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Addressing drought through rural religious communities in Senegal

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Introduction

Severe ecological changes across the Sahel, the region on the southern border of the Sahara, have created a difficult environment for agriculture and rural village economies. The social and political effects of these changes include loss of agricultural livelihoods, leading to food insecurity, mass rural-to-urban migration, and limited educational and employment opportunities. While states and international polities work on large-scale infrastructure projects to address these challenges, rural communities, while small in scale, are important players in rethinking how to transform the environment around them. These transformations, for many, rely on integrated religious teachings, religious organizational structures, their personal spiritual journey and their environmental work.

This article reviews global and regional causes of ecological changes across the Sahel, the effects of these changes, and community-level responses that connect spirituality and their environmental work. It draws on ethnographic interviews and observations in Senegal's central regions, highlighting ways in which communities are rethinking how to transform the environment in small-scale ways. The ethnographic focal points are Mbakke Kajoor and Ndem: two residential Sufi communities (*daaras*) founded on the idea that environmental work must be integrated with spiritual renewal. Residents and managers of these two *daaras* cite religious principles of caring for creation and people. These principles motivate them to transform their environment into a habitable place. They also use location-specific strategies to manage and improve water, soil and agricultural resources. As agriculture continues to be disrupted because of climate variations across the Sahel, creating a liveable environment relies on this science, integrated with local structures that drive people's commitment to the transformational work.

Mbakke Kajoor, Ndem, and the significance of *daaras*

While secular organizing is often effective in Senegal, religious networks are particularly important politically and socially. The *daaras* in Mbakke Kajoor and Ndem are affiliated with the Mouridiyya, one of the most populous and influential Sufi orders in Senegal. Senegal is predominantly Muslim (about 94 per cent), with a small but visible Christian minority (4 per cent). A majority of this Muslim population identifies as Sufi. Sufism within Islam includes disciplines of practices and beliefs focused on a spiritual path towards God. People choose a

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shaykh as a spiritual guide on that path, and become disciples of that shaykh. This connects them to the shaykh's other disciples, but also to the disciples of their shaykh's shaykh, and to other members of their Sufi order; this is a network of relationships for the disciples, and a network of influence for the shaykhs. People travel to visit other disciples, to work with other disciples, and to visit holy sites or shaykhs for their blessing. These visits reinforce and strengthen these networks. Senegal's state policies actively protect open religious dialogue in the public sphere, giving shaykhs and their disciples public voices. In addition, the secular democratic state partners with religious institutions on shared educational and social initiatives. This has strengthened religious networks over time, making them one of the main forces for any kind of social change within Senegal.

In rural agricultural areas, a *daara* is a residential community led by a shaykh and populated by his disciples. Rural *daaras* are focused on religious study, under the direction of a shaykh, and communal self-sustaining work. Ndem's *daara*, established in the 1980s, is within ten kilometres of Bambey, a small city. Mbakke Kajoor's *daara* is north-west of Ndem, located a short distance from the established town of Mbakke Kajoor. Both are within Senegal's central regions. Mbakke Kajoor has particular historical significance for Mourides. In the late nineteenth century, Shaykh Amadu Bamba Mbakke (1853–1927), the founder of the Mouridiyya, started attracting disciples with his teachings in Mbakke Kajoor. Also in Mbakke Kajoor, Bamba met a new student who would become one of his prominent disciples, Shaykh Ibra Fall (1858–1930). Fall became the model for a sub-order of the Mouridiyya, the *Baye* Fall (*Baye* being the Wolof for 'father').

When Fall met Bamba, he not only practised service to Bamba, he turned his labour into a form of unceasing prayer. He did not stop to pray five times a day: why stop when you are already praying through work? Fall was an intellectual and author, yet he focused on labour rather than spiritual study; this made him a controversial figure (Babou 2007: 64–5). Following his model, Baye Fall beliefs about labour as a form of prayer continue to be controversial today. Work for the community, though, has deep meanings for Baye Falls. The mystical work of Sufism can be expressed through labour: as Shaykh Mbow (2001: 34) wrote, labour is 'a gift of his person, his goods, his sweat, to God; therefore work is a full act of worship'. Ndem resident and Baye Fall Moussa Diack explained this orientation to work as essential to life.

> Work is always there. Work is not to earn money, it's for life. It's an engagement. All that you do, you don't do for yourself, you do for the community. You can't cross your arms and sit back, there is always work. The importance is you, it's you, it's being human.[1]

Farma Thiam, another Baye Fall resident of Ndem, agreed: 'Our work, it's for the community.'[2] Labour is part of the Baye Fall spiritual path; it is also a connection to shared expressions of faith. While the focus on work is not unique to Baye Falls among the Sufi orders prominent in Senegal, they make it a central tenet of their

[1]Interview with author, Ndem, 27 May 2018.
[2]Interview with author, Ndem, 29 May 2018.

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faith practice. Being engaged in a *daara*, a place of spiritual study, means working for that community.

