Open Data for Improved Land Governance

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Key words: open data, land data, land administration, land governance

1. SUMMARY

Open and transparent land data and information is generally recognised as an important component for good land governance. It supports more efficient service provision and informed policy making to enable the sustainable development of society. The Land Portal Foundation through the ***Open Up Guide for Land Governance*** and ***LandVoc*** is making an important contribution to open land data initiatives. Globally very little land governance data is available as open and structured data. This limits opportunities for informed policy making and the development of strategies to respond to land governance challenges.

The Open Up Guide for Land Governance aims to uncover land governance datasets or databases and their sources, describe the state of the available land governance data, and conduct a technical data assessment of the data in terms of its openness at country level. Information gaps as well as technical and semantic challenges can be identified using a partnership approach which impact the availability and discoverability of data. LandVoc is a tool to link different sources of information online in order to improve the information ecosystem. Individually or collectively these initiatives can be used to improve data management practices, improving the accessibility and quality of open land governance data.

Increasing the available open data requires improved data management practices to be applied to ensure data privacy, quality and authoritativeness. Coherent policy frameworks (governing collection, maintenance, access, standards, use and integration) need to be developed that respond to the diversity of land data needs, data producers and the differing levels of land governance authority. This requires political and social capital and a degree of trust between government and society with regards to data governance. Digital land administration systems can work to support an e-government system that is able to ingest, process and analyse complex information from multiple sources for informed decision making but requires human and financial resources. Government can be the biggest beneficiary of value added services based on long term and stable data needs and infrastructures.

Open data is not a panacea to land governance challenges, but more discoverable and accessible open data is a necessary condition. These initiatives provide a flexible implementation guideline to describe the data ecosystem and provide an assessment of openness. It sets a benchmark for improvement and facilitates the identification of technical and institutional challenges. The outcomes are that data management practices are improved, data across geographies and languages are linked, improved decision making is enabled and global indicators can be reported on.

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2. RATIONALE

The purpose of this paper is to provide an overview and describe the key features of the two approaches/instruments that have been developed by the Land Portal Foundation in support of more open and interoperable land governance data and information. Generally, openness and transparency are seen as important principles in land governance and have been adopted in numerous frameworks as key principles for assessing good land governance (Bayer, 2022), (Quan & Kumar, 2017), (Koroso, van der Molen, Tuladhar, & Zevenbergen, 2013), (World Bank, 2012), (FAO, 2012), (Burns & Dalrymple, 2008). Opening up access to land data and information is needed to support improved land governance and enables governments to provide services in an efficient and transparent manner. It can enable individuals, communities, and businesses to run their lives ethically and with integrity. Open government data initiatives have continued to increase exponentially (Vetro, et al., 2016) and are reflected in initiatives such as the 78 countries that are part of the Open Government Partnership (OGP, 2022). Opening up land governance data and information can promote equity and justice while enabling individuals, communities and business to pursue social and economic development opportunities in the land sector.

3. PROBLEM

There is a globally poor record of publishing land administration data including data on public land holdings. In the comprehensive report on "*The State of Open Data: Histories and Horizons"* it is stated that there is no structured open data on *"government landholdings, purchases and disposals*" (Davies, Walker, Rubenstein, & Perini, 2019). Research findings from a comparative study on land governance in Southern Africa concluded that the lack of land data and information is a key land governance challenge. (Bayer, Enemark, & Kirk, 2020). Indeed the lack of information on the internet and in Africa, especially in relation to land, has been documented by the Land Portal Foundation with its work on mapping land information ecosystems, as well as by other spatial data researchers in Africa (Guigoz, et al., 2017). Limited access to land data and information closes knowledge systems and experience from other geographies that are relevant for tackling similar problems. Without land data and information, governments are limited in their ability to formulate evidence-based policies and develop strategic responses to a variety of land governance challenges. This lack of open and accessible land data and information requires that interventions should focus on the development of strategies to create awareness and support for the development of open land data policies and initiatives at government level.

4. OPEN DATA APPROACHES TO LAND GOVERNANCE

In order to address this problem and to support the opening up of land data, the Land Portal Foundation developed a set of resources such as the Open Up Guide for Land Governance (Bayer & Booth, 2021) and LandVoc (Cagdas, Meggiolaro, & Stubkjaer, 2021), (Mey & Meggiolaro, 2020) to support governments in making their land governance data more open. These initiatives are designed to support countries and organisations to improve not only the degree of data openness, but also their data management practices through the use of metadata, semantic vocabularies and adopting appropriate data standards.

