

# Ownership, Control, and Governance of the Benefits of Data for Food and Agriculture



Analysis Brief

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## About this work

Nearly 670 million people will be facing hunger in 2030. This is the same proportion (8% of the world's population) as in 2015 when the UN Sustainable Development Goals (SDGs) were launched ([FAO, IFAD et. al, 2022](#)). Unless agrifood systems are completely transformed, food security for all will continue to be challenged by global conflict, climate extremes, economic shocks, COVID-19 and new pandemics.

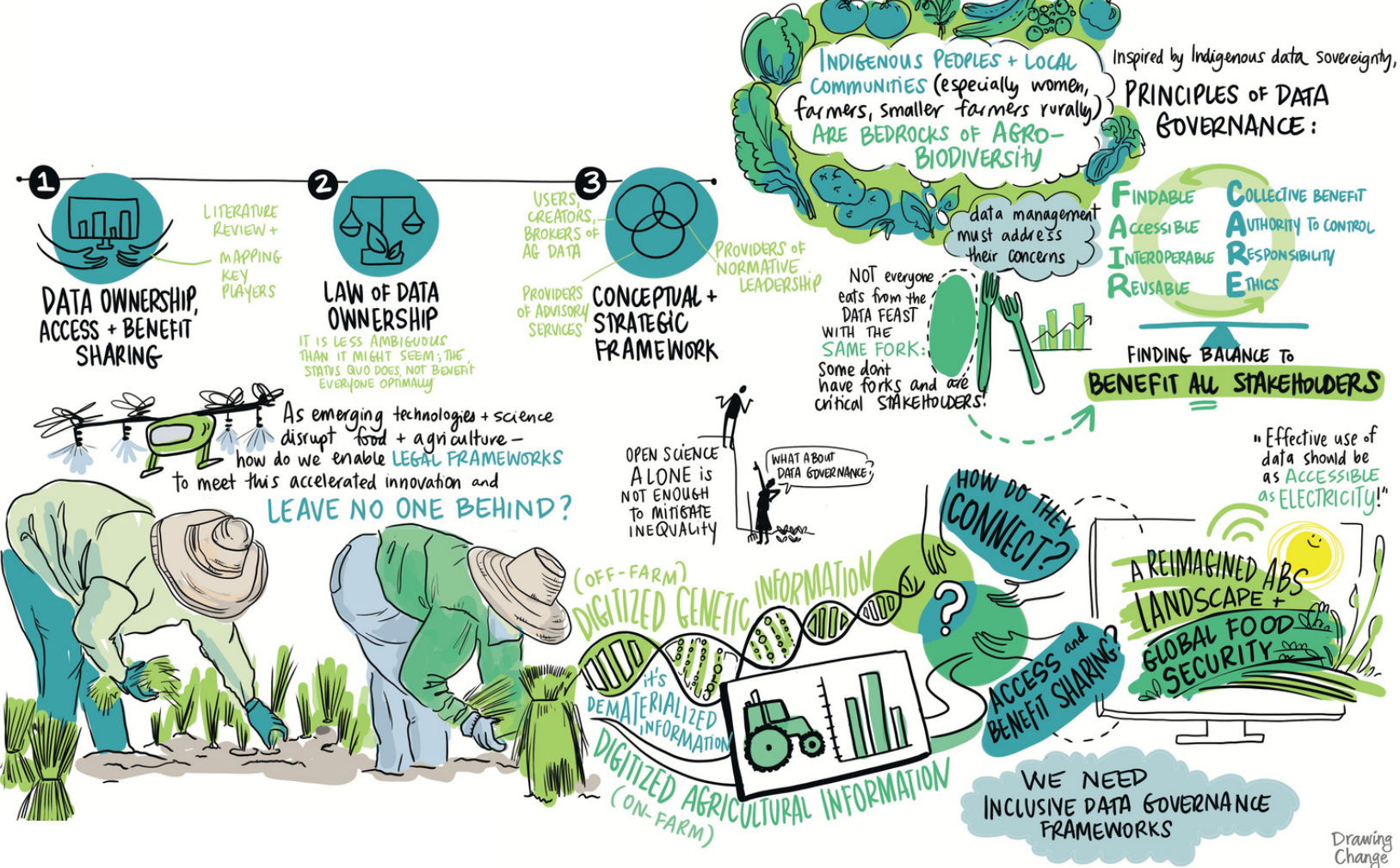
**One essential step towards creating a resilient food system is understanding how the ownership and control of agricultural data can intersect with food security goals. This understanding must consider sustainability through climate action, ecosystem restoration, uplifting traditional knowledge, and empowering women and girls.**