The site where Bamba and Fall met became a place of pilgrimage, but it is within a region particularly hit by drought. In 2014, Mouride authorities asked Baye Fall shaykh Babacar Mbow to develop the pilgrimage site, and it became the present-day *daara* in Mbakke Kajoor. They broke ground in January 2015. Mbow and Aïssa Cissé, Mbow's wife and a respected community leader, have been committed to furthering spiritual education and environmental renewal in the region since the 1980s, when they, along with Ndem's elders, established Ndem's *daara* north of the small city of Bambey. Both *daaras* integrate environmental goals and religious teachings.

Both of these *daaras* are predominantly Baye Fall, creating a community-wide shared commitment to labour. Each person makes an individual commitment to their beliefs, however: *daaras* are not homogeneous, and identifying as Baye Fall, Mouride or even Muslim is not a requirement to be a resident. *Daaras*, then, are a group of individuals who each find spiritual fulfilment in religious study under a chosen shaykh's leadership and in working for their community. For Mbakke Kajoor and Ndem *daara* residents, directing their labour to environmental revitalization connects this spirituality to Islamic religious teachings about caring for God's creation and caring for common humanity. Their dedication is evident in what the *daaras* have been able to accomplish, and also in residents' discourse about any topic, which inevitably returns to labour and spirituality. In a conversation that was not particularly about work, Farma Thiam explained a Wolof proverb, *daw ca ba ngay am yi tank* (run while you still have legs) not in the way it is sometimes interpreted (an equivalent to 'strike while the iron is hot') but in terms of work: you should work while you still can work.[3]

My ethnographic research includes periodically visiting these two *daaras*, plus other sites in Senegal's western-central regions of Dakar, Thiès, Diourbel and Louga. I learn by working alongside people and participating in everyday conversations in homes, workplaces and community spaces. Interviews follow up on earlier conversations and events, or I ask interviewees to explain a concept or a new project they are implementing. I use thematic text analysis, inductively looking for common ideas expressed in both interviews and everyday interactions. I return to communities over time, checking in on continuing projects and verifying what I learned on previous visits, while following the growth and the challenges of people's work.

Senegal's socio-political environment fosters communities such as *daaras* because the state encourages open religious dialogue and grants public attention to religious organizations. *Daaras* thus have the latitude in the public sphere to try out new technologies, harness the communal participation of their residents, and draw on region-wide (and sometimes global) religious networks, grant-making partners and occasionally state support. Narratives of large-scale processes such as climate change and global economics often gloss over these village-scale environmental transformations. Rural towns, however, create new responses to these contemporary crises. These communities have the flexibility of small-scale experimentation; they also have the local infrastructure of participatory decision making

[3]Interview with author, Ndem, 20 February 2016.

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and leaders in touch with social relationships and on-the-ground circumstances. While small in population, they are connected to regional religious and political institutions that can support their efforts in economic and environmental revitalization. But how do they leverage their religious networks in their work? How do they consider their environmental work and spiritual commitments to be integrated?

Senegal's environmental and religious history

Senegal's history includes monarchical, colonial and postcolonial states; a region deeply influenced by Islam; the environmental history of the Sahel; and the economic history of an agricultural region. People created these institutions to be consciously intertwined, and this integration is present even in the region's early written history. Historically, religious authorities have had, in general, either more or equal popular influence compared with state authorities. Their scope of influence includes hierarchies of religious authorities who answer to one another, their disciples who listen to their teachings and who live across regions – and, indeed, across international borders – and intentional communities built on religious teachings, specifically *daaras*. Occupying colonial authorities did not have this regional legitimacy. From the 1840s to the mid-twentieth century, colonial disruption of agricultural practices added to recurrent drought and shifting global climate patterns, all of which damaged both the agricultural economy and associated social structures in this agricultural region. Over time, people turned to religious institutions for both community and environmental revitalization.

When Muslim traders and teachers first introduced Islam to the region over 1,000 years ago, they recognized the need to integrate themselves into existing castes, lineages and states (Brenner 2000: 146; Ware 2009: 22). This meant establishing authoritative lineages of religious teachers that consciously mirrored and overlapped with kin lineages. In addition, teacher–disciple relationships created expansive regional networks of people contributing to the legitimacy of these religious authorities. Mbow commented on the popular legitimacy of the shaykhs in these networks: 'With teachers and disciples, there has to be confidence, trust, and respect. Teachers do not choose their disciples; disciples find their teacher. They have to have confidence in their teacher.'[4]

Using this authority, a number of scholars, including Bamba of the Mouridiyya, and Shaykh al-Hajj Malik Sy and Shaykh Ibrahim Niasse of the Tijaaniyya, created a mass movement of accessible Islamic learning throughout West Africa. In doing so, they created alternative social structures that set themselves apart from both regional monarchies and the French and British colonial administrations that controlled West Africa at that time. The *daaras* offered both different authorities and distinct communities. Bamba's disciples looked to their shaykh for religious education and a model of correct behaviour, and they practised service to their shaykh and their community through agricultural labour (Babou 2003: 313; Ware 2014: 186). Combining Baye Fall beliefs about

[4]Interview with author, Mbakke Kajoor, 1 June 2018.