The approach taken by the Land Portal Foundation in partnership with the Open Data Charter with the Open Up Guide for Land Governance (Bayer & Booth, 2021) is to identify and describe the land governance datasets or databases and their sources. The land governance data categories that are identified and assessed for their openness are derived from the primary functions of the land administration system, rather than the external need for indicators. The Open Up Guide approach is to describe the state of the available land governance data, and conduct a technical data assessment of the data in terms of its openness, at country level. This helps us to identify not only the existing data and information, but just as importantly, the gaps in data and information. It allows for the identification of technical and semantic issues which impact the availability of data. This approach to assessing open data for land governance views the open and accessible land data as a process that provides opportunities for cooperative learning and for the improvement of the technical quality of the available data.

The semantic vocabulary LandVoc (Land Portal, 2022) serves as a tool that can be used to link different sources of information online. It helps to increase the discoverability and visibility of data and information, ultimately making the information ecosystem more accessible and democratic. Collectively or separately these two independent but related approaches can be used to chart a "roadmap" for increasing and improving the accessibility and quality of open land governance data. The roadmap can be used to identify datasets for opening up, or the improvement of existing open data regarding land.

Land administration has changed from being a parcel data record, to striving for being an integrated information and decisions support system in pursuit of sustainable social, economic and environmental management (Williamson, Enemark, Wallace, & Rajabifard, 2010) (Zevenbergen, De Vries, & Bennet, 2016). While numerous approaches to assess land governance have been developed, they tend to be based on perception surveys, key stakeholder interviews and other data and provide an overview of land, data and information governance. The Sustainable Development Goals (SDGs) of the United Nations (UN) has 17 goals with 169 corresponding targets and indicators associated with it. The Global Land Governance Index (Landex, 2022) and Prindex (Prindex, 2022) use indicators derived from other indicators, perception surveys (*survey-based indicators*) and interviews (*people-based indicators*) amongst other methods. The Land Matrix (Land Matrix, 2022) tracks large scale land deals only, while the Land Government Assessment Framework (World Bank, 2012) is based on performance scores as rated by land experts. The Global Data Barometer Land Module has a specific focus on land tenure information; it is based on key expert interviews (GDB, 2022).

4.1. Open Data Innovation and Land Governance

The Land Portal seeks to support open data innovations and management practices that drive increasing accessibility of land data and information. The Open Up Guide for Land Governance initiative seeks to open up country level data by fostering local capacity and open data literacy initiatives (Bayer & Booth, 2021). It presents the opening up of data as a process that must be in line with local laws and practices as well as using appropriate interoperable standards. And is to be used by governments to collect and release land-related data to improve data quality, availability, accessibility and use for improved citizen engagement, decision making and innovation. It can assist communities in monitoring whether environmental protections are being upheld, and to support land rights claims over geographical areas inhabited for generations. Civil society organisations can make use of land governance data to understand patterns of land deals, support environmental and social advocacy, and investigate and address land corruption.

The land governance sector and its institutions have to find a way to accommodate the opportunities presented by open data innovations while negotiating this rapidly changing environment. While we expect that institutions should be stable and provide certainty for the land sector, they also need to be flexible and change over time in order to provide for new relationships and innovations. This view is reinforced by Yoshikawa, Tsui-Auch, & McGuire (2007) who state that institutional change and innovation does co-exist with continuity and certainty. The land sector has been transformed by technological change in the past, such as the shift from analogue to digital technology (GIS, total stations) as well as the introduction of satellite-based observations (space-based measurement).

It is necessary to briefly describe the land administration and open data context in relation to the Land Portal initiatives. Land administration is a set of interrelated functions, activities and outcomes that are technically complex, politically sensitive and combines a number of disciplines, including information technology, which is changing rapidly. Social, political and technological change are all drivers of innovation, but social and political factors especially may also serve as an obstacle to innovation, especially when the proposed innovations may be perceived to negatively affect a dominant political grouping. The rapid technological development in information technology and the subsequent innovations in open data technology is a significant challenge that land administration systems have to negotiate.

