The Role of Open Data in Fighting Land Corruption

Evidence, Opportunities and Challenges

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

As a federally owned enterprise, GIZ supports the German Government in achieving its objectives in the field of international cooperation for sustainable development.

Published by:
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

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Bonn and Eschborn, Germany

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On behalf of
German Federal Ministry for Economic Cooperation and Development (BMZ)
Division 411: Governance, democracy and rule of law
Bonn

GIZ is responsible for the content of this publication.

Bonn and Eschborn, January 2021

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Disclaimer

This publication was commissioned and funded by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH – Anti-Corruption and Integrity Programme, on behalf of the German Federal Ministry for Economic Cooperation and Development (BMZ). This study, awarded to the School of Agriculture, Policy and Development – University of Reading through a competitive tender process (Contract No. 81252938), was conducted by Dr Marcello De Maria and Niko Howai. The contents of this publication do not represent the official position of either BMZ or GIZ.

Acknowledgments

The authors would like to express their gratitude to Annette Jaitner and Nicole Botha (GIZ, Anti-Corruption and Integrity Programme) for their supervision throughout the whole project, as their work greatly enhanced the quality of this study.

The authors wish to thank also Prof. Elizabeth Robison and Prof. Simon Mortimer (School of Agriculture, Policy and Development – University of Reading) for their encouragement and support, as well as Mrs Frosso Tsapanidou (Contracts Manager at the Research & Enterprise Services of the University of Reading) for her meticulous assistance.

Together with a number of colleagues from GIZ and the University of Reading, who contributed in many ways to this publication, we also wish to thank all the anonymous respondents and sectoral experts, who – during the dreadful time of the COVID-19 pandemic – agreed to take part in the in-depth interviews that informed much of this research, providing precious insights and sharing ideas, views, experiences and knowledge.

EXECUTIVE SUMMARY

The rapid progress in digital *information and communication technologies* (ICTs) comes with both fresh opportunities and new challenges for different sectors and actors adopting the new solutions that become available over time. Since the mid-2000s, the global land governance community has piloted a series of open data and transparency initiatives largely based on such digital innovations, aiming at increasing accountability and counteracting corruption in the land sector, both at the local and global level. By combining a desk-based review of the existing literature and data with a series of semi-structured interviews with a panel of sectoral experts, this study takes stock of more than a decade of interventions pioneering the use of open data to curb land corruption, and explores their impact, their achievements, the existing barriers and limitations, as well as potential ways to overcome them.

While open data and transparency initiatives tackling land corruption – which is one of the issues undermining the achievement of sustainable land governance – are reaching their maturity, their success and their ability to secure funding and investments in the near future still hangs in the balance, as it relies on the capacity to demonstrate, measure and track impact on the ground. This report initially examines the theoretical background and a number of concrete examples that support the use of open data and land information systems to achieve transparency and anticorruption goals, retracing the long chain of actions that is needed to produce tangible results. It then presents and discusses a number of original findings that emerged from our analysis, organising them into two main categories. The first category looks at the areas of consensus, highlighting those aspects where the evidence provided by the existing literature and the views expressed by the professionals we interviewed typically match up. Conversely, the second category focuses on *disagreement*, identifying recurrent controversies and suggesting potential ways to balance the divergent views.

The key findings grouped under the *consensus* category are summarised below. First, despite the multiplication of open land information systems in recent years, there is still a lack of complete, accessible and reliable data where it is needed the most. This means that there is incomplete data in terms of time and geographical coverage, but also that there is not enough information to directly measure the impact and track the anticorruption achievements of open data and transparency initiatives in the land sector. However, the ever-growing knowledge base offers an unprecedented opportunity to shape new metrics and combine existing

ones in order to start building a baseline against which progress and impact at the intersection between open data, land governance and anticorruption can be measured in the coming years. Second, it is generally recognised that open data and land information systems can play a pivotal role in combatting land corruption, but there is still a sizeable gap between the potential and the actual impact of existing projects. This suggests that there is still much untapped potential to be unlocked and – at the same time – highlights the need to scale-up monitoring and evaluation efforts in this specific domain, by understanding better the complex theory of change that supports the use of open access data and information to combat land corruption, and by strengthening both qualitative and quantitative methods to measure anticorruption impacts in the land sector along the open data value chain. Third, the success of open data and information systems in promoting transparency and counteracting land corruption depends not only on how well these initiatives are designed and implemented, but also on several – *technical* and *institutional* – *enabling conditions*. Technical preconditions include the use of harmonised standards to ensure the interoperability of different sources of data, the existence of suitable digital and ICTs infrastructures, the know-how needed to build and maintain such systems, as well as the financial sustainability in the long run. *Institutional preconditions* include the political will to deploy open access land information systems for anticorruption purposes, the legal legitimation of the data included in the system, the existence of suitable and enforceable rules in the legal and judiciary systems allowing for the prosecution of corruption cases, and, finally, the widest possible participation of different stakeholders in designing the system, identifying the relevant information and actively using the data to promote accountability and expose corruption in land governance.

When focusing on *disagreement*, four controversial issues emerged regularly from the desk-based research and from the conversations we had with sectoral experts. These existing controversies can be well described as *trade-offs* between two opposite views that need to be balanced in order to maximise the anticorruption potential of open data and transparency initiatives in the land sector. The first and possibly the most controversial trade-off opposes transparency and privacy concerns. While transparency in land governance is crucial to enable anticorruption activities, land information systems typically also contain sensitive personal and business information that could be misused if it got into the wrong hands. Mixed data licences ensuring open access by default except for private and sensitive information – such as the ones used in the New Zealand Land Information System or in the land and property data service for England and Wales – have proven to be a viable option to balance privacy and transparency issues when it comes to land registries. The second trade-off is between *availability* and *accessibility*. Indeed, while open land data and information systems need to be able to host a constantly growing amount of complex and detailed records, they also face the challenge of allowing different users – with different needs and levels of expertise – to retrieve the exact piece of information they require. The Land Portal has addressed this trade-off by using complex technologies and semantic standards to classify different contents in the back-end of its open access web portal, whilst providing a user-friendly interface in the front-end, ultimately making it easier to connect different users with the data and information they need. The third trade-off reflects the disconnect between the global and the local dimensions of land data, land tenure and land corruption. Indeed, land corruption is strongly influenced by historical, socio-economic, cultural and institutional factors at the local level, but the fight against corruption also requires concerted action and global coordination in order to be effective – especially when looking at cross-border forms of land corruption, such as money laundering and land grabbing. Ensuring the interoperability of local and global land and anticorruption databases by adopting internationally harmonised and sector-specific standards – such as the Statistical Data and Metadata eXchange (SDMX) or LandVoc – can potentially make it possible to find the right balance. The last trade-off revolves around the dualism between official and unofficial sources of data. The experiences of Prindex and Landex suggest that ensuring multi-stakeholder participation during the whole data life cycle can bridge the gap between unofficial and official statistics, facilitating the data legitimation and uptake of unofficial sources by public authorities.

In the light of the findings discussed so far, we formulated a series of recommendations for the wide range of stakeholders – including private sector, land and development practitioners, donors, implementing agencies, national governments, NGOs and civil society – that need to collaborate to put in place open data and transparency initiatives which can effectively counteract land corruption. Firstly, land data and information should become '*open by default*', as opposed to the '*closed by default*' approach that dominated for too long in the land sector. While personal and sensitive information needs additional layers of protection, ensuring the adherence of land governance interventions to open data principles and standards is crucial to increase transparency and achieve anticorruption goals. This should be done by means of enforceable conditionality measures. Secondly, the success of these initiatives in counteracting land corruption

not only depends on endogenous factors, but also on a number of external factors and preconditions that need to be addressed in parallel by creating a functional open land data ecosystem. Thirdly, engaging with the largest possible number of stakeholders during all phases of the open data life cycle – from the initial inception to the final use of the data for accountability and anticorruption purposes – is vital, as the value added of open data systems relies on the active participation of different user groups. Fourthly, make sure that women and other vulnerable groups are in the position to access and use the information, but also to contribute to the creation, maintenance and evolution of the land data and information ecosystem itself. Fifthly, it is essential to scale up the monitoring and evaluation efforts of existing initiatives, promoting further research via better impact metrics for interventions at the intersection between open data, land governance and anticorruption. Finally, while existing open data and transparency initiatives that target land corruption are producing different narratives in support of their individual efforts, a simple but powerful, evidence-based and globally shared advocacy message is still missing.

KEY CONCEPTS AND DEFINITIONS

This study revolves around two concepts, namely **open data** and **corruption**, and it explores their interaction and repercussions in the specific field of **land governance**. Given the multidisciplinary nature of this research, we provide the following key concepts and definitions to help the readers to better navigate the rest of this report (*Box 1*). Further important definitions are provided in the Glossary of Terms at the end of this publication.

BOX 1 – KEY CONCEPTS AND DEFINITIONS

Open data, according to the Open Definition*, is data that 'anyone can freely access, use, modify, and share for any purpose (subject, at most, to requirements that preserve provenance and openness'. Therefore, the idea of open data – which, at the same time, is derived from and contributes to open knowledge – refers to the concepts of data availability, accessibility and (re)usability for everyone, but also to the need for traceability over the whole data life cycle, from the original data sources to the final usage. While the concept of open data, per se, is not necessarily related to ICTs, the actual implementation of open data systems is intrinsically connected to digital infrastructures, new technologies and ICTs. Indeed, according to Zuiderwijk, Janssen and Davis (2014), the defining element of an **open data ecosystem** – that is, a system where data, information, users and infrastructures are interconnected like different components of natural ecosystems – is the ability to publish open data on the internet. Corruption, according to Transparency International‡, is 'the abuse of entrusted power for private gain.

Corruption erodes trust, weakens democracy, hampers economic development and further exacerbates inequality, poverty, social division and the environmental crisis'. **Land corruption** is a sectoral form of corruption, the boundaries of which reflect those of land governance. In particular, land corruption§ 'is commonly defined as the abuse of entrusted power for private gain while carrying out the functions of land administration and land management'. It comprises a diverse range of public and private instances of corruption related to multiple aspects of land governance, from land administration and management to land use and access. For the sake of greater clarity, throughout the whole report 'land corruption' will be used interchangeably with terms such as 'corruption in the land sector' and 'land-related corruption'.

Land governance, according to FAO†, comprises 'the rules, processes and structures through which decisions are made about access to land and its use, the manner in which those decisions are implemented and enforced, and the way in which competing interests in land are managed. Land governance therefore encompasses statutory, customary, religious and informal institutions. It includes state structures such as land agencies, courts and ministries and municipalities responsible for land, as well as informal land developers and traditional bodies. The concept of land governance covers the legal and policy framework for land, as well as traditional practices governing land transactions, inheritance and dispute resolution. In short, it is fundamentally about power and the political economy of land.'

* See the Open Definition 2.1, available at: *http://opendefinition.org/* (last accessed on 30/08/2020).

‡ See Transparency International website: *https://www.transparency.org/en/what-is-corruption* (last accessed on 16/09/2020).

§ See the thematic portfolio on Land and Corruption on the Land Portal website, available at: *https://landportal.org/voc/landvoc/theme/land-corruption* (last accessed on 16/09/2020).

† See the FAO website: *http://www.fao.org/land-water/land/land-governance/en/* (last accessed on 18/09/2020).

INTRODUCTION

Sustainable land governance, both at the global and at the local level, is crucial for achieving the Sustainable Development Goals (SDGs) and addressing some of the major global challenges that humankind is facing in the 21st century – including food security, poverty eradication and climate change (Zúñiga, 2018; FAO, 2019; Wehrmann and Lange, 2019). New technologies such as linked open data and blockchain – together with an ever-growing data, knowledge and information base – offer an unprecedented opportunity to promote transparency, fight corruption and to inform decision and policy-making (De Maria and Sato, 2019; Kossow, 2020).

However, technical, financial, legal, political and organisational barriers limit the adoption of innovations in information and communication technology (ICT), undermining their success as anticorruption tools (Conradie and Choenni, 2014; Berends, Carrara and Vollers, 2017). Despite a growing body of evidence in support of open data and other ICTs as anticorruption tools (OECD, 2017), in many sectors and countries the use of most recent ICTs is still at an early stage, and the impact of open data on reducing corruption is only measurable in terms of its potential *ex-ante*, or – at best, rests solely on fragmented and circumstantial evidence – *ex-post* (Adam and Fazekas, 2018).