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work with Bamba's teachings about service and religious education was historically a strong draw to *daara* communities. Today, for projects such as those organized by the Ndem and Mbakke Kajoor *daaras*, accessing and deploying the Mouridiyya's massive religious network for the labour necessary for their work, especially when the new project is located at one of its significant historical sites, is a powerful force.

Economically supporting these *daaras* has always been a challenge. Nineteenth-century leaders including Bamba funded their *daaras* and their growing networks of disciples through the French colonial economy of peanut cash cropping. Starting in the 1840s, French-controlled peanut production became focused on Senegambia's central regions, known as the 'Peanut Basin' (Adams and So 1996: 34; Glenzer 2002: 7). French strategies for resource extraction were similar to other European colonial operations throughout the world (tea in British India, rubber in Belgian Congo) and were amplified with the 1873 global recession. European powers, in other words, addressed their own financial difficulties by extracting natural resources by force from territories they occupied. Other demands for peanuts encouraged the cash crop: Industrial Revolution machinery created a need for more oil, which peanuts could provide. US tastes for snack peanuts increased their value across the Atlantic. The crop became so lucrative that migrant labourers travelled to the Peanut Basin for seasonal work (Brooks 1975: 29, 46; Hynes 1979: 28, 89, 97–8; Narizny 2007: 181).

French dictates for peanut production discouraged sustainable farming practices, such as rotating crops, allowing land to lie fallow to regenerate organic matter, and protecting water sources with buffer land. Instead, the colonial administration forced farmers in the central regions to use all available land for the cash crop. Replacing food crops with peanuts (which had become a speculative global market commodity with unstable prices) created food insecurity in these areas. Just as harmful, they ignored other agricultural regions, giving those farmers no opportunities for income generation (Adams and So 1996: 34; Brooks 1975: 45–6).

A description of that time that I have heard repeatedly in the region is 'the French exported our soil along with the peanuts'. As the climate became hotter and drier, with a long-term rainfall decline since 1855, monocropping added to severe land degradation. That is, not allowing farmers to rotate or plant different types of crops together meant that the soil had no chance to recover its organic content depleted through peanut production. There are two main types of soil in this region: one that is sandy, with miniscule organic content; and one that is predominantly sandy but with higher clay and organic matter content. Both Ndem and Mbakke Kajoor have the first type of soil. Compounding the effects of drought, low organic matter means that water evaporates faster. Hotter temperatures lead to higher evaporation rates, and decreasing rainfall over time is not sufficient to replenish the moisture needed to support agriculture (Tschakert and Tappan 2004: 538–9). Adding necessary organic matter – through soil amendments such as manure and compost and through planting nitrogen-fixing plants, described below – is an uphill struggle. In 2018 I visited another *daara*, only ten kilometres away, with residents of Ndem; between sighs of comparison they pointed out how healthy the trees were and how much faster they had grown, in better soil than Ndem has.

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Along with the growing agricultural crisis, the late nineteenth century became a time of social and political upheaval, leading to the downfall of the Wolof monarchy and the formalization of a French colonial administration. The popularity of *daaras* and the growth of Islamic education during this time are not coincidental: these were religious leaders' responses to their populations' needs.

The peanut cash crop was productive for France until the first decade of the twentieth century, before the 1910–15 drought. As in later droughts, the extreme dry conditions caused famine, death and major migrations away from rural areas. There are only a few mentions of this drought in colonial records. Glenzer (2002: 5–9) describes this lack of reporting a strategy, as the French population's internal criticism of its government's colonial enterprise was growing. A second reason, Glenzer notes, was the failure of an early twentieth-century European scientific agenda: importing outside farming technologies and crops, rather than focusing on indigenous varieties and technologies. To comment on a drying environment would be to admit the failure of their agricultural plans. During the 1920s to the 1950s, French colonial scientific goals became more data-oriented, and better suited to the realities of the Sahelian environment. This included funding for agricultural agents, training for farmers and irrigation projects. While they did not stop cash cropping, their scientific publications started commenting on the processes of land degradation in the Sahel (*ibid.*: 11–13).

Throughout the twentieth century, a number of economic factors – colonial cash cropping, a focus on the Peanut Basin and neglect of surrounding agricultural areas, and survival responses to drought – led to both overgrazing and the clearing of wooded areas for agriculture. Most of the Sahel's population – 80 per cent – lived and continues to live in rural areas. Along with their livestock, people can stress the environment through land use (Stephenne and Lambin 2004: 372). If we acknowledge past state land policies and consumption patterns, we see that drying trends are not natural or passive phenomena. They are a perfect storm of global inequalities, past and current government decisions and ecological changes (Boelens *et al.* 2016: 2–3; Schmidt 2014: 220–1; Swyngedouw 2009: 56–7). At the same time, it is misleading to isolate the causes of regional drought without looking at global environmental shifts. While land use is not the only factor, it does contribute to other variables – primarily an increase in greenhouse gas emissions – that are causing rising temperatures and erratic rainy seasons in the Sahel (Held *et al.* 2005: 17891–2; Kaptué *et al.* 2015: 12133; Kerr 2003; Mertz *et al.* 2010; Zeng 2003: 999).