Open data, which may be defined as "*digital data that is made available with the technical and legal characteristics necessary for it to be freely used, re-used, and redistributed by anyone, anytime, anywhere*" (ODC, 2022) has the potential to disrupt the existing institutional framework. Open land governance data, which needs to be published in accordance with government's laws and regulations, can assist in the provision of efficient and transparent government services. This means that organisations need to adopt new institutional innovations in order to keep up with the changes that are required/demanded. The increasing demand for open land data is being driven by a data revolution and technological innovation where information is widespread, diffused in society and easily accessible. Technological change is

not the only driver of innovation and institutional change, but it is a primary driver of institutional change (Ruttan & Hayami, 1984).

The process of implementing the Open Up Guide for Land Governance may be viewed as three separate but connected components in a process that may be implemented in a flexible manner. The first component is to describe the state of a country's land information ecosystem. The second component is to conduct a data assessment with regard to a set of 10 criteria for the technical openness of the data, and the final component is the identification of data resources that may be published as truly open data.

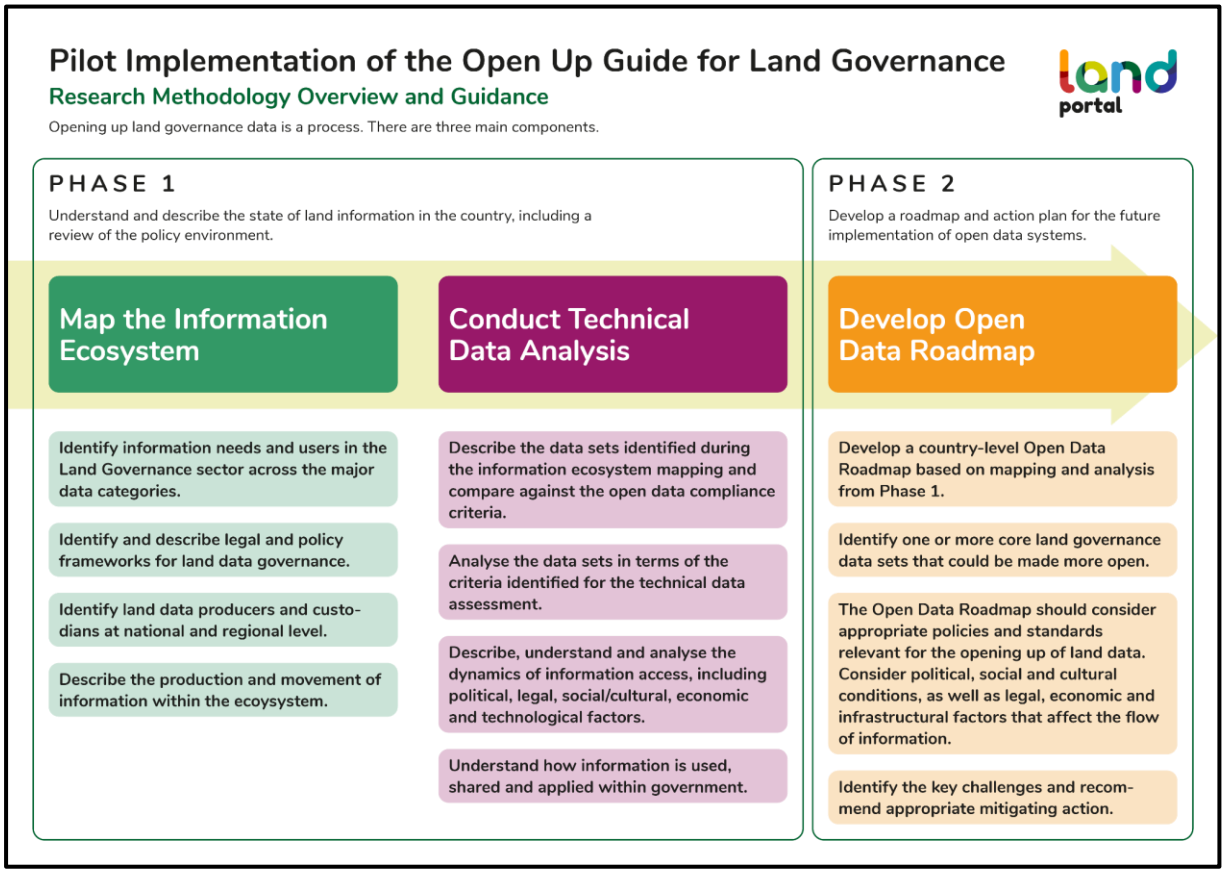

Figure 1: Open Up Guide Research Methodology. Source: Bayer 2022

The Open Up Guide for Land Governance sets out:

