

CORPORATE-LED CLIMATE ADAPTATION

How the Gates Foundation, Microsoft,
and AGRA are enabling the digital
capture of African food systems



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1. Introduction

Global food systems are in need of significant transformation. Industrial food systems are not only failing to provide food security for all, they are also contributing to the changing climate on a massive scale. In this context, smallholder food producers, Indigenous peoples, and food-chain workers have advocated fiercely to transform food systems through agroecology—an ecological approach to agriculture that prioritizes and advances social equity. By contrast, multinational corporations have worked to reassert control over global food systems through “climate-smart” agriculture.

The Bill and Melinda Gates Foundation (BMGF) has been at the forefront of promoting the corporate-driven model of industrial food systems and is a champion of climate-smart agriculture. In 2006, the Gates Foundation, together with the Rockefeller Foundation, founded the Alliance for a Green Revolution in Africa (AGRA). For almost two decades, AGRA has funded governments and organizations that promote Green Revolution technologies, including synthetic fertilizers and hybrid seeds, and has lobbied governments across Africa to pass laws supporting the industrialization of agriculture. The BMGF has also funded the development of genetically modified crops and lobbied vigorously for their adoption. In 2020, however, a series of reports published by civil society based on independent research found that BMGF and AGRA had failed to meet their promises and that it had not substantially ameliorated food insecurity (1); its main contribution was the transformation of government policies to adopt corporate technologies (2). In fact, according to a report by IPES-Food, 85% of the projects the BMGF invested in were focused solely on supporting and increasing the efficiency of industrial agriculture strategies (3).

While AGRA and the BMGF continue to support the adoption of commercial seeds, fertilizers, and other agro-chemicals, they are now increasingly supporting the adoption of a new set of technologies that they claim are free from the baggage of past Green Revolution technologies: digital agriculture. They are not alone. Multinational corporations, governments, and international institutions are all investing in a new digital “revolution” of agriculture.

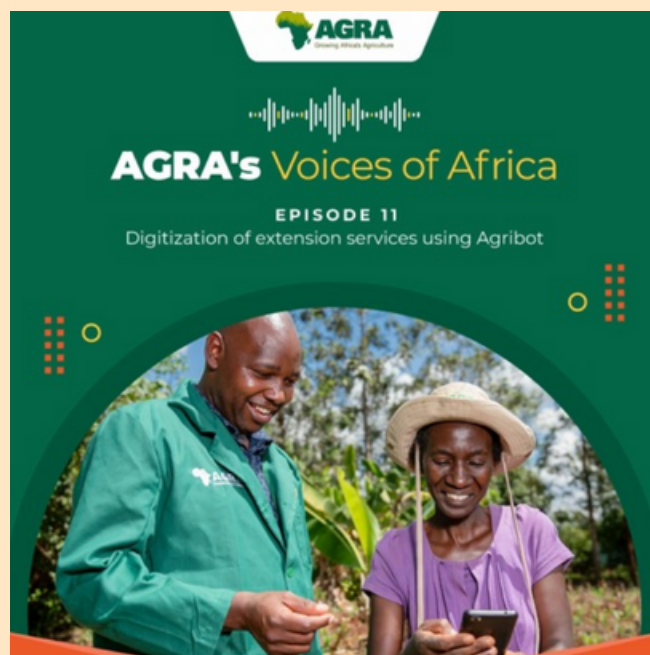
Digitalization can take many forms—from high-tech sensors embedded in the soil that collect information on soil qualities, to mobile phone apps that ask farmers to input data about their farm size and crop production in return for information and advice. Proponents of digitalization emphasize its benefits by claiming that it will provide farmers with more information. But these technologies also enable the private sector to amass vast amounts of granular data on farmers’ territories, practices, and relationships. Competition for this data has attracted a host of technology corporations—including Google, IBM, and Microsoft—to the agricultural sector, turning data into a lucrative commodity.