In the first half of the twentieth century, Senegal's anti-colonial political leaders and its religious leaders found ways to organize their constituents and respond to these political, economic and environmental instabilities. Farmers in rural areas sought ways to manage all of these factors and still maintain their livelihoods. Meanwhile, Sufi orders continued to grow in popularity.

Newly independent but with continuing challenges

Senegal's first administrators after its independence in 1960 needed the help of influential religious leaders to rebuild the country's social structures and economy after colonialism. They designed the new state to be a secular democracy that protects public religious discourse and invites counsel from religious authorities. This created a beneficial relationship between secular state and religious

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authorities: they support each other's popular authority and have since worked together on a number of initiatives (Diagne 2013: 44–6; Stepan 2013: 221). Senegal's relative political stability shows that economic, infrastructural and environmental pressures affect states no matter their political structures or current conflicts. In each state, environmental shifts may (or may not) contribute to political conflicts, or political instability and climate changes can be concurrent but not causal (see Benjaminsen *et al*. 2012; Gleditsch and Nordås 2009).

At independence, Senegal faced common postcolonial challenges: to grow its newly established independent economy quickly, and to fund needed infrastructure projects such as roads, an educational system, and agricultural and economic markets. The first administration decided to continue centralized agricultural cooperatives to help fund the state. These cooperatives had a similar effect to French control over local organizations: to limit community-based organizations (CBOs), private businesses and local markets (Bouchier 1971: 21; Patterson 1999; Thioub *et al*. 1998; Tignor 1987: 49).

Shortly after independence, the 1968–74 Sahelian drought brought mass devastation, with between 100,000 and 250,000 human deaths in Senegal alone, and livestock loss nearing 90 per cent in rural areas (Rogers 1977: 282). Following this drought, international aid increased exponentially. The idea of development in the Sahel, and defining what development meant, became global rather than regional in scope. The responsibility for the outcome of development efforts in turn became internationally disperse, with a number of agencies within and outside the Sahel participating in these efforts in some way (Glenzer 2002: 21). The World Bank was another primary funder of postcolonial development efforts. Senegal was the first nation to accept a World Bank loan that mandated restructuring the state economy. Designed with neoliberal ideologies, the structural adjustments favoured privatization of land and businesses over community or collective efforts, and the decentralization of state control over small business loans, agricultural support services and markets (Duruflé 1995: 74; Lecomte 1992: 88).

Along with the severe need that follows natural disasters such as drought, the newly independent national economies of Sahelian nations were economically dependent on, and indebted to, this international aid that did not always align with their national, regional or local strategies. Ndem's and Mbakke Kajoor's *daara* managers have been able to partner with European foundations for infrastructure needs, such as solar panels for their water tower that keep them off the unreliable state electrical grid and state water supply. A private French foundation funded their organic garden and gardening education initiatives. They also have had the ability to choose *not* to partner with initiatives that do not match their goals. For example, agricultural projects that use synthetic chemical fertilizers do not match their strategies of developing and using only organic fertilizers and pesticides. Chemical additives might work in the short term but will degrade their already desiccated sandy soil over the long term by killing off what little organic matter exists. Not every community, though, has the ability, or the organization, to be able to rebuff these well-meaning projects that are not aligned with their own needs.

The 1980s and 1990s brought recurrent droughts and political restructuring that mirrored economic restructuring. In 1980, the state started allowing autonomous CBOs to form, corresponding to their decentralized economy. Along with this

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freedom to organize were demands for communities to manage social services on their own (Patterson 2003: 37–8). In many rural towns, strengthened weekly markets replaced state cooperatives as centres of rural economies. Farmers, small businesses, and local and regional traders regained access to their local economies with these markets (Perry 2000: 462; Thioub *et al*. 1998: 66).

Each town organized around its economic base: fishing, tourism, agriculture, artisanal trades, industry, or a combination of these. Situated in the old Peanut Basin, the village of Ndem featured degraded land and few economic opportunities. Starting in the 1980s with a *daara* adjacent to the village, Mbow and Cissé sought to address the '*exode rurale*': the rural exodus of farmers and their families from central Senegal's villages, away from a collapsed agricultural economy that no longer supported them. Moussa Diène, an accountant in Ndem, described the conditions that the area faced: 'I've been here in Ndem since 1993. In 1993, you didn't have the water tower, the general stores. You were obliged to walk two kilometres to find a store. You didn't have water or electricity.'[5] Since then, the *daara* has created an artisanal campus that creates hand-woven, dyed and tailored household goods and fashion products for a global clientele. The craft workshops serve as a local economic enterprise in Ndem, employing people from Ndem and nearby villages. The *daara*'s residents have built and staffed a health clinic and schools, and have experimented with different ways of growing crops, described below. The *daara* structure has allowed the community to adapt to economic and environmental shifts.