The Food and Agriculture Organization (FAO) of the United Nations commissioned GODAN (Global Open Data for Agriculture and Nutrition) to conduct [a detailed study in 2022](#), exploring this topic, and asking: **As emerging technologies radically disrupt all aspects of food and agriculture, how do we enable legal frameworks to meet this accelerated pace of innovation while leaving no one behind?**



**Societally we should aim to make the effective use of data as accessible as electricity. It is not an easy task. But with the right approach to sharing data and the right support from governments, it is more than possible for the world to create a model that will ensure that data does not become the province of a few large companies and countries. Instead, it can become what the world needs it to be - an important engine everywhere for a new generation of economic growth<sup>1</sup>.**

<sup>1</sup> Brad Lee & Carol Ann Browne, *Tools and weapons: The promise and the peril of the digital age* (New York: Penguin Press, 2019) at 245.



This brief presents key highlights in four parts from the study, *Ownership, Control, and Governance of the Benefits of Data for Food and Agriculture (PDF)*:

- 1 The context, players, and emerging concerns surrounding global norms and policies governing digital resources for food and agriculture
- 2 An outline of existing legal frameworks for data ownership
- 3 A conceptual framework for engagement with data management and governance balancing the FAIR and CARE principles
- 4 Steps forward

# 1. Data for Food and Agriculture



## Context and Players

- Improvement in agricultural production and nutritious food is a complex endeavour. Agricultural production now entails technology, planet genetic resources, digital innovation, and applications of various knowledge forms. This technical complexity must be considered along with differing cultural practices and interests across civilizations.
- The United Nations Food and Agriculture Organization (FAO) plays a major role in bridging expertise and technology in food, sustainable agriculture, and natural resources, leading international efforts to defeat hunger and achieve food security for all. To meet these goals, it is critical to address ownership and control of agricultural data, and to consider how the world's 570 million smallholder farmers, especially women, can move into the rapidly expanding digital economy.
- Many international agencies are developing agendas on the use of digital technologies in different stages of the agri-food value chain. As data is pivotal in all aspects of agricultural supply chains, the landscape of players involved in data access and benefit sharing (ABS) is complex. It includes large multilateral institutions (e.g. FAO, World Health Organization), organizations setting norms like the World Intellectual Property Organization, environmental organizations such as the UN Convention on Biological Diversity, economic leaders like the World Trade Organization and many more.
- There is an opportunity now for all of these players to converge to address existing socio-economic power structures within the agri-food sector. There is a need to explore collectively topics that have often been siloed i.e. the use of on-farm agricultural data (crop yields, farm conditions etc.) and off-farm agricultural data (e.g. genetic sequence information).

- One key foundation to build upon is the Plant Treaty, an international framework that aims to ensure the conservation and sustainable use of plant genetic resources for food and agriculture, and the fair and equitable sharing of the benefits arising out of their use (see Box 1).
- With adoption of the Plant Treaty in 2001, the FAO can now leverage nearly two decades of norm-setting experience to convene other stakeholders towards a shared commitment to serve present and future generations and ensure that all benefit from the next waves of technological disruptions.

## Box 1.

**The International Treaty on Plant Genetic Resources for Food and Agriculture (Plant Treaty) was adopted by the United Nations Food and Agriculture Organization (FAO) in 2001. The Treaty facilitates access to the genetic materials of 64 crops in a Multilateral System (MLS) for users engaged in research, breeding and training for food and agriculture. The Treaty recognizes the enormous contribution of farmers to the diversity of crops that feed the world, and ensures conservation of plant genetic resources, and the fair and equitable sharing of the benefits arising out of their use.**

**If genetic material is used for proprietary benefit, users are obligated to contribute a percentage of royalties to a global Benefit Sharing Fund designed to support smallholder farmers mainly of the Global South. As the private sector's interest in the use of intellectual property to leverage innovation in agriculture continues to intensify, the impacts and successes of Plant Treaty-inspired access and benefit sharing models have yet to be fully realized.**