While the data revolution – characterised by the transition to big data, open data and new digital data infrastructures (Kitchin, 2014) – is projected to make available an astonishing 44 zettabytes[1] of digital data and information by the end of 2020 (Desjardin, 2019), about 1 billion people in 140 countries still feel insecure about their land and property rights (Prindex, 2020). Perceptions over tenure insecurity and corruption appear to be strongly correlated, with higher levels of corruption typically associated with weaker tenure security (ibid., p. 26). According to the 2013 edition of the Global Corruption Barometer, land is one of the sectors where the prevalence of corruption is perceived to be higher, with one in five adults reporting to have paid a bribe for land-related services such as registering or transferring land (Transparency International, 2013). More recently, 61% of the respondents who took part in the latest round of Afrobarometer – an opinion poll that reached more than 47,000 individuals in 35 African countries between 2016 and 2018 – declared that it is very likely that a rich person could pay a bribe or use personal connections to get away with registering land that is not theirs (Afrobarometer, 2019).

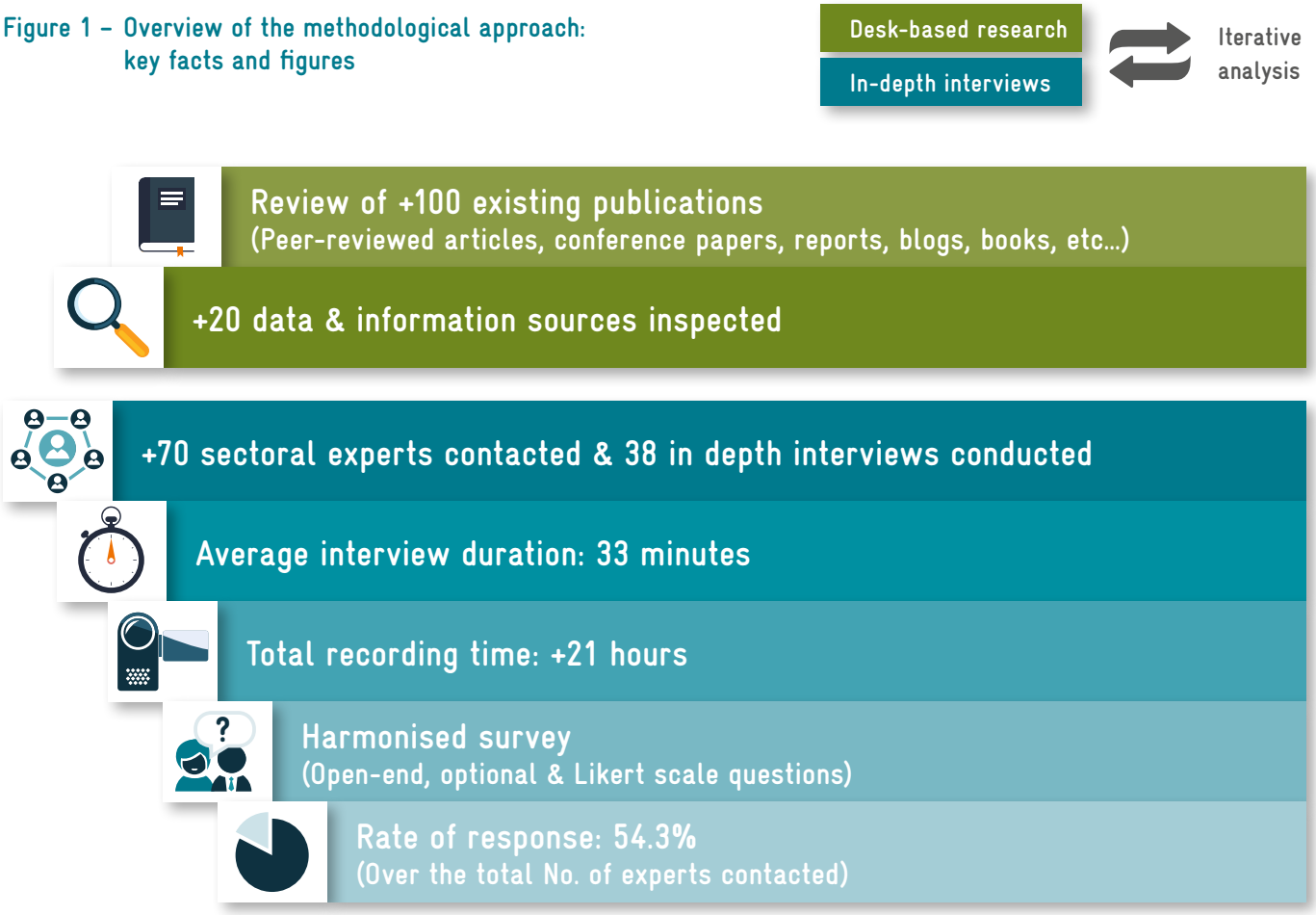
Despite the growing consensus around the use of open data and information systems as anticorruption tools, and notwithstanding the multiplication of transparency and open data initiatives, it is still unclear how to assess their actual impact on land-related corruption. In order to fill this gap, the Anti-Corruption and Integrity Sector programme — commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) — commissioned this study to detect existing open data, information systems and transparency initiatives in the land sector, to understand their impact on land corruption, and to identify the key conditions for success.

1 One zettabyte corresponds to 10^{21} bytes – that is, one trillion gigabytes.

METHODOLOGY AND STUDY DESIGN

This study explores the intersection between open data, land governance and corruption by adopting a hybrid (qualitative and quantitative) approach. Our method relies upon two major sources of information: i) comprehensive desk-based research, and ii) a series of semi-structured in-depth interviews with land governance, corruption, open data and knowledge management experts from all over the world.

Figure 1 – Overview of the methodological approach: key facts and figures



Source: Authors' elaboration

The desk-based research was conducted both before and after the interviews, therefore iteratively adding value to the study. In the first phase we systematically reviewed the existing literature, identifying relevant information and data sources, as well as existing gaps and controversies in the specific field of this study. The findings of this preliminary exploration informed the survey, making it possible to refine the key research questions, design and harmonise the interview structure, and profile the desired population of respondents.

The final survey structure, as shown in Figure 2, contained a set of eleven open-ended core questions, a series of auxiliary follow-up questions and three questions measuring – with a Likert scale – the perception of each interviewee as regards the importance, potential and actual impact of open data, information systems and transparency initiatives as anticorruption tools in the land sector. Given the multidisciplinary nature of this research, we reached a well-assorted and diverse panel of experts all over the world, with different degrees of professional experience in one or more of the following domains: open data and ICTs, land governance, anticorruption and transparency. Our respondents are drawn from the private sector, from NGOs and civil society, from universities and research institutes, as well as from international and governmental institutions.

Figure 2 – Survey and interview design

QUESTIONNAIRE I INTERVIEW STRUCTURE

Part I: Open questions (semi-structured interview)

Core open questions

Follow-up questions (optional)

Q1	Can you please briefly introduce your self (name, affiliation, role…) and tell us about your personal experience with open data, information systems and corruption in the land sector?
Q2	What are the main open sources of data and information in the land sector?
Q2a	Anything specific on land corruption?
Q3	Can open data, information system and transparency counteract land corruption?
Q3a	Can you expand on why & how?
Q4	What are the main benefits of using open data and promoting transparency in the land sector as an anti-corruption tool?
Q5	What are the main risks and limitations?
Q4a	How would it be possible to address such risks and limitations?
Q6	How do land information systems need to be designed to support anti-corruption?
Q7	How would you measure the performance and impact of open data, information systems and transparency initiatives on corruption in the land sector?
Q8	What can be done in order to increase the effectiveness of open data, information systems and transparency initiatives as anticorruption tools in the land sector?
Q9	What are the main gender issues to be considered when looking at land-related data, information systems & corruption?
Q10	What are the current and future trends for open data, information systems and anti-corruption in the land sector?
Q11	Can you think of any specific open data, information system and transparency initiative or project aiming at combatting corruption in the land sector?
Q11a	Who implemented the project(s) [contacts, links, info, …]?
Q11b	Where?
Q11c	When?
Q11d	Was/Is it successful or not? Why?

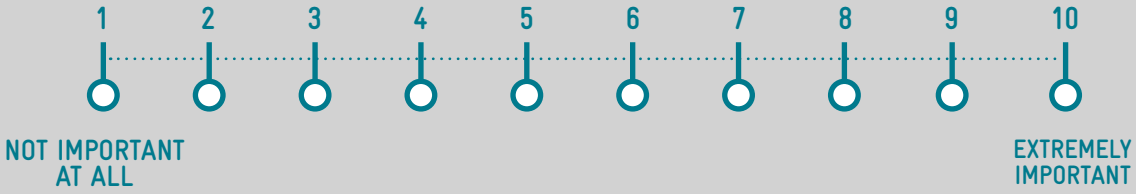
Figure 2 – Survey and interview design

QUESTIONNAIRE I INTERVIEW STRUCTURE

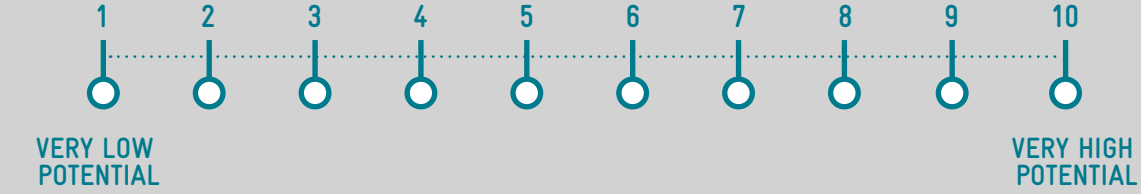
Part II: Measuring perceptions (Likert scale)

Core perception questions

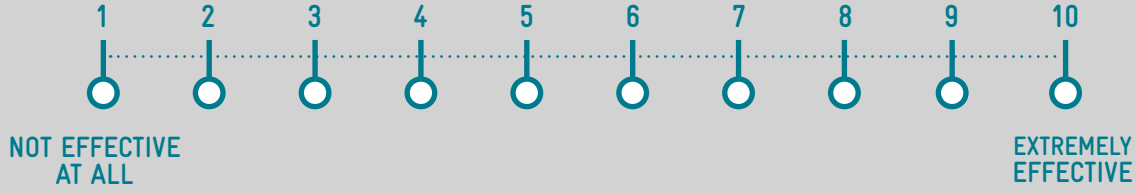
Q12 On a scale from 1 to 10 like the one displayed below, how would you rate the **importance** of open data, information systems and transparency initiatives in counteracting corruption in the land sector?



Q13 On a scale from 1 to 10 like the one displayed below, how would you rate the **potential** for open data to work as an anti-corruption tool in the land sector?



Q14 When you think about existing land-related open data, information systems and transparency initiatives, how **effective** – in practice – are these initiatives in counteracting land corruption? Please refer to the scale displayed below.



Source: Authors' elaboration

We identified 70 key respondents and 38 of them accepted to take part in the interviews. Given the political sensitivity of corruption-related issues, all respondents were granted full anonymity and were asked for their informed consent beforehand. All interviews were conducted online and recorded, but the content of each conversation was then transferred into anonymous transcripts.

With more than 21 hours of recordings, the survey provided a unique set of data, information, experiences and – sometimes conflicting – perspectives as regards the use of open data and information systems as anticorruption tools in the land sector. Such an enormous amount of evidence collected through the interviews required a second phase of desk-based research, in order to validate, triangulate, analyse and further elaborate the additional information collected.

In this research we analysed all materials gathered by means of the desk-based research and the expert survey by organising the findings along two major lines of enquiry, highlighting consensus on the one hand, and on the other, existing controversies related to the use of open data and ICTs as anticorruption tools in the land sector. Finally, by carefully balancing areas of general consensus and controversial issues, and by looking at best practices and potential solutions, we produced a set of practical recommendations.

THE BACKGROUND: OPEN DATA AND CORRUPTION IN LAND GOVERNANCE

The Extractive Industry Transparency Initiative (EITI) – arguably the most famous international transparency initiative related to natural resources – adopted an open data policy from the early stage, with 95% of its data currently available in open data format[2]. Officially launched in 2002, the EITI currently includes 54 countries implementing the EITI Global Standard, which promotes the open and accountable management of oil, gas and natural resources in order to reduce corruption in natural resource management and to promote sustainable development[3]. It received over US$6.7 million from 91 supporters – including governments in implementing countries, international development partners, financial institutions and private companies – in 2019 alone[4].