The 2007–11 global economic recession, combined with environmental changes, brought new challenges. A number of European boutique owners and traders have developed relationships with Ndem, commissioning high-end fashion and household items. When the recession caused them to struggle financially, they had to cut back on the number of products they ordered, or stop the orders completely. With fewer commissions, a necessary source of income, Ndem's managers could not consistently pay their workers. Retooling and diversifying their product lines and partnering with different companies has helped. And many of their European clients have returned as commissioning partners.

Along with recurrent economic crises beyond local control, the interior Sahel areas continue to deal with a steadily drying environment. Climate changes have brought late rainy seasons, rising temperatures, and erratic alternating drought and flooding (Roudier *et al*. 2014: 42–4). The annual rainy season determines when rural residents plant the staple crops of millet and peanuts, along with vegetables and greens. They prepare the fields for the growing season, spreading manure and compost. They plant millet right before the first rains and peanuts after the rains have started. All other work in rural areas stops to plant and cultivate the crops in July and August. This is the hot rainy season. Following it are the hot dry season and the cool dry season: these seasons see no rain, but, with proper irrigation, the climate can support other crops, including vegetables. Because farmers rely on timing to plant and cultivate staple crops, the shifts in the rainy season have brought regional food shortages: the staple crops are facing permanent unpredictability.

[5]Interview with author, Ndem, 29 January 2016.

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Transforming the environment

Food and water insecurity are common experiences across the Sahel, beyond rural populations' ability to change them, but people are addressing these issues in a number of ways. The CBOs that started in the 1980s and 1990s – Ndem is an example – have adopted new technologies, including those that access solar power and groundwater. They have also worked with regional agriculture experts to develop new techniques in organic farming, such as different kinds of soil amendments to add more organic content to the garden soil. These experiments with crop varieties and farming methods are common throughout the Sahel, as climate changes require on-the-ground innovations (Mertz *et al.* 2010). Building on their research and experience in Ndem, Mbow, Cissé and a number of Ndem's managers started planning for the new site in Mbakke Kajoor in 2014. They moved to the new location in early 2015 to start building the new *daara* and educational centre. They immediately began reforestation, gardens and seedling nurseries, and educational programming for women and men in the surrounding villages. They combine a number of elements to make this feasible: the attraction of an important holy site, religious motivations to encourage participation in their work, and regional expertise in environmental and agricultural sciences. Limited water supply and poor soil are their two biggest challenges.

The first step in establishing any residential and agricultural site in Senegal is access to water. The Dakar peninsula, for example, has faced chronic water shortages: in 2018, there was a shortage of potable water for months in the greater Dakar area, one of the most populous urban areas in West Africa (Haque 2018). While the demand for water is acute in urban areas because of population pressures, many rural areas never had running water to begin with. Water shortages in rural areas often mean that less water is available to be brought in by truck or collected at a well; it affects both people and the livestock and crops they rely on. Local water towers provide access to clean drinking water from groundwater reserves, as the piped national water system often carries harmful bacteria. Groundwater is plentiful and free of harmful minerals in the area encompassing Senegal, but often too deep to access with a handpump (MacDonald *et al.* 2012: 2–5).

New technologies allow communities to access groundwater, yet the energy to run the pump can be another barrier. Ndem's water pump, which is on the national electrical grid, established in 1995, shorted in a series of nationwide blackouts that started in 2010. In 2011, Ndem received a grant from a European foundation to install solar panels for a constant energy supply (Cochrane 2013: 115–16). In 2018, they built a new water tower with larger capacity (150 square metres versus the previous 30 square metres). This substantially increased access to potable water in the fifteen surrounding villages. The Mbakke Kajoor *daara* has access to two water sources. The first, a borehole 300 metres from the *daara*, is salty, appropriate only for construction and cleaning. The garden managers use this water for plants but are frustrated that their growth is hampered by the poor-quality water. A second water tower, about one kilometre from the *daara*, has potable water for cooking and drinking. The *daara* pays a fee for their access to this water. Residents bring the water to the *daara* in large plastic jugs and keep it in communal areas for the shared kitchen and for everyone's

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drinking-water use. One of the *daara*'s goals is to build its own tower in order to have control over its drinking water. Mbow explained:

> We are looking for a water source at Mbakke Kajoor for all the projects here. We also want water autonomy. You know, we are close to the desert, here in the Louga Region. The drought started here, and that started immigration. You can go ten kilometres and not see anyone, only sand and trees. And even so, there are resources here. We have human riches, we can develop trees and agriculture. We have huge potential.[6]

Access to a water source allows communities to find sustainable ways to live. Mbow takes this a step further: regular access to potable water will unlock the human riches they have. For Mbow, the region's richness is each human being's inner spiritual life, expressed through the work that each person is called to do. But that first requires water for people to live and work.

After access to water, poor soil and intense direct sunlight are the next challenges for Senegal's central regions. Both *daaras* have substantial garden areas that allow space for seedling nurseries, animal pens, tree farms and vegetable and experimental plots. They are surrounded by either concrete block or wire fencing, with latched gates to keep out donkeys, cows, goats and other large animals that would destroy the plants. Gardening managers develop their organic farming techniques here, then train people from surrounding villages on tree care and vegetable farming.