- Key datasets for land management accountability, and how they should be collected, stored, shared and published for improving land governance and transparency;
- Good data policies and frameworks, including metadata, standards and governance frameworks if available;
- Existing gaps or challenges in the policies and frameworks; and
- Use cases from real-life examples to illustrate the potential impact and transformation this type of data can provide in local contexts.

In March 2020 the Land Portal held an online workshop "***Towards an Open Up Guide for Land Governance***" (Land Portal, 2022) which identified the core data needs for open data on land governance. The core data needs included information on *i) land parcels, ii) land use, iii) land transactions, iv) and performance of land governance functions.* Participants also identified data needs relating to *land valuations*, *tax collection*, *policy evaluation*, and the *decision-making framework* around land. These identified data needs correlate very closely with the land administration functions set out for a modern land administration system geared towards supporting sustainable development and good land governance (Williamson, Enemark, Wallace, & Rajabifard, 2010).

Conceptually the modern theory for land administration sees land administration as being more broadly in support of sustainable development. In order to ensure sustainable development, an integrated and digital information system and information infrastructure must be in place. This land information infrastructure in turn supports the land administration functions of land tenure, land use, land value and land development.

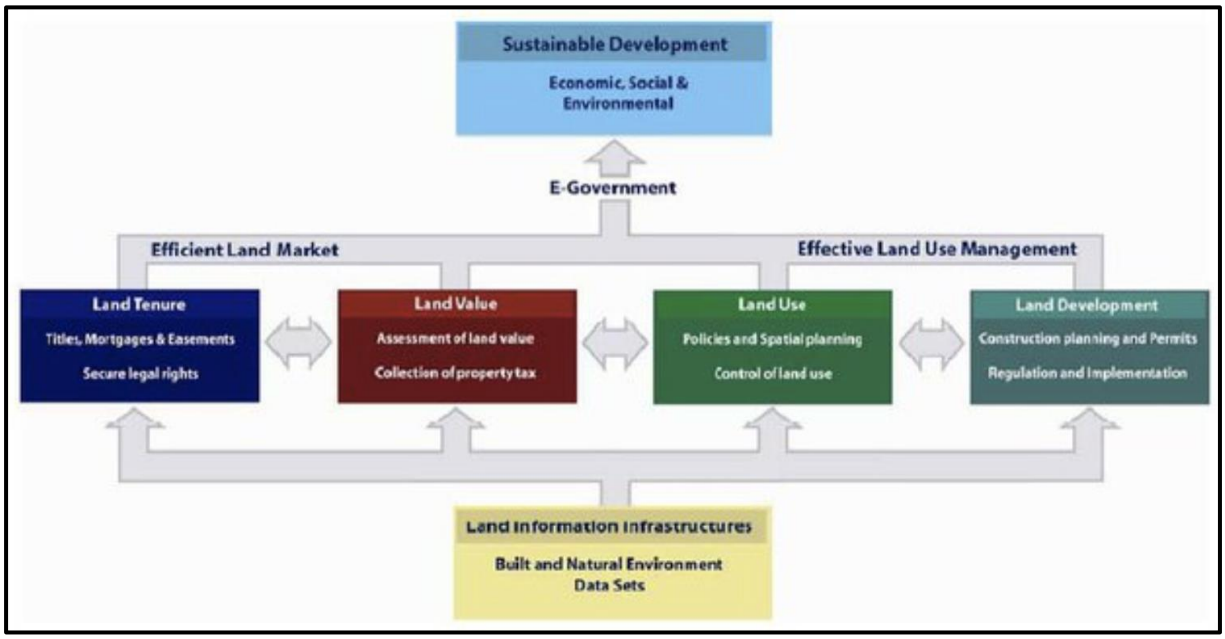

Figure 2: A Global Perspective of Modern Land Administration Systems. Source: (Williamson, Enemark, Wallace, & Rajabifard, 2010)

The perspective of a modern land administration theory serves as the inspiration for the land governance data considered in the Open Up Guide. The approach is therefore to focus on data that is produced by the land administration functionaries in the ordinary course of their work. This approach was validated in April 2021 at a workshop by a wide-ranging group of land and data experts (Land Portal, 2022).