Among these corporations, the entry of Microsoft into the digital agriculture space is particularly concerning. Just as the company used monopoly control to ensure dominance in personal computing, it is now seeking to establish and profit from a monopoly over agricultural data.

This report analyzes three digital agricultural services being promoted by the BMGF to advance the digitalization of agriculture in Africa: Digital Green, Agribot, and Azure Data Manager for Agriculture (formerly known as Azure FarmBeats).

The first two, Digital Green and Agribot, are both examples of “digital advisory services,” which is one of the primary ways digitalization has targeted African smallholders. These services are offered as a way for farmers to be informed and respond in real time to climate change and other farming considerations. They give farmers agricultural advice over digital platforms, often using digital tools to analyze farm conditions and dispense “customized climate-smart” advice (4). As rainfall and growing seasons change, digital advisory services may be an aid for farmers to adapt to climate change. However, digital advisory services primarily led by the private sector and philanthrocapitalist ventures means the promotion of commercial interests. Left in their hands, digital advisory services may be a recipe for the further corporate capture of control over food systems.

The final service, Azure Data Manager for Agriculture, is a cloud infrastructure platform developed by Microsoft to manage and provide data for other digital agricultural services, including advisory services. The platform does not provide farming advisory services in and of itself, but rather ensures that Microsoft controls a key data infrastructure for other applications. Together, the services offered by Digital Green, Azure Data Manager for Agriculture, and Agribot raise critical questions—and important risks—for farmers.



AGRA podcast featuring discussion of Agribot:
<https://soundcloud.com/user-610643193/voices-of-africa-ep-11-agribot>

This report aims to illustrate the growing interconnections between the BMGF, AGRA, and Microsoft. This is part of a larger trend in which technology companies are moving into food systems. But these interconnections also reveal how Gates is increasingly becoming a direct beneficiary of his philanthropic efforts. Like past AGRA Watch reports (5), which revealed how Gates is benefitting from the Green Revolution through his investment in agricultural input corporations, this report shows how Gates is lining his own pockets by promoting policies and technologies owned by Microsoft, a company in which he remains the largest private shareholder (6).

Most notably, these services broadcast farming advice that is framed as the cutting edge in sustainability, and yet is financially backed by the agrochemicals industry and meant to expand demand for their products. This brings into question the integrity of the “advice,” and whether farmers are aware that the main role of this content is advertising. From our analysis of the following brief case studies, we argue that digital advisory services, as part of a digital agriculture system promoting industrialized, input-heavy agriculture, have negative effects on workers and the environment. Moreover, our analysis of Data Manager for Agriculture reveals how Microsoft is increasingly entrenching itself within the broader ecosystem of digital agriculture, making it a powerful private infrastructure with access to farmer data. This raises risks



AI image created with keywords “Bill Gates, tech, agriculture” (using Imagine AI)