Like many farmers across the Sahel, they rely on agroforestry to address both poor soil and direct sunlight: growing trees along with vegetable crops for shade and soil stability and to block wind from blowing away topsoil. Both *daaras* add compost to garden areas to improve their sandy soil. Along with compost, adding nitrogen to the soil is necessary for any plant growth. This nutrient is depleted across the Sahel, and extreme heat can reduce nitrogen fixation. Millet, one of the staple crops, is not nitrogen-fixing: it can only gather its nitrogen from the soil, depleting this resource. Legumes, including peanuts, are nitrogen-fixing: they take some of their nitrogen from the atmosphere and some from the soil. Planting nitrogen-fixing trees, especially two types of acacia indigenous to the Sahel, and the casuarina tree, which is used in tropical areas globally for this purpose, add nitrogen-rich organic matter via their roots and through dropping leaves and branches (Cochrane 2016: 49–50; Dakora and Keya 1997: 809–11; Ngom *et al*. 2016; Watson 2012).[7]

Ndem's residents have planted trees in the residential area since the *daara*'s beginning in the 1980s; they started agroforestry in the garden area in the early 2000s. While it is still hot, when one walks from the outside area without trees into the Ndem *daara* with its shade it is noticeably cooler. Planting trees in Mbakke Kajoor started at the same time as construction of the residential area. Its two garden areas soon followed in 2016. The Ndem garden has benefited from over two decades of composting, soil amendments, agroforestry and irrigation. The Mbakke Kajoor gardens started from scratch, but they have transferable knowledge from Ndem and regional extension agents for support. As Fatou

[6]Interview with author, Mbakke Kajoor, 1 June 2018.
[7]Also B. Fall, interview with author, Ndem, 1–2 June 2015.

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Diack, a resident of Ndem, said: it's 'thanks to Ndem' that Mbakke Kajoor has moved quickly to establish gardens, trees, buildings and educational programmes, after decades of experimentation and lessons learned in Ndem.[8]

For each tree and large shrub, gardeners construct a small bowl of sand that will hold water, circled by rocks to stabilize the sand against stiff wind. In the bowl, they mix compost and the sandy soil and then plant the tree or shrub in it. A mulch of hay around the plant acts as compost (organic material decomposes quickly in the heat) and keeps moisture from evaporating too quickly. When I worked in the Mbakke Kajoor garden, the garden manager pushed us to water everything by 11.30 a.m.; watering after that would be pointless because of the direct sun and immediate evaporation. One variation in tree planting in Ndem in 2018 was to double dig compost around new orange trees, then cut the top and bottom off a ten-litre water bottle to create a plastic cylinder; encircling the new plant with this provided some protection from wind and rodents (rats are a perpetual problem). Old car tyres are often repurposed into containers for tree nurseries and protective borders for garden areas with high foot traffic. This attention to each plant and each garden area is necessary for their survival.

The minutiae of organic gardening techniques matter, as experimentation is needed to transform a severely arid landscape without adding harmful chemicals. For example, each garden worker has a preferred recipe for an organic pesticide solution, but they all include a combination of hot peppers, garlic and leaves from different trees that are repellent to pests. Ndem's garden manager, Cheikh Ngom, talked about these details, but also described the big picture of his work: 'The objective [of the garden] is a little big: it's to spread knowledge and to work.'[9] He explained that many people do not know that oils from locally grown plants are more nutritious than imported oils, and they also do not understand the reasons why produce such as tomatoes grown with synthetic chemical pesticides are harmful. *Daara* residents' objectives of practising organic agriculture and circulating knowledge have required them to work closely with regional extension agents and international funding and expertise, while also building wide participation within Ndem's *daara* and the fifteen villages surrounding it. Ngom sees the garden as an educational resource, and organizes interactive visits with nearby school groups to start that education early. As well as inviting people in, he, regional extension agents and other gardeners from Ndem take this knowledge out, working with surrounding villages to start organic gardens.

A similar goal of spreading knowledge is part of Mbakke Kajoor's gardening agenda. One of its garden managers explained that they were in their second year of giving a tree to each of the 100 women who are involved in other educational programmes at the *daara* (including sewing, literacy and French classes).[10] He also instructs them on how to care for the trees, especially after the rainy season when water is scarce and the trees are still young. In this way, the *daara* can help people in the seven surrounding villages start their own greening efforts, with the knowledge and resources they need. To be a long-term and widespread solution – two standards for effective environmental change – these

[8]Interview with author, Ndem, 3 June 2018.
[9]Interview with author, Ndem, 4 June 2018.
[10]Interview with author, Mbakke Kajoor, 2 June 2018.

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methods must function without electricity. While they are based in scientific study, their low-tech nature is crucial in a region with limited and unpredictable electricity sources.