The Open Up Guide has adopted the approach that land governance data must now include data on the core land administration functions of land tenure, use, value, and development. This provided a foundation for the Open Up Guide to use the new theory of land management as the

conceptual framework for land governance data in the Open Up Guide, including the typical functions that need to be carried out for good land governance. The Open Up Guide therefore makes provision for four key data categories derived from the land administration functions and two additional data categories. The data categories include: **i) Legal, Policy & Institutional Data; ii) Land Tenure Data; iii) Land Use Data; iv) Land Development Data; v) Land Value Data; and vi) Other Land, Climate Change & Environmental Data**. For each of these categories, associated key information types have been identified based on the primary functions of land administration authorities and their ability to support reporting on the global initiatives above. The Open Up Guide focuses on public sector data collected or administered by national and local governments, but there might be other types of data collected by international organisations, civil society organisations, private enterprises, and individuals.

DESCRIPTION	TYPE	DATA STEWARD	STANDARD
PARCEL DATA SET **CADASTRE: SURVEYED PARCEL BOUNDARIES**			
Information contained in the National Cadastre. This is a record of all surveyed parcels nationally. Encompasses urban and rural land parcels. Also includes sectional parcels removed from the surface of the earth (3-D) » Coordinate System: Ellipsoid, Geoid, Projection » Parcel ID: Unique Parcel Identifier, Lot Number » Parcel Dimensions: Area, Length of sides, Coordinates » Parcel Description: Township, Reference Plan, Sectional Plan	» Spatial Vector	» Surveyor General or Equivalent	» ***ISO 19152:2012 Land Administration Domain Model (LADM)***
PARCEL DATA SET **CADASTRE OF TRADITIONAL/INDIGENOUS OR CUSTOMARY LAND PARCELS**			
Contains information on customary land parcels. Identification of parcels could be by name and rough location only. Sometimes stored by Government agencies where customary rights are legally recognised. Often deregulated and stored by traditional authorities in a distributed manner and across a range of formats and may be subject to the ***CARE principles for Indigenous Data Governance***. Information, if documented, might not be digital. » Coordinate System: Ellipsoid, Geoid, Projection » Parcel ID: Unique Parcel Identifier, Customary Lot Number, Locality Name » Parcel Dimensions: Area, Length of sides, Coordinates, Location » Parcel Description: Traditional Authority Area, Reference Plan, Locality Plan, Locality Name	» Spatial Vector	» Minister Responsible for Traditional or Indigenous Affairs » Traditional or Indigenous Authorities » Individuals	» ***ISO 19152:2012 Land Administration Domain Model (LADM)***
PARCEL DATA SET **CADASTRE OF SETTLEMENTS, PARCELS OR STRUCTURES**			
Contains information on the location of urban land parcels. Often these parcels might be documented by the local authorities responsible for the area. Sometimes also involves Traditional Authority structures, especially in peri-urban areas. Often deregulated, distributed and stored across a range of formats. » Coordinate System: Ellipsoid, Geoid, Projection » Parcel ID: Unique Parcel/Structure Identifier, Informal Lot Number » Parcel Dimensions: Area, Length of Sides, Coordinates (Point Coordinate) » Parcel Description: Settlement Area, Reference/Community/Municipal Plan	» Spatial Vector	» Minister responsible for Local Government » Local Authorities » Traditional or Indigenous Authorities » Community Based Organisations » Individuals	» ***ISO 19152:2012 Land Administration Domain Model (LADM)***

Figure 3: See a sample data set table for Land Tenure Data: Source (Bayer & Booth, 2021)

- **Legal, policy and institutional** data is concerned with largely bibliographic data in the form of land laws, policies and regulations. It concerns information about laws, policies and regulation and how available and accessible this information is online.
- **Land tenure** data and information is related to and concerns the recording, allocation and depictions of land and land related commodities. This can include survey and cadastral data parcel boundaries and ownership information as well as the rights and obligation held over land.
- **Land use** data concerns information which is related to the use and control of land. It also covers information on the use of public lands as well as the enforcement of land uses and land use designations.