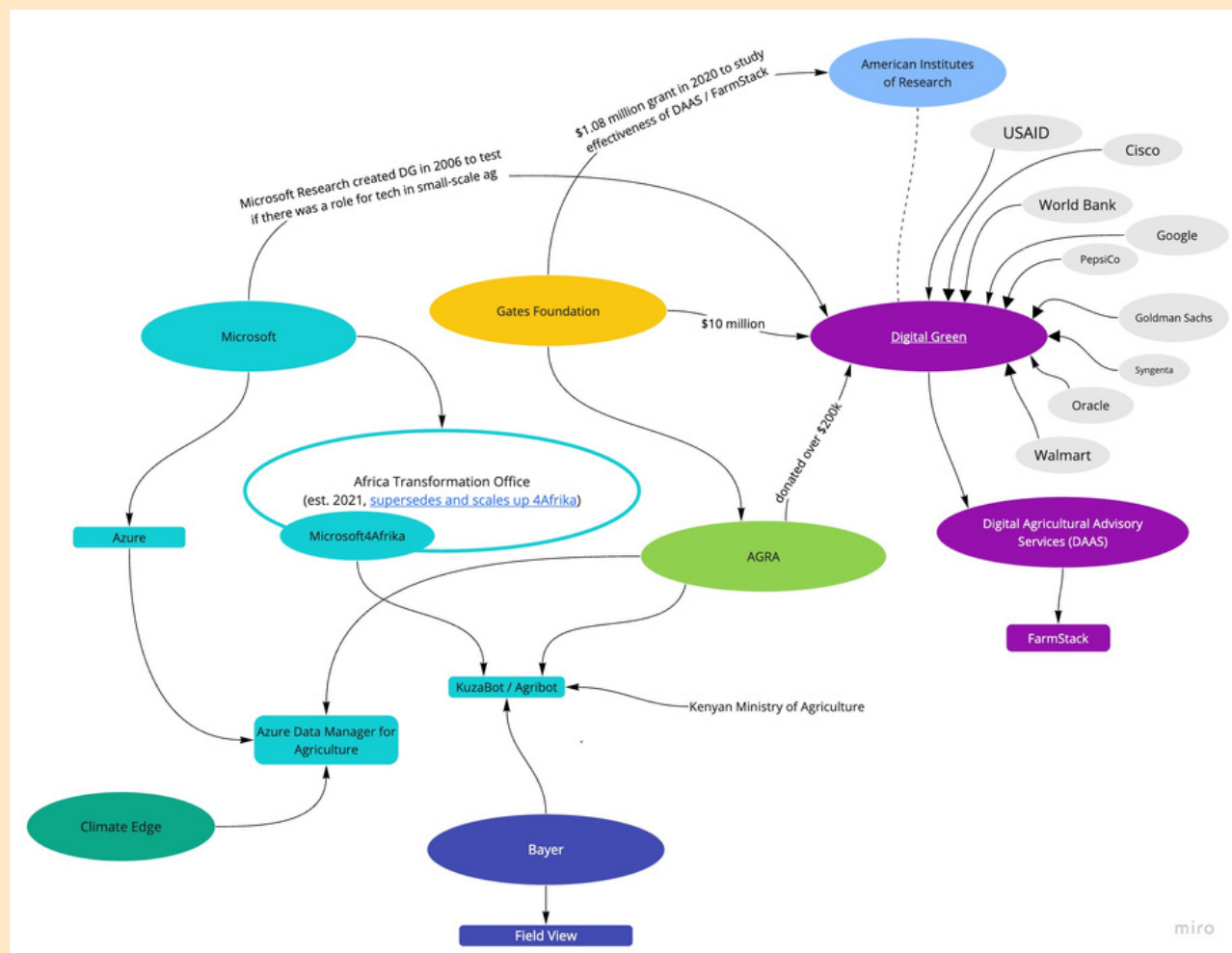
not only for farmers but also the national sovereignty of countries that wish to protect their data.

These case studies do not provide an exhaustive overview of the role played by Bill Gates in promoting digital agriculture. Gates also funds digital agriculture through other initiatives, including Breakthrough Energy, an investment firm that Gates founded (7). Nevertheless, our case studies show that letting corporate interests guide agricultural policy results in growing corporate power over food systems, the creation of imbalances in access to data, and the promotion of toxic products for the sake of power and profit. By elaborating these risks, we hope that this report can affirm the calls of the food sovereignty movement for climate resilient agriculture policies that center and empower farmers. We also seek to clarify the need for structural

approaches to data governance that protect the collective and individual data rights and sovereignties of land stewards and foster safe and sustainable working conditions.

2. Case Studies

Digital Green, Azure Data Manager for Agriculture, and Agribot each provide examples of the way in which AGRA, Microsoft, and the BMGF are all increasingly working together to promote digital agriculture in Africa. Each program illustrates a different aspect of this push. Digital Green is currently pioneering **new methods** of reaching customers, thereby laying the groundwork to expand the reach of advisory services globally. Agribot represents the introduction of digital advisory services into AGRA's **existing networks** of Village-Based Advisors—people who are selected by AGRA to demonstrate practices and promote products to their community with the sponsorship of input providers. Azure Data Manager for Agriculture is an all-in-one platform, which Microsoft is betting on to establish **platform power**—concentrating and controlling digital agricultural services and data.