Widespread participation is part of the strategy to build Mbakke Kajoor's *daara* and educational centre. The Mouride and Baye Fall network is massive, and the religious draw of the holy pilgrimage site has brought serious financial and labour investment. Equally as powerful is the site's clear emphasis on environmental education. Both Mbow and the two *daaras* have a positive record with international and regional grant-making organizations: the *daaras* have been able to use the grant money as intended. They also have the administrative infrastructure to report back to the funders on their use of these funds and the benefits the funded projects have brought to the *daaras*. These funders have worked with the *daaras* on their groundwater access, solar panel installation for the Ndem water pump, and both *daaras*' garden initiatives. The *daaras* have been able to deploy all of these resources, working within and across their funding, religious and social networks. Cissé replied to my query about financing this project:

> For the question of finances, all of what we collect is made up of funding from our [Mouride] base. That's the spirit of the project, particularly for the prayer hall and the residence [for religious leaders]. Concerning the education centre and the agroforestry teaching farm, we also appealed to funding agencies, as these projects have a social character. The context is Mouride but the problem is the same for other regions of Senegal, where populations are confronting the same difficulties.[11]

Mbow also spoke of the secular attraction for external funding agencies: 'The project is global, so we have partners for Mbakke Kajoor, such as an agroecology association that is against chemicals and totally for organic farming, like us.'[12] Their outreach for funding from both the Mouride base and secular external grants works well for such a project.

Even with careful planning, rural CBOs contend with an unpredictable ecology and unforeseeable economic market changes. This is why interviewees across Senegal – whatever their religion, ethnicity, gender or location – have explained to me the need for a multifaceted and holistic approach to both economic and environmental efforts, using the words 'total' and 'transformation' when they talk about 'change'. While the changes any rural community makes to their local ecology are miniscule compared with Sahel-wide drought and rising temperatures, the transformation is palpable when vegetables or millet can grow in an area that was once desiccated sand, when a larger number of people are able to plant trees that will both provide needed shade from hot sun and allow other plants to grow, and when people can live in rural areas because of access to water and food. Seeing the difference between the desert outside a garden fence and growth on the other side, and knowing what it takes to make that change happen, is evidence of this small-scale yet significant kind of transformation.

[11]Personal email communication, 10 January 2018.
[12]Interview with author, Mbakke Kajoor, 1 June 2018.

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Environment, religious organizations and spirituality

Transformation applies to soil amelioration and community building, but it also applies to spirituality. Religious and other types of community-based structures facilitate this transformation, and motivations for the work are often related to both community commitments to religious teachings and personal spiritual journeys. Ndem and Mbakke Kajoor are just two examples of organizations committed to ecological transformations. While I have focused here on *daaras*, a number of communities across the Sahel have created locally specific organizations to address these challenges, including other types of religious groups, locally elected councils, local markets, agricultural unions, communal work groups and small business associations. Local CBOs have several advantages over state or international development agencies. For example, local authorities have a known legitimacy, whether elected by popular vote or chosen because of their personal reputation for piety, leadership or vision. There is always the potential for the pitfalls of corrupt leadership and corrupt elections, and inequalities that come with this corruption have been well documented in development literature, including patronage, unequal access to resources, and gender and class inequities (see, for example, Latha 2010: 55–7; Patterson 2003: 38–9; Sieveking 2007: 32–3).

Local projects, though, have the potential advantage of widespread participation and a sense of belonging to, designing and owning local organizing efforts. In a number of studies on social and religious hierarchies and women's organizing strategies in Senegal, women do not necessarily challenge male-dominated religious or state hierarchies; instead, they create their own realms of authority to create social change (Augis 2014: 201–2; Buggenhagen 2012: 7; Hill 2018: 7–9; Sieveking 2007: 32–5). *Daaras* are often effective organizing structures in Senegal for this very reason: the religious groups are established institutions. Inequalities do exist within them, but, at the same time, they provide stability and a buffer against opposing forces such as environmental disasters, external development goals that are contrary to local goals, and dips in needed funding.

Locally designed projects can thus respond more nimbly to on-the-ground realities, changes in rainfall, variable funding and internal personnel changes. Some external funding sources, for example, do not recognize the need for fencing to keep free-range goats, donkeys and cows away from reforestation and gardening initiatives. Or, rainfall fluctuations may mean that funding deadlines for gardening or agricultural programmes need to change. The shifting rainy season also has effects on each CBO's operations. In Ndem, a multifaceted approach to economic sustainability has included artisanal production, but erratic agricultural seasons mean that weavers, dyers and tailors need to go to their fields at different times, changing when they are able to finish a commission with a foreign vendor. Communication with vendors must be clear, and vendors must be willing to be flexible.

Externally imposed project designs often do not take into account these delicately balanced social networks and environmental realities or the ways in which people work within them.[13] In her study of attitudes to development

[13]See also Roy (2010: 309–12), who discusses this issue in Mali; and West (2015: 58), who discusses it in Burkina Faso.

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projects concerning pastoralists in Niger, Greenough (2007: 112–14) argues that ignoring local resource allocation, adaptive strategies in times of drought, carefully balanced relationships and local knowledge undermines the very foundations that should be strengthened to address the challenges at hand.

