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Transparency and Leverage Points for Sustainable Resource Management

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Abstract: The phrase 'sunshine is the best disinfectant' is commonly used to suggest that transparency can counter corruption and ensure accountability. In the policy world, several analytical tools have been developed to obtain information on what policy decision would bring about the biggest positive effect for the least amount of effort. There is a tendency to view transparency as the silver bullet in that respect. This paper aimed to shed light on how measures of transparency can serve as a leverage point for sustainable resource management. We begin by analysing the concept of transparency and then draw from Donella Meadows' work on leverage points to analyse the transformative potential of increasing transparency towards sustainable resource management. We then demonstrate the use of this analytical approach by applying it to three case studies on resource management systems in Ukraine, Romania, and Iceland. The results suggested that transparency in resource management needs to be accompanied by widely accepted standards and accountability mechanisms for it to serve as an effective leverage point. If these factors are neglected, the credibility of transparency can be undermined. Prioritising transparency as a policy intervention to alleviate corruption risks, in the absence of accountability mechanisms and clear rules, might be misplaced, and require deeper leverage points.

Keywords: transparency; sustainable resource management; corruption; leverage points

Citation: Gisladottir, J.; Sigurgeirsdottir, S.; Stjernquist, I.; Ragnarsdottir, K.V. Transparency and Leverage Points for Sustainable Resource Management. *Sustainability* **2022**, *14*, 16801. https://doi.org/10.3390/su142416801

Academic Editors: Roberta Troisi and Annamaria Nese

Received: 27 October 2022
Accepted: 11 December 2022
Published: 14 December 2022

1. Introduction

Under the premise that human actions have led to overexploitation of resources, which threatens conditions on the planet [1–3], the topic of sustainable resource management has become increasingly important. In that respect, the EU is facing challenges with unsustainable management practices and negative trends in land and sea use [4]. The problems imposed by resource use more often than not turn out to be those of high complexity, while academia has tended to offer simple theoretical models to gain insights into the challenges and offer universal solutions [5].

Sustainability challenges are often framed as issues with quick fixes, and researched in largely disciplinary perspectives, without considering that these are complex problems with human actors, social and political behaviour, and institutional dynamics [6]. Moreover, sustainability research and policy have primarily addressed leverage points that have relatively low impact [6]. Fishcer and Riechers [7] claim that directing attention to shallow leverage points is unlikely to lead to transformative change, but acting on deep leverage points is more difficult in practice. However, there is an urgent need to focus on more powerful areas of intervention [6].

The widely cited definition of sustainable development, as laid out in the Brundtland report, refers to it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [8]. While research on corruption has tended to be fragmented, as researchers have focused on studying the phenomenon within their own academic fields, each of which treats corruption differently [9],

it is recognised that it has negative effects on social and economic development [10,11]. For example, research addressing the relationship between corporate social responsibility and sustainability concluded that CSR goals were difficult to achieve without mitigation of the risk of corruption [12]. Furthermore, research on supply chain sustainability has indicated that the implementation of sustainability standards could have unintended consequences of supply chain corruption [13]. It is also widely accepted that corruption leads to ecologically unsustainable resource use [14]. Corruption has the tendency to impede sustainable natural resource use and drives short-term decisions with potentially catastrophic impacts on ecosystems, economies, livelihoods, and societies [15]. More knowledge about effective policies to combat corruption in natural resource sectors is needed, but, according to Williams and Le Billon [16], policy success depends, to a large extent, on the appropriateness of the policies with respect to the context in which they are implemented. Transparency has usually been regarded as the remedy for corruption, as well as a vital precondition for good governance and effective environmental policies [17]. It has, in recent years, been promoted to increase accountability in natural resource management; for example, through initiatives such as the Extractive Industries Transparency Initiative [18].

In this research article, we set out to analyse whether, and then how, transparency is an effective policy measure to alleviate corruption risks in the context of renewable resource management. To address the research questions, we drew on previous findings from our case studies of renewable resource systems in Ukraine, Iceland, and Romania, and explored policy implications through the twelve leverage points in the analytic framework proposed by Donella Meadows [19]. The framework offers a powerful tool to analyse policy interventions and draws on the discipline of systems thinking. Finally, we elaborate on possible responses. To our knowledge, transparency measures to alleviate corruption risks in resource management have not previously been approached through the lens of systems thinking.

