

Introducing the Agriculture Open Data Package

BETA version

Fiona Smith and Andre Jellema

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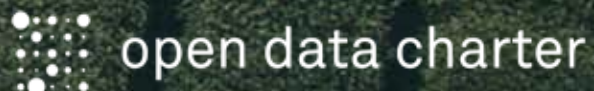




Photo by : Spencer Pugh



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Executive summary

Achieving global food security is one of the biggest challenges of our times. Open data - data that anyone can access, use or share - can help shape solutions by enabling more efficient and effective decision-making at multiple levels across the agricultural value chain, fostering innovation via new services and applications, and driving organisational change through transparency. A wide range of data is needed by a variety of agricultural actors to meet different needs: to empower farmers, optimise agricultural practice, stimulate rural finance, facilitate the agri value chain, enforce policy, and promote government transparency and efficiency.

The Agriculture Open Data Package (AgPack.info) has been designed to help governments get to impact with open data in the agriculture sector. This practical resource provides policy perspectives, key data categories, example datasets, data standards, and use cases that policymakers and other stakeholders in the agriculture sector or open data should focus on, in order to address food security challenges. This briefing provides an introduction to the Package - its objectives, scope and content.

In the Package we identify **fourteen key categories of data** and discuss the effort it will take for a government to make this data available in a meaningful way. The categories include data on: pest and disease management, production advice, soil, hydrology, elevation, meteorology, markets, infrastructure, value chain, land use and productivity, rural projects, government finance, official records and regulations. The Package also highlights more than **12 use cases** (the number is growing)

demonstrating how open data is being harnessed to address sustainable agriculture and food security around the world. Examples include: mapping water points to optimise scarce resource allocation in Burkina Faso; surfacing daily price information on multiple food commodities across India; and benchmarking agricultural productivity in the Netherlands. Where relevant we also highlight **applicable data standards**, such as the open contracting, international aid and transparency initiative (IATI), and global product classification (GPC) standards.

However, we recognise that the agriculture sector is diverse, with many contextual differences affecting scope of activities, priorities and capacities. Therefore the Package is meant as a source of inspiration and an invitation to start a national open data for agriculture initiative. In the full version of the Agricultural Open Data Package we discuss important implementation considerations such as inter-agency coordination and resourcing to develop an appropriate data infrastructure and a healthy data ‘ecosystem’ for agriculture.

We invite policymakers, agriculture specialists and members of the open data community to:

- ▶ **Add your comments** on the beta version of the Agriculture Open Data Package (available at www.agpack.info/).
- ▶ **Adopt the Open Data Charter.** Become a champion of the Agriculture Open Data Package, and be involved in shaping future versions of the resource.
- ▶ **Host national and local-level consultations** to landscape your national agriculture data infrastructure, define your policy perspectives, and plan your open agriculture data strategy.
- ▶ **Prioritise relevant government agriculture data for release** based on the 14 recommended data categories and sample datasets contained within the Package.
- ▶ **Contribute your use cases to the Package.**

Send comments and use cases to enquiries@godan.info. Feedback on this document can also be made via the Open Data Charter Resource Centre. The GODAN Secretariat and network can provide support to governments that are working to put the package into practice and look forward to hearing from you.