A web of connections, partnerships, and financial flows between Microsoft, the Gates Foundation, and AGRA (and other corporate and governmental partners)

2a. Digital Green

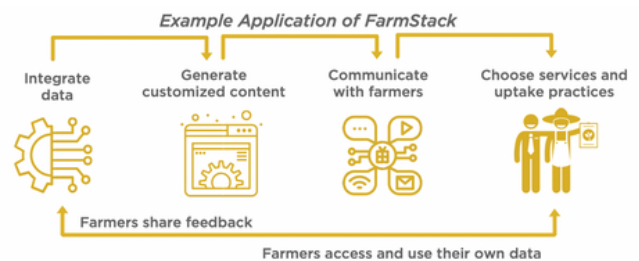
Originally created as a Microsoft Research project in 2006, Digital Green became an independent nonprofit development organization in 2008 (8). It aims to pioneer the use of technology to reach small-scale farmers.

Since branching off from Microsoft, Digital Green has built close connections with the BMGF, receiving over \$10 million from the BMGF and over \$200,000 from the BMGF-funded AGRA (9). While Digital Green initially focused on India and Ethiopia, it later expanded to Nigeria, Kenya, and Malawi, and elsewhere around the world (10).

Digital Green is creating new methods of digital communications for advertising to farmers. Its tools, which cover a wide range of digitalization practices, include:

- Community Videos, which publishes videos in local languages promoting the practices that Digital Green's partners (including governments, NGOs, and corporations) wish to spread. Digital Green's partners include Syngenta, The World Cocoa Foundation and Oracle (11).
- FarmStack, a market research tool that enables organizations to share, combine, and analyze the data that they have collected on farmers (12).
- MarketAccess or Loop, a produce delivery service that acts as a

middleman between farmers and markets. It promises to help farmers get perishable products to markets quickly and efficiently, while also lowering costs for consumers (13). However, Loop raises equity issues, as it prioritizes connecting farmers to large urban markets and reduces local availability of fruit and vegetables (14). As demonstrated with other kinds of internet- and app-mediated middlemen services, these kinds of services can also end up forcing producers to lower their costs, charging increased prices to consumers, and undermining existing vendors (15). The consequences of such an app in the agricultural sector can already be seen with Twiga Foods in Kenya (see below).



FarmStack is marketed as a “win-win” for both companies and farmers. However, farmers are empowered only as consumers - to give or sell their data, to receive ads, and to buy products.

Image source: [Digital Green FarmStack 2-pager](#)

- KisanDiary, a personal accounting app for farmers. It provides farmers with an analysis of budgets and harvests, updates them on the status of financial markets, advises them on crop management, and lets them share their data online for comparison (16). This poses the risk of market manipulation, as farmers' data helps predict market trends for

the companies and speculators, while the advice provided to farmers is not transparent.

Twiga Foods: A Cautionary Tale

Twiga Foods was launched in 2014 in Kenya with funds from the Microsoft 4Afrika program and still runs on Microsoft's platform Azure. Twiga started out as an app-based company connecting farmers to small retailers, bypassing middlemen and lowering costs for vendors and consumers. The company then expanded into financial services with a loan scheme and a business tracking app for retailers, and it created its own line of staple products. Surprisingly, Twiga also moved to delivering farm produce directly to consumers through a partnership with Kenya's largest e-commerce platform Jumia (17). As GRAIN points out, Twiga Foods cuts out small vendors and "has refashioned food distribution using pretty much the same workforce to enable corporations to insert themselves in the middle and extract wealth" (18). Twiga is a warning case study for the future development of Digital Green's MarketAccess/Loop.