2. Transparency

Research articles on the topic of transparency and its relevance for corruption have risen significantly from the year 2000 to the present [20,21]. Calls for increased transparency have become louder in many sectors of society, and it has become an important feature of policy and institutional design, and, thus, it has been suggested that we live in the age of transparency [22,23]. In terms of the anticorruption policy discourse, transparency and public accountability are central features [16].

Transparency is often seen as a necessary condition for governmental quality and increased accountability, and has, therefore, become conflated with terms including impartiality, corruption, participation, and state capacity [24]. However, even though research has pointed towards a correlation between low transparency and high corruption levels, causality has not been established, and the role transparency has in reducing corruption lacks the better understanding necessary to inform policy. Therefore, enhanced knowledge about the role of improved access to information is needed, as well as the limitations involved [25]. In a natural resource context, the notion that increasing transparency and public access to information regarding resource revenues results in more equitable management was challenged by Lujala and Epremian [26].

There are many different approaches when it comes to pinning down the meaning of the term transparency, and various academic disciplines approach it from different angles. Some approaches are more detail oriented [27], while others are higher-level approaches. Meijer [28], for example, defines transparency as "availability of information about an actor allowing other actors to monitor their workings or performance of this actor". In his attempt to untangle the concepts of transparency and accountability, Meijer distinguishes between three basic principles: transparency as a virtue, as a relation, and as a system. The perspective of transparency as a virtue considers transparency as someone being open about their behaviour and intentions. Looking at transparency as a relation is a perspective based on principal-agent theory. The corruption literature that places transparency at the centre of

anticorruption policy usually stems from this perspective [29]. The logic underpinning this approach is that transparency tackles the information asymmetries between the principal and the agent [24]. Within this strand, Vishwanath and Kaufmann [30] explained the term as an increased flow of reliable and relevant information about the issue of interest, where denied information access, or the provision of irrelevant or untimely information, would constitute a lack of transparency. However, Bauhr and Grimes [24] suggested that it is not sufficient to look at the information available to the principal, but that the purpose of that information needs to be clear.

The third and final perspective, in which transparency is considered as a system, is one in which analysis focuses on the underpinning rules that guide the behaviour of actors in the system. This approach is favoured by Transparency International (TI) and can be found in the debate on good governance [28]. The definition of transparency as defined by TI deals with how easy it is to monitor both the processes of policy making and their outcomes [31]. This can be linked to the academic strand that approaches corruption as a collective action problem [32,33], where actions taken by actors are dependent on what they expect others to do. Transparency could then make corruption more visible and, therefore, influence the decision making of the relevant actors towards increased engagement with, and monitoring of, corruption, since that is what they have come to expect of others. According to Rothstein [34], empirical evidence suggests that individual perceptions of others are stable and do not change easily. The limitations of transparency-facilitated accountability attempts have also been brought up by O'Neill [35], suggesting that transparency can breed an environment of scepticism, and that pursuing trust as a goal would produce greater benefits.

A precondition for transparency measures to be effective in addressing corruption, is that the information made available through such measures should be reached, and understood, by the public. This means that having free press, and an educated public, matters [29]. Furthermore, simply detecting wrongdoing is not sufficient, and the principals, or those that the information is directed at, need to have both the capacity and authority to act on the information [17]. Accountability processes can be divided into separate stages. First is the information phase, where the conduct of an actor is disclosed, followed by a phase where an accountability platform places questions and requests explanations of the conduct. Lastly, there is a consequence phase, where the platform, or an enforcement mechanism, passes judgement on the conduct and decides on the appropriate consequences [36]. Having enforcement mechanisms in place, that are respected by stakeholders in resource sectors, is vital, as an organisation relies on its reputation and legitimacy to function, and negative media coverage can affect the way in which stakeholders perceive the organisation [37].

Renewable resources are often overexploited, even when private property rights have been assigned to a given system, or rules put in place to counter commons problems. This has been attributed to the fact that renewable resources are not static, but dynamic, and people are prone to misperceive bioeconomic and feedback structures in such systems [38–40]. According to Langarudi et al. [41], when managing common pool resources, which renewable resources tend to be, management decisions depend on perceptions regarding the availability of the resource. It is reported that the process from when availability is measured, reported, and analysed until a decision is made and implemented, takes time. Research on resource availability perceptions and how they come to influence management decisions have been in short supply [41]. If transparency is meant to ensure accountability and promote sustainable resource management, it needs to be clear who is meant to be accountable to whom, for what, according to which standards and for what reason [36].