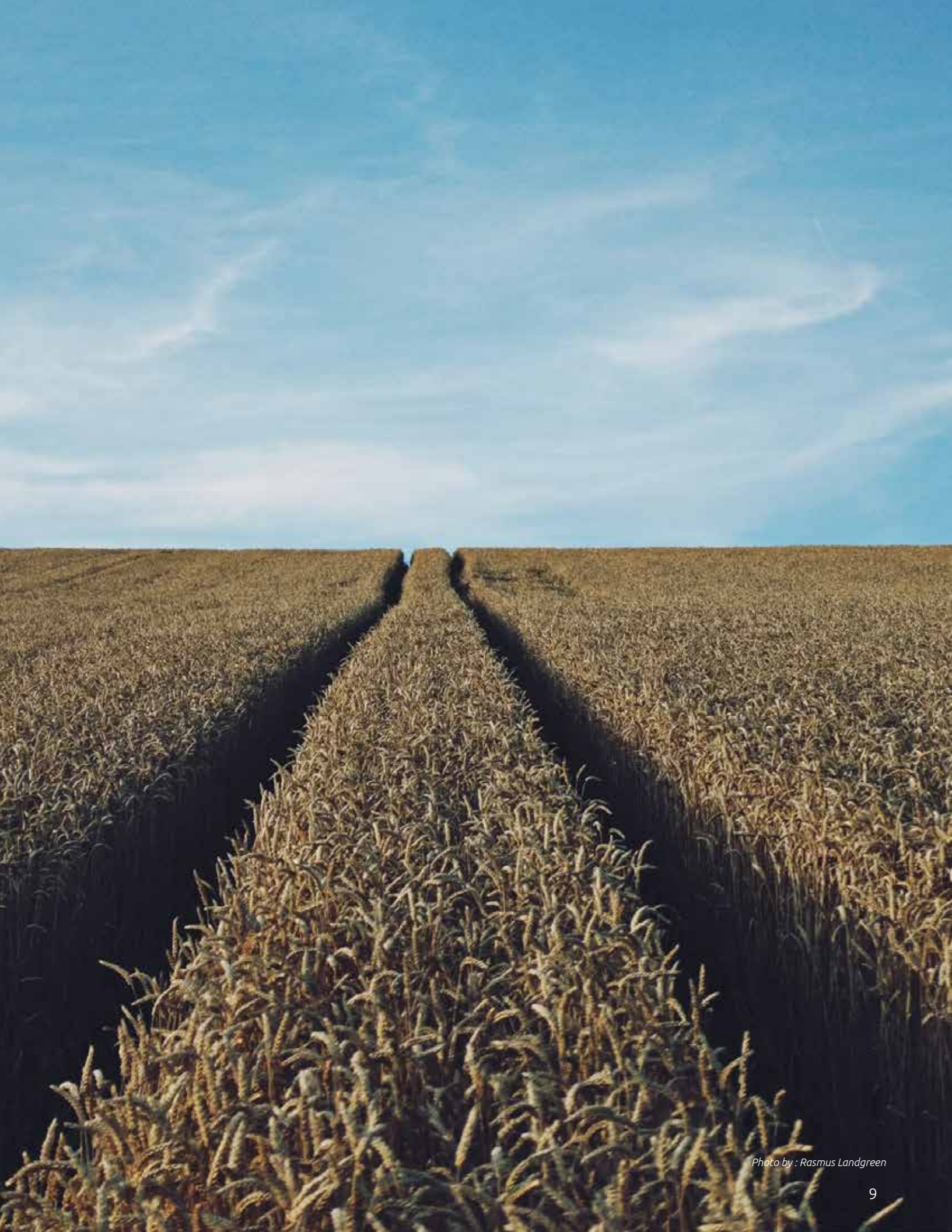


Photo by : Rasmus Landgreen



Photo by : William Hook

The International Open Data Charter

The International Open Data Charter was developed by open data experts from governments, multilateral organizations, civil society and the private sector. It sets out six principles for the release of data, which should be:



The Charter is supported by a global multi-stakeholder action network. The Charter principles can be adopted by governments and international institutions. Adopting organisations are asked to provide a high-level statement of commitment, as well as to outline the specific and time-bound actions that they will take to further implementation of the Charter principles.

Private-sector and non-governmental organisations are encouraged to endorse the principles of the Charter.

Open Data Packages

A Charter **open data package** is a curated resource, providing insights and guidance on how to make open data available, and to support the use of open data, in a particular sector.

Packages are designed to support strategic action and data interoperability. They identify key data-sets, common standards and practices that charter supporters can implement.

Packages are peer-reviewed and are developed through collaboration that engages both data publishers and data users. Packages are designed to be globally relevant: catering for the differing needs and capabilities of Charter supporters.

This is a **beta** version of the **Agriculture Open Data Package**. The proposal for this package was approved by the Charter Technical Working Group in **May 2016**, and this **beta** version is being developed by the **Global Open Data for Agriculture and Nutrition (GODAN)** network, and **The Open Data Institute (ODI)**.