2b. Agribot

Agribot, also known as Kuzabot, is a chatbot developed by Microsoft to complement AGRA's Village-Based Advisor program (VBA), which has already been subject to criticism (19). AGRA and Microsoft announced Agribot in 2019, and it was initially rolled out in the counties of Embu and Makueni, in partnership with the Kenyan government (20). While Microsoft provides the technological infrastructure, AGRA implements it through communication and networking, with much of the outreach to farmers being done by national ministries of agriculture (21). In 2022, AGRA and Microsoft announced they would implement Agribot in all countries with a VBA program (22). Between 2017 and 2021, this included Ghana, Kenya, Mozambique, Burkina Faso, and Tanzania, among others (23).

As a promotional video illustrates, Agribot works to automate and disseminate the corporate-sponsored advice of VBAs, which form a central part of AGRA's extension services (24). VBAs are farmers and local input vendors recruited to demonstrate and advertise sponsored farm inputs. VBAs are self-employed but are linked directly or indirectly to seed, fertilizer, and pesticide companies that provide commissions for product sales (25).



Screenshot from AGRA's "[Our Approach to the Village Based Advisors \(VBA\) Model](#)"

Agribot sends out messages with input recommendations to VBAs and their clients, offers automated instruction numbers farmers can call, and allows VBAs to advertise to their target audience through bulk messaging.

The VBA model and Agribot are not meant to provide disinterested advice for farmers' well-being, but to sell agricultural inputs, many of which can cause long-term damage to the land. As an AGRA report states: "Seed and fertilizer companies support VBAs [...] Many seed and fertilizer companies leverage this system to introduce their products to smallholder farmers to increase sales" (26). Services like Agribot accelerate this dynamic—as illustrated by Agribot's competitor, Arifu, which is the largest agricultural advisory chatbot on the Kenyan market and "creates a feedback loop by generating a demand for Syngenta seeds" (27). The 2022 expansion of the partnership between AGRA and Microsoft includes a strategy to make Agribot profitable by partnering with agribusiness giants Bayer, Yara, Syngenta, Nestle, Rabobank, and Olam (28).

2c. Azure Data Manager for Agriculture

Azure Data Manager for Agriculture is a platform that centralizes an array of digital agriculture services by Microsoft and other companies, available as a subscription service on the Microsoft Azure marketplace. Azure Data Manager for Agriculture was developed by Microsoft as the company's attempt to create a one-stop-shop for all agritech products. It is currently being implemented by AGRA in Kenya, Nigeria, Rwanda, Ghana, Tanzania, Uganda, Malawi and Ethiopia, as a result of a 2019 agreement between AGRA and Microsoft (29).

Azure Data Manager for Agriculture is also an on-farm service in itself, consisting of electronic devices like soil sensors or drones that gather data about the farm and relay it to the farmer's computer or mobile phone. AI software then analyzes the data from the farm alongside regional data uploaded by other providers. Farmers receive these personalized statistics about their land in the form of data maps and graphs, with advice on how to manage their crops (30).

Microsoft has partnered with the mapping software company Esri and the US Department of Agriculture (USDA) to use Azure Data Manager for Agriculture for data gathering and analysis for USDA's Agricultural Research Service (ARS). The program has been monitoring the effects of cover crops at Beltsville Agricultural Research Center in Maryland since 2019, and is meant to expand to over 200 partner farms across the US. It is presented as a way to cut data-gathering costs through automation, to improve the allocation of research funding (31), and, for farmers, to "build or augment your digital agriculture solution" (32). However, as Azure Data Manager for Agriculture becomes a

site for the centralization of data from many operators, this public-private partnership illustrates the issue at stake: why is a private company like Microsoft aggregating data for public research?

