artefacts, seeds, markets, ecological elements and projects and program that promote new crop technologies. Moreover, longitudinal studies of maize cultivation in Luoland and more broadly the implementation of Green Revolution program in Africa and beyond, have shown that innovations that are (crop-technology) introduced by such interventions are contested and as a result, not widely accepted in the villages (Chambers, 1984; Hebinck et al., 2015; Kimanthi, 2019; Koppel and Oasa, 1987; Mango, 2002; Mango and Hebinck, 2004).

Despite an awareness of these contestations and that gender and cultural practices play important roles in development, the MVP and similar project and program interventions before and after MVP (such as ICRAF's agroforestry program) (Place et al., 2007) and the current efforts of the One Acre Fund to promote the cultivation of hybrid maize (Kimanthi, 2019) were – and still are – rather gender blind. While numerous studies examined and problematized the intersections between gender and other social differences in the context of agricultural interventions, these are rarely considered in development planning and practice (Carr, 2008a; Harcourt, 2016; Hartmann, Hendrixson, & Sasser, 2016; Lagesen, 2012; Leach, Mehta, & Prabhakaran, 2016; Leder, Clement, & Karki, 2017; Ray, 2016; Sachs, 2019; Sobha, 2007; Tavenner & Crane, 2019; van der Burg, 2019). Most projects do not account in their design and implementation for gendered power dynamics and differences between and amongst women that may be relevant in shaping crop cultivation and how these could potentially (have had an) impact on their expected project outcomes. An additional reason for our choice to use MVP as a case study is that even as the MVP has been well-studied and documented (Cabral et al., 2006; Carr, 2008b; Clemens and Demombynes, 2011, 2013; Kimanthi and Hebinck, 2018; Nziguheba et al., 2010; Sanchez et al., 2007; Wilson, 2015) it has rarely been examined from a gender perspective.

For this paper we explore and interpret gender and intersectionality from an assemblage perspective in food crop cultivation. Intersectionality in feminist scholarship requires attention to differences among women and men that make visible multiple shifting identities and experiences of domination and subordination. We specifically draw on intersectionality as conceptualized in the new materialist and postcolonial feminist political ecology (FPE) (Alaimo and Hekman, 2008; Mollett and Faria, 2013) that investigates how gender and other social categories, such as marriage type and social status within households, and nonhuman elements, such as maize seeds and technology, dynamically intersect and are mutually constitutive (Davis, 2008; Leder and Sachs, 2019) in a specific socio-ecological context (Nightingale, 2011). An assemblage perspective implies investigating these changing human and nonhuman intersections as 'working arrangements' (Buchanan, 2015) and through this identifying the emergent properties of assemblages as the "grafting of new elements and reworking old ones; employing existing discourses to new ends" (Murray Li, 2007, p. 265). The analytical value lies in its ability to have us 'tease apart' the constitutive parts of the heterogeneous elements

that make up assemblages (McLean, 2017; Murray Li, 2014). This assemblage perspective and postcolonial and new materialist intersectionality complement each other when tracing the changing intersections of both human and nonhuman heterogeneous elements that shape maize cultivation in the lived experiences of Luo women over time, through struggles that are manifested through negotiations, contestations and resistance (Herbert, 2000).

To demonstrate the productivity of using the notion of assemblage we examine two categories of women, senior women (e.g., mothers-in-law or the first wife) and junior women (daughters-in-law or wives in a lower order of seniority within Luo polygamous households), and maize seeds as major actors in food crop cultivation in Luoland. Being one of the studies of the longitudinal project of the study of agrarian change in Luoland, this paper allows for an extensive analysis of dynamics as assemblages generated by the lived experiences of gender and other differences among the 'Luo women' enacted through the cultural rituals involving both human and nonhuman elements and how these impact on maize cultivation and household food security.

The paper proceeds as follows. In the next section, we explain gender and intersectionality from an assemblage perspective to lay foundations for our analysis and structure for our findings. After describing the site and methods of data collection, the sections that follow center on an analysis of three stories of maize planting and harvesting by 'women' in the Luo polygamous households. We focus on how gender, other social differences, in particular social status within Luo polygamous households, and nonhumans, such as maize seeds, are transformed through the struggles among senior and junior wives in situated socio-ecological contexts. The analysis shows women's struggles to balance cultural expectations and survival by embracing external elements such as the introduced maize technology. In the conclusion, we discuss the contribution of thinking in terms of an assemblage to unsettling binary notions of gender from *within* the essentialized category of women used in development programming.

2. Gender and intersectionality from an assemblage perspective

Gender relations in food crop cultivation are complex and shape a multiplicity of changing practices that are contested and, at times, lead to struggles (Herbert, 2000). Women's agricultural practices are subject to situated power struggles that do not fit binary categories of men and women. To understand how gender constantly unfolds in and through Luo women's cultivation of maize in a manner that recognizes local nonhuman elements, such as local maize, cultural artefacts, rituals, ideologies, and newly introduced nonhuman elements, such as hybrid maize, we shift analysis from an essentialized and decontextualized notion of gender to that of evolving lived experiences in a specific socio-ecological context.

Our starting point is that society is constituted by a dynamic assembly of heterogeneous interactions and associations between human and nonhuman actors (Latour, 2005). That is, human (e.g., farmers differentiated by gender and social status within households) and nonhuman elements (e.g., maize seeds, markets, and regional atmosphere), are all constitutive parts that together form an assemblage. Among the nonhuman elements, we also include, as Latour (2005) and Fox and Alldred (2015) put forward, *events* that can relate to past and present policy interventions such as land tenure policies, the Green Revolution, the MVP and the associated transfer of new knowledge, project procedures and hierarchies. Assemblages are more than heterogenous compositions. They entail a myriad of constructive elements that lay out a specific kind of arrangement and these elements are arranged in a locally specific way and in a specific ecological context (Nightingale, 2011). Furthermore, assemblages are not just theoretical constructs but *performed* (Deleuze and Guattari, 1987). That is, they are made and unmade; assembled, disassembled and reassembled and coordinated by human actors in search of some semblance of certainty to realize different sets of objectives with different means (Rosin et al., 2013). Our task is to unpack assemblages, and here we follow Bueger (2014), in pursuit of an empirical project.