According to Le Billon, Lujala and Rustad (2020, p. 1): 'The EITI is generally considered a success story, given the large number of resource-dependent governments that have committed to it and the vast support it has received from donors, non-governmental organisations (NGOs), and extractive industry companies. Yet, after more than a decade of implementation, many researchers, practitioners, donors, and decision-makers are asking what the EITI's impact on resource governance and development has been so far, and whether the EITI assumption that information disclosure brings about change is indeed valid. As a result, donors, practitioners, and many of the studies evaluating the EITI have called for an explicit Theory of Change (ToC) as it could help understand how the EITI is expected to result in better extractive sector governance and improved development in participating countries.'

If EITI has committed to develop a detailed ToC in 2020, measuring the impact of open data as an anticorruption tool is still a challenge in many sectors and countries, and a number of researchers and organisations have recently started to explore in greater depth the causal link between open data, transparency, anticorruption and development (Lujala, 2018; Lujala, Brunnschweiler and Edjekumhene, 2020). This report adds to this line of enquiry with a specific focus on open data and (anti)corruption in land governance. The following section initially explores the concepts open data and corruption separately, contextualising them within the land governance domain. It then joins these concepts up again, laying down the theoretical and practical background of using open data as an anticorruption tool in the land sector.

Open Data and Land Governance

According to the Open Definition[5], open data are data that 'anyone can freely access, use, modify, and share for any purpose (subject, at most, to requirements that preserve provenance and openness'. Therefore, the idea of open data – which, at the same time, is derived from and contributes to *open knowledge*[6] – refers to the concepts of data availability, accessibility and (re)usability for everyone, but also to the need for traceability, especially in terms of the acknowledgement of original data sources and methods. Since the early 2000s, the legal and policy framework has evolved dramatically both at the national and at the international level, fostering the adoption of open data principles and promoting the implementation of open data initiatives, especially in the public sector (Attard et al., 2015; Welle Donker and van Loenen, 2017; Adam and Fazekas, 2018). Some examples in this sense are the European Public Sector Information (PSI)[7] Directive in 2003, the Open Government Partnership[8] (OGP) and the President Kibaki Kenya Open Data Initiative[9] in

2 See the EITI Global Factsheet released in October 2020. The EITI Factsheet is available online at: https://eiti.org/files/documents/en_eiti_factsheet_2020.pdf (last accessed on 25/01/2020).

3 ibid.

4 See the 2019 EITI Annual Accounts and Q1 2020 Forecast, which can be accessed online at: https://eiti.org/files/documents/board_paper_46-8-a_2019_eiti_annual_accounts_and_q1_2020_forecast_0.pdf (last accessed on 20/09/2020).

5 See the Open Definition 2.1, available at: http://opendefinition.org/ (last accessed on 30/08/2020).

6 See the full Open Definition 2.1, available at: https://opendefinition.org/od/2.1/en/ (last accessed on 30/08/2020).

7 The PSI Directive, formally 2003/98/EC, was subsequently amended by Directive 2013/37/EU of the European Parliament. Available on-line: https://eur-lex.europa.eu/eli/dir/2013/37/oj (last accessed on 31/08/2020).

8 See: https://www.opengovpartnership.org/ (last accessed on 31/08/2020).

9 See: https://www.opendata.go.ke/ (last accessed on 31/08/2020).

2011, the President Obama Executive Order on Open and Machine-Readable Government Information[10] in 2013 and the Open Data Charter[11] in 2015.

ICTs and open data are inherently connected, as the practical implementation of open data systems relies on digital infrastructures and web-based ICTs (Davies and Fumega, 2014; Zuiderwijk, Janssen and Davis, 2014). Open data systems are flexible and can be adopted for various different purposes, producing a range of advantages for actors in government, public administration, private sector, civil society and the general public (Davies and Fumega, 2014). There are both direct and indirect social and economic benefits associated with open data. Social benefits are primarily connected with greater transparency and accountability, with enhanced participation and engagement, as well as with better informed policy and decision-making. Economic benefits are typically related to greater efficiency in public service provision and to innovation-led economic growth and development. For instance, a report commissioned by the European Commission estimates that the open data economy in the EU28+ is worth €325 billion in the period 2016-2020, hosting about 100,000 open data jobs and producing over €1.7 billion in cumulated cost savings for public administrations in EU member states (Carrara et al., 2015). Another study published in 2013 by the McKinsey Global Institute reports that thanks to open data 'an estimated $3 trillion in annual economic potential could be unlocked across seven domains', and that such potential value 'would be divided roughly between the United States ($1.1 trillion), Europe ($900 billion) and the rest of the world ($1.7 trillion)' (Manyika et al., 2013, p. 6).

Despite the emphasis put on the social rewards derived from open data, it is usually harder to quantify the direct and indirect impacts of open data and ICTs in terms of increased transparency, accountability and participation (Bertot, Jaeger and Grimes, 2010; Granickas, 2013; Trapnell, 2015). Open data are increasingly seen as a key ingredient in the fight against corruption (Granickas, 2014; Attard *et al.*, 2015; Warsaw, 2015; OECD, 2017), but there are multiple ways in which open data and ICTs can be designed and used in order to increase transparency. Open data can promote both *upward transparency* – when, say, the government can observe better citizens' behaviour – and *downward transparency* – when, on the other hand, citizens can better observe the behaviour, actions and performance of government members and public officials (Heald, 2006). Upward and downward transparency allow for different forms of surveillance and have different – and sometimes opposite – implications in terms of their impact on corruption. Most importantly, Davies and Fumega (2014, p. vi) highlight that: 'The impact of ICTs for anti-corruption is shaped by citizen engagement in a local context. Whether aimed at upward or downward transparency, the successful anti-corruption application of an ICT relies upon citizen engagement. Many factors affect which citizens can engage through technology to share reports with government or act upon information provided by government. ICTs that worked in one context might not achieve the same results in a different setting'.

Similarly, the link between open data and accountability goes in two directions: on the one hand, open data represent a cost-effective and time-saving way for citizens and businesses to hold the government accountable in their operations, for instance by providing additional scrutiny over public procurement and contracts. On the other hand, open data supports public authorities in holding private companies and individuals accountable for their actions, contributing – among other things – to the identification of instances connected with tax avoidance and tax evasion. The former is often referred as *vertical accountability*, while the latter is also known as *horizontal accountability* (Trapnell, 2015).

There are a number of constraints, risks and limitations that not only prevent the adoption of open data and the realisation of the full benefits associated with it, but also might potentially generate negative socio-economic impact (Zuiderwijk and Janssen, 2014). The key obstacles faced by open data and information systems are often interrelated, but they can be grouped into six main categories which include *political, organisational, financial, legal, technical* and *awareness-related* challenges (Berends, Carrara and Vollers, 2017). Political and organisational challenges refer to the lack of will by politicians and decision-makers – both in commercial and non-profit organisations – to adopt and invest in open data and ICTs, as well as to the ability of organisations and public administration to adopt open data principles and implement ICTs at all levels (e.g. from central to local offices). Financial challenges are mainly related to the implementation and maintenance costs of open data. Indeed, while open data might be often free of charge for final users, they nevertheless require important initial investments and financial sustainability in the long run. *Technical challenges* generally include issues related to

10 See: https://obamawhitehouse.archives.gov/the-press-office/2013/05/09/executive-order-making-open-and-machine-readable-new-default-government- (last accessed on 31/08/2020).

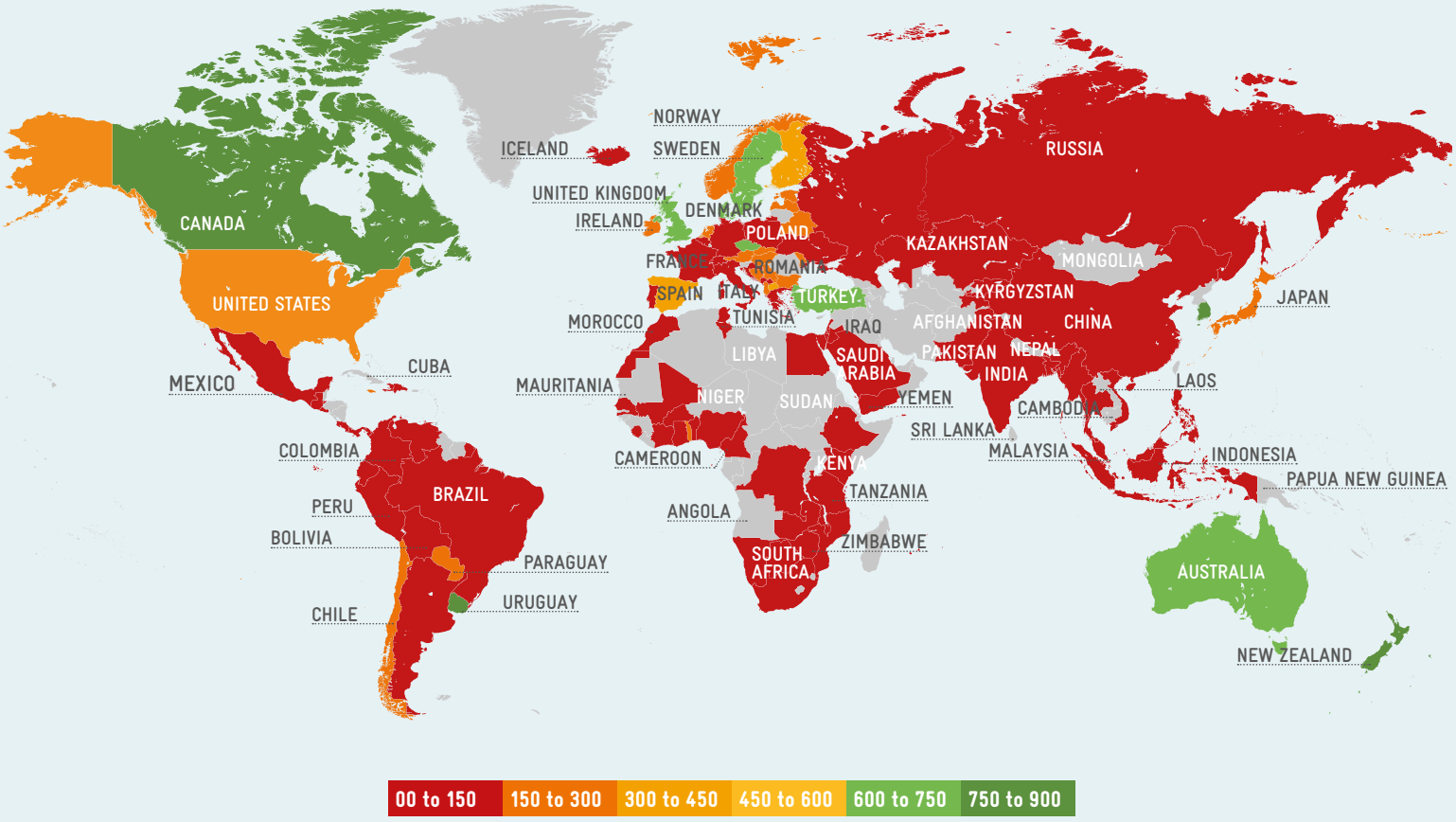
11 See: https://opendatacharter.net/wp-content/uploads/2015/10/opendatacharter-charter_F.pdf (last accessed on 31/08/2020).

the quality, accuracy and timeliness of the data, but also the gaps in the implementation of harmonised standards, the use of inadequate digital infrastructures, and the lack of professional expertise and know-how. *Awareness-related challenges* reflect the disconnect between who implements, produces and maintains open data and information systems, and the range of potential final users and beneficiaries, as they might not know the existence of such systems, or they might not be able to properly access and use them, with potential risks of misuse and misinterpretation of data. Finally, *legal challenges* comprise risks such as potentially breaking legislations, violations of privacy and controversies in determining data ownership. The tension between transparency, privacy and security – especially when it comes to the disclosure of sensitive personal data, political information, financial and corporate documents – has received much attention (Janssen and van den Hoven, 2015; Green et al., 2017; Hulstijn, Darusalam and Janssen, 2017; Scassa, 2019). In the land sector, the risk that open data, social media and other ICT systems containing sensitive information might be (mis)used (for instance for surveillance, smear campaigns and retaliation) against activists, land rights defenders and vulnerable communities, has been repeatedly acknowledged (Global Witness, 2019; Swedwatch, 2019).