Digital agricultural services make a profit in two ways: 1) marketing services and products to farmers, and 2) reselling farmer data. Climate Edge, whose services are available on Azure Data Manager for Agriculture, is an example of this model (33). Climate Edge describes itself as “your all-in-one smallholder engagement platform,” boasting that its clients range from NGOs (like Cropnuts) to “the world’s largest agribusinesses” such as Unilever (34). Climate Edge advertises to farmers on behalf of its clients via SMS and also provides its clients with sales analytics on farm inputs like fertilizers, pesticides, and seeds. Climate Edge then monetizes this data. It currently offers its services to farmers in exchange for selling their data to insurance companies, banks, input providers, commodity speculators, and NGOs (35). This data increases the power of corporations and contributes to the financialization of agriculture, including commodity market speculation and land grabbing.



Screenshot from Climate Edge's *"How smallholder farmers can transform our global food systems"*

3. Analysis

The services we have described in this report are touted as development aids that will empower farmers with tools to better understand their land and enable more resilient and productive practices. However, these services operate within the model of industrialized agriculture and serve corporate motives, extracting profit through the sale of products and commodifying valuable data on farmers and farmland without fully informed consent. This practice facilitates food system financialization (when financial speculation and other financial services and products become key drivers of economic activity), posing serious adverse consequences for farmers. As part of this process, digital advisory services provide new channels for agribusiness to market commercial seeds, pesticides, herbicides and fertilizers that can have major impacts on ecosystems, living beings, and the climate. The following sections trace the effects of these digital technologies on farmers' autonomy and knowledge.

Promoting industrial agriculture

Digital agricultural services cater to farmers who run large-scale, monoculture enterprises. Aerial imagery from satellites or drones and the analysis of this imagery primarily serve very large farms, where farmers cannot assess their crops by walking among them. Artificial intelligence looks for patterns among the crops, which may work when fields are homogeneous, but analysis becomes more complicated if the farmer practices multi-cropping or companion planting. Additionally, advisory services advertise commercial seeds and give “advice” on only a limited number of crops, which neglects crop diversity and works against the preservation of Indigenous and local varieties. As a consequence of this technological bias, farmers may choose to plant fewer crops or avoid companion planting, thereby adapting their farm to the tools rather than the other way around.

Industrialized agriculture reduces ecosystem diversity on land, in waterways and in soil microbiomes. Advisory services recommend certified seeds, which are bred to be uniform and are patented by private seed companies. The use of certified seeds reduces biological diversity as Indigenous and local varieties fall out of customary use or are displaced by the new breed, thereby increasing vulnerability to plant pests, illnesses, and changing climate conditions. For farmers, these seeds also create dependence on input providers, because patents and technology agreements prohibit farmers from saving and replanting patented seeds. Moreover, hybrid varieties do not “breed true” and therefore must be re-purchased each season, and most industrial seeds come packaged along with fertilizers or pesticides in order to achieve their yield potential (36).

Advisory services sometimes also actively push pesticides and fertilizers, whose negative ecological and health impacts are well documented (37). Reliance on agrochemicals may also increase as the soil becomes depleted from monocropping, initiating a vicious cycle (38). As these chemicals increasingly face regulation in North America and the EU, manufacturers are looking to export them to the Global South instead (39). Moreover, many inputs promoted by Village Based Advisors are intimately tied to the fossil fuel industry (40). Synthetic fertilizers have a significant impact on the climate, contradicting the promises that digital advisory service platforms make about climate-resilient agriculture.

Extracting farmer data

In the realm of digital agriculture, information about farmers' land, practices, and knowledge is being quantified and transformed into "data"—an asset that can be extracted and sold, in the same way that our personal data as consumers has become increasingly exploited. The sale of data about farmers and their land can hurt farmers in multiple ways.