Assemblages are "never fully stable and well bounded entities, they don't have an essence, but exist in a state of continual transformation and emergence" (Ureta, 2014, p. 305). Gender seen from an assemblage perspective is "an on-going movement where associations with bodies, norms, knowledge, interpretations, identities, technologies, and so on, are made and unmade in complex ways" (Lagesen, 2012, p. 444). Gender is "only a temporary articulation rather than an essential identity category" (Coffey, 2016, p. 33) of fluid and flexible associations of material, social and ideological elements. Thus, gendered practices, like in Luo maize cultivation, are flexible (Grace, 2004): that they change as shaped by negotiations, contestations and resistance (Herbert, 2000). Focusing on actual practices, assemblage thinking recognizes gender for its meanings exhibited, produced, and reproduced by the interacting elements rather than as a fixed identity category.

While gender is increasingly understood as an ongoing process within development studies (Nightingale, 2006; Tufuor, Sato, & Niehof, 2016), intersectionality, despite its importance within gender studies, is still less understood. Intersectionality originated in the black women's articulation of their lived experiences in the 1800′s settler colonial US. It is best known through the work of the US feminist legal scholar Crenshaw (1989), and it emerged as a key analytical tool in western gender studies after the 1990s to challenge gender essentialism and make visible differences among and between women (Carr and Thompson, 2014; Chafetz, 2006; Leder and Sachs, 2019). This intersectionality typically recognizes overlaps of socially constructed differences, such as gender, race, and class (Grace, 2004; Gunnarsson, 2011; Leder and Sachs, 2019), emanating from US-based social hierarchies, and is often applied as states of being. Furthermore, this intersectionality offers no response to the long standing critiques of anthropocentrism and insensitivity to the role nonhumans play in transforming practices in development studies (Agarwal, 1990; Goheen, 1996; Momsen, 2009). Intersectional analyses informed by new materialism (Alaimo and Hekman, 2008) draw on assemblage thinking to understand the overlapping of both human and nonhuman elements as ongoing processes (Puar, 2012). Additionally, postcolonial intersectionality in feminist political ecology (FPE) (Mollett and Faria, 2013) enables us to see those overlaps as "axes of power" acknowledging the way gender and other heterogeneous hierarchies (e.g., social status within polygamous households in Luoland) are intertwined in national and international development interventions that shape human-nature interactions. Intersectionality conceptualized in new materialist and postcolonial FPE together with assemblage thinking has us 'tease apart' gender and other oft-essentialized elements in a manner that illuminates how human and nonhuman elements 'intersect', and that interprets the relations and interactions between social differences and nonhuman elements as dynamic and mutually constituting ongoing processes of change in a specific constantly evolving postcolonial socio-ecological context (Nightingale, 2011).

The study of change and transformation requires attention to processes of change rather than states of being, for which the terms *territorialization* and *deterritorialization* (DeLanda, 2006) are used. Territorialization refers to the locally and routinely carried out practices (e.g., seed selection, land use, labor sharing, planting and harvesting rituals) that hold heterogenous elements together and protect the *internal* coherence of assemblages (Murray Li, 2007). Deterritorialization processes, on the other hand, change

the capacity of an assemblage, causing a breakdown of relationship and disruption of the coherence or creates new assemblages (Anderson et al., 2012; Anderson and McFarlane, 2011; Nail, 2017). For instance, the introduction of new technologies or training that provides new knowledge may result in deterritorialization. Murray Li (2007, p. 265) pictures processes of de-/territorialization as the "grafting of new elements and reworking old ones; employing existing discourses to new ends." Territorialization and deterritorialization permit recognition of intersectionality as ongoing processes of forging new connections between human and nonhuman elements to produce multiple and shifting identities and new power relations.

3. Data collection site and methods

The data collection was carried out in two sub-locations of Yala (see Fig. 1); Sauri and Nyamninia sub-locations, where the MVP was implemented in western Kenya (See Fig. 2). Sauri was the pilot site where, since 2004, the MVP was implemented. Nyamninia is an adjacent sub-location to which the MVP was upscaled. The data was collected as part of a longitudinal study in western Kenya that began more than two decades ago (Almekinders et al., 2021; Hebinck, 2001; Hebinck & Mango, 2001, 2008; Hebinck et al., 2015; Kimanthi, 2014, 2019; Kimanthi & Hebinck, 2018; Mango, 1996, 1999, 2002; Mango & Hebinck, 2004, 2016). The study set out to analyze the dynamics generated by a number of intervention programs (e.g., the Green Revolution, agro-forestry and zero-grazing) that aimed at improving agricultural production mainly by deterritorializing the Luo assemblage. The focus of the study was to capture the impact of these interventions on the social fabric and to describe whether and how these interventions were contested and negotiated at the household level to resonate with the local conditions and shared preferences, and thus whether and the degree to which processes of (re)territorialization and deterritorialization occur simultaneously and new assemblages emerge.

A diversity of methods was used to collect data in this mainly ethnographic study: ethnographic interviews, life history interviews, participant observation, literature review, focus group discussions (FDGs) and key informant interviews. Case studies of particular situations were done between 2014 and 2018 to permit deeper understandings of emerging issues associated with the MVP and to trace underlying ideas about gender that shaped the design and implementation of the MVP in Yala. Some of these cases also featured in previous studies (Mango, 2002). The respondents were selected purposively for a diversity of perspectives through snowballing. In total, sixty male and female farmers were formally interviewed in addition to many less formal discussions. Three FGDs were held, one group with women only and two groups consisted of both men and women, guided by a list of semi-structured questions. The first FGD, a women-only group, was attended by thirteen women from different stages in their lifecycles (e.g., both younger and older women most of whom live with their co-wives, mothers-in-law, or daughters-in-law in Sauri). The second FGD consisted of three men and six women conveniently selected in Nyamninia. The topics discussed in the second FGD were like the first group about similar experiences in relation to cultural practices in maize cultivation. The third FGD was organized for both men and women in Nyamninia to triangulate the findings from the first and second FDG regardless of the gender composition. It had eleven participants of which four were men and seven women. The participants in all the FGDs were free to discuss issues openly, even giving personal experiences regardless of the 'gender' composition of the group. While several women were studied in detail during the 2014–2018, the three cases[2] studied in detail provide the clearest pictures representing typical subject positions of Luo women who engage in maize cultivation. The narratives of these three women depict the salient characteristics of the social relations between the senior and junior women around maize cultivation in Luoland as expressed by all respondents.