When it comes to open data in the land sector, it must be noted that there are a number of potentially relevant – distinct but interrelated – data and information needs, reflecting the complexity, interdependence and number of issues typically associated with land governance. For instance, for land ownership data there are at least 4 different domains of information that needs to be considered, namely i) *cadastres and land registries*, ii) *land concessions, large-scale land acquisitions and long-term leases*, iii) *land use and land use change*, and iv) *land governance and institutions* (Davies and Chattapadhyay, 2019). However, despite the multiplication of information sources in recent years, land ownership data are rarely open and accessible. Figure 3, which is based on data from the 4th edition of the Open Data Barometer (ODB), provides empirical support to this claim (Open Data Barometer, 2017). The ODB is a composite index that ranks how well the different countries are producing, disseminating and using open government data. When we turn our attention to one specific component of the ODB, which evaluates the openness of land ownership data, the great majority of countries score very poorly – between 0 and 15 out of 100, as shown in the map in Figure 3. Moreover, the level of openness of land ownership data lags behind all the other 15 categories of data assessed in different editions of the ODB, with just 1% of the governments publishing open land ownership data in 2016 – as shown in the table reproduced in Figure 3 (p. 18), below the map. A study jointly published by Transparency International and the World Wide Web Foundation on open data for anticorruption reaches a similar conclusion, and whilst recognising the importance of open beneficial ownership records for land, properties and other assets, it also highlights how none of the countries analysed had such a registry in place (Vrushi and Hodess, 2017).

The lack of transparency and openness in land information systems, together with the presence of overlapping and sometimes conflicting tenure systems (e.g. customary versus official tenure regimes) in many countries all over the world (RRI, 2015; De Maria, 2019), creates a perfect environment for corruption to thrive in many areas related to land governance (Chiodelli and Moroni, 2015; De Schutter, 2016; Jaitner, Caldeira and Koynova, 2017; Zúñiga, 2018). With this in mind, there are still numerous examples suggesting that when land data is made available in an effective way – and possibly in combination with other sources of information related to agriculture, taxation, legal frameworks, company ownership, etc. – it can generate substantial value added for society, when actively used for research, investigative journalism, community planning, business decisions and policy-making (Chibamba et al., 2019; Davies and Chattapadhyay, 2019; Ferris, Pichel and Sorensen, 2020; Jaitner, Shilling and Matthaei, 2020). For instance, in 2005 Denmark released an open access address dataset, harmonising and making available free of charge information on the GPS coordinates for all addresses in the country. A few years later, in 2009, the direct financial benefits deriving from the Danish open address dataset were estimated at €64 million, with a total cost of about €2 million (Mcmurren, Verhulst and Young, 2016). The release of the open address dataset benefited a wide range of actors in the country, including citizens, firms and public authorities: it increased the efficiency of Post Denmark in the delivery of its services; it enhanced the response of emergency services thanks to improved accuracy in identifying the exact location of emergencies; it allowed for the harmonisation of address records between local municipalities, the Cadastre, the Land Registry, and different utilities and energy providers; finally, it promoted growth and innovation, with more than 500 new digital applications – ranging from GPS car navigation systems to geo-marketing tools – using the open address dataset by 2009 (*ibid*.).

Figure 3 – Open land ownership data in the world according to the Open Data Barometer



DATASETS	4th ed % OF OPEN DATASETS PUBLISHED BY ALL GOVERNMENTS	3rd ed	2nd ed	1st ed
BUDGET	10% ↓	18% ↑	13% ↑	9%
COMPANY REGISTRIES	5% ↑	1% ↓	3% ↓	4%
SPENDING	3% ↑	2% ↓	9% ↑	6%
CONTRACTING	3% ↓	8% ↑	6%	N/A
LAND OWNERSHIP	1% ↓	5% ↑	3% ↓	4%

Table 4: % of governments publishing fully accountability related datasets for the different editions of the Barometer.

Source: Map – Authors' elaboration based on the 2016 calculated score for 'D2 – Land' from the 4th ed. of the Open Data Barometer Report (Open Data Barometer, 2017). This score is calculated over an index ranging from 0 to 100, where 100 reflects the maximum level of openness for a dataset; Table – Reproduced from the 4th ed. of the Open Data Barometer Report (Open Data Barometer, 2017, p. 18).

Corruption and Land Governance

Corruption, with its many faces, inflicts a wide range of social, political, environmental and economic costs on individuals and on the society as a whole. According to Transparency International (Transparency International, 2020), corruption can be defined as 'the abuse of entrusted power for private gain. Corruption erodes trust, weakens democracy, hampers economic development and further exacerbates inequality, poverty, social division and the environmental crisis. Exposing corruption and holding the corrupt to account can only happen if we understand the way corruption works and the systems that enable it'. It is estimated that different forms of corruption – including bribery, misappropriation, tax elusion and money laundering – cost an astonishing $1.26 trillion a year to developing countries alone (Fleming, 2019), which is a figure greater than the entire GDP of Mexico in 2019[12].

Several studies explored the specific risks and the peculiar forms of corruption in natural resource management and in land governance (Le Billon and Williams, 2017; Zúñiga, 2018; Tacconi and Williams, 2020). For instance, there are three predominant forms of corruption in land-use planning: *legislative corruption, bureaucratic corruption* and *public works corruption* (Chiodelli and Moroni, 2015). *Legislative or regulatory corruption* refers to the practice of influencing legislators – for instance with bribes, gifts, exchange of favours and lobbying – in order to amend or pass laws and regulations, so as to produce private gains that would not materialise otherwise for given individuals or groups. *Bureaucratic corruption* pertains to cases where firms, groups or individuals put pressure on or provide illicit incentives to public officials in land administration offices, in order to speed up procedures, obtain permits or receive services they would not normally be entitled to. Finally, *public works* corruption refers to illegal practices aiming at influencing decisions related to public procurement and contracting over public infrastructures and other services related to land use and land administration[13].

Corruption in the land sector affects both urban and rural areas, and disproportionally hits vulnerable and marginal groups in society – including women, indigenous people, minority groups, youth and poor people; it can reduce the ability of small-scale farmers to increase agricultural productivity, therefore undermining the achievement of food security goals, both globally and locally; it can contribute towards restricting access to land for specific groups, with adverse impacts especially on those who rely on this vital resource for their livelihood; it can provide perverse capital incentives, favouring land investments that can damage local ecosystems and populations; it can exacerbate gender inequalities, favouring gendered forms of discrimination in land inheritance and land titling registration, and increasing women's vulnerability to bribing, harassment, violence, extortion and sextortion; it can lead to fundamental human rights violations, with unlawful expropriations, forced evictions, displacement and violence against indigenous people and local communities, and slave labour in agriculture and other extractive industries. Finally, land corruption may lead to social unrest, land conflicts and land dispute across the world, following issues such as forgery of land certificates, multiple allocation of the same land parcel and land grabbing. (Richardson, 2004; Wehrmann, 2008; De Schutter, 2016; Randria Arson *et al.*, 2018; Zúñiga, 2018; Tacconi and Williams, 2020).

Examples of land corruption – in many different forms and at all levels – have reached the headlines all over the world. For instance, Global Witness exposed how, in Myanmar, actors from the private sector, politics and the military colluded to confiscate land from ethnic minority villagers during the national privatisation programme in 2006 (Global Witness, 2015). While militaries and politicians retained control and then leased large portions of the confiscated land to private companies that have now established commercial rubber plantations, local communities have lost their main source of livelihood, without being consulted and with very little or no compensation at all (*ibid.*). More recently the *Financial Times* has covered the corruption and money laundering scandal involving the Iranian development of luxury houses and villas in Basti Hills – Tehran's Beverly Hills[14]. The former deputy aide Akbar Tabari is standing trial, accused of having established a criminal network to influence court decisions, forge documents and facilitate money laundering in return for bribes and properties in Basti Hills, in an effort to control the whole land and real estate market in Lavasan county – the area where the exclusive neighbourhood is located.

12 According to the World Bank, Mexico was the 15th world economy based on GDP, with $1.258 trillion (current US$) in 2019. See: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD (last accessed 31/08/2020).

13 The Global Infrastructure Anti-Corruption Centre (GIACC) compiled a long list of practical examples of corruption in infrastructure: https://giaccentre.org/chess_info/uploads/2019/10/GIACC.CORRUPTIONEXAMPLES.pdf (last accessed 02/09/2020).

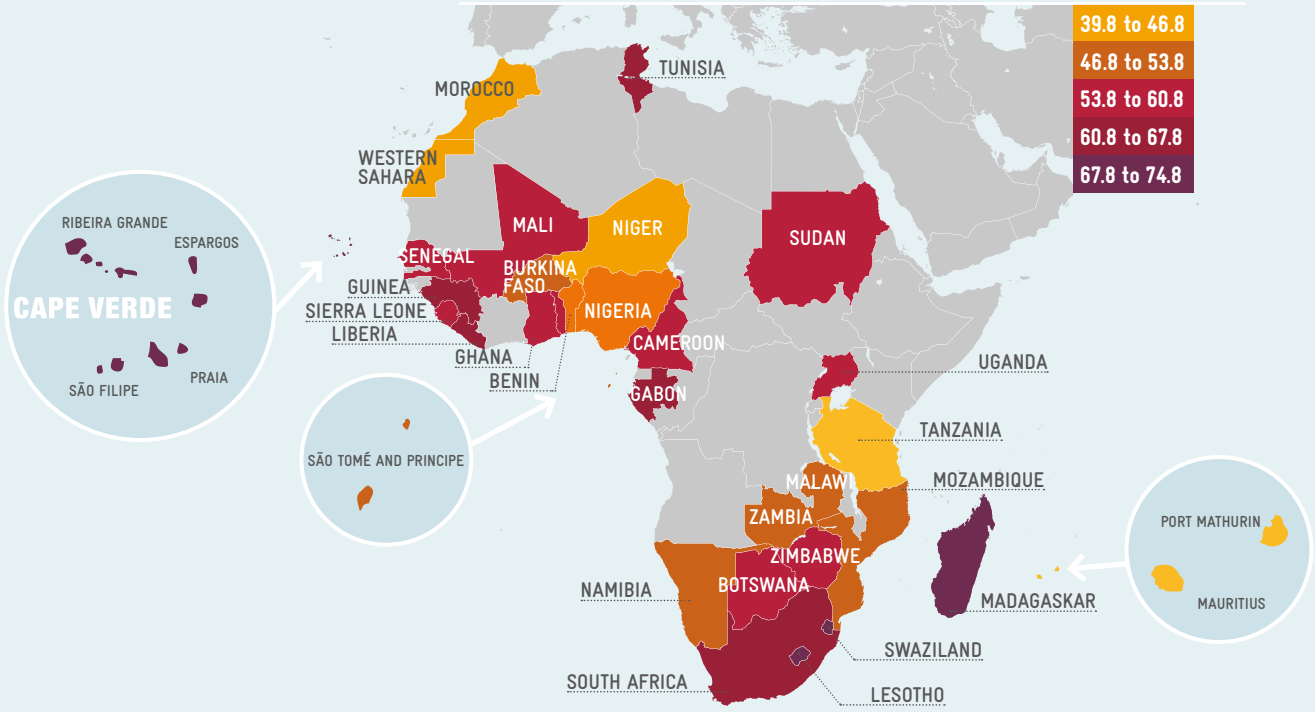
14 See: https://www.ft.com/content/b787b7e8-e9a0-4b39-b35e-64b6019f8c5a (last accessed 21/09/2020).

While the existing metrics of corruption specific to the land sector are fragmented and incomplete, they still provide some important insights. For instance, in the introductory section, we already mentioned how – in the latest round of the Afrobarometer opinion poll – almost two in three respondents reported that it is very likely that a rich person could pay a bribe or use personal connections to get away with registering land that is not theirs (Afrobarometer, 2019). The same survey suggests that ordinary persons – as opposed to rich people – are much less likely to pay bribes and use personal connections in order to register land (*ibid.*), therefore highlighting how land corruption also embodies an income inequality dimension.

Some of the existing measures of land corruption are reproduced in Figure 4. Landex[15], a composite land governance index promoted and developed by the partners of the International Land Coalition (ILC), developed a country-level indicator measuring perceptions of land corruption (Landex Indicator 8c) in collaboration with Transparency International (TI) and using Afrobarometer data. The indicator, which reflects the likelihood that a bribe could be paid in order for someone to register land that is not theirs, is currently available only for 33 African countries and its distribution is represented in the map in Figure 4. On average, the indicator scores 58.9 out of 100 – where 100 represents the highest incidence of land corruption – and suggests that corruption in the land sector is generally perceived as a pervasive problem in the surveyed countries. Mauritius (39.8), Tanzania (43.3), Niger (46.4) and Morocco (49.9) are the only countries scoring below 50 for this indicator, while data for Lesotho (70.6) and Eswatini (74.8) suggests that over 70% of respondents in these countries believed that it is likely or very likely that their fellows citizens pay bribes and use personal connections to register land that is not theirs.