Photo by : Damien Kuhn

Introduction

The Challenge

The world today is facing a major food security challenge. As the world's population grows to around 10 billion by 2050¹, the global agriculture system is under pressure to provide adequate and nutritious food to meet the demand. In many places fertile land is degrading, water resources drying, and genetic resources disappearing because of unsustainable agricultural practices and other anthropogenic pressures². Increased climate variability and more extreme weather events make agricultural production even more uncertain³. On top of this, price volatility has a disruptive effect on production systems and food security, especially for vulnerable populations⁴.

Achieving food security through sustainable agriculture is a global priority for the UN in the next 15 years, as enshrined in the 'Sustainable Development Goals' (SDG 2)⁵. Achieving this goal is no simple task. It means sustainably increasing agricultural productivity, while creating more resilient food production systems, and shaping more accessible and equitable markets.



1. Estimates and UN Population Division (2012), World Population Prospects: The 2012 Revision, available at: www.unfpa.org/world-population-trends

2. The State of the World's Land and Water Resources for Food and Agriculture (2011). <https://goo.gl/QpiJFH>

3. Climate-Smart Agriculture Sourcebook (2013), FAO. www.fao.org/3/i3325e.pdf

4. Price Volatility and food security. A report by the HLPE on food security and nutrition (2011) FAO. <https://goo.gl/wIZBXe>

5. sustainabledevelopment.un.org/sdgs



Photo by : Marcus Zymmer

The Opportunity

To meet these challenges, growing volumes of data generated by governments, organisations and individuals need to be harnessed. Improved access to, and use of, open data at grassroots, local, national and global levels holds the potential to transform both long-standing and emerging problems, finding solutions that benefit farmers and global food security.

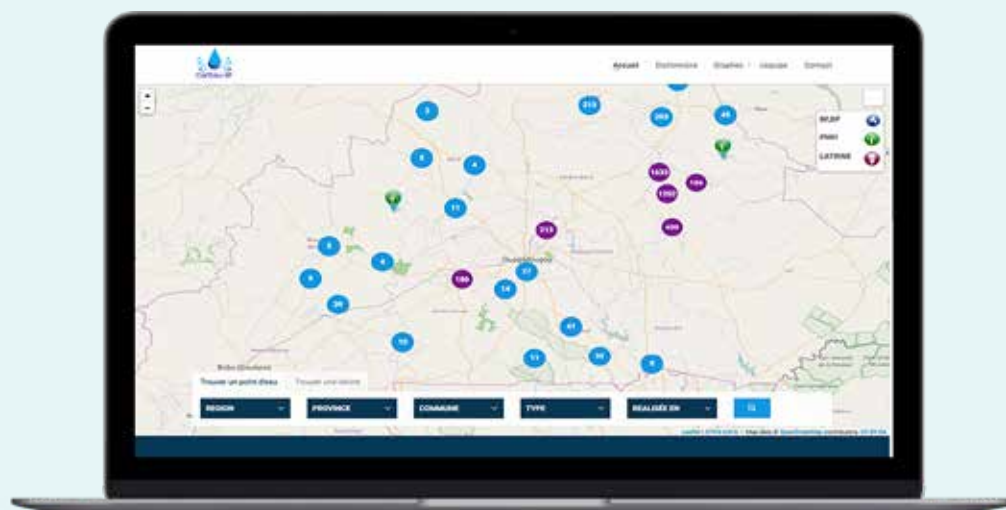
However, critical datasets that could be used to accelerate innovation and change are often inaccessible. Existing efforts to share and publish data are not always joined up for maximum impact. Making open data work for agriculture requires a shared agenda to increase the supply, quality, and interoperability of data, alongside action to build capacity for the use of data by all stakeholders.

Open data is data that anyone can access, use or share⁶. Making agriculture data open can help shape solutions to food security in ways that would otherwise be expensive, time intensive or impossible. Possible responses include:

- ▶ **enabling more efficient and effective decision making** by stakeholders at all levels, from small-holder farmers to policy-makers
- ▶ **fostering innovation that everyone can benefit from** - as a raw material for creating new services, insights, and applications
- ▶ **driving organisational and sector change** through transparency in food production chains, and by openly measuring progress against targets

Governments can play a pivotal role in strengthening the global data infrastructure for agriculture by publishing relevant datasets and making sure they are ready for re-use.