Universal solutions to solve accountability challenges in natural resource governance institutions might sound logical, but as institutions operate according to unique conditions and contexts, these conditions and contexts need to be considered if policy measures are to stand a chance of alleviating problems [15]. According to an analysis made by Cucciniello et al. [21], transparency works well to achieve certain goals under certain cir-

cumstances, while it fails in others. Therefore, they suggest moving away from questions regarding the value of transparency, and, instead, directing efforts at understanding where, and under which circumstances, transparency delivers on its potential to bring positive functional change. The aim of this paper was to contribute to the academic debate on successful policy measures to curb corruption risks in natural resource settings, by studying policy measures in different contexts and sectors, with an emphasis on transparency.

3. Analytical Framework

Donella Meadows' [19] pioneering work on leverage points offers a powerful approach for analysing policy interventions. It draws on the discipline of systems thinking: a framework for looking at the world in terms of systems by understanding structure, feedback and dynamic behaviour, rather than static images, events and linear thinking [42].

Meadows [19] states that the most important element of systems thinking is realizing where possible intervention points are located to change the behaviour of the system, which is often overlooked. Meadows lists up 12 stages of leverage points, based on how effective they are, or their potential to bring transformative change. They range from shallow points, including changing parameters or strength of negative feedback loops, to deeper ones, such as making changes to the structure of information flows or altering the goals of the system. Fisher and Riechers [7] claim that directing attention to shallow leverage points is unlikely to lead to transformative change, but acting on deep leverage points is more difficult in practice. The higher the impact the leverage point has, the more resistance there is towards changing it [19]. Abson et al. [6] drew on Meadows' work by categorising the 12 leverage points in terms of the following four system characteristics: parameters, feedbacks, design, and intent. These categories are demonstrated in Figure 1. They state that leverage points that can be categorized as deep are the ones that tackle the design and the intent of the system, focussing on the social structures and institutions that manage feedback and parameters and the underpinning values, goals and world views of the actors that shape the direction in which the system is oriented [6].

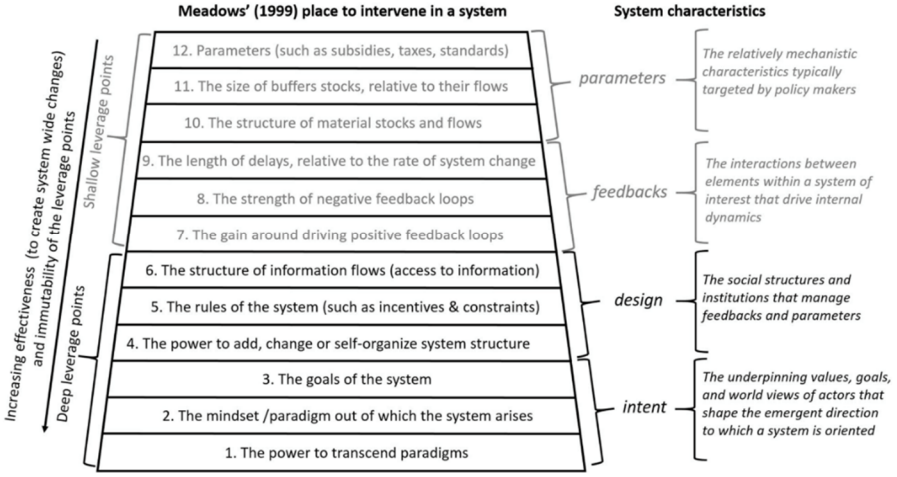

Figure 1. From Meadows' [19] twelve leverage points to four system characteristics. Transparency belongs under leverage point number 6, regarding structure of information. Reprinted with permission from Abson et al. [6]. 2016, Springer Nature.