TI's Corruption Barometer (see the bar chart on the right-hand side, Figure 4) shows how the prevalence of corruption in the land sector is higher when compared to other public services, estimating that globally more than 1 in 5 people have paid a bribe for land-related services (Transparency International, 2013). Recent data from Prindex – which measures perceptions of tenure insecurity in 140 countries – provide empirical support for the existence of a strong link between corruption and land rights, suggesting that higher levels of perceived tenure insecurity tend to be observed in parallel with greater corruption, as well as with weaker institutions and lower levels of economic and human development (Prindex, 2020).

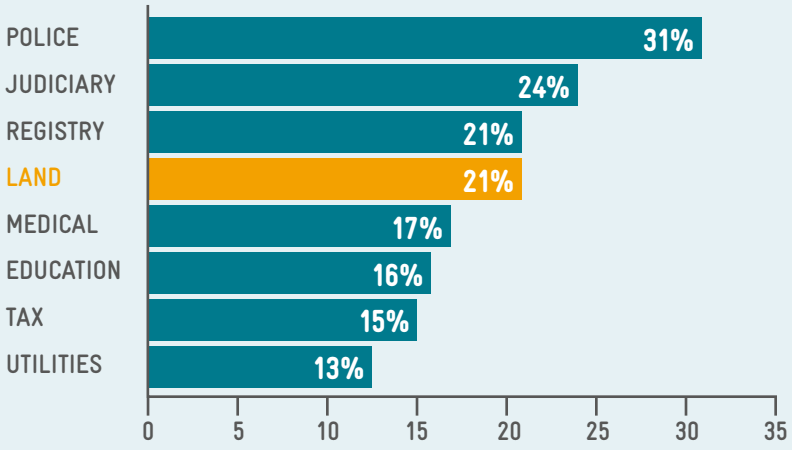
Figure 4 – A selection of quantitative measures of land corruption



Source: Map – Authors' elaboration based on Landex indicator 8c, 'Corruption in the land sector' (International Land Coalition, 2020), where higher values reflect higher levels of land corruption.

15 For more information on Landex see: https://www.landexglobal.org/en/about/ (last accessed on 31/08/2020).

Figure 4 – A selection of quantitative measures of land corruption



2013 Global Corruption Barometer

Percentage of people who have paid a bribe to each service (average across 95 countries*)

In the past 12 months, when you or anyone living in your household had a contact or contacts with one of eight services, have you paid a bribe in any form?

* Data from the following countries was excluded due to validity concerns: Albania, Azerbaijan, Brazil, Burundi, Fiji, France, Germany, Lebanon, Luxembourg, Malawi, Russia and Zambia.

Source: Bar chart – reproduced from the 2013 Global Corruption Barometer (Transparency International, 2013, p. 11)

Using Open Data as an Anticorruption Tool in the Land Sector

As previously noted, there is a growing consensus on the use of open data and other open ICTs as important tools to counteract and expose corruption (Grönlund et al., 2010; Rajshree and Srivastava, 2012; Granickas, 2014; Goodrich, 2015; Open Data Charter, 2018; Kossow, 2020). According to Davies and Fumega (2014), whether ICTs such as open data can achieve anti-corruption benefits depends on a variety of factors, such as the specific design and implementation of the open data system, the nature of the incentives promoting its adoption among different stakeholders and the specific context of application – with a range of specific challenges to be addressed in low and middle-income countries (Adam and Fazekas, 2018).

The G20 Anticorruption Open Data Principles[16], adopted in 2015, affirm that:

'Open data can help prevent and tackle corruption, according to national law and experiences, by shedding light on government activities, decisions, and expenditures; as well as increasing levels of accountability, allowing citizens and government to better monitor the flow and use of public money within and across borders. Open data can facilitate this by, in particular:

- **Following the money**: showing how and where public money is spent, which provides strong incentives for governments to demonstrate that they are using public money effectively;
- **Open contracting**: allowing advanced search, analysis and understanding of public procurement processes, through the increased disclosure of reusable data in machine readable formats around procurement's whole lifecycle, including planning, tendering, award, implementation and evaluation stages, in accordance to national laws and regulations, as well as national capabilities.
- **Changing incentives**: by modifying corruption-prone environments, and preventing regulatory capture, conflict of interest, and lobbying and revolving door opacity, through transparency and the increased monitoring of government affairs from all sectors of society; and,
- **Enabling cross sector collaboration**: supporting governments, citizens, and civil society and private sector organizations to collaborate on the design of policies to prevent corruption and increase government integrity.'

While the points made in the excerpt above might seem common sense to many people, quantitative assessments over the impact of open data systems on corruption remain extremely scarce. There is some preliminary evidence of a positive correlation between corruption and open data (Granickas, 2014; Machova, 2017), so that lower levels of corruption tend to be associated with higher prevalence of open data and information systems. However, the causal link – that is, whether open data is allowing for lower levels of corruption, or vice-versa – still needs to be investigated further, especially considering the wide range of additional factors that might influence, on the one hand, the diffusion of open data and, on the other hand, the severity of corruption-related issues in different contexts and sectors.

16 Available at: http://www.g20.utoronto.ca/2015/G20-Anti-Corruption-Open-Data-Principles.pdf (last accessed on 02/09/2020).

To the best of our knowledge, there is currently no quantitative assessment – or agreement over a specific metric – for the impact of open data, information systems and transparency initiatives on corruption in the land sector. However, interest in this topic is rapidly growing, together with the confidence that this approach could effectively counteract land corruption and contribute to sustainable land governance. Compared to only few years ago, when seminal land-focused open data and transparency initiatives started to be conceived (Locke, 2013; Locke and Henley, 2013), there is today an unprecedented wealth of open data and information that can be used to measure progress over better land governance and to assess impacts on land corruption. Initiatives such as, but not limited to, the Land Portal[17], Prindex[19], Landex[19], Open Land Contracts[20], Land Matrix[21], Who Owns England[22], TI's Global Corruption Barometer[23], the Sustainable Development Goals[24] and the Open Data Barometer[25], together with a number of new national-level digital land information systems[26], are today more than ideas, and are based on several years of experience, collaboration and learning.

The next section examines some of the initiatives that work at the intersection between open data, land governance and anticorruption, and analyses the outcome of over 1,280 minutes of recordings of individual conversations with a unique panel of sectoral experts. The result of this exercise brings us on a journey that reviews the key perceptions, the main trends, as well as the opportunities and challenges that characterise a field that is rapidly transitioning towards a more mature phase.

17 See: https://landportal.org/ (last accessed on 02/09/2020).

18 See: https://www.prindex.net/ (last accessed on 02/09/2020).

19 See: https://www.landexglobal.org/en/ (last accessed on 02/09/2020).

20 See: https://www.openlandcontracts.org/ (last accessed on 02/09/2020).

21 See: https://landmatrix.org/ (last accessed on 02/09/2020).

22 See: https://whoownsengland.org/ (last accessed on 02/09/2020).

23 See: https://www.transparency.org/en/gcb (last accessed on 02/09/2020).

24 See: https://www.un.org/sustainabledevelopment/ (last accessed on 02/09/2020).

25 See: https://opendatabarometer.org/ (last accessed on 02/09/2020).

26 The likes of LINZ – Land Information New Zealand: https://www.linz.govt.nz/ – last accessed on 02/09/2020) and NLISU – National Land Information System Uganda http://ugnlis.go.ug/ – last accessed on 02/09/2020).

PRODUCING NEW EVIDENCE: KEY FINDINGS AND RESULTS

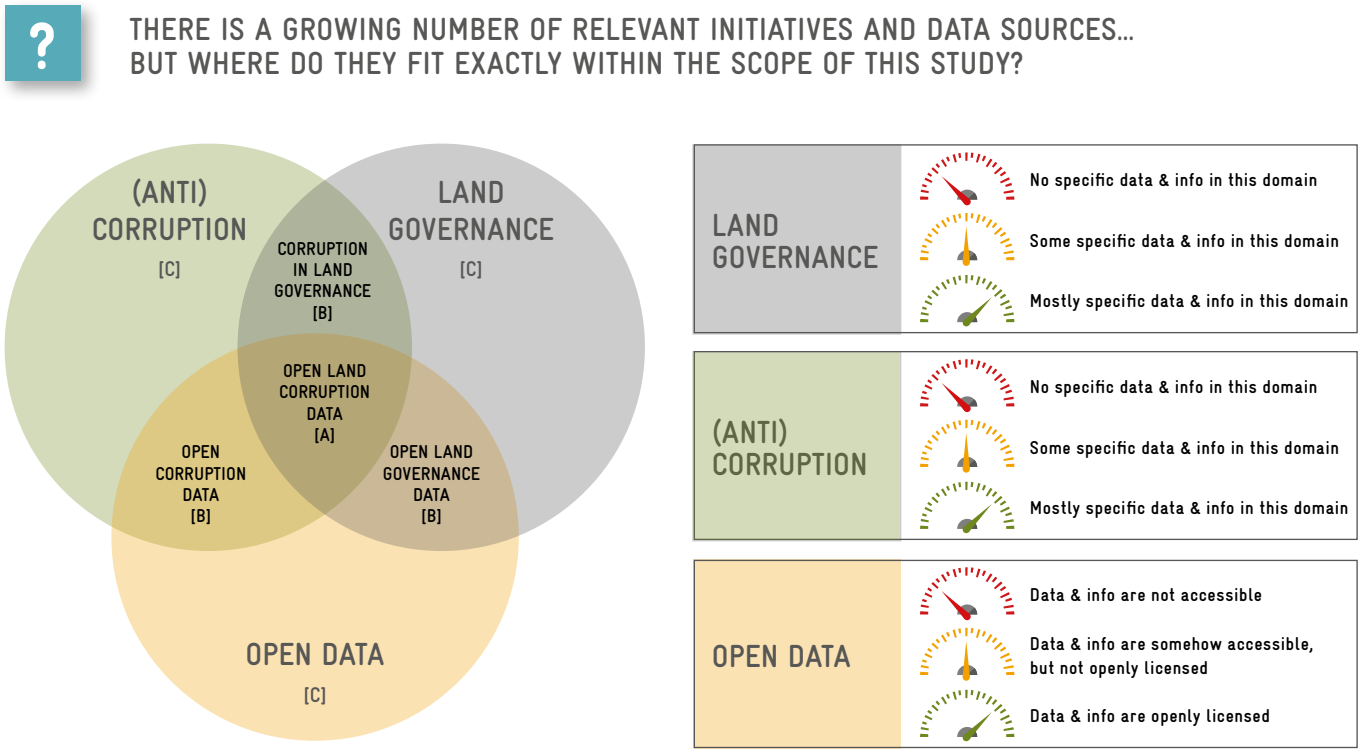
Measuring Impact

The necessary premise to be made here is that measuring the outcome of open data and transparency initiatives related to land corruption is difficult, because it requires retracing causal relations over a long and complex chain of evidence, whilst taking into account also all other external factors that might potentially influence the evolution of corruption and open data dynamics in the land sector. Despite the proliferation of measurement approaches on the impact of open data (Lämmerhirt, Rubinstein and Montiel, 2017; Open Data Barometer, 2017; De Souza, Luciano and Wiedenhöft, 2018; Lafortune and Ubaldi, 2018; Blank et al., 2019; Open Data Watch, 2019), the main challenge remains tracking data reuse consistently, as it is hard to monitor how a wide range of final users are employing the data and what is the end result of their operations. Regarding corruption, it must be noted that this is typically done in secrecy, behind closed doors, which makes measuring it and following its evolution over time intrinsically difficult (Kaufmann, Kraay and Mastruzzi, 2011; Trapnell, 2015; Trapnell, Jenkins and Chêne, 2017).

By combining results from the desk-based research and the interviews, two key findings emerged and will be discussed more in detail in this section: firstly, despite the increase of data and information providers, it remains inherently difficult to measure the actual anti-corruption impact of existing open data and transparency initiatives in the land sector; secondly, while recognising the importance of such initiatives and some positive impacts, the experts we got in touch with believe that these initiatives can (and should) increase their anticorruption impact on the ground.

In the previous section we discussed the current scarcity of methodologies and actual appraisals specifically looking at the impact of open data, information systems and transparency initiatives on land corruption. At the same time, our research revealed the existence of a growing and unparalleled amount of potentially relevant data and information sources, which are – at least to some extent – openly accessible, machine-readable and reusable. In order to move forward from this deadlock, we produced – based on both the existing literature and the suggestions collected from the expert survey – a specific analytical framework (Figure 5) which helps position different programmes across the multidimensional spectrum of this research.