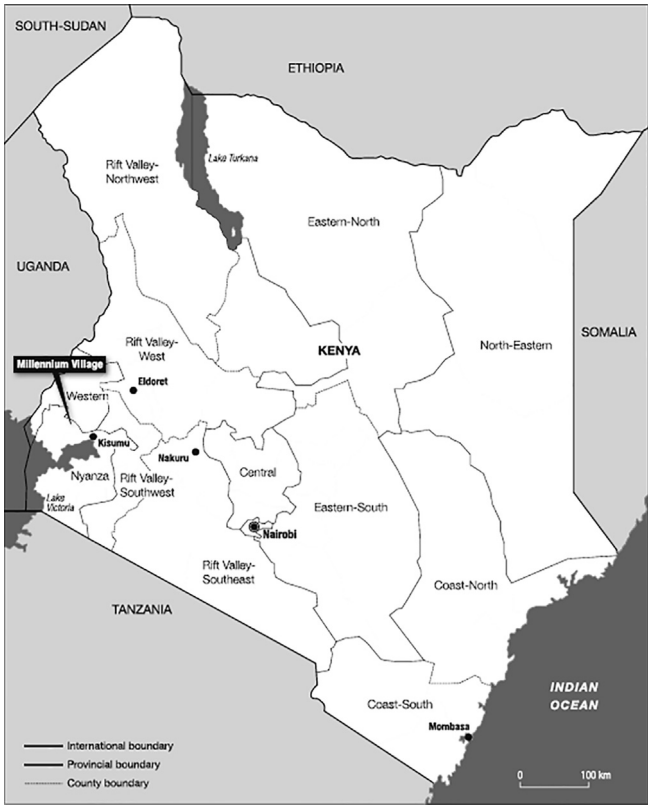

Fig. 1. A map showing the location of Yala.

4. Transformations of the Luo assemblage

Given the focus of our study on the practices of junior and senior Luo women in maize cultivation, it is important to provide some detail about the Luo assemblage. Neither technically nor theoretically may we speak of a singular discrete Luo assemblage. There are, however, some features that are common. Polygamy, the rituals and cultural processes of planting maize and a market for land are important and common throughout Luoland. After the implementation of the Swynnerton Plan from 1954, a land tenure policy developed and implemented in Kenya from the 1940s onwards, land has gradually come to be allocated as private property. Ownership of land is registered in a land and title deed registry (Hebinck and Mango, 2008; Shipton and Goheen, 1992). The private land was mostly registered in the name of the head of the family who were mostly men. These would later be divided among his sons and grandsons. Women hardly own any land and are not customarily supposed to inherit land; but presently, however, some of them do through purchases.

Most inhabitants of the Yala area belong to the Luo ethnic group. The Luo belong to the Nilotic group and are believed to have migrated from Sudan sometime in the 16th Century (Cohen and Atieno Odhiambo, 1989; Ocholla-Ayayo, 1976; Ogot, 1967). When they arrived in Kenya, they inhabited the territories bordering

[2] The names used for these women are pseudonyms so as to protect the identity of the women since the information they gave is much more detailed than what the other women shared during the FGDs and/or interviews.

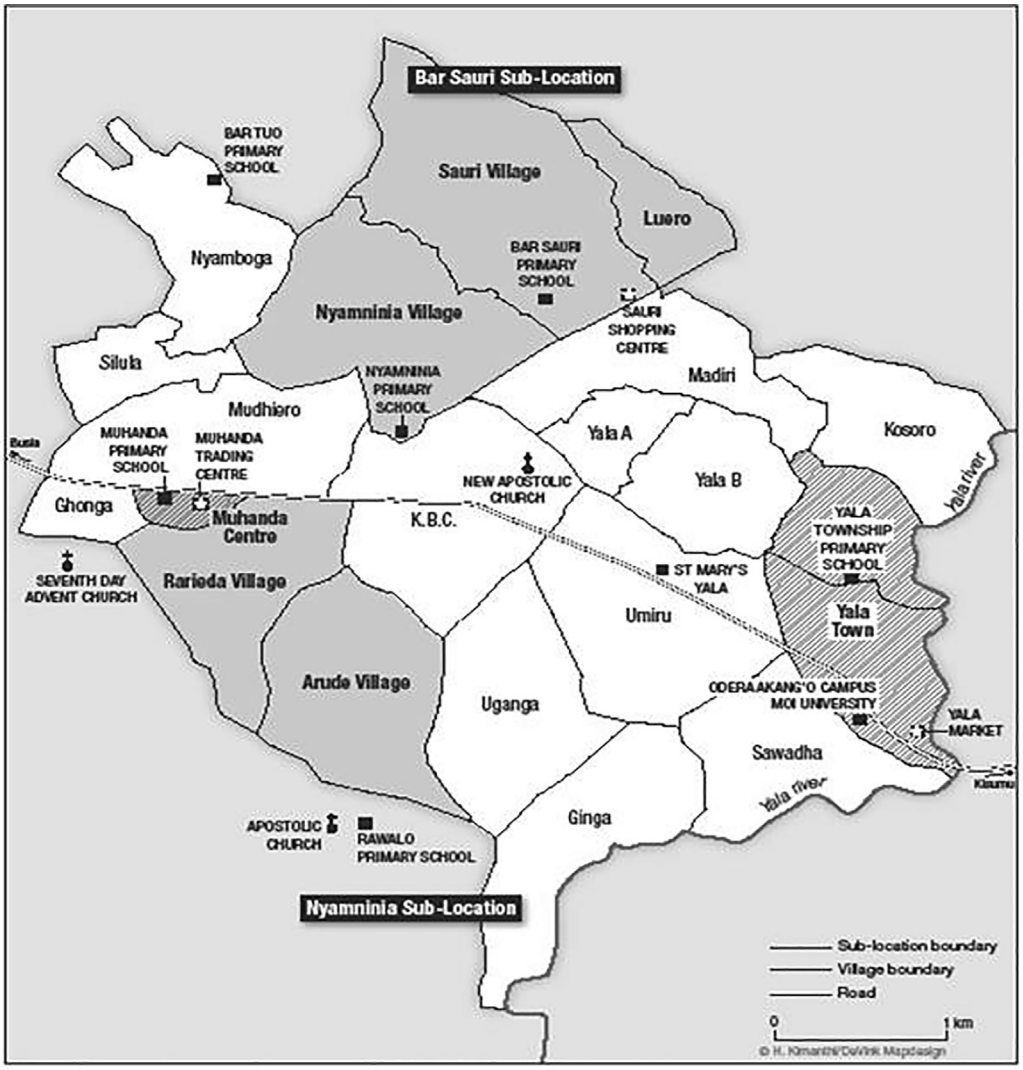

Fig. 2. Map showing the two study sub-locations and the villages.