## Emerging Issues

Data and informatics are already transforming agri-food systems, helping to overcome barriers of cost, capacity, access, feasibility, traceability, and quality. This transformation can benefit smallholder farmers, especially women, and promises improved economic outcomes for countries whose agricultural biodiversity underpins the global food supply. Yet digital technologies may further entrench rather than bridge the digital divide in agriculture, as well as escalate gender gaps. Concerns can be summarized as follows:

- Many farmers are concerned that they are not benefiting in the short or long term from the value of the data collected on their farms or from their participation in supply chains. Such data may include business insights or products and services enabled by on-farm data. This inequality is amplified particularly for smallholder farmers, and mostly women.
- Many countries – particularly those that are countries of origin of plant genetic resources – consider that the access and benefit sharing (ABS) objectives enshrined in international treaties and national laws may be undermined by free and unfettered access to genetic sequence information, which bypasses the ABS obligations that otherwise govern access to physical samples of material.
- There is a trade-off between confidentiality and data use, even while data may be underutilized due to capacity constraints at the national, local and various informal levels.
- The promotion and adoption of open data principles alone will not guarantee better outcomes for smallholder farmers. In fact, the open distribution of increasingly large and complex new data sources may exacerbate the productivity gap between small and large farms.
- Digitization expedites a de-coupling of genetic resources from their provenance in Indigenous or local communities. This unlinking means that ABS and its *raison d'être*, is completely bypassed and underscores a deep need to include Indigenous peoples and local communities in data frameworks, as conservers of biodiversity and custodians of local knowledge.
- Finally the most recent literature and policy debates about the ownership of and access to data indicates that discussions are sharply bifurcated. On one hand, there is a strong and growing body of research on digitized genetic information (upstream). On the other hand, there is a strong and growing body of research on digitized agricultural data (downstream). But there is very little (if any) research connecting or thinking across the two topics, let alone their ramifications for ABS. More integrated and cross-cutting analysis on ownership of and access to food and agriculture data of all kinds is warranted.

**Upstream data:** dematerialized data such as genetic sequences that can be generated by, or used in the process of plant breeding or other R&D.

**Downstream data:** data produced from, for, or about on-farm activities, such as meteorological patterns, soil microbial conditions, crop yields, environmental factors, farm equipment operations, or commodity pricing.

## Key Takeaway

Ideas around agricultural data governance tend to be separated into discussions of data produced on-farm (downstream) and data produced off-farm (upstream).

Both trigger policy challenges around access, ownership, consent, and sharing of benefits.

Now is the time to connect the research, discourse and governing frameworks for on-farm and off-farm data, to identify underlying commonalities, and to engage all stakeholders in an inclusive data governance framework.

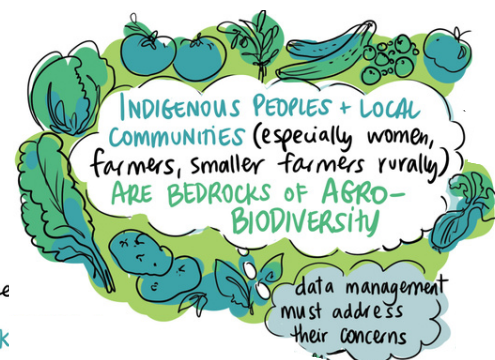
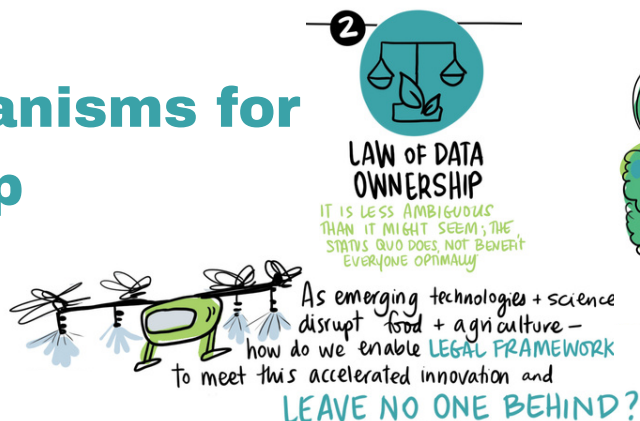


**The core challenge is to ensure that whatever governance mechanisms are developed around agricultural data, that those are inclusive. What we're seeing is significant risks that some of the members of the most marginalized communities in the world are being excluded from the benefits of data driven agriculture.**