Figure 5 – Analytical framework: understanding open data in land governance as an anticorruption tool



Source: Authors' elaboration

Ideally, measuring impact in this specific area would require *open land corruption data*[27] – that is, open data that captures variations in the level of land corruption over time and across different geographies. In the absence of such a – very particular – source of information, it might be possible to identify, as a second best, proxies combining *land corruption metrics* (which might not be open or related to open data), open corruption data (which might not be land-related) and *open land governance data* (which might not capture land corruption)[28]. The least desirable situation would be to have distinct measures for land governance, corruption and open data with no overlap whatsoever with any of the other domains[29].

Following this analytical framework, the various initiatives more frequently mentioned in the literature and in the interviews were classified based on their affinity with each one of the three domains of interest – namely, *open data, land governance* and *(anti)corruption*. The simple criteria used for this classification are reported on the right-hand side of Figure 5, while the classification itself is shown in tabular form in Figure 6. In particular, for the *land governance* and for the *(anti)corruption* domain we used a traffic light system, where a red indicator shows that – for a given source of information – there is no domain-specific data or information; a yellow light indicates that some domain-specific data and information exists; and, finally, a green light reveals that the analysed source mostly contains domain-specific data and information. The same traffic light system was applied to the *open data* domain, but this time the focus was on data accessibility, so that a green light indicates the presence of an open data licence; the yellow light means that data and information are accessible and downloadable – at least to some extent – online and free of charge, but with no specific open licence (or, in some cases, with no licence at all); the red light designates sources for which we were unable to access, download or visualise the data. Similar methods have been already successfully used to assess the information landscape with regard to land governance and open data (Davies, Perini and Alonso, 2013; Mey et al., 2019a, 2019c, 2019d, 2019b), but some inherent limitations have to be acknowledged. In particular, this approach is inevitably incomplete and involves a degree of subjectivity. Nevertheless, this exercise also provides some original and useful insights and helps to better understand the current landscape of information on open data for anticorruption.

A series of important conclusions can be drawn by looking at the full classification reported in the next page, in Figure 6. Firstly, none of the initiatives assessed obtained a green light in all three areas, suggesting that there is no one-size-fits-all yardstick for measuring the impact of open data on anticorruption. Secondly, we found that one in three initiatives assessed does not currently have an open data licence, even if the majority of them make it possible to access and download the data. If the lack of an open licence might reflect a deliberate choice, as it is the case for Timby, which protects the identity of its users so as to facilitate reporting of corruption instances by reducing the risk of retaliation, in other cases it produces uncertainty for final users, as the reuse of the data might not be clearly regulated. Thirdly, corruption – let alone corruption in the land sector – appears to be the domain where it is harder to find specific data, implying that more metrics and information are needed to fully capture its magnitude and evolution over time. Fourthly, in spite of the typically limited coverage of different sources in terms of time and space, there is growing potential for complementarity and comparability across the different initiatives, as different sources can be combined to produce a better representation of the situation on the ground. Practical examples in this sense already exist. For instance, Landex is an index that combines different sources in order to produce a better representation of different dimensions of land governance, and the land corruption indicator used in Landex comes from the collaboration between ILC, Transparency International and Afrobarometer.

27 See the area labelled as [A] on the left-hand side diagram in Figure 5.

28 See the areas labelled [B] in the diagram in Figure 5.

29 See the areas labelled [C] in the diagram in Figure 5.

Figure 6 – Positioning existing initiatives between open data, land governance and (anti)corruption.

SOURCE	OPEN DATA	LAND GOVERNANCE	(ANTI) CORRUPTION
AFROBAROMETER			
CADASTA			
CORRUPTION PERCEPTION INDEX			
GLOBAL CORRUPTION BAROMETER			
GLOBAL OPEN DATA INDEX			
FAOSTAT			
LAND MATRIX			
LAND MARK			
LAND PORTAL			
LANDEX			
MO IBRAHIM INDEX OF AFRICAN GOVERNANCE			
NEW ZEALAND LAND INFORMATION SYSTEM			
OPEN DATA BAROMETER			
OPEN GOVERNMENT PARTNERSHIP			
OPEN LAND CONTRACTS			
PRINDEX			
RESOURCE WATCH			
SUSTAINABLE DEVELOPMENT GOALS			
TIMBY			
WORLD BANK OPEN DATA			
UGANDA NATIONAL LAND INFORMATION SYSTEM			

Source: Authors' elaboration

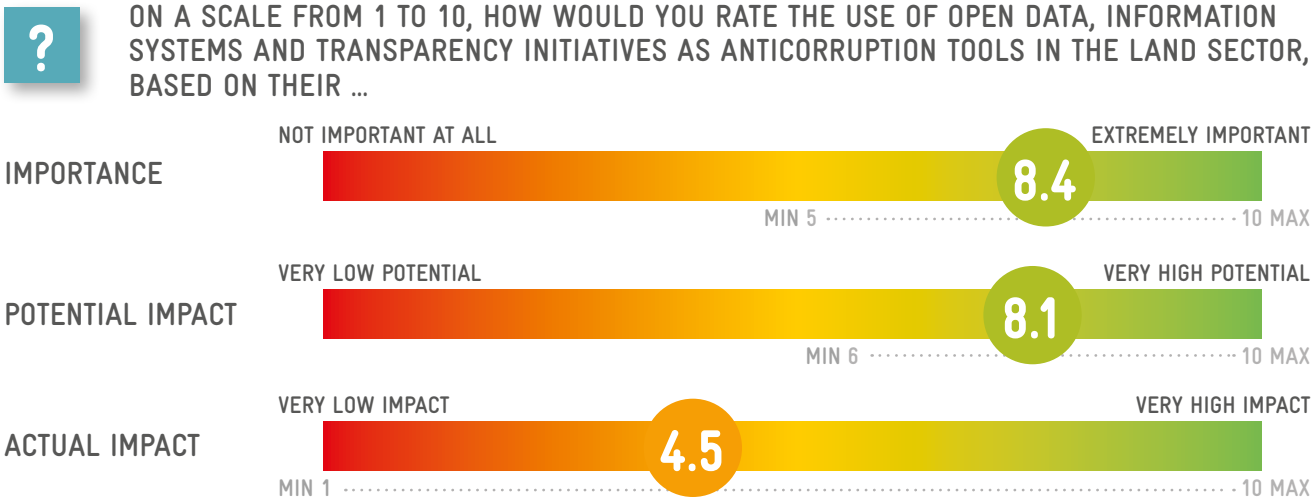
Overall, our research suggests that there are potentially enough information sources to build a country-level baseline for measuring the anticorruption impact of open data and information systems in the land sector. However, a baseline would be only the starting point for measuring impact, as it would be necessary to then track the evolution of land corruption and open land data systems over time. In addition, based on the nature of the sources that we analysed, such a country-level baseline would not capture how different communities and stakeholders are impacted within different regions of a given country. This is a crucial element to be considered when planning interventions, as we previously highlighted how corruption disproportionally hits the most vulnerable and marginalised individuals, including women, poor people and minorities.

While more rigorous research is needed in order to better quantify the impact of open land data and information systems for anticorruption, there are already ways to explore different forces at play and their potential effect in this specific field. Indeed, in recent years there has been a multiplication of efforts to produce studies, manuals and guidelines (Shrubsole, 2017; Trapnell, Jenkins and Chêne, 2017; Open Data Charter, 2018; Zúñiga, 2018; Hart, 2019; Mey and Davies, 2019; Le Billon, Lujala and Rustad, 2020), as well as to collect best practices and success stories and expose corruption in the land sector. For instance, Transparency International collected a series of best practices for combating land corruption in Africa (Chibamba et al., 2019) and gathered effective responses to land corruption issues that negatively impact women (Randria Arson et al., 2018).

Other relevant examples include the work of *Who Owns England?* (Shrubsole and Powell-Smith, 2020), that exposed – just to cite one case – opaque land and property transactions between British councils and offshore companies using open land data (Powell-Smith, 2018), or a study that looked at how the real estate sector in São Paulo attracts the interest of shell companies for money laundering, tax evasion and speculation (Angelico, 2017). One successful case might produce better results than a thousand use cases[30], and it can provide plenty of learning materials and useful indications. However, it must be also noted that it is typically hard to infer the overall impact – and all the potential ramifications – of open ICTs on land corruption from a few isolated examples, especially considering that what worked in one case might not work in different socio-economic, political and cultural settings (Davies and Fumega, 2014; Adam and Fazekas, 2018).

Finally, the expert survey offered additional insights. We asked our respondents to rate – on a scale from 1 to 10 – the *importance*, the *potential impact* and the *actual impact* of open data, information systems and transparency initiatives in counteracting land corruption. The result (Figure 7) highlights a significant gap between the potential impact that these initiatives could achieve and the perceived impact that is currently realised, thus highlighting that there is plenty of room (and need) for improving existing efforts. The following sections of this study try to understand how this gap can be closed, first by identifying areas of general consensus, and then by exploring controversial issues, as well as potential ways to balance divergent views and increase impact.

Figure 7 – Open data and information as anticorruption tools in the land sector: measuring perceptions



Source: Authors' elaboration based on survey

30 Use cases = open data users or cases in which open data have been accessed, used, reused

Exploring (and Exploiting) Consensus

Our analysis looked at the existing literature and at the interviews from two main perspectives. On the one hand, we identified the areas of general consensus, which are discussed in the present section. On the other hand, we recognised and examined a number of recurrent controversies in the field – that is, areas, ideas and perceptions where different publications and experts expressed divergent views. Such controversies, which we have interpreted in terms of the trade-offs between two extreme positions, are discussed in detail in the next section of this report. Balancing these trade-offs, building further consensus and exploiting existing strategic areas of agreement are in our view the most effective ways to reduce the gap between the potential and the actual impact of current open data and transparency initiatives combatting land corruption.

Despite recognising the enormous progress made over the last decade or so, with an unprecedented amount of relevant land governance data and information that increasingly complies with open data standards and principles, the experts we talked to repeatedly indicated that we still lack reliable and complete data in areas where we need them the most. Many reported that cadastres, land registries and asset ownership records are often outdated, incomplete and inaccessible in many countries, especially in the Global South. Similarly, data and information sources on land corruption tend to be partial and fragmented, which makes it hard to identify priority areas for interventions and track progress.

In line with the findings of our desk-based research, all respondents acknowledged the existence of multiple forms of land corruption, with different implications for specific population groups and stakeholders, which vary depending on the socio-economic and institutional traits that characterise each country, region and society. The specific types of land corruption that were most frequently mentioned in the interviews are related to: money laundering and speculation through investments in land and real estate; tax evasion with regard to land and properties; different forms of corruption in land titling and land regularisation programmes, which includes – but are not limited to – bribery, forgery and the exchange of favours for land certificates and other land administration services; elite capture – which involves both traditional and public authorities – of the benefits associated with land use and land access; a wide range of corrupt practices in various phases of the negotiation and implementation of large-scale land deals and investments, which might alter the distribution of the potential benefits for private gain and result in unfair compensation, forced evictions, unlawful dispossessions and violent conflicts among armed forces, public officials, investors and affected local communities. Women, ethnic and religious minorities and low-income households are generally recognised as the most vulnerable subjects, typically experiencing higher risks and more damage from corruption in relation to land issues.

The survey results reveal a general consensus among the respondents with regard to the importance of implementing open data infrastructures for reducing the instances of corruption in the land sector, recognising a strong potential for improving land governance both locally and globally. However, according to our panel of experts, much of this anticorruption potential currently remains untapped. One of the recurring concepts that might help explain the gap that we observe between the actual and potential impact is that open data is a necessary but not sufficient condition for anticorruption, just like transparency alone is not sufficient to tackle corruption. In this sense, many respondents observed that open land data, information systems and transparency initiatives are a means to an end, and that achieving actual anticorruption goals in the land sector would require meeting a series of *enabling conditions*.

While some of these enabling conditions – or prerequisites – are endogenous to the open *data ecosystem*[31], other preconditions are external to data and information infrastructures. Enabling conditions can be classified in two broad categories, relating to technical and institutional aspects respectively. Technical preconditions include the use of harmonised standards in the publication of data, metadata and information, which are important for maximising the accessibility of the information provided and interoperability among the different sources; the need for building suitable digital infrastructures; the capacity and the know-how required to implement, improve, use and maintain open land data and information systems in the long run; the adoption of quality controls and procedures that ensure timeliness, accuracy and completeness of the data.

31 For more details on the concept of the *data ecosystem* with respect to land governance, see the *Land Information Ecosystem* Declaration signed in 2017. Online: https://landportal.org/news/2017/05/land-information-ecosystem-declaration (last accessed 03/09/2020). See also Zuiderwijk, Janssen and Davis (2014) for a detailed description of the essential elements of *open data ecosystems*. We provide a definition of *data ecosystem* in the Glossary of Terms at the end of this report.