what is now Lake Victoria. They planted crops, fished as well as held livestock. Their main diets consisted of fish, grain, and milk. Cereals, such as sorghum, millet and legumes and later maize, were some of the crops that were deemed important as these were essential for building a new homestead (Ocholla-Ayayo, 1976). The Luo also traded with their neighbors the Abaluhya (Hay, 1972). They practiced shifting agriculture mainly for subsistence. They used to broadcast the seed (Mango, 2002) and when cultivation became more permanent and under the influence of a series of national policy interventions, they gradually adopted crop rotation and eventually new cultivation technologies like line planting and hybrid maize.

Typical for Luoland is that the villages are scattered across the landscape. A village is composed of a range of homesteads (*dala*) where the domestic groups build their houses and have their fields. The smallest social unit of a *dala* is the 'household' usually consisting of a father and mother(s) and their offspring. Residence in a village is based upon kinship – or more specifically people that descend from the same grandfather (*Jokakwaro*) – but also upon alliances developed out of strategic considerations (Cohen and Atieno Odhiambo, 1989; Southhall, 1952). This settlement pattern remains significant and still recognizable today.

Polygamy is practiced in Luo society (Cohen and Atieno Odhiambo, 1989; Mango, 2002; Potash, 1978, 1981). Although statistics (Kenya National Bureau of Statistics, 2010) indicate that polygamy is on the decline in Kenya, with a national prevalence rate of 13 %, among the Luo, almost one out of every-four marriages are polygamous. A Luo man is culturally and legally permitted to marry more than one wife. In the past, the men used to marry many wives, according to one's capabilities and wealth, and each of the wives has a position within the *dala*. Hence, we make a distinction between senior and junior wives, between first, second, third and so on. Each of the wives is allocated her own piece of land and it is socially expected of each wife to cultivate to feed her children. The setting of a Luo homestead is such that the house of the first wife, *mikayi,* who is seen as the rightful co-owner of the *dala*, is constructed in the middle of the *dala* with the house facing the gate. The second wife is known as *nyachira* and her house is constructed on the left side from the gate, right of the *mikayi's* house while the house of the third wife, who is known as *reru,* is constructed on the left side of the *mikayi's* house and the right side from the gate. This makes for a complex setting. Co-wives refer to each other as *nyieka* which literally means jealousy or rivalry and 'my co-wife' can be translated as 'my partner in jealousy.' This expresses something about the situated social norms in which tensions and conflicts exist.

For the purposes of this analysis, we expand the term *mikayi* to also include the mother-in-law, especially in contemporary Luoland where the families are now increasingly monogamous and a married couple lives with the extended family within the same

compound. In this case, the *mikayi* oversees the traditional farm decision making and the wives of her sons, living together within the same compound, refer to each other as *nyieka* even though they are not co-wives. In the extended monogamous households, men and women cultivate the same piece of land and, thus, there are rarely women's or men's fields. Some women may have 'kitchen gardens' (*surudu*) where they plant crops such as vegetables mainly for subsistence purposes. In extended households, the intergenerational family members cultivate the same piece of land. This happens if land has not been subdivided for sons yet, so they cultivate the same land together with their families and families of their siblings. Once land is subdivided, the sons can establish their own *dala* where they can live and cultivate their own land together with their wives and children.

The farming system of the Yala area is rain-fed and maize based (Mutuo et al., 2007). The area has high potential for agriculture as it has a bimodal rainfall pattern that allows for long and short planting seasons each year. The long season which occurs between March and June, locally known as *chwiri,* and receives about 1120 mm of rain. The short season which lasts between September and December, known as *opon,* receives an approximate rainfall of about 710 mm (Mutuo et al., 2007). However, the rains are becoming more and more erratic. The farmers, men and women, plant a wide range of local maize varieties, collectively known as *Nyaluo.* Selected *Nyaluo* seeds are saved from the harvest and locally distributed. *Nyaluo* is regularly combined with the planting of hybrid maize varieties. These are purchased from the various kinds of markets one encounters in the region. The continuous planting of *Nyaluo* occurs despite the Green Revolution efforts from the 1970 onwards, including the recent MVP interventions that advocated for the cultivation of high yielding hybrid maize varieties. A pattern[3] that is widely observed today is that during *chwiri*, hybrids are planted in the main fields as there is sufficient rainfall, and local in the kitchen gardens. *Nyaluo* varieties are predominant during *opon*.

Below we continue with an analysis of intersecting human and nonhuman elements and how their intersections differ in and during the cultivation of maize for the women within the *dala* from a perspective of gender and intersectionality as an assemblage.