**- Prof. Jeremy de Beer**

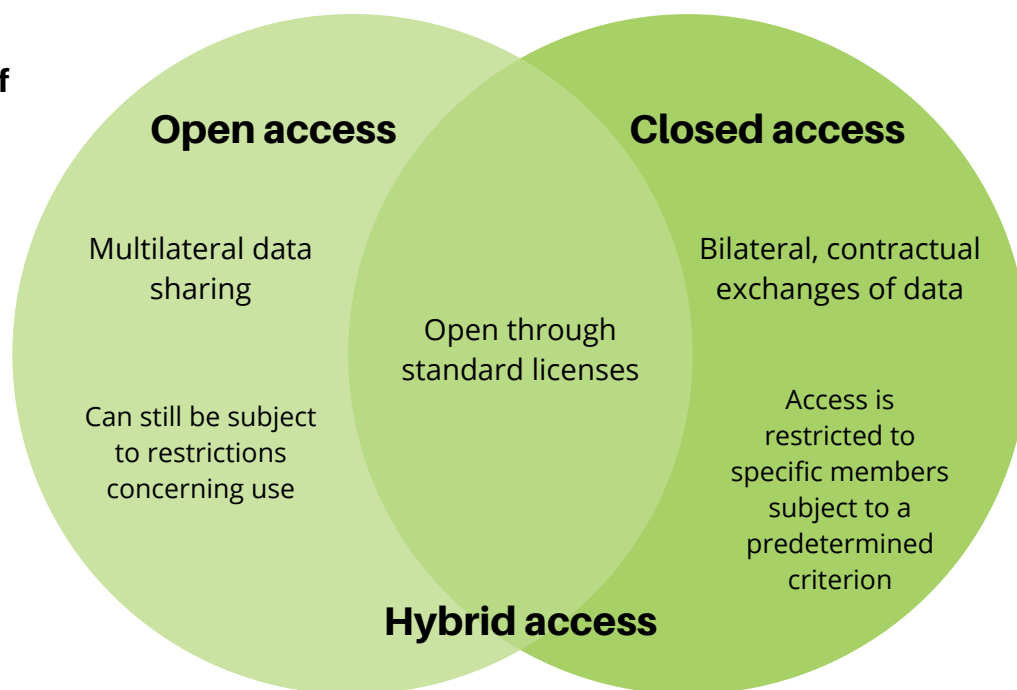
Professor, Faculty of Law, and Director, Open AIR, at the Centre for Law, Technology, and Society, University of Ottawa

## 2. Legal mechanisms for data ownership



- The law of data ownership is less ambiguous than it might seem. Data *are* owned, and those ownership rights *are* exercised. Whether and how that *ought* to be the case is debatable.
- Legal mechanisms for data ownership include copyright, database rights, patents, plant breeder’s rights, trade secrets, regulatory data, traditional knowledge systems, personal data rights, and more. There are also technological and social mechanisms through which data control is achieved (e.g. control over collection, storage, curation, access and sharing, and use), thus amounting to a de facto form of ownership.
- Data governance occurs principally through arrangements underpinning multilateral data sharing (open approaches) or bilateral, contractual exchanges of data (closed approaches) (see Figure 1).
- In recent years, codes of conduct have been developed around the use of agriculture data that have attempted to safeguard farmers’ interests and strengthen control over the data they generate. These codes are largely voluntary and are not compliance-based.

**Figure 1. Models of Agriculture Data Management**



**A more sophisticated evaluation of the underlying legal conditions, infrastructure, and social norms is needed**





## Key Takeaway

An ownership approach to agricultural data raises significant concerns about the ability of all stakeholders, especially smallholder farmers, to benefit optimally from digital innovation in agriculture.

To resolve tensions, a more sophisticated evaluation of the underlying legal conditions, infrastructure, and social norms is needed. This includes a deeper understanding of the many possible variations between the two extremes of free access and controlled access, particularly regarding the use of data in research.

A more nuanced understanding then enables more informed discussions concerning the appropriation of data related to agriculture, whether genetic or farm related. Additionally, codes of conduct are an opportunity to bring a tangible, understandable, and usable framework to complex agriculture data contracts.