The other group of enabling conditions comprises a number of *institutional preconditions*. The political will needed to build open land data and information systems and to deploy them as anticorruption tools in the land sector is seen generally seen as the most important enabling condition, but also as the most difficult to achieve. Several respondents noted that without sufficient political support, there is a risk that open land data initiatives to combat corruption will remain only on paper. Another important institutional factor can be referred as *data legitimation*, which is the process whereby data is made not only legally open (for instance by attaching an open licence to it), but also included as part of planning, decision and policy-making operations by public authorities, central governments and local administrations. Together with data legitimation by public authorities, it is important to ensure the widest possible citizen participation right from the inception phase, which is vital to make sure that the data in the system corresponds to what the general public demands. Finally, the legal and judiciary systems need to have a suitable and enforceable set of laws and procedures to ensure accountability and to prosecute corruption cases that are exposed by open land data and information systems.

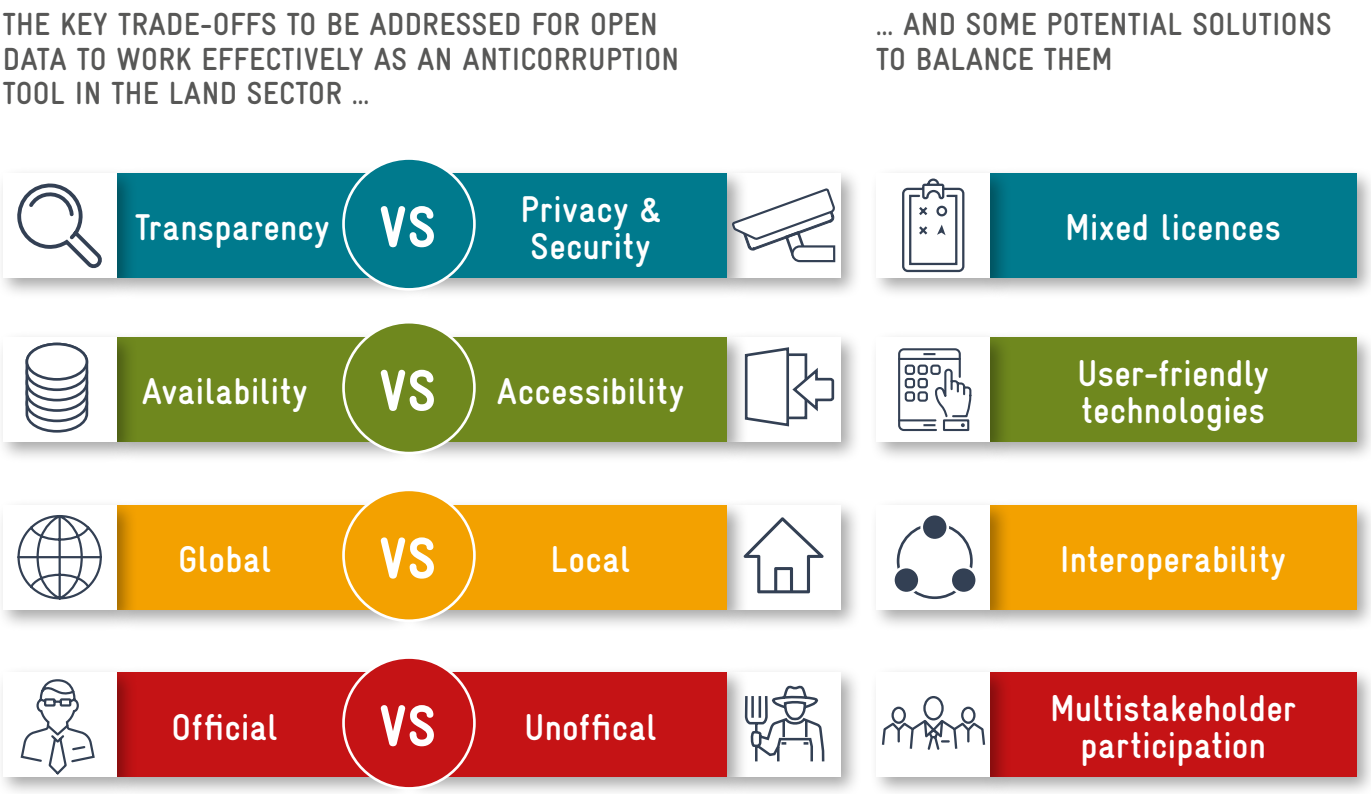
The importance of these enabling conditions emerged regularly in the interviews, with the respondents often reckoning that when both *technical* and *institutional* enabling conditions are met, then the flow of data and information in the system is not just open, but can also be used for anticorruption purposes by a wide range of stakeholders. The effective reuse of information is crucial, but it is only one step in the long chain of actions that is required to move from open data to transparency, and then from transparency to concrete anticorruption results. The general environment – technical, cultural, political, legal and institutional – in which open land data and information systems are released is not only crucial for ensuring the functioning and uptake of the system itself, but it also enables it to achieve concrete anticorruption results.

Balancing Trade-offs

When looking at the future, several experts suggested that we are at a crucial moment in time, in which the global effort of using open data to counteract land corruption still hangs in the balance between success and failure. In the near future, the ability of different initiatives to translate the potential of new open technologies into actual impact will be decisive, ensuring the best possible distribution of the benefits across different stakeholders and overcoming the barriers that prevent the achievement of anticorruption goals. In this sense, if highlighting the areas of consensus among the professionals working at the intersection between open data, land governance and anticorruption is important, there is also a strategic need to identify and address the controversies that exist in this field. That is the specific focus of this section.

Four controversial issues emerged regularly form the review of the relevant literature and from the conversations we had with our panel of experts. We found out that these recurrent issues could well have been described as trade-offs between two extreme positions, and we looked also at potential solutions and practical ways of balancing the mixed – and sometimes conflicting – views expressed over each trade-off. Figure 8 summarises the four fundamental trade-offs associated with the use of open data for anticorruption purposes in the land sector, as well as potential mechanisms to address the disagreement and combine the different positions.

Figure 8 – Key trade-offs and potential ways to overcome them



Source: Authors' elaboration

The first trade-off, which is possibly also the most controversial, is between *transparency* on the one hand and individual *privacy* and *security* on the other. This problem is not new to the open data community, and has been described as follows (Scassa, 2019, p. 340):

> *'It is important to note, however, that privacy rights are not absolute, and they are balanced against other competing public interests. One of these is transparency. In many countries, "right to know" or "access to information" laws mandate the release of information in the hands of government, yet also contain limitations on disclosure that serve to protect privacy. In other words, there is a long-standing acknowledgement that there is a balance to be struck between the right to access government information and the privacy rights of citizens.'*

The New Zealand Land Information (LINZ) system[32] provides a practical example of how this dualism has been balanced in the land sector. Different pieces of information in the database – which integrates data on property titles, land parcels, boundaries, land use maps and aerial imagery – use different licences, in what can be depicted as a land information system with mixed licences. Most of the data are openly licensed, with the exception of property and ownership layers containing personal information, which are protected by a specific licence for personal data and are subject to a mechanism of access control[33]. Similarly, land and property data for England and Wales can be easily found online, on a governmental webpage[34] that lists all the available datasets alongside the licences and the key information contained in each of them. Mixed data licences are used here as well. Indeed, datasets such as the INSPIRE Index

32 See: https://www.linz.govt.nz/data/licensing-and-using-data (last accessed 04/09/2020).

33 See: https://www.linz.govt.nz/data/licensing-and-using-data/linz-licence-for-personal-data (last accessed 04/09/2020).

34 See: https://use-land-property-data.service.gov.uk/#inspire (last accessed 22/09/2020).

Polygons Spatial Data – which provides spatial data with the indicative position of registered freehold properties – or the Price Paid Data – which contains monthly price data for property sales in England and Wales – are downloadable for free by anyone under the terms of the Open Government Licence[35]. Other datasets containing personal and sensitive information, such as the records of overseas companies that own property in England and Wales or the National Polygon Service, are subject to some form of access restriction, including specific data licences, registration and access control mechanisms, and the payment of fees for retrieving and using the data. These examples demonstrate how the *'open by default'* principle can be successfully combined with privacy concerns, so that, in practice, land information systems can be 'as open as possible and as closed as necessary'. It must be noted, however, that this approach on its own might not be sufficient to protect activists, defenders of land rights and private individuals reporting instances of corruption in contexts with limited freedom of expression and repeated violations of fundamental human rights. The specificity of each geographical, political and cultural context should be considered when assessing what data can be safely and openly released to detect and prosecute land corruption, and what data can be potentially misused, allowing for an extra layer of protection especially for private and sensitive information.

The second trade-off refers to the tension between the need for easy access to land and anticorruption information systems, and the necessity for an ever-growing amount of timely, accurate, spatially and socially disaggregated data and information. In this case, the *availability* of data – both in terms of quality and quantity – clashes with the *accessibility* of the information in the system. Big data systems are complex, and ordinary people might struggle to find the information they need, and to process and eventually make sense of it. New technologies and digital solutions may be the answer to this challenge, as they are becoming increasingly user-friendly, allowing for intuitive and affordable ways of interacting with complex data and information systems. The Land Portal, with almost a million pageviews in 2019 alone and 65% of users from the Global South[36], is an excellent example of how a huge amount of open access land data and information from thousands of different sources can be made accessible online in a simple manner, connecting citizens, governments, firms and organisations across the world with the knowledge they need.

There are also limitations coming with the use of new user-friendly ICTs, which mainly revolve around the digital divide. The *digital divide* refers to the gap between those who can access and use internet and other digital media, and those who cannot. A report published last year provides a good overview of the main facts and figures related to this issue (ITU, 2019). The share of the global population with access to the internet has constantly grown in the last decades, reaching 53.6% in 2019. However, only 19% of the population in the least-developed countries (LDCs) had access to internet in the same year. A crucial dimension of the digital divide is the *digital gender gap*. Globally, 58% of men use the internet, compared to only 48% of women. In developing countries, the digital gender gap is worsening over time, and in 2019 more than 86% of women remained offline in the LDCs. While many of the experts we consulted underlined how women are more vulnerable to land corruption and how the digital gender gap is a barrier reducing their access to open land data and information systems, they also emphasised that open data initiatives for anticorruption that successfully address women's needs are the ones that can achieve the higher impact. They also pointed out that the gender gap is not only related to the final use of land information systems, but that it covers the whole information and project life cycle. In this sense, a key factor for the success of open data and transparency initiatives for anticorruption in the land sector is investing in capacity building, education and training for women, which creates more opportunities for them to become professional data analysts, ICT experts or project managers, ultimately empowering women not just as end users, but also as creators, managers and promoters of open data and information ecosystems.

The disconnect between the *global* view and the *local* perspectives is the third crucial trade-off identified in our analysis. Indeed, land corruption is strongly influenced by historical, socio-economic, cultural and institutional factors at the local level, but the fight against corruption also requires concerted action and global coordination in order to be effective, especially when looking at forms of land corruption that typically have a strong international component, such as money laundering and land-grabbing. Ensuring the interoperability of local and global land and anticorruption databases and information systems, by adopting internationally harmonised and sector-specific standards, can potentially help to find the right balance. The Open Data

35 See: https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/ (last accessed 24/09/2020).

36 See the 2019 *Land Portal Annual Report*. Available at: https://landportal.org/library/resources/landportal-annual-report-2019 (last accessed 04/09/2020).

Standards Directory[37], which collects over 60 technical and quality standards for open data in areas that among others include building permits, zoning, road construction and crime statistics, uses the following definition (Open Data Standards Directory, 2020):

> *'An open data standard is a set of specifications (or requirements) for how some sets of data should be made publicly available. Generally, open data standards describe data about a particular subject, for example service requests (Open311) or building permits (BLDS). Like the data they describe, open data standards are generally developed "in the open", meaning that anyone who is interested has a way to contribute.'*

The same source also distinguishes between different types of open data standards, which might be combined. For instance, *schematic standards* are used to set the structure of different elements composing one dataset, as well as to describe how different datasets are related to each other. *Semantic standards* define the vocabulary and the relationship between different terms used to compile and publish the data. Some examples of relevant standards for open land and corruption data include: The Statistical Data and Metadata eXchange[38] (SDMX), which sets the base for interoperability and data exchange between different information systems; LandVoc[39], the semantic standard for land governance; the National Incident-Based Reporting System[40] (NIBRS), developed by the FBI in order to standardise the format of crime data reporting across different law enforcement agencies in the USA.