4.1. The key roles of mikayi in maize cultivation: Rituals of golo kodhi and dwoko cham

In the Luo cultural repertoire, the *mikayi* of the *dala* is supposed to sow maize seeds first and harvest maize before any other person can do so. These cultural practices are known as *golo kodhi* and *dwoko cham* respectively and they have significance among the Luo. These serve culturally and historically as elements of the (re)territorialization processes that stabilize the Luo assemblage socio-materially and connects the elements. *Golo kodhi* is meant to fertilize the seeds and get the blessings from the ancestors so as to guarantee a good harvest as well as give respect to the elderly within the community who are deemed knowledgeable (Mango, 2002). During the planting season, some of the maize seeds to be sown are stored in the house of the *mikayi.* The husband spends the night with her before sowing. On the sowing day, which is normally the next day, the *mikayi* takes seeds through the gate to her field to plant for reasons we explain later and then sows the seeds. After sowing, the husband spends the next four nights with her in her house. If the husband is deceased or unavailable, the *mikayi* still performs the ritual using a cock and hen. She throws the seeds to be planted to the hen, makes sure that the hen mates with the cock and then plants them following day. The *mikayi* does not need to plant the whole field before the rest of the *nyieka* within the *dala* can follow suit. Sowing only a few seeds is enough, and the rest of the *nyieka* repeat the practice with the husband in order of seniority. If a married woman lives within the same compound with the *mikayi* (as a daughter-in-law), she must let the *mikayi* plant first according to the culture. When the crops are ready for harvest, *dwoko cham,* a ritual that implies bringing back the harvest home, is performed. The order of seniority among *nyieka* is again observed and the *mikayi* is expected to harvest first according to the culture. Harvesting in this context involves the *mikayi* picking few ears of maize from her farm, preparing (mostly by boiling or roasting) and eating them. This then permits *nyieka* to harvest as well. Customarily, the ritual must be observed even if *nyieka* have nothing to eat at home, implying that they must wait for *mikayi* to harvest first. Failure to follow *golo kodhi* and *dwoko cham* is believed to bring *chira,* an illness that makes the woman who ignored the rituals grow thin until she dies, unless a diviner (a traditional healer/practitioner) treats *chira* using *manyasi – a* herbal concoction.

The Luo ideology behind *golo kodhi* and *dwoko cham* is associated with the making of a gate. This is a ritual that is performed when a man establishes his own *dala.* Gate making is a complex and culturally significant practice that involves the presence of humans, the man, his *mikayi,* his eldest son, elders, and a diviner of the *dala*, and nonhuman elements, such as a cock, an axe, and the fruit of Sodom apple (*Solanum incunam*) that are presented during the ritual. The eldest son carries an axe and a cock which symbolizes defense while the *mikayi* carries the Sodom apple that symbolizes fertility. At the entrance to the *dala*, a 'T' post is installed which basically means: one post on the left side, another on the right side and the other one is crossed over the two posts. The cock is then slaughtered by the elders and hung over the overhead post in the middle of the gate with blood dripping at a point where the diviner later buries a *manyasi* container. The cock is then roasted at the gate and eaten with *ugali* (maize meal) prepared by the *mikayi.* A covenant is made between the members of the *dala* and the ancestors. *Manyasi* is administered by the diviner to the man, *mikayi* and the sons to unite them and so that they can observe the covenant they made with their ancestors. The meaning of the gate is sacred and it is unthinkable that a junior woman from the the *dala* would pass through the gate to go to the farm and sow seeds before the *jaduong dala* (the head of the homestead) and his *mikayi* have done so (Mango, 2002). This ritual strengthens and cements the practices of *golo kodhi* and *dwoko cham*, that is, it is a practice that further territorializes the Luo assemblage.

It is evident that the *mikayi* plays a key role in food crop cultivation within the *dala.* As the 'co-owner' of the *dala*, her roles are vital in the successful establishment of a *dala,* through the necessary rituals for *dala* establishment and also for food security within the *dala.* The *mikayi* is well informed about the happenings around her *dala,* more even than her husband (Musandu, 2012). There are also other farming practices that the husband can seldom do before consulting her. If the husband wants to start preparing the land and any other subsequent farming practices, from planting to harvesting, he has to consult with the *mikayi* (Musandu, 2012). Culturally, most of the household decisions in general would revolve around the *mikayi* and the husband. This calls for submission to the *mikayi* on the part of the junior wives. One woman of about 60 years of age and a *nyachira*, during an interview, explained her relations with the *mikayi*:

> She is like my mother. My parents had advised me if I got married to someone's husband, I should respect her and live well with her. I thus wait for the *mikayi* to do her duties like *golo kodhi* and *dwoko cham.* Even when our husband died, I still let her plant and harvest first.

[3] A recently unpublished held survey shows that this pattern is not limited to Yala only but is common in other regions in Luoland and in neighbouring Luhya community as well. See Almekinders et al. (2021).

Even though *nyieka* are expected to respect each other and accord respect, especially, to the *mikayi*, their relationship with the *mikayi* does not always proceed harmoniously. The *mikayi* may exercise her power over junior wives in a way that brings about suffering to the junior wives and their children. During one of the FGDs, a participant, a middle-aged woman participant who used to live in the same *dala* with the mother-in-law, highlighted that:

> The challenge with *golo kodhi* is that some *mikayi* tend to intentionally delay too much in planting. This delays planting by other *nyieka* who would want to do it in good time, especially with the hybrid maize seeds. It is more of a punishment, especially if they are not in good terms with their *mikayi*. I had to persuade my husband so we could establish our own *dala* because of this challenge and now I can plant as I wish.

What we observe here is the tensions between the *mikayi* and the junior wife and the need to plant the hybrid seeds in the right time as it yields best when they are sown at the onset of the rainy season. Elements such as gender, the power relations within the *dala*, cultural practices, like polygamy, the hybrid seeds, the gate, changing climate, household food (in)security – all intersected to result in territorialization of the Luo assemblage.

The *mikayi* exercises her control over her junior women with her *dala* so as to define her own identity as the first, most powerful, wife and the 'co-owner' of the *dala*. Adhering to the custom implies a process of territorialization that reinforces respect towards those who are deemed more knowledgeable as regards to cultivation practices, however, this is changing due to concurrent deterritorializing processes. During one of the visits to an elderly lady born in 1930 and a second wife, reflecting the impact of agricultural extension work, stated that:

In the past, the senior women used to teach the junior ones about good cultivation practices, but nowadays, the junior ones teach the senior ones.

The meaning of knowledge is changing such that some junior women, who would traditionally leave the farming decisions to their mothers-in-law upon marriage (Potash, 1981) are today embracing 'modernity' (non-traditional knowledge). These have mostly been introduced through the governmental and non-governmental organizations such as the MVP that are more readily accessed by younger community members. It is junior women who now teach 'modern' knowledge to the senior women, such as the elderly mothers-in-law, as opposed to learning the 'traditional' ways of farming from them.