- **Land development** data is related to the data and information on the building of new infrastructure and the provision of services. This could include information on the public acquisition of land, expropriation as well as development and building permits and the information on the land value capture system.
- **The land value** data includes data and information related to the assessment and value of land. It may also relate to the collection of land-based revenue and taxes as well as information on the land market in general.
- **Other land and climate change** data and information could be about administrative and political management unit boundaries, national census data, agricultural census data and other socio-economic data. In many countries it may also concern data and information about public asset declarations, public procurement, beneficial ownership and datasets for resilience and climate change.

Priority is given to the identification and description of land government data from the government in the open up guide. This focus stems from the fact that government agencies generally have the primary responsibility for land administration as well as being the key producers of land administration data, a core focus of the guide. This does not exclude or detract from the value of private and community data producers, and the role they may play in the production of spatial data. The observation unit for the purposes of the open up guide is defined as "*a structured collection of information, including statistical (numerical) data, bibliographic (publication) data, spatial data and multimedia contents*". It may be a statistical dataset that contains information about the number of women land owners, but also a database of publications that contains information about (a certain topic of) land governance. The focus should be on government data sets produced by the relevant department as part of their ongoing functions. These data sets should be distinguished from project data, where entities (donor, private, NGO) might create once off collections of data about a specific topic or issue, but that might not be supported on an ongoing basis. Acknowledging that not all information about the information landscape is measurable in numbers or captured in a dataset, data and information may include individual publications, websites or a specific law or legislation.

To support data management practices recommendations are made for the use of appropriate standards where applicable for all the data categories identified in the guide. The use of appropriate standards when countries are developing, reforming, or implementing land data governance systems is a prerequisite for effective land and geospatial administration and management. Some of the standards that have been proposed in the guide include the ***ISO 19152:2012 Land Administration Domain Model (LADM)*** is the fundamental international land administration data standard. It defines a reference model for the basic components of land administration, provides an abstract conceptual model for the subject, object, rights and the underlying topology. The ***Open Geospatial Consortium (OGC) Standards and Resources*** was developed to make location information and services FAIR (Findable, Accessible, Interoperable and Reusable). In addition, the ***INSPIRE*** implementing rules on interoperability of spatial data sets and services and ***Technical Guidelines*** (Data Specifications) for the

European Community specify common data models, code lists, map layers and additional metadata on the interoperability to be used when exchanging spatial datasets.

Land data is generally considered to be less personal data intensive than other types of data and land records for example have historically been open and available for public inspection. However land data is often perceived to be sensitive and generally care must still be taken to ensure that publishing open data adheres to common standards and policies ensure restricted data is protected, data formats are consistent, and the data can be used legally locally and globally. Using common standards allows interoperability and reduces inefficiency while enabling better decision making in national and local organisations and communities that collect and manage data.

Codes of conduct are also emerging to cover the sharing of sensitive data to protect all involved from the risks of data sharing. The codes of conduct provide principles that parties considering data sharing agreements may apply in such contracts. ***GODAN's codes of conduct***, provides voluntary guidelines and a set of principles around how to transparently govern farm data. This online tool provides the conceptual basis for general, scalable guidelines for everyone dealing with the production, ownership, sharing, and use of data in agriculture. In addition, the guide recommends that governments and practitioners consider the rights of indigenous people to control information and data about themselves and their lands, individually and collectively. ***Indigenous Data Sovereignty***, which focuses not only on data issues, but also on asking fundamental questions about power relations and land governance, forces the data community to improve their data management and consider all stakeholders.

The Open Up Guide for Land Governance therefore serves as a guide for those governments and other stakeholders that wish to embark on a process of opening up land data. It helps users to describe the existing land data and its technical characteristics at national level. However, it is not enough to describe the land data and information, it is also important to link discrete data sets and other information sources online. Improving the management of data (not only the volume of data) helps to increase the discoverability and visibility of information and improve information equity. In the Land Portal approach to data innovation and openness, the Open Up Guide approach is complemented by the semantic vocabulary LandVoc (Land Portal, 2022). It serves as a tool used to link different sources of information online increasing discoverability and visibility of related information and ultimately support better data management practices.