**The current ownership and management structure of agricultural data [and] the new technological dynamics at this juncture, call for serious consideration of global approach where ethics play a major role and where access and use of data by all actors including smallholder farmers, truly serves to create a public good outcome.**

**- Daniele Manzella**

Legal Officer, International Treaty on Plant Genetic Resources  
for Food and Agriculture, FAO of the UN

### 3. A conceptual framework for a multitude of actors

Inspired by Indigenous data sovereignty,  
**PRINCIPLES OF DATA GOVERNANCE:**

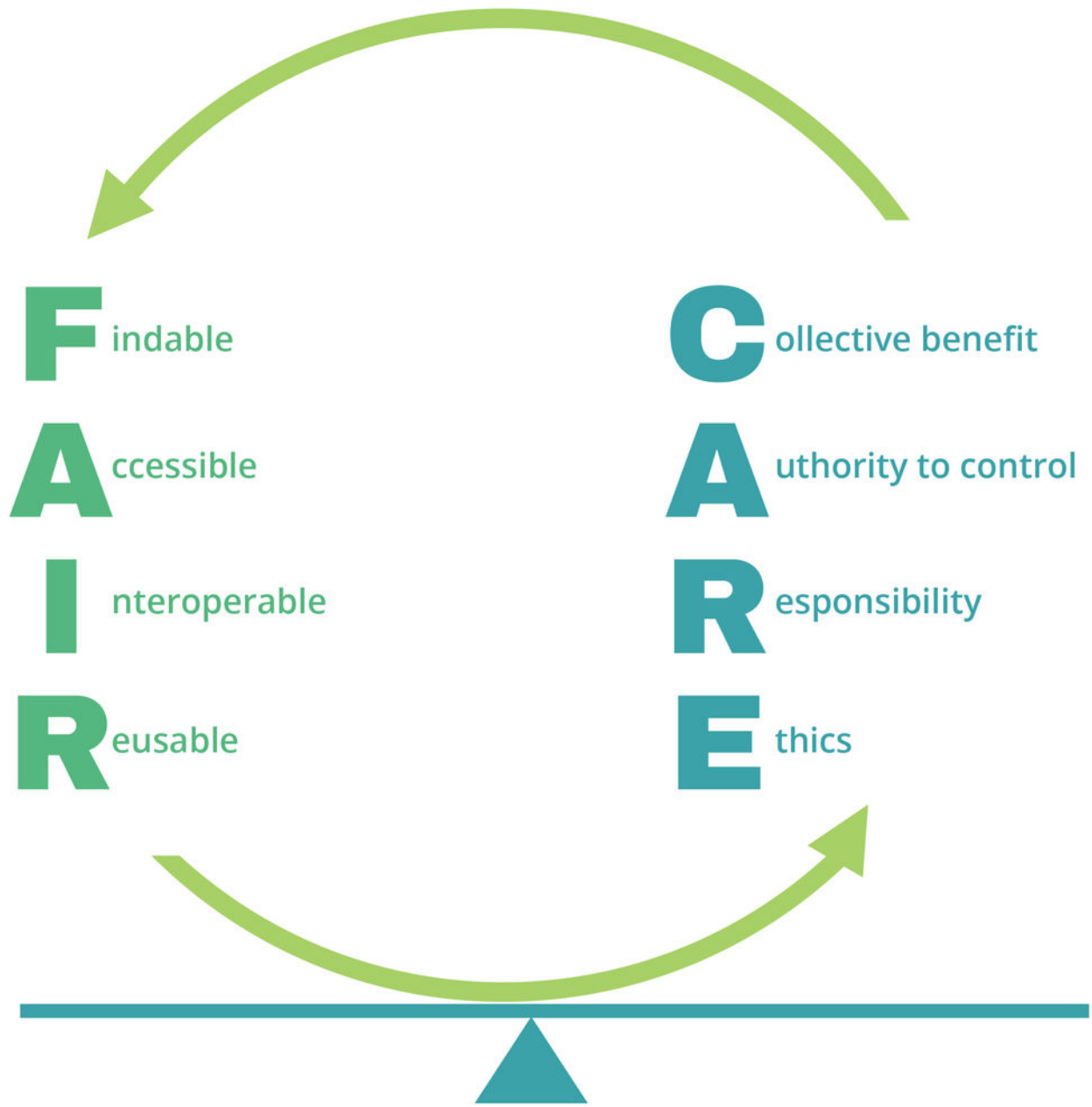


Any conceptual or strategic framework for data management and governance must consider 1) the perspective of users, creators, and brokers of agricultural data and their ethical implications and expectations; 2) the organizational role of those who provide advisory services and technical assistance by supporting and scoping issues on data governance law and policy; and 3) providers of normative leadership in agricultural data, such as the FAO and Plant Treaty.