Below, we explore three stories of Atieno, Akello and Akinyi about the co-existence of *mikayi, nyieka* and daughters-in-law and the extent to which relationships impact on maize cultivation within the *dala*. The first case illustrates the stories of Atieno and Akello from the same *dala*, which brings out the character of endurance for peaceful co-existence and its repercussions. The second case describes Akinyi's story, which depicts the struggle for autonomy through power contestation. Analysing the generational changes shows how practices, such as *golo kodhi* and *dwoko cham*, have been deterritorialized through struggles and how intersecting external elements, both humans and nonhumans, inserted into the Luo assemblages influence the process.

4.2. Mikayi and MVP training: The stories of Atieno and Akello

The first story is that of a junior wife who observed the order of seniority while finding another livelihood strategy for survival. Atieno studied up to class seven got married as *nyachira* at the age of 19. She has endured sufferings under the *mikayi,* and who is described by the neighbours as a harsh lady and a dictator even to her husband. All her married life, Atieno faced difficulties with crop cultivation, which is largely controlled by the *mikayi*. As socially expected, the *mikayi* has been in control over most decisions, including farming, in the *dala*. During the planting seasons, once it rained, the *mikayi* intentionally delays in planting knowing that, according to the situated ideology, Atieno cannot plant before the *mikayi* does and that Atieno needs to plant at the onset of the rainy season in order to yield desirable outcomes that are necessary for her and her children's survival. Atieno knows that the *mikayi* is financially better-off as she controls some of her husband's income and she has had no need to hurry planting. Atieno stated this as follows:

> During the long rains, my co-wife delays me a lot and I end up planting too late. She knows that she can pay people to plant for her and finish within a day while I am left to plant for several days in addition to having been delayed in planting by her unwillingness to plant in good time to permit me also to plant. I am not happy about it.

Since the use of the hybrid maize technology introduced by the MVP is labour intensive, the *mikayi* hires labour and plants the whole field in a single day. On the other hand, Atieno has to rely on her family labour, that is, to plant with her children for several days even after having been delayed by *mikayi*. This implies that the seeds planted by the *mikayi* and those by Atieno have nearly-two weeks' time difference. Atieno knows that, as she learned from the MVP trainings, this time frame is enough to negatively impact yields, especially with hybrid maize, which is recommended to be planted best performs when planted before or at the onset of rains for better yields.[4] Constituted by the situated gender and Luo ideologies, cultural norms and rituals, Atieno, plants after the *mikayi* planted, thus late. The similar story repeats itself during the harvesting time as the *mikayi* intentionally delay in performing *dwoko cham* when the maize is ready to harvest. The *mikayi* has food in storage most of the time and has enough money to buy food in case of shortage. On the other hand, Atieno suffers with her children at times even when the maize is ready to harvest in her farm and in some extreme cases her yields are reduced due to excess rains that spoil the mature maize. She explained:

> Mikayi had money that she got mainly from our husband who was a teacher. She would use the money for food while I suffered as I waited for her to perform *dwok cham*. At times I would be given food by my neighbors and when *mikayi* would notice that I have some food to eat, she would then perform *dwok cham*.

Both Atieno's and *mikayi's* acts of observing *golo kodhi* and *dwoko cham* contribute to territorialisation processes within the Luo assemblage while maintaining their identity as respectful *mikayi* and *nyachira* respectively in the situated context. However, for Atieno to maintain an identity as a respectful *nyachira* within the Luo polygamous *dala* involves both obeying the seniority principle and feeding her children.

When gender and intersectionality are seen as elements of an assemblage, it becomes clear how these territorialization processes are interwoven with threads binding a multiplicity of human and nonhuman elements in a specific socio-ecological context. On the

[4] The famous 'Dr. Allan trials' carried out in Kitale in the mid-1960s that apart from fertilizer application, the time of planting is crucial for obtaining the higher yields. The Kitale Research Station estimated that for Western Kenya only 50% of the yield is obtained if sowing is delayed two weeks. 70–80 kg grain/ha. are lost for each day's delay after the first week of the rains. The time of planting crucial for reaching the inherent technological optimum of hybrid maize which in turn is greatly influenced by the availability of labour (Source: AIR/World Bank (1985), vol. 1. Main report, chapter II: World Bank, Kenya. Agricultural inputs review. Vol. 1 & 2, Nairobi, World Bank, Eastern Africa Projects).

one hand, repeated intentional delaying acts can be read as a depiction of how *mikayi* is threatened by what Atieno represents: the modern knowledge about maize cultivation, gained from the MVP training and what the potential negative effects associated with the knowledge have on her social status as the *mikayi* within the Luo polygamous household, which she long wished when she first joined the *dala* as a junior wife. Additionally, the same knowledge that pushes Atieno to feel bitter about the relationship with the *mikayi*, threatens her livelihood and increases her vulnerability to food insecurity. Broadly, if women are seen as a homogeneous group and in isolation from intersecting human and nonhuman elements in a specific socio-ecological context, then, none of these programmatically relevant struggles would be visible.

The continuation of *golo kodhi* and *dwoko cham* contributes to reterritorialization. However, we observed practices that deterritorialize the Luo assemblages. One such an example is Atieno finding another livelihood strategy outside the *dala*. While she had no prior formal job, Atieno performed some informal community activities to gain some income. She worked as a traditional birth attendant and, after receiving formal training, she became a midwife. She later joined a community-based organization that focused on family planning before being absorbed by Pathfinder International[5] as a village counsellor. She also worked for the health program of the MVP as a community health worker until 2012. She is now the acting village elder, that is, a government administrative assistant in a village (the lowest administrative level within the government). All these other activities she has been doing outside her household are not controlled by her *mikayi*. Her *mikayi's* delaying acts delimit her agency. They reduce the number of options she has to secure livelihoods through farming but, simultaneously, they enable her to find other livelihood opportunities to feed her children and establish a social position within the situated community beyond the *dala.* We saw elements of the Luo assemblages, such as observance of the order of seniority and engagement in the livelihood strategy that supports community wellbeing, both of which afforded Atieno no interruption from her *mikayi* and community members, that supported Atieno's ability for survival. Although these two elements are accessible to other women in the community, it is questionable if other women can follow Atieno's footsteps since these elements are nested in a series of contingent encounters with other elements, all of which overdetermined Atieno's survival.