The critical balance in such agricultural and water resource initiatives is between local management and external support. CBOs in their various iterations – such as *daaras*, women's associations or elected councils – strategically choose to work sometimes within and sometimes apart from these external relationships. Local strategies often have to rely on larger institutions for funding, expertise or resource allocation. Partnerships with states are sometimes fraught, as local and national interests may be different. In other situations, these relationships may work well, and may even have mutual benefits: Senegal's state and religious organizations partner on a number of projects. Other less well-publicized projects show how the state can address local needs, such as a state-funded reservoir north of Bambey that takes advantage of rainy-season flooding and provides a watering hole for pastoralists' herds, at least until the water dries up again. In another example, West (2015: 60–1) describes state–NGO partnerships that have created cereal banks to address Burkina Faso's food insecurity.

Some funding for Ndem's and Mbakke Kajoor's *daara* projects comes from partnerships with European foundations that are attracted by their record of transparency and accountability with other external grant agencies. Mbakke Kajoor's primary supporting network is the Mouridiyya: the religious directive to build a community at Mbakke Kajoor's holy site came from the Mouridiyya's hierarchy, and its financial and labour participatory base is Mouride. This is a shared commitment to Bamba's teachings, yet also a deeply spiritual commitment for each individual involved.

Both managers of the two *daaras*' diverse projects and residents of the *daaras* make these connections when they talk about their work. Soxna Aïssa Cissé explained: 'The work here is fundamentally spiritual. After that, we have economic projects. If you make an effort, it's possible to find peace. It's an interior work.'[14] The work of one's spiritual journey is the priority; it defines and guides the *daara*'s goals of economic and environmental revitalization. Fallou Gassama, a former manager in Ndem, explained the next step: having a group of dedicated individuals is the strength behind community revitalization.

> Ndem is a beautiful example, because it's community development at its foundation. The population of Ndem has a desire, a deep determination to make Ndem work. The population volunteers that desire. And also, we are religious people, that's our strength. We have a unity that can accomplish much. What we do is shared … Our spirituality, that's our strength. Spirituality exercises a determination and strength.[15]

The phrase *mbollo mooy dollé* (unity is strength) that residents of both *daaras* often repeat during the workday is a shorthand for the ideas that Cissé and Gassama described. Unity, driven by common spiritual goals and shared religious beliefs, is the strength of their work.

[14]Interview with author, Ndem, 10 June 2013.
[15]Interview with author, Ndem, 10 June 2011.

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Local approaches to small-scale environmental and economic transformations rely on these strengths. They are slow because of the circumstances: lack of rainfall, lack of water, rising temperatures and unpredictable electricity. Most of the work is laborious, done by hand. These projects are slower than the global climate changes drying the Sahel, yet they are making rural communities liveable again, with long-term goals and perspectives. Augmenting the soil over time, agroforestry and managing water are all established practices and have yielded small-scale results across the Sahel. While *daaras* are very specific kinds of communities, using community-based organizing that makes sense for each locality plus new agricultural innovations suited to the environment is a combination that can be – and is being – replicated. The deep meanings of work for the *daaras* discussed here, plus the religious structures that support their work, make their environmental labour transformative for life-sustaining agriculture within damaging socio-ecological conditions, and also spiritually transformative. Religious teachings and the experiences of these two *daaras* have made both transformations, while small in regional scale, nevertheless significant for the *daaras* and the villages surrounding them.

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Abstract

Severe ecological changes across the Sahel have created a difficult environment for agriculture and rural village economies. Rural communities, while small in scale, are creating new ways to transform their degraded environment. Their small size allows them to develop location-specific strategies to manage and improve water, soil and agriculture. This article focuses on two Sufi communities (*daaras*) in Senegal that integrate environmental work and spirituality. Religious organizations are influential in Senegal, as is the idea that labour is a part of both personal spirituality and shared religious teachings. As agriculture continues to be disrupted because of climate fluctuations, creating a habitable environment relies on applying region-specific agricultural science, and working through local structures. These conceptions of labour, along with the religious structures that support their work, make environmental projects spiritually significant, and also transformative for agriculture in a challenging environment.

Résumé

Des changements écologiques profonds dans tout le Sahel ont créé un environnement difficile pour l'agriculture et les économies des villages ruraux. Des communautés rurales, quoique de taille modeste, créent de nouvelles manières de transformer leur environnement dégradé. Leur petite taille leur permet de développer des stratégies localisées pour gérer et améliorer l'eau, les sols et l'agriculture. Cet article s'intéresse à deux communautés soufies (*daaras*) au Sénégal, qui intègrent travail environnemental et spiritualité. Les organisations religieuses sont influentes au Sénégal, tout comme l'est l'idée que le travail fait partie de la spiritualité individuelle et des enseignements religieux partagés. Alors que les fluctuations climatiques continuent de perturber l'agriculture, la création d'un environnement habitable repose sur l'application de sciences agricoles spécifiques à la région et sur le travail réalisé dans des structures locales. Ces conceptions du travail, avec les structures religieuses qui soutiennent leur travail, rendent les projets environnementaux spirituellement significatifs mais aussi transformatifs pour l'agriculture dans un environnement difficile.

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