6. theodi.org/what-is-open-data



Sharing data to optimize water use: carteau.gov.bf

Accurate and up-to-date agriculture data can be difficult to obtain. Often, the same information is collected by different government organisations, representing an inefficient use of scarce public resources. For a landlocked country like Burkina Faso in the Sahel region, knowing the access to critical resources like water is crucial for determining the potential crop production, especially in the dry season.

To better target their agricultural policies, the government of Burkina Faso is working on a dataset to show the agricultural potential of the various regions of the country. As a first step they have been compiling a dataset on all known water points in the country such as wells, dams, pumps and sanitation.

To obtain this information, the national agency for promoting information and communications technology (ANPTIC) organised workshops with stakeholders inside and outside government working in water and sanitation, to collate data on all known water sources. Government ministries, agencies, NGOs, companies and other actors were invited to share their data or to contribute in different ways to the project by promotion, building apps based on the data, or making financial contributions.

The results are shared in a database available under an open data licence to all contributing organisations including policymakers and the public for the benefit of the country.



Photo by : Nicole Harrington

Getting to impact with open data in agriculture

What is the Agriculture Open Data Package?

The **Agriculture Open Data Package (AgPack.info)** provides a roadmap for governments and other stakeholders considering what open data to publish to support the food security and the agricultural sector. It is a curated resource providing guidance to policy and decision-makers with:

- ▶ an overview of potential roles of open government data in the agricultural sector, including different policy perspectives from around the world
- ▶ key data categories, example datasets and existing data standards relevant to the agricultural sector
- ▶ important considerations when developing an open agriculture data infrastructure
- ▶ illustrative use cases to inspire charter supporters towards implementation
- ▶ key resources for further reading

The beta version of the Agriculture Open Data Package was developed following an open participatory process (see figure below).

April	Proposal Setting the focus for the package
July	Consultation Questionnaire. Validating approach/collecting initial data categories and ideas
Aug	Engagement Expert consultations. Detailing data categories and datasets
Sept	Alpha GODAN Summit workshop: presenting draft frameworks
Oct	Alpha IODC Madrid: focus on implementation and interoperability
Dec	Beta Full package draft available for review and early adoption
2017	Version 1.0 release Following review by Charter Lead Stewards and community

Focus on arable farming

The agricultural sector is diverse (including husbandry, forestry, fisheries, horticulture, aquaculture, etc) with many different types of actors and organisations involved. The list of open datasets that could impact on improved agriculture is extensive. In this first edition of the Agriculture Open Data Package, we focus on arable farming. Future editions may broaden to look at other sub-sectors as well.

To understand the potential of open data for arable farming we provide six ‘policy perspectives’. These perspectives, derived from desk research and consultations with policymakers, connect com-

Connecting agriculture data to user needs

6 Policy Perspectives

- ▶ **Empowering the farmer.** Farmers (and especially smallholders) often have less access to information than other specialist actors. This may be because of their education level, but even more so because of the remoteness of many rural areas, the relative immobility of the farmers, and the many things farmers need to know. The combination of open data and mobile information services can help to overcome this power imbalance. Relevant data for farmer empowerment includes actual and historical market prices, physical infrastructure and its condition, location of licensed organisations (eg logistics, transport), and land ownership.
- ▶ **Optimizing agricultural practice.** Government extension services possess a lot of data on agricultural best practices. Their challenge is often reaching the farmer in the last mile, or continuously updating extension officers with the latest information. By providing agronomic data as open data and supporting public or private information service development, many more farmers can benefit from the latest agronomical insights. This information includes data on crop selection, farm management, early warnings, and sustainable production methods, but also environmental data such as weather forecasts, climate change predictions, soil data, altitude data and hydrological data.
- ▶ **Stimulating rural finance.** The price of financial services for farmers is strongly dependent on the assumed risks by financial institutions. These institutions (whether MFIs or banks) require information on local price history, regional production figures over time, regional farm profiles, regional growing conditions, local crop characteristics, climate change

mon national and regional food security objectives to the different data needs of actors within the agriculture sector. Different actors benefit from different sources of data. For example, a smallholder farmer needs information at a plot level to make operational or strategic decisions on when to plant what crop and how to manage these crops on his or her farm. By contrast, financial service providers may be looking for a more general picture of agricultural risks or harvest successes in a region to determine a strategy for their operations. Open datasets can be used by different groups, but it is important to identify their distinct needs when designing open data policies.

predictions, and extreme weather events to set out financing strategies, and accurately estimate risks while lending to or insuring clients.