Our second story is about a junior woman who started ignoring the rituals of *golo kodhi* and *dwoko cham* after taking MVP training as a survival strategy. Akello is the *mikayi's* daughter-in-law and has basic education as Atieno, but she is much younger. Culturally, Akello is the third in line in terms of planting and harvesting in the *dala* such that *mikayi* plants first, then Atieno who is her step mother-in-law and lastly herself and the same order for harvesting. Akello acted on the knowledge gained from MVP training and planted and harvested before the *mikayi* and Atieno. Complex intersections of the human elements, such as the MVP trainers and women, and the nonhuman elements, such as hybrid seeds, polygamy, cultural norms, and new knowledge gained from the MVP trainings, facilitate and shape deterritorialization processes within the Luo assemblage. The perspective of gender and intersectionality within the framework provided by assemblage makes a simple analysis that see MVP trainings changed the situated maize cultivation practices via new knowledge and technologies, empowered 'women' and alleviated poverty successfully as hopelessly inadequate. These intersecting human and nonhuman elements together encouraged Akello to exercise her agency to ignore *golo kodhi* and *dwoko cham* even though it could bring her *chira* or loss of support from her *nyieka* who observe the order of seniority that would potentially threaten her family's wellbeing. If Akello had another livelihood opportunity that could meet her needs in close proximity, like Atieno did, she could have kept observing the order of seniority. The same intersecting elements that encouraged Akello to ignore the order of seniority and cultural rituals are easily accessible to other women in the community. Her practice, however, should be understood as forced by the specific set of circumstances found in her own socio-ecological context at that time. If she followed the rituals, she and her children would potentially have gone hungry, for it would be at least nearly-four weeks delay in planting, which would leave her and her children scant possibility for survival.

Further, the gendered power dynamics among *nyieka* within the same *dala* are shifting. Deterritorialization processes have triggered the *mikayi* to change her cultivation practice: she stopped delaying planting and harvesting and started performing the rituals responsibly. These power struggles between the *mikayi* and Akello contributed to the reterritorialization of the Luo assemblage. All acts by Atieno, the *mikayi* and Akello are partly in accordance with and partly not in accordance with the situated sociocultural norms. All three women attempted to maintain their respective social status and identity within the Luo polygamous *dala*, albeit such practices were enacted differently by different women depending on their social status within their specific Luo households: *nyieka* maintaining their identity as respectful Luo mothers who take responsibilities for their children's survival and for the *mikayi* as the authority in making decisions within the *dala*, which she looked up to have when she joined the *dala* as a junior wife. Also, Akello's choice to plant immediately resulted in saving Atieno from abuse of *mikayi*'s delayed planting and harvesting. Atieno follows *golo kodhi* and *dwoko cham* as a sign of respect to her *mikayi* and Luo customs, while keeping her dignity within the village, which has helped her to enhance her livelihood by employing cash earning activities outside the *dala*. These mixtures of (re)territorialisation and deterritorialization processes in part reproduce the existing cultural, including gender, ideologies but simultaneously transform some aspects. We observe the emergence of new patterns of gendering in maize cultivation such as ignoring the rituals by the junior women and stopping with delays in planting and harvesting by *mikayi* and taking up off-farm jobs. An assemblage perspective enables us to see the Luo assemblage as articulated through shifting intersections of gender and human and nonhuman elements, propelled by interdependent and contradictory deterritorialization and territorialization processes in contemporary Luoland.

4.3. Contesting the power of the mikayi: The story of Akinyi

Our third story is about a junior wife who started ignoring the rituals of *golo kodhi* and *dwoko cham* without taking MVP training. Akinyi went to school up to class eight and got married to a man who is the last born among his three brothers. At the time of her marriage, her husband had not established his own *dala*, so they initially lived within the *dala* of his father together with her husband's brothers' families who also had not yet formed their own *dala*. This meant that those who lived there were all under the cultural rules of the father's *dala*. Her mother-in-law, *mikayi,* in this study, was supposed to guide her sons' wives when it came to planting and harvesting according to the Luo culture. Before she retired at the age of 57 in 1993, Akinyi taught at a primary school away from home. Upon her retirement she settled at the *dala* permanently and became a full-time farmer. During the first planting time after her permanent return, she noticed that the *mikayi* was too reluctant to perform *golo kodhi* and *dwoko cham* in a timely manner, just like the *mikayi* of Atieno and Akello. The *mikayi* would

[5] This is an NGO that worked within the community, dealing with reproductive health care.

wake up in the morning and sit outside her hut, basking in the sun as other people within the village worked on their land. Neighboring farmers planted seeds on time and their maize germinated and grew before the *mikayi* performed *golo kodhi*. Many times, Akinyi's *nyieka* had to 'sweet talk' the *mikayi* to encourage her to perform *golo kodhi*.

After the first planting season, Akinyi decided not to endure the *mikayi's* abusive delays. She had to feed her children through farming because she had no other source of livelihood. At the beginning of the following planting season, Akinyi decided to ignore the *mikayi* and planted first.

> I decided that I was not going to waste my time 'sweet talking' her to plant first. So, when it rained, I took my seeds, went through the gate, which was prohibited, and planted in my farm. When *mikayi* found out, asked me why I planted before she could perform *golo kodhi* and so the other wives had not planted. She said it was bad and that women of nowadays do not listen. I told her I would be doing that every season if she was not willing to plant in good time. From that time, she began to do the right thing. The other wives told me that I had really saved them because they had suffered a lot for years.

Mikayi was furious about Akinyi's behavior as it showed no respect towards her, the *mikayi*. Akinyi partly contributed to deterritorialization processes by not waiting for the *mikayi* to initiate the rituals. It was only after Akinyi became adamant and continued to overtake the *mikayi* in planting and harvesting that the *mikayi* began to perform the rituals in a timely manner again. The *mikayi* did this in the context where other *nyieka* continued to openly support the *mikayi* to initiate the rituals thus resulting in reterritorialization. It is worth noting that other *nyieka* made no accusation against Akinyi but instead appreciated the fact that Akinyi's counter-cultural practices forced the *mikayi* to act responsibly again so that they no longer needed to be delayed in planting. These *nyieka*'s practices are contradictory: while they always waited for the *mikayi* to perform the rituals they simultaneously made no accusation against Akinyi who disobeyed the rituals, which shows their support for Akinyi's counter-cultural practices. However, not all people in the community supported Akinyi. Villagers talked negatively about the disrespectful nature of Akinyi's practices, which was less significant for Akinyi, who, unlike Atieno, had no visible position within the community.