Transparency is essentially about the flow of information. Increasing transparency is meant to decrease the information asymmetries between principals and agents. According to the leverage point approach, transparency would be considered a deep leverage point, as it is essentially about making changes to the structure of information flows (leverage point 6) in a specific context. Transparency is a policy measure that is categorised as a design characteristic, according to the approach by Abson et al. [6]. Changing the rules of the system (leverage point 5), such as those affecting incentives and constraints, shares

the characteristics of, but has higher leverage potential than focussing on the power to add, change or self-organise a system's structure (leverage point 4), according to Meadows' framework. The leverage points with the highest potential for transformative changes are those that focus on the intent of the system, revolving around making changes to the goals of the system, the mindset or paradigm out of which the system arises and the power to transcend paradigms (leverage points 3, 2, and 1). The rationale behind this ranking is that policy intervention is constrained by the hierarchy of the characteristics. If the policy focus is aimed at leverage points on the shallow end, and conflicts with those above it in the hierarchy, then the probability it will lead to the desired changes in the system are minimal [6]. We applied the leverage point framework in our analysis of both the potential, and role, of transparency as a measure to alleviate the risk of corruption in resource management systems.

4. Methods

The analytical framework was applied to the following three case studies on renewable resource systems: arable soil in Ukraine, fisheries in Iceland, and forestry in Romania. Even though different resource sectors in the cases were under study, agriculture (i.e., arable soil), fisheries, and forestry are all primary production sectors, and, therefore, part of systems and sectors that are vital for realising the circular bioeconomy for wellbeing [43]. Having various resource sectors under study provided the opportunity to gain more general insights to inform the research question. The countries also rank differently on the Corruption Perception Index, published by Transparency International, which makes for an interesting comparison between the cases. They were studied through a comparative qualitative case study design [44–46], using semi-structured interviews [47]. The research process is outlined in Figure 2.

Figure 2. The different stages of the research process, along with dates for when each stage took place.

A reference from the Research Ethics Committee of the University of Iceland was obtained before the fieldwork took place in 2018. To navigate the sampling process, stakeholder maps of each resource sector were constructed, and developed with a combination of brainstorming, using mind mapping, and a value chain approach [48–50]. To ensure that an important stakeholder group would not be left out, actors along the value chain were included, as well as those that influence the value chain, such as members of the executive and legislative branches of government, journalists, and public officials. Due to the delicate nature of the research, key informants were recruited based on the stakeholder analysis and the criterion that they were highly knowledgeable about the sectors [48–50]. The key informants were interviewed first, and then they provided a list of possible participants in the research. Further interviewees were recruited through the method of snowball sampling [51], where individuals that have been interviewed are used as informants to identify and suggest further participants. Measures were taken to protect the anonymity of the stakeholders, as both the lead researcher (who was the only researcher to know the interviewees) and the translators signed a declaration of confidentiality and commitment to the research ethics of anonymity. Interviewees were provided with a participation information sheet before signing an informed consent form, stating that they had been given, and understood, the explanation of the research project, and were aware that they could withdraw their contribution at any time. A total of 40 semi-structured interviews were conducted, with 44 stakeholders from various positions along the value chains in the resource sectors: 15 in Ukraine, 12 in Iceland and 13 in Romania. Those included were, for example current or former members of government, politicians, journalists, NGO members,

fishermen, farmers, forestry workers, public officials, and business owners. The interviews were coded, first, in a software for qualitative data analysis (Nvivo) and, then, subjected to analysis based on qualitative system dynamics [52]. There were several limitations of this research, including the lack of female representation among the interviewees, as only 18% of the participants were female. Thus, the generalization of the findings could have been strengthened with additional interviews and interviewees. Furthermore, as the lead author conducted and coded the interviews, a greater risk for bias is acknowledged. Lastly, it is recognized that the Russian invasion into Ukraine has drastically changed circumstances in the country since the data collection took place in 2018.

During the interviews, stakeholders were not asked questions directly about transparency. They were, however, asked about their perceptions on corruption, the development of democracy in their countries, how they regarded the media environment, about trust in the resource sectors and what measures had been taken to build trust.

5. Results

The topic of transparency was brought up by the interviewees in a vast majority of the interviews. To ensure credibility in transparency as an effective policy tool for sustainable resource management, we identified that it included access to information on management of a resource regarding ownership, the condition of the resource and how the revenues involved were being managed. All of these different aspects of transparency require access to some form of data, often facilitated by public authorities. We are living in an era of information overflow, meaning there is an abundance of data available, and, therefore, the challenge is making sense of it, rather than collecting it. Accessing data and delivering it in a way that makes it understandable to the public is where the media environment serves an important role.