- ▶ **Facilitating the agri value chain.** Actors in one part of the value chain need to know about performance in other parts of the value chain in order to make decisions such as who to do business with, or how to comply with the quality standards in different markets. Key datasets include regional production figures over time, regional farm profiles, registered companies, and the condition of transportation infrastructure.
- ▶ **Enforcing policies.** Many regulations result in lists of items or organisations that are permitted, licensed, restricted or forbidden. Having this data and the related legislation openly available can lower administrative costs, promote internal collaboration between different government agencies, and enable third-party services to make this information easily accessible for actors in the agri value chain to act upon. Relevant datasets include land registration, licensed organisations (corporations, businesses, NGOs), safety inspections results, import/export tariffs, and permitted pesticides.
- ▶ **Government transparency and efficiency.** Donors, policymakers, beneficiaries, and civil society require data on government spending in the agricultural sector to promote more efficient decision-making, equity and prevent corruption. Relevant data includes government spending, subsidy distributions, and rural development projects.

Understanding the data infrastructure for agriculture

A **data infrastructure** consists of data assets, the organisations that operate and maintain them and processes, policies and guides describing how to use and manage the data⁷. The data assets in a data infrastructure may be maintained by organisations in the private, public or third sector.

Governments around the world collect and generate enormous amounts of data to develop and monitor agriculture policies, but they may also provide information as a public good. Often, responsibility for collecting and maintaining agriculture data is distributed across different ministries and agencies. Sometimes data assets are also (semi) privatized. Although government structures across the globe vary, relevant government data for agriculture can generally be found in:

- ▶ the ministry of agriculture, including associated extension, research or subsidy bodies
- ▶ other government agencies (which may be semi-privatised) including a meteorological agency for weather and climate data, a mapping agency providing geographical data, and statistical offices conducting population surveys and monitoring
- ▶ ministries dealing with water, natural resources, infrastructure, spatial planning, trade and finance

Developing a data infrastructure for agriculture is therefore not a matter for a single ministry. Success depends on collaboration and aligning shared interests. However, the need for open collaboration may also increase the potential for innovation across multiple sectors. For instance, open weather data will be used by everyone from farmers to the transport industry to individual citizens.

A strong agriculture data infrastructure also requires that different datasets can communicate with each other. Adherence to common open data standards can help. A **data standard** is a guideline or series of guidelines that defines the way in which data should be collected or structured. By following the standard similar data can be easily compared over time, across locations, and within and between organizations, as well as being easily manipulated to produce visualizations and identify trends. In other words, they help to make re-use simple.

For more information about what a common data ecosystem for agriculture might involve, see the GODAN paper ‘A global data ecosystem for agriculture and food’ (2016)⁸.

7. theodi.org/what-is-data-infrastructure

8. www.godan.info/documents/data-ecosystem-agriculture-and-food

Strengthening the Bargaining Power of Farmers: The Indian AGMARKNET Portal



The complex network of rural markets in India consists of 7,190 regional markets regulated by the States and the Uniform Territories (UT), and about 22,505 rural periodical markets. Traditionally, farmers were restricted to trade in a limited number of markets resulting in a lack of competition, high market fees and a long chain of intermediation resulting in lower prices for the farmer and higher prices for the consumer.

To strengthen the bargaining power of farmers and create greater price transparency to the benefit of the consumer, the Indian government launched the AGMARKNET data portal (<http://agmarknet.gov.in/>). The portal provides

easy access to daily price information for more than 2000 varieties and about 300 commodities from more than 3245 markets spread all over the country, together with trend reports for the important commodities and futures prices from the Multi Commodity Exchange of India Limited and NCDEX.

The AGMARKNET data portal follows a series of laws to reform agriculture markets in India. By making this data available and accessible online, it effectively disseminates market information and promotes common approaches to grading, standardization, packaging, and quality certification of agricultural produce.