Akinyi's story makes it clear that taking MVP training and the new knowledge and technologies learned from it are not a key element of Akinyi's ability to succeed in maize cultivation. Elements, such as Akinyi's being away from the *dala* and the community for an extended time period, and exposure to other cultures through education and occupation, were unique to Akinyi's case. Shaped by these unique elements, together with similar human and nonhuman elements mentioned in Atieno's story, Akinyi became less strongly articulated by elements of the existing Luo assemblage; observing the order of seniority, the rituals and ideologies that support these practices, in comparison with the rest of *nyieka* who wholly submitted themselves to these norms. Unlike other *nyieka,* Akinyi no longer believed that repercussions would befall her when she disobeyed these norms. This disbelief, together with her felt responsibility as a mother to feed herself and her children and silent support from the *nyieka*, produced the strength needed and courage for her to disobey the authority of the *mikayi* and ignore how her acts would be taken by the community people.

5. Conclusion

Our assemblage perspective, paying specific attention to how human and nonhuman elements intersect in specific contestations, offers a useful analysis of transformations of the Luo assemblage. Transformations of gender, maize cultivation and intra-household dynamics have occurred through a contradictory mixture of context specific processes that have a diversity of effects on (re)territorialization and deterritorialization. Some aspects of the Luo assemblage in some sites are reproduced and strengthened by reterritorialization practices, such as when the mothers take responsibility for household food security and respect the ancestors by performing the planting and harvesting rituals. Similar to what Murray Li (2007, p. 265) emphasizes, the processes we observed involved the "grafting of new elements and reworking old ones; employing existing discourses to new ends." We also emphasized the deterritorialization effect when junior wives contest and resist the cultural practices to plant and/or harvest before their *mikayi*. Deterritorialization processes, as the literature stresses (Anderson et al., 2012; Anderson and McFarlane, 2011) change the capacity of an assemblage, causing a breakdown of relationships and disruption of the internal coherence. The cases explored in this paper contain trends that are shared, every time a bit differently, by many of the situations of the women we have encountered over the years in Luoland when it comes to maize cultivation. New elements that are embraced, such hybrid maize and new livelihoods options like taking up jobs within the community and the dynamic practices of individual women are manifestations of the way the Luo assemblage and gender in this context unfolds neither smoothly nor evenly. The assemblages constituting and constituted by Luo practices appear to be rather permeable and dynamic. They, ultimately, appear to contain a challenging and fascinating mixture of deterritorialization and (re)territorialization processes that are neither well understood by development actors such as the MVP nor amenable to the sorts of theories that support their inquiry.[6]

Our perspective illuminated effects of the ways in which the MVP overlooks differences among women, in particular the intra-household dynamics surrounding the planting and harvesting rituals that differentially affected junior and senior women as well as the subsequent impact on the yields and household food security. The effects we have explained through an assemblage lens are multidimensional and variant. For instance, one common effect experienced by Atieno, Akello and Akinyi is that the more the tensions between the *mikayi* and the junior women escalate, the more vulnerable the junior women and their children become with respect to household food security. Moreover, when faced with increased vulnerability, they exercise their agency to find ways to materialize other livelihood opportunities to feed their family while on the other hand, the *mikayi* amends her ways. Additionally, our analysis also made visible differences among the junior women depending on how they are articulated through changing gender and other intersecting humans and nonhuman elements in the situated socio-ecological contexts. The effects we have made visible are not limited to what we describe here. Our findings indicate the significance and direction of some of the heterogeneity to which other methods are insensitive, but our findings do not pretend to exhaust either the diversity of what is or the manners in which they matter. Our perspective makes it possible to see how movements of both human and nonhuman elements in and out of an assemblage modifies it. Understanding the Luo assemblage, comprised of human and nonhuman elements, enables us to see potential implications for the ways gender, maize cultivation and intra-household dynamics and household food security are enacted within the Luo assemblage.

[6] Some 25 years ago Fairhead and Leach (1996) and Leach and Mearns (1996) reached a similar conclusion. We have in common to enrich the Luo assemblage with the social history of maize.

Conceptualizing gender and intersectionality as elements within an assemblage in the context of the implementation of the MVP in western Kenya enabled us to explore the way and direction in which the changing dynamics in relations, practices and intersections of both human and nonhuman elements unfold. This conceptualization not only makes it difficult if not impossible to essentialize gender but also makes visible relations and dynamics among women within Luo polygamous households and how these dynamics and differences are produced in relation to nonhuman elements in a specific socio-ecological context. We have shown how the relations between humans, the way co-wives interact with one another, MVP development practitioners, neighbors, and nonhuman elements, such as hybrid maize technology, the gate, new knowledge, climatic conditions in their intersections and interactions are continuously transformed through the processes of territorialization and deterritorialization. This results in an unfixed identity of the Luo assemblage and more specifically of women within the *dala*. An assemblage lens also opens a new door to examine how Luo women construct themselves and their actions, in interaction with both human and nonhuman elements to exercise agency to support their livelihood. This reflects on the differences between them given the unique social positions within the *dala* and as women living within the same context.

The differences within the 'Luo women category' and their changing dynamics are often overlooked in development practice. The MVP presented and treated 'women' as an essentialized category and interventions were designed to benefit 'women' as a whole. The struggles that they are involved in, that is, towards redefining their relations and reclaiming their individual autonomy within the cultural boundaries are made invisible while in reality many of them are in a dilemma of proper cultural behavior and fully embracing new knowledge. These struggles and the associated territorialization and deterritorialization processes, along with the changing nature of the interacting elements, can be productively engaged with as they largely shape the success of development practice. On the other hand, this may present a challenge in practice on how to address the complexities. Our assemblage perspective suggests that this requires innovative thinking outside the box and beyond the norm on the part of development practitioners so that the insights gained can be used productively to come up with localized means for constant innovation of adaptive solutions to emergent complex situations.

CRediT authorship contribution statement

Hellen Kimanthi: Conceptualization, Methodology, Investigation, Data curation, Writing – original draft. **Paul Hebinck:** Supervision, Writing – review & editing. **Chizu Sato:** Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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