The [full report \(PDF\)](#) goes into detail on the role of each. Here we highlight a few key elements.

#### To be FAIR, one must CARE: co-existing principles for data governance

- Many stakeholders recognize the benefit of an open orientation to agricultural data as part of the broader ecosystem of open science. Communities of practice have embraced the acronym FAIR, designating that data and digital assets should be findable, accessible, interoperable, and reusable.
- However, extending the benefits of agricultural innovation to rural and marginalized populations requires a critical outlook on the FAIR Principles. Mindful of the exclusive and narrow scientific and open science orientation of the FAIR imperative, a countervailing response from Indigenous Peoples and local communities has been articulated in the CARE Principles for Indigenous Data – collective benefit, authority to control, responsibility, and ethics (see figure page 11).



**Finding balance to benefit all stakeholders**



## Key Takeaway

Overall, the study presents the case for an inclusive and sustainable global regime of data governance. A framework, modelled by the open, Multilateral System of benefit sharing in the Plant Treaty, is identified as the most viable – if not inevitable – path forward.

This framework models the potential for adjustment, adaptation, or scaling for more inclusive open science, digital gene sequence information, and a new landscape of benefit sharing on a global level.

The study underscores an urgent call for a novel and more systemic approach to governing data and innovation for agriculture – one that addresses inequalities explicitly but also provides for broader recognition of responsibilities that all actors have. Norms and mechanisms can be built to reflect diverse capacities, world views, expertise and ways of knowing that were not fully captured in the past.



**Claiming ownership, when you can own data, but you do not have the capacity to put it into use would be of no consequence. This raises the imperative for data governance beyond mere ownership, but in ways that deliberately harmonize policy principles and laws with technology and science in order to advance inclusion and fairness, considering that everyone does not feed off the data feast with an equal sized fork. Some do not even have forks at all, but they remain critical stakeholders in data governance.**

**- Dr. Chidi Oguamanam**

Professor, Faculty of Law, Research Chair in Bio-Innovation, Indigenous Knowledge Systems and Global Knowledge Governance, University of Ottawa

## 4. Moving forward



The COVID-19 pandemic has highlighted inequities not only in social and economic systems, but also in the research and innovation ecosystem and in macro-level systems of governance. As society emerges into a post-pandemic era, ongoing limitations relevant to the agricultural data discourse are still to be overcome. Further areas for cross-sectoral research relevant to data for agriculture include the following issues ([Welch, E., Louafi, S., Carroll, S.R., et al. 2021](#)).

**1) Power imbalances:** There continues to be an uneven distribution of capacity, infrastructure and financial resources resulting in tensions across the needs of wealthier groups and countries vis-à-vis less resource-endowed groups and countries.

**2) Policy-science disconnect:** Research is a complex system where heterogeneous actors from a variety of disciplines produce new knowledge and innovations through a non-linear, feedback-rich process wherein it is difficult to distinguish inputs from outputs. Yet current macro-level frameworks tend to treat research as a linear process in which different policy frameworks regulate research and innovation inputs and outputs.

**3) Capacity:** Current policy approaches often fail to account for complex differences in capacity. Consequently, demands for reciprocity for knowledge and resource sharing can create barriers to collaboration and exchange.

## Key Takeaway

This study was built on a novel collaboration of perspectives from different academic disciplines and sectors, including policy, law, economics and development.

Such cross-sectoral collaboration is encouraged and required to continue research that aims to better understand data governance and the opportunities and challenges that it provides for food and agriculture.



**This discussion we're having is really a way to add to that basis [of knowledge] and to future work in terms of asking: What are the gaps? How do we ensure that all low to middle income countries have the needed data literacy to engage in these conversations [...] and how do we engage with data to ensure more sustainable livelihoods for all within planetary boundaries that allow climate resilience?**

**- Dr. Éliane Ubalijoro**

Executive Director, Sustainability in the Digital Age; Global Hub Director,  
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