Core agriculture data categories, datasets and standards

Identifying priority data assets

There are many different datasets, held right across government, that can benefit the agriculture sector. As discussed above, implementing an open data strategy for agriculture may involve a number of different government departments coming together to improve access to, and interoperability of, a range of datasets.

On the next page we identify **14 key data categories**, and a range of specific datasets that, when made available as open data, have the potential for use and impact in agricultural development. The data categories represent thematic groupings of data related to agricultural, environmental and economic topics that are generally collected and maintained by governments around the world.

The figure below illustrates the different data categories, exemplar datasets and relevance to different policy perspectives. The heat map indicates the relative ease of publication and potential for impact.

Implementation

The Agriculture Open Data Package is only a starting point - a source of inspiration - to start thinking about an open data strategy for agriculture. National and local policy objectives will need to guide priorities, data selection, and where to place emphasis on interoperability. In this process a government-wide consultation, as well as consultation with local agricultural and IT stakeholders is needed to landscape the opportunities, benefits and capacities. A strategy for open agriculture data should ultimately be aligned with other government plans such as e-government strategy, to increase sustainability and guard against isolated implementation.

Other important implementation considerations are highlighted in the full version of the Agricultural Open Data Package. These include readiness and assessment tools, responsible data publication, and engaging with members of the international open data and agriculture community, e.g. the European Space Agency.

Category	Description	Example datasets									
Administration and legislation data											
Government, agricultural law and regulations	Policy and legislation texts relevant for the agricultural sector	Subsidy schemes; animal health and welfare regulations; import/export regulations; environmental regulations; (phyto)sanitary regulations									
Official records	Lists of organisations, people or products officially registered, permitted or restricted as a result of legislation	Permitted pesticides; (import/export) tariffs; (safety) inspection results; approved permits; licensed organisations (corporations, businesses, NGOs); land registration									
Government finance data	Data on the financial management of the government, budgets, spending	Penalties given to agricultural actors; agriculture-related tax income; agricultural subsidy expenditure									
Rural development project data	Data describing rural development (RD) projects funded by a government. This may be the local government or a donor government (aid)	Rural development project documents; rural development project baseline and survey data; rural development project output, outcome and impact; general information on a rural development project									
Socio-economic data											
Land use data and productivity data	Data describing the land use, crop types and production of an area or region	Biomass; crop yield; cultivated crops and livestock; land use data									
Value chain data	Data describing the value chain and its activities	(Food) product data; company profiles of groups of value chain actors or organisations; (food safety) inspection results									
Infrastructure data	Data describing national networks for roads, water, ICT, including their condition and maintenance	Internet coverage; waterways; road management schedules; mobile telephone coverage; road network									
Market data	Data on the location of markets, market prices, market standards	Import/export volume; lists of markets and auctions; market prices; global food prices; location of markets; standards, grades, labelling; market management and rules									
Natural resources, earth and environment data											
Meteorological data	Quantitative data on weather and climate	Climate change predictions; climate zones; observations archives; real-time observations; short-term weather forecast									
Elevation data	Data describing the elevation of the terrain and its derivatives	Digital elevation model; height points; slope data; aspect data									
Hydrological data	Data describing the state and dynamics of ground and surface water	Water management; water tables; water quality; real-time water levels; historical records on flooding; flood zones; water balance; location of water sources									
Soil data	Data describing soil properties	Soil classes; soil samples; soil maps									
Agronomic data, agricultural technologies											
Production advice	Data related to crop selection, crop and land management	Fertilizer recommendations; intercropping, relay cropping and rotations; agronomic practice recommendations; crop calendars; data on cultivars, land races and farmer varieties including new releases									
Pest and disease management data	Data on the distribution of pests and diseases and their treatment	Occurrences and distribution of plant diseases; treatment of plant diseases; recommended pesticides									
1 Empowering farmers		2 Optimizing agricultural practice		3 Supporting agrifinance		4 Facilitating agri value chains		5 Enforcing policies		6 Government efficiency and transparency	