The fourth and last trade-off we detected is related to the previously discussed concept of *data legitimation*, reflecting the existing tension between *official* and *unofficial* sources of data. Official data is normally curated, endorsed, published and used by public administrations, national statistical offices and governments. Unofficial data, instead, is typically generated by non-governmental actors, such as private firms, civil society organisations, NGOs, universities and research institutes. There is no general or simple rule to say whether one type of data is more open or of a better quality than the other. Official data tends to have more chances to contribute to the design, monitoring and evaluation of public decisions and policies, but it might also suffer from different forms of political pressure and interference. *Unofficial* data might cover aspects neglected by official statistics or provide alternative metrics for controversial issues, but it might not reach a sufficient level of legal, political and scientific legitimation to influence decision- and policy-making. Ensuring the wide and gender-balanced participation of multiple stakeholders – including governments, national statistical offices, private sector representatives, civil society groups, NGOs, sectoral experts and universities – over the whole open data and information cycle, from the initial design to the final use, can increase data legitimation, reducing the distance between official and unofficial sources. Land-focused data and information initiatives such as Prindex[41] and Landex[42] are proving how multi-stakeholder participation can be achieved in practice and how unofficial data sources can complement, and eventually become part of, official and public information systems. For instance, the United States of America has announced the official adoption of Prindex[43] to report and track progress over the United Nations Sustainable Development Goal (SDG) 1.4.2, which focuses on tenure security.

37 See: https://datastandards.directory/ (last accessed 04/09/2020).

38 See: https://sdmx.org/ (last accessed 04/09/2020).

39 See: https://www.landvoc.org/ (last accessed 05/09/2020).

40 See: https://www.fbi.gov/services/cjis/ucr/nibrs (last accessed 05/09/2020).

41 See: https://www.prindex.net/ (last accessed 05/09/2020).

42 See: https://www.landexglobal.org/en/ (last accessed 05/09/2020).

43 See: https://www.prindex.net/news-and-stories/united-states-announces-official-adoption-prindex-measure-perceptions-tenure-security/ (last accessed 05/09/2020).

Concluding Remarks and Practical Recommendations

It is estimated that 463 billion gigabytes of data will be produced every day by 2025 (Desjardin, 2019), and it is crucially important to understand how such an incredible amount of information will be organised, accessed, processed and used – and whether it will help to improve our ability to take decisions and tackle global challenges. While open data and ICTs have already proved to be effective in the fight against corruption in many sectors and countries (OECD, 2017), their specific impact in the land governance domain has received far less attention. With this in mind, this study explored how the current data revolution can affect the achievement of sustainable land governance, focusing in particular on the impact of open data, information systems and transparency initiatives on the various forms of corruption that affect the land sector.

Using an iterative analytical process that combined desk-based research with in-depth interviews among a panel of sectoral experts, this report examined the current information ecosystem at the intersection of open data, land governance and (anti)corruption. Our analysis revealed overwhelming support for the use of open data as an anticorruption tool in the land sector, but it also found strong evidence for the existence of a high degree of untapped potential. Building greater consensus on open land data and information initiatives, as well as producing further compelling evidence to demonstrate their impact in eradicating land corruption, are crucial elements for unlocking this potential. However, it is also paramount to resolve existing controversies by balancing the conflicting views that currently undermine the short- and long-term success of the interventions and projects in this particular field. In this sense, this report identified four fundamental trade-offs – between *transparency* and *privacy*; data *availability* and *accessibility*; *global* and *local* dimensions of land information systems and instances of land corruption; *official* and *unofficial* sources of data – and as many potential antidotes, providing a range of concrete examples of successful implementation for the proposed solutions.

In particular:

- The use of *mixed data licences* can be extremely effective in balancing concerns over individual privacy and security, with the need to increase transparency in land information systems and inform anticorruption efforts.
- The adoption of *user-friendly technologies* can balance the ever-increasing availability and complexity of land data and information, with the need to ensure the broadest possible level of accessibility. Indeed, the open data potential to detect, expose and counteract corruption can be turned into real impact only when a wide range of stakeholders actively access and use the data for different anticorruption purposes.
- The adherence to existing open data standards is crucial to enhance *interoperability* between different levels of the land data ecosystem, which can ultimately make it possible to integrate global anticorruption efforts in the land sector with specific local-level interventions.
- *Multi-stakeholder participation* since the inception phase of open data and anticorruption initiatives can increase the level of legitimation of different sources of information, improving their comparability and complementarity, and reducing the tension between official and unofficial statistics.

If it is still a difficult task to directly measure the impact of open data and transparency initiatives on corruption in the land sector, a number of success stories, practical examples and good practices are emerging, providing additional evidence in support of the important anticorruption role played by such initiatives in the land sector. However, even cutting-edge open land data systems might fail to achieve concrete results in the fight against corruption if a series of *enabling conditions* – often external to the information system itself – are not met. For instance, political endorsement of open data and transparency initiatives is crucial to achieve success, as are citizen engagement and legal systems with suitable and enforceable rules allowing for the

prosecution of land corruption cases. In general, open data are a necessary but not sufficient condition for increasing transparency, promoting accountability and curbing corruption in land governance. Their full anticorruption potential can be achieved only when these initiatives are harmonised and combined with other interventions tackling technical, cultural, political and institutional bottlenecks that prevent the achievement of concrete anticorruption results.

In light of the findings discussed so far, we formulated a series of recommendations to increase the impact of open data as an anticorruption tool in the land sector. The success of open data initiatives typically relies on the active and continued participation of a diverse range of stakeholders – from government officials to NGOs, from national and international donors to different actors across the private sector and the civil society. For this reason, the following recommendations are intended for all parties involved in the establishment of open data and transparency initiatives counteracting land corruption, but each recommendation can be interpreted and implemented by different stakeholders in a number of ways, based on the specific role, responsibilities and duties that they have in a given project.

- Embed the *'open by default'* principle in land governance and anticorruption interventions. For a long time, land information systems and anticorruption activities in the land sector operated under the *closed by default* assumption, but it now high time to reverse this trend, embracing the need to design initiatives that are always as *open as possible*, and only *as closed as necessary*. Make sure to include incentives and enforcement mechanisms, for instance by incorporating in contracts conditionality measures related to the adoption and implementation of specific open data principles and standards;
- Adopt a more holistic view when planning and implementing open data and anticorruption initiatives in the land sector, ensuring a high level of coordination and interoperability across all components of the data and information ecosystem, and making sure that all socio-economic, technical and institutional enabling conditions are in place;
- Ensure the widest possible participation by providing tailor-made incentives for different stakeholders, making sure to cover the whole data and information life cycle, from the design of open land information systems to the reuse of information for the achievement of anticorruption goals;
- Address gender issues and the digital divide by empowering women and other marginalised groups to become leaders and drive the evolution of the land and anticorruption data ecosystem. They are much more than simple beneficiaries and end users and they should put in a position to contribute to the design, management and implementation of the open land data and information ecosystem.
- Support further research to produce more reliable and complete metrics of impact in this particular field. This is crucial in order to communicate effectively the range of diversified benefits that stem from different initiatives and to mobilise human and financial resources in a more effective way.
- Coordinate better existing advocacy efforts for the use of open data as an anticorruption tool in the land sector. While the number of open data and transparency initiatives targeting land corruption is increasing over time, each project tends to craft its own – peculiar – narrative, scattering the advocacy message across different dimensions of the open data, land governance and anticorruption space. Formulating a single, clear, evidence-based and shared global advocacy message can increase the level of coordination among different actors and contribute to further resource mobilisation, while leaving enough space to communicate the individual value added and the specificities embedded in each initiative.

Open data and ICTs are not a magic bullet to ensure greater transparency and curb corruption in the land sector, but there is no doubt that much can be achieved when these tools are used widely, effectively and responsibly. Existing open data and transparency initiatives have proved their potential to counteract land corruption over the last few years and are now entering a crucial phase where they are called upon to scale up, measure and magnify their impact on the ground. There are risks and challenges associated with open data and transparency initiatives. There is room to improve existing open data and information systems, which are not enough to eradicate land corruption on their own. Despite these limitations and caveats, it remains very hard to imagine corruption-free and sustainable land governance without an open data ecosystem that enables the free flow and reuse of relevant data and information.

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GLOSSARY OF TERMS

OPEN DATA I LINKED OPEN DATA

Open data, according to the Open Definition[44], is data that *'anyone can freely access, use, modify, and share for any purpose (subject, at most, to requirements that preserve provenance and openness'*. Therefore, the idea of open data – which, at the same time, is derived from and contributes to *open knowledge*[45] – refers to the concepts of data availability, accessibility and (re)usability for everyone, but also to the need for traceability, from the original data sources to the final usage. **Linked open data** (LOD) is a specific type of open data containing structured information that is developed in a format that is readable and suitable for machines, but not necessarily easy on the eye. By using harmonised standards, LOD allows for interoperability among different sources, so that several different datasets can be integrated and interrogated all at once. LOD promotes data and information exchange, as opposed to having contents from different sources segregated in different *information silos*.

DATA INTEROPERABILITY

Data interoperability is a prerequisite for building large complex information systems, such as *big data* or *data ecosystems*, and refers to the possibility to search, extract and combine data and information from a variety of different sources.

DATA ECOSYSTEM I BIG DATA

A **data ecosystem** is a network of data and information repositories, digital infrastructures, analytical tools and users connected to one another. Just like natural ecosystems, a data ecosystem is complex and changes over time as a result of actions and interactions between the different elements that compose it. **Big data** is an expression used to refer to large complex and dynamic sets of data that typically grow at a very fast rate, as well as the set of applications and tools used to organise, combine and analyse the information in such systems.

DATA LICENCE

A **data licence** is a legal document that defines the boundaries of data ownership (including intellectual property) and accessibility, and the forms of admissible dissemination, use and reuse by third parties.

METADATA

Metadata is *'data about data'*, some sort of summary describing the main attributes of data, information and digital contents themselves. The metadata includes information such as the measurement unit, the original source, the date of creation, the last time a piece of information was updated or edited, the definition and description of different variables included in a given dataset, the size and format of the data, and so on.

INFORMATION AND DATA TRANSPARENCY

Information and data transparency correspond to the scenario where information and data, as well as their sources and underlying methodologies, are made publicly available and can easily be verified. When this also includes rules and identities of decision- and policymakers, it can provide greater accountability and increase the probability of detecting corruption.

44 See the *Open Definition 2.1*, available at: http://opendefinition.org/ (last accessed on 30/08/2020).

45 See the full *Open Definition 2.1*, available at https://opendefinition.org/od/2.1/en/ (last accessed on 30/08/2020).

CORRUPTION

Corruption refers to the abuse of entrusted power and dishonest behaviour for private gain. It erodes trust, hampers development and worsens inequality, poverty, social division and the environmental crisis. **Land corruption** is a sectoral form of corruption. It comprises a diverse range of public and private instances of corruption related to multiple aspects of land governance, from land administration and management to land use and access.

SEXTORTION

Sextortion is the criminal practice of forcing someone to do something, particularly to perform sexual acts, often by the mean of threats, intimidation and blackmailing, or in exchange for favours and services. While sextortion is better known as a cybercrime, for instance in relation to the theft of private pictures and personal videos stored online or on digital devices, this degrading form of corruption is also pervasive in land services, although in this form it remains – to a large extent – concealed and hard to detect and expose.

LAND GOVERNANCE

Land governance refers to the processes, rules and structures that oversee the decisions made on access to land, its use, the way decisions are established and enforced and the management of competing land interests. Land governance includes also customary, informal, religious and statutory institutions. It involves various groups such as courts, land agencies, local communities, land developers, traditional bodies, ministries and municipalities. Land governance covers the legal, policy and institutional framework for land, including dispute resolution and inheritance, ultimately determining how efficiently and sustainably this resource is managed at different administrative levels.

LAND RIGHTS I CONTINUUM OF LAND RIGHTS

Land rights refer to the ability of individuals to obtain, use and access land and property. It comprises the specific set of rules that – in different contexts and legal frameworks – specify who may use and access land and property, the duration of access and the conditions of its use such as who may rent, sell or destroy the land and property. The expression **continuum of land rights** reflects the whole range of diverse – formal and informal – tenure and property regimes and the diversity of associated land rights.

CADASTRE I LAND REGISTRY

The **cadastre** or **land registry** is an official register of the location, boundaries, value, nature and ownership of real estate assets – such as buildings, homes and plots of land – and their evolution over time. Typically maintained by public administrations, land registries and cadastres can be separated or joined together, and in many jurisdictions provide information that is relevant to calculate land and property taxes and establish which person, firm or group is responsible for the payment.

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