5.1. The Icelandic Case

Transparency and evidence-based policy making can be described as some of the main properties of the Icelandic fisheries management system, which is based on Individual Transferable Quota (ITQ). It has been hampered in its role as a poster child for sustainable fisheries [53], however, as empirical evidence suggests that it has succeeded in ensuring positive development, both in terms of ecological as well as economic benefits [54], while coming under critique for disregarding social aspects [55].

The Marine and Freshwater Research Institute (MFRI) is a government body responsible for measuring resource availability and, currently, serves under the Ministry of Food, Agriculture and Fisheries [56]. The resource availability is based on the annual stock assessment, which is based on sampling the institute collects out at sea at designated locations. After data analysis, the recommendation for the total allowable catch (TAC) for the following year is published and is sent to the Minister responsible for fisheries. In recent years, it has become a norm that the Minister approves and sets the total allowable catch based on the recommendation from the MFRI. Subsequently, the rule for the quantity of fish that can be caught, per species, is set [57]. The process of setting rules on the total allowable catch each year is based on the best available science and can, therefore, be described as evidence-based [58]. By publishing data and reports, the MFRI facilitates transparency and openness in their work.

The Directorate of Fisheries (DoF) is then tasked to report on catch data, as they collect it from boats and vessels, and to monitor the sector [59]. Catch data information is published on their website, shared with the MRFI, updated regularly and based on the weight of the catch, as measured on the scale located in each harbour in the country. Data is published on their website regarding various aspects, such as the following: share of the total allowable catch translated into tonnes, how much each vessel or boat has caught out of its share, yearly difference, broken into categories for each species, and data on vessel or boat ownership. Catch data reporting is, therefore, considered to involve a highly transparent process. The monitoring duties consist of joining fishing crews out at sea to

monitor and register by-catch, discarding and high grading. Discarding refers to when caught fish are thrown back into the ocean, and high grading refers to when smaller fish are discarded so as to have only larger, more valuable, fish in the count towards the quota. Tasks also include checking and verifying that fishing gear is up to code, that catch data journals are correctly filled out, that weighing the fish at the harbour is done correctly and that the right species are registered in the catch numbers [60]. The accountability mechanisms available to the DoF, as they monitor the sector, involve giving those suspected of being involved in wrongdoing a chance to explain their actions. If wrongdoing is confirmed, licences can be revoked, but only temporarily, or fines imposed. However, DoF rulings can also be appealed to the Ministry of Food, Agriculture and Fisheries [61]. Stakeholders in the sector who were interviewed in this study widely considered that the DoF did not have the resources to make effective use of the accountability mechanisms available to it [62].

Access to the fisheries resource has been, de facto, privatized through allocation of quota ownership [63]. However, it is, in its essence, a common pool resource, and those utilizing the resource are, therefore, accountable to the public, and there is an increased demand for sustainable resource management requiring that the maximum sustainable yield is not exceeded. The standards are clear, as the TAC is recommended by scientists and set by the Minister responsible for fisheries through an evidence-based process. The reason for the standards is to avoid overexploitation and collapse of fish stocks, which would have severe ecological and economic consequences, as well as social consequences.

There was a general satisfaction among interviewees that real-time GPS monitoring of vessel location, as well as daily updates on catch numbers, is published on the DoF website. However, even though the processes in which resource availability is measured and publicly reported can be considered highly transparent, there were concerns among several interviewees that the reported numbers did not necessarily reflect reality. There is transparency in the reported catch data, but not all interviewees considered the processing of the catch data as being a transparent process. Perceived opportunities for measures, including underreporting fish weight, cheating on icing percentage or discarding of by-catch, were not considered to be well documented. Lack of observer coverage were cited as reasons for scrutinizing the reported catch data, as the DoF was generally perceived to lack the ability to carry out its role of monitoring and enforcing regulations [62]. Additionally, issues regarding catch recommendations by the MRFI were often brought up by interviewees. Total allowable catch is solely based on science, as sampling techniques are used to obtain knowledge on the condition of the fish stocks. As the process of determining the TAC does not involve a mandate to consult with the fishing industry, an opportunity to debate whether the sample is representative enough of the stock presents itself if the recommendations conflict with what fishermen out at sea perceive about the state of the resource. This was, for example, mirrored in a comment made by a current/former member of academia: "So, why would you trust the recommendation or the advice or you know, whatever it is, why would you trust the result, of that process, if you weren't allowed to be in it. But it also directly impacts you. And you felt you were supposed to be part of it?" It was recognized that ensuring transparency in that process also meant making sure that the right people were involved to ensure social sustainability in decision making. Improved communication between stakeholders regarding the data and its production could strengthen trust in the knowledge production process.