Brokers use farmer data to predict and manipulate farmers' choices and opportunities. The more data they acquire, the more they and their clients can "nudge" and control farmers' behavior, even while advertising farmers' power to make data-driven decisions. For example, services like Climate Edge can provide commodity market speculators with yield predictions, which risks driving down crop prices. Overall, an imbalance of information exists between farmers and data buyers, as farmers can only see their own data, while actors who buy aggregated data acquire the capability to take advantage of that knowledge to buy low and sell high. It is also worth noting that it is unclear how AI makes decisions (41). Algorithms determining various important aspects of life, from who gets past resume screening tools to who gets loans, often incorporate racist and misogynistic assumptions or biases.

Another risk of data harvesting is land grabbing. The aerial footage and land data that services like Azure Data Manager for Agriculture collect can be sold to potential land buyers or land owners. Information about the land that would have otherwise been unknown or kept private to those farming on it becomes valuable data essential to prospective land investments. Food systems researcher Alistair Fraser argues: "[A]s new portions of land enter into contemporary financial calculations [...] there is a growing need for, and increased importance of, data" (42). To farmers, this poses a concrete risk of having their best plots of land targeted, bought, or otherwise expropriated, or seeing their rent increase as their land's productivity is quantified. A similar outcome already happened in 2020, when farmers renting from landlords through the company Tillable saw their rent increase after Tillable signed an agreement with Bayer (43). The data that

Bayer Fieldview's digital agriculture service had gathered on the tenant farmers had been used to revalue the land.

Similarly, sharing data on the financial health of a farm can impact the farmers' access to credit or insurance. Digital Green and Climate Edge both stress their role in helping smallholders access credit and insurance. While accumulating a digitized record of finances can be an important step to gaining access to credit, it is worth remembering that these efforts are often backed by financial services seeking clients. Once farmers are involved in bank relationships, their data empowers financial actors to assess farmers and may end up undermining farmers' economic wellbeing. For example, the sharing of unfavorable data could raise farmers' costs of insurance or make it difficult for them to get loans. This data can be factored into calculations of financial risk, which often rely on algorithms that reflect existing social biases and reproduce racial, gender, and other forms of discrimination (44). Like most internet users hastily signing privacy policies, farmers may not be fully aware of what data is being collected and for what purposes that data may be used (45).

Devaluing local knowledge

Advocates of food sovereignty argue that digital agriculture can best serve farmers by complementing rather than eliminating Indigenous and traditional knowledge and practices, and that

digital infrastructures are more likely to adapt to the true needs of small-scale food producers when provided as a public service rather than a profit-driven venture.

By contrast, Digital Green, Azure Data Manager for Agriculture, and Agribot's services promise sustainability and smallholder prosperity (46) but in practice entrench the industrial agriculture model which degrades the environment, favors corporate sponsors, and exacerbates inequality under the pretense of feeding the world. In fact, the types of techno-fixes these companies promote have no record of meaningfully increasing food access. Copious evidence actually suggests that they concentrate land, resources, and power in the hands of the few. Importantly, to sell their services, these companies rely on an assumption that farming and farmers are struggling not due to structural issues, but due to a deficit of data—which corporate actors purport to solve through techno-fixes. Bill Gates demonstrates this assumption in a promotional video for Azure Data Manager for Agriculture, entitled “More data, better farms” (47). In it, he puts forth a reductionist view of inherited and learned farming methods, suggesting that data is the only way to know the land. In an article accompanying the video, Gates writes: “a farmer who knows the temperature, pH, and moisture level of his soil can make all sorts of informed decisions that save money and boost yield” (48),

implying that Azure Data Manager for Agriculture is a novel and affordable way to get this kind of information. However, small-scale farmers already have this knowledge, as it is the very basis of agriculture.

The propaganda for data-driven agriculture can be alluring in suggesting that these technologies can enhance farming through greater control over the many variables that go into food production. In one Azure Data Manager for Agriculture promotional video, a young, white, male farmer from northeastern Washington state explains how he has been able to deploy multiple sensors to detect fine-grained variability in temperature on a hilly set of fields, enabling him to plant in a more heterogeneous pattern (49). But small-scale farmers have not always “planted the whole field the same”—industrial agriculture normalized this practice in the 20th century. Azure Data Manager for Agriculture, Digital Green, and AgriBot propose that the only solutions possible are digital systems optimized to protect the status quo. By contrast, alternatives to industrial agriculture—such as agroecology—have long centered diversification of production and working with local agro-ecosystems, rather than imposing soil-degrading industrial monocultures.