4.2. Semantic Interoperability

The Land Portal developed the *LandVoc* (Land Portal, 2022) as a standard controlled vocabulary with 310 land governance related concepts related to land governance curated by a community of experts. Controlled vocabularies allow us to search and discover data and information in any online storage system by tagging data and information through the use of unique ID's for each concept (Mey & Meggiolaro, 2020). In this way we can link data and information resources across language terms for the same concepts to ensure that the most relevant data is retrieved for the users. There was a gap in the use of standard vocabularies in

the land governance sector with only 20 concepts related to land governance included in the AGROVOC vocabulary in 2012. By 2016 a gap analysis on the use of controlled vocabularies by the Land Portal Foundation that there was "*no structured or uniform approach to use (structured vocabularies) to publish information*" (Mey & Meggiolaro, 2020), leading to the development of LandVoc. Building on the existing land glossaries, such as FAO's ***Multilingual Land Tenure Thesaurus*** and the ***GLTN GLII*** glossary, new terms and concepts were added and validated. The current 310 LandVoc concepts are organised hierarchically and are available in 9 languages (English, French, Spanish, Portuguese, Khmer, Vietnamese, Burmese, Thai, Swahili and Arabic). It serves to connect and allow the exchange of information with other databases linked to other vocabularies. In 2016, LandVoc reached a critical mass within AGROVOC enabling users to download LandVoc as a separate scheme. LandVoc hit another milestone in 2020 when it became an independent set of relations, creating an independent sub-schema within AGROVOC.

LandVoc is used to enrich all the content (bibliographic data, statistical data and other media) produced or ingested on the Land Portal Website. This may include *academic papers* and *official reports*, *statistical indicators*, *data stories*, *blog posts*, and *news items*. Aggregating external content and enriching them with LandVoc is an especially important service we provide geared towards improving metadata. Contents tagged with LandVoc terms are transparently displayed, making it easy for readers to discover and access additional content.

LandVoc promotes standardisation and contributes to making land data and information more discoverable, while being careful not to duplicate efforts or standards, but still make universal standards useful for the land community. It helps to make information from our partners become more visible and discoverable to those who are seeking it. As noted earlier however, the land governance field is very complex and is constituted of a number of interrelated disciplines. This presents a range of challenges across disciplines, languages, geographies and nuances. As a result, deciding on classifications and classification systems are inherently controversial and may even become political.

The complexity of land administration and as evidenced by the multitude of land tenure systems that may exist within just one country (customary, communal, tribal, religious, formal, flexible, nomadic, seasonal) and associated with multiple languages creates many obstacles for "standardisation". However, the intention of LandVoc as a standard vocabulary is not to "*counteract such differences or 'impose' a standard for a particular concept, but rather, to build a tool that embraces and highlights our differences*" as described by Mey & Meggiolaro, (2020). This facilitates access to more information sources and allows us to broaden the base of information from which we operate and gain deeper and new insights into land governance.

Other organisations may choose to use LandVoc simply as a glossary and to manually manage their information. Similarly individual researchers may use it to make sure they are using appropriate terms in their writing and make their research more accessible and discoverable. LandVoc supports cross-language information discovery and serves as a foundational tool that helps to improve the potential impact of data and ensures information is easily searchable and discoverable. Connections are being made between terms with one main goal, making

information more discoverable and accessible. LandVoc may have an independent hierarchy, but it shares infrastructure with AGROVOC and other sub-schemes.

LandVoc concepts are mapped to other vocabularies including;

- ***EUROVOC*** - European Vocabularies
- ***CaLAThe*** - Cadastre and Land Administration Thesaurus
- ***CAT*** - Chinese Agricultural Thesaurus
- ***ASFA*** - Aquatic Sciences and Fisheries Abstracts
- ***LusTRE*** - Linked Thesaurus framework for Environment
- ***NALT*** - National Agricultural Library Thesaurus
- ***UNBIS*** - United Nations Bibliographic Information System Thesaurus General
- ***(GEMET)*** - Multilingual Environmental Thesaurus and more.

LandVoc can be an extremely powerful tool in making data and information more discoverable. It connects knowledge and experiences from across the world, bridging both language and culture barriers. LandVoc is an unbranded linking tool between the different classification and tagging systems information providers in the land sector use.