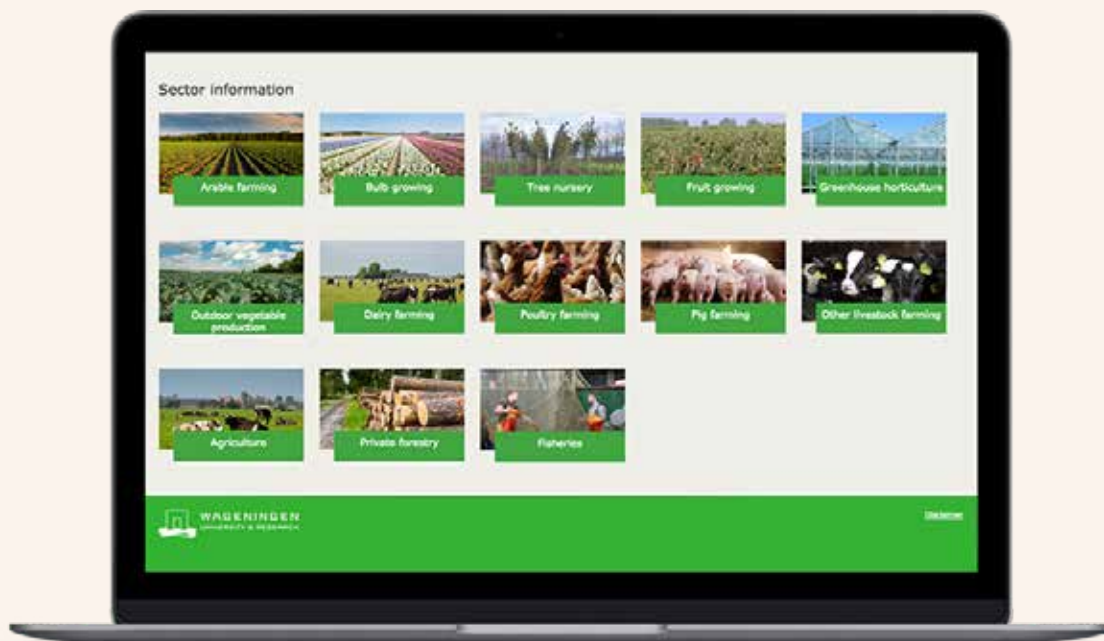
Agrimatie.nl

The agri value chain at a glance while securing privacy

www.Agrimatie.nl is a webportal on the agricultural value chain in the Netherlands, available in both Dutch and English language. Initiated by the Government of the Netherlands, it provides an in depth overview of all agricultural census data from the national statistical agency, as well as dedicated research. The data is made explorable online in interactive charts and easy-to-use search and filter functions.

The database contains time series of the structure, production and performance of all farms in the Netherlands, together with hundreds of other indicators on e.g. environmental impacts, employment, prices, trade. Because of the sensitivity of the raw data on individual farms the portal provides interactive charts to navigate and aggregated data download options.

The data can be used by different actors in the agricultural value chain to explore the viability of the agricultural sector, determine business strategies, or benchmark performance of their company against the sector average. Policy makers can explore the data while developing sector strategies. Data journalists can easily verify, complement or visualize their stories with data facts on the sector.





Source: Bedrijveninformatienet



Source: Bedrijveninformatienet



Next steps and call to action

This beta version of the Agriculture Open Data Package (AgPack.info) was launched in December 2016. This version is available online, accessible via the Open Data Charter Resource Centre - open for comments and feedback. A final version will be produced based on this feedback.

In 2017 and beyond we hope to build on the first version of the package by covering further sub-sectors (e.g. fisheries), deepening the different key data categories and their descriptions, improving the standards and interoperability, adding new policy perspectives and use cases to inspire and acknowledge progress of open data in agriculture.

We invite policymakers, agriculture specialists and members of the open data community to:

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If you are a recent Charter Adopter, you can access further resources to help with general open data implementation at the Open Data Charter Resource Centre, accessible online via:

opendatacharter.net/resource-centre



Acknowledgements

The **AgPack.info** was initiated by the Global Open Data for Agriculture and Nutrition (GODAN) initiative, the Open Data Institute (ODI) and Open Data for Development Network (OD4D) and is part of a series of sector-focused guidelines for governments managed by the International Open Data Charter (ODC). After launch, the Agriculture Open Data Package will be updated and maintained by the GODAN initiative and OD4D Network.

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