A serious consequence of the spread of advisory services—particularly across agriculturally-rich continents like Africa—is farmer deskilling. Deskilling refers to the loss of traditional knowledge and



Screenshot from Bill Gates' "[More Data, Better Farms](#)"

practices as cycles of intergenerational transmission are disrupted by technology that replaces skilled human labor. This begins a vicious cycle of increased dependence on patented seeds, industrial inputs, and corporate guidance, which is of course profitable for private extension providers. As part of this process, deskilling can also lead to the loss of important crop species and the overall reduction of agricultural biodiversity.

Science can and should combine with agroecology to increase resilience in the face of the climate crisis by providing weather reports and pest warnings. These services should be (and often are) a public service that facilitates the autonomy of small-scale farmers. The LiteFarm project is an example of how digital agriculture technology can be co-designed in collaboration with farmers while preserving farmer data sovereignty (50). In contrast, any potential benefit corporate technologies offer is undermined by corporations' focus on appropriating data and nudging farmers toward purchasing proprietary and commercialized inputs.

The Nyéléni Forum on Food Sovereignty newsletter has proposed the following questions to guide digital agriculture within ethical bounds (51):

- Who are the actors developing digital technologies and for what purposes?
- Who has access to and control over digital technologies and for what purposes?
- Who owns the huge amount of data that is created everyday by all of us, and who has the right to use and draw economic benefit from it?
- How should the applications and impacts of digital technologies be monitored and assessed? How should these technologies be governed and regulated for the public good?
- How should the risks deriving from digital technologies be assessed, and their application be monitored?
- How can we challenge the dominant narrative that equates innovation with technology, to underline and promote peasant and indigenous innovations, practices and knowledge?
- What are the relationships between peasant and indigenous innovations, practices and knowledge, and digital technologies?
- How can we use digital technologies to advance food sovereignty and agroecology? With what kinds of technologies, under what conditions and how should they be governed?

4. Conclusions

This report has sought to illustrate the connections between AGRA, BMGF, and Microsoft. All three are increasingly working together to endorse an “African Green Revolution” and promote digital tools that are pushing farmers even more toward a centralized, productivist, and industrialized form of agriculture. Technologies such as digital advisory services are driven by large agricultural input corporations who are investing in e-extension services to create demand for their products. These services challenge farmers’ control over their knowledge, their data, and their land. In the long term, the replacement of Indigenous and traditional practices with sponsored advice leads to the deskilling of farmers and the loss of both material heritage (like local seed varieties) and knowledge (like the ability to recognize plant diseases). Dependence on private products and guidance allows extension providers to profit at the expense of farmers.

Moreover, BMGF and AGRA are entrenching Microsoft as a key player both in the delivery of digital agricultural services and in creating the infrastructure for the digitalization of agriculture. This raises important concerns that Bill Gates, who remains the largest private shareholder of the Microsoft Corporation, is enriching himself through his philanthropy. More broadly, it demonstrates the increasing control by data managers, corporations, and tech billionaires over agriculture as

as a new field of investments and profit generation.

Ultimately, it is time for the voices of food sovereignty advocates to not simply be included in conversations about digital technology for climate-resilient agriculture but also to organize their own sites and spaces for imagining and building technological systems embedded in food sovereignty. Digital agriculture can potentially help small-scale producers, but it needs to be co-designed by farmers themselves and center their interests, rather than being guided by incentives to accumulate wealth and concentrate power. The current structures that create and promote digital agriculture are flawed, and they need to be rejected in favor of technology that serves farmers.



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