5. OPEN DATA GAPS AND CHALLENGES

Open data is not without some issues of concern that need to be addressed and managed. Some of the key issues of concern include privacy, data quality and the authoritativeness of the data, while they are important, are fairly straightforward to address and are not open data problems but rather general data management issues. The authority and quality (best determined by the users and depending on the purpose) of the data derives not from being held in an open or closed repository, but rather from whether good data management practices are applied. Another challenge is the diversity of land data needs and data producers as well as the differing levels of land governance authority (village, municipal, regional, national, customary, private, community). This requires a coherent policy framework to ensure collaboration on how data is collected, maintained and made available as structured, standardised and updated data.

The next challenge is that not only must the data be collected and made open, but it must serve as a basis for informed decision making. This requires that the capabilities for analysis, decision making, and policy development are put in place. Data coming from different sources and custodians (public and private) will need to be layered and integrated for advanced information analysis.

In order to drive innovation and increase the opening up of land data and information, the twin challenges of social and political will and the lack of trust between government and society need to be overcome. Without political will from the side of the government and a demand from society for access to open data, in order to improve equity, efficiency and governance in the land sector, can increase the risk. Citizens in many countries are not always confident that their interests are being protected at local and national levels of government. The adverse effects of a lack of transparency and openness in the land sector which disproportionately affects

vulnerable, indigenous, and marginalised groups in society means that there are concerns that open data is just another tool to exploit people. Introducing or expanding open land data infrastructure requires that work must be done to engender trust in the process and outcomes in respect of improved land administration and public services.

To maximise the benefit of fully open land data it is assumed that land administration systems are digital and work in support of an e-government system that is able to ingest, process and analyse complex information from multiple sources for informed decision making. To varying degrees land data is often still analogue, and even where data has been digitised, the analogue records are often the legal source of information. Converting information into digital records (digitising) and converting business processes (digitalisation) in order to fully derive the benefits of access to digital data and information is slow and expensive in terms of financial and human resources. Consideration must be given whether to include digitization and digitalisation in a full reform of land administration systems or whether to carry it out separately.

It is important that we consider the government and its departments responsible for land governance as being key beneficiaries of the process of opening up government held data and information on land. Value added government services built on top of and utilising open land data and information can create long term data needs, services and revenue which other agencies and actors can rely on. This can create longer term stability (important for investing in durable information infrastructures) that would be less likely to be affected by a change of government as the government itself is a key user and beneficiary.

6. CONCLUSION

We must be clear that open data is not a panacea to land governance challenges, it is not even an objective in and of itself, but rather one of the many means to an end, which is to improve land governance. The land data derived from the functions of a modern land administration system should be opened up in an effort to improve land governance performance. It has been shown that it is not sufficient for data to be open, but it should also be more discoverable and accessible.

The Open Up Guide for Land Governance provides a template in the form of a flexible implementation guideline for describing the state of land data and information at country level. Using the dataset as the unit of observation allows for a verifiable and replicable assessment of openness. Using a common framework allows for the identification of common problems, challenges and potentially solutions across geographies. It also sets a benchmark against which future improvements can be measured, and allows for the identification of technical, capacity and policy challenges as well as future interventions.

The process of opening country level up data allows a tool such as LandVoc to be used to structure land data and information. It can be used to link data and information in a systematic

and coherent manner across geographies in order to provide not only translations services but to be able to aggregate data. This is especially useful for reporting on national development indicators but also for contributing to international and global indicators for land governance.

Together these initiatives from the Land Portal can play a key role in helping to open up land data and information in a structured manner that addresses the major concerns of stakeholders and improves data quality, accessibility. Land administration data, far from currently being complete or authoritative on a global level, can be improved by opening up the data. Open data will allow non-traditional spatial data sources in the land sector to be harnessed to shore up shortcomings in official data sources to improve decision making. Improving data management practices allows the quality of the data to be open and transparent to all. This can serve to broaden the base of information and data that is to be used as the basis for land governance decision making in society.

Just as important is the opportunity for data and information exchange and the subsequent opportunity for dialogue between the different stakeholders (government, society, researcher, lands practitioners) through the elevation of under described and under documented data and information resources.These initiatives serve to democratise the information ecosystem and provide a more level playing field for all land governance stakeholders.

NOTE: The Open Up Guide For Land Governance is currently being piloted in Madagascar and Senegal.

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