To address friction between stakeholders surrounding the process of determining the TAC, the success of introducing harvest control rules was identified, which essentially means that a certain standard has been agreed upon by stakeholders. Therefore, if fish stocks are going down, meaning that restrictions for fishing that species are put in place, there is less controversy involved since the standard put forth in the harvest control rule is accepted.

5.2. The Romanian Case

According to Szarek-Mason [64], corruption was a major obstacle for Romania's accession into the European Union, which laid out, in a comprehensive monitoring report, that corruption was a serious and widespread problem. Even though progress had been made, the fight against corruption had been limited, as perceived levels of corruption were high and success levels in prosecution of high-level political corruption was low [65]. The challenges facing the country in addressing corruption risks have also been present in the forestry sector [66–68].

The reported total forest area in Romania covers approximately 29% of its territory and the forests are considered to be some of the richest in terms of biodiversity in Europe [69]. The legislation surrounding the forestry sector is the Forest Code (Law nr. 46/2008) and was described by interviewees as comprehensive and highly descriptive. It outlines the standards that apply for forest management.

Currently, the Ministry of Environment, Water and Forest (MEWF) is the central authority in forest management. The country is divided into forest districts that ensure forest management [69]. Romsilva, or the National Forest Administration, is a self-funding state institution that operates under the MEWF and manages publicly owned forests and national parks [70]. The National Forest Inventory carries out studies to assess the forest resources in the country to provide data for national forestry policy and comes under The Forest Research Institute (INCDS) [71], which provides a scientific basis and advice for sustainable forest management [72] and develops forest management planning. All forests need to be managed according to a forest management plan, that is updated every 10 years, and private forest owners can choose between having one done by Romsilva, or by a private forestry administration service; the second option being more popular. The MEWF approves the forest management plans, which provide a basis for calculating the total allowable cut. It is calculated based on the combined allowable cuts, reported by each forest district [73]. Forest guards are tasked with implementing, monitoring, and controlling the sector, and their authority derives directly from the MEWF [70]. According to interviewees, forest guards lack the resources needed to carry out their legal roles.

The question of whether forest management is carried out according to the standards laid out in legislation can be answered through measurements and data. Through the interviews conducted in Romania, we learned that there are several constraints to the production and publication of forestry data, that can impede sustainable management. For example, it has been challenging for the sector to move from paper-based bureaucracy to electronic bureaucracy, as standardisation in reporting templates and forms was lacking, resulting in inaccuracy in forestry data [74]. As identified by a current/former academic in the field, it was also challenging to convey the meaning of statistical significance and sampling errors involved in forestry measurement data to the wider public. Moreover, there were concerns among interviewees that the forest inventory was taken with too great of an interval in between, and that there was too little data made available to assess the amount of deforestation in the country.

When asked about data collection regarding illegally cut forest trees, a current/former forest owner claimed that many illegally cut forest trees were not being reported as illegally cut and the practice was being covered up, so the data did not reflect reality. The individual stated that:

> "There is a lot of forests that have been cut and that are being cut and are never showing up in any statistics. Depends a lot on the local forest service, you know, how corrupt they are or not. And on the regional forest guard, you know, the forest controlling inspectorate. Whether they are okay or whether they are corrupt as well".

This quote also serves to highlight a prevalent perception, amongst many of the interviewees, that the accountability mechanisms in place are only enforced when suspicion of failure to comply with the rules and legislation in place surfaces, and only if the public

officials involved in the management have not themselves been corrupted. Therefore, we identified issues regarding standardization, lack of ability to produce the data, the integrity of that data and the ability to make sense of the data for the public.

Public access to relevant data to evaluate forest management was also discussed as a constraint, where a current/former journalist described that, despite freedom of information acts, public institutions often restricted the release of information, as "it's only secrecy, you know. It's secrecy. Corruption and shady". A current/former member of an NGO mentioned that the general tendency of public authorities to restrict access to information had to be met with efforts to increase transparency, because as things were being withheld from the public eye, it left a place for doubt regarding the legitimacy of actions undertaken by the authorities.

5.3. The Ukrainian Case

This study was conducted prior to the Russian invasion into the Ukraine in early 2022, as reflected in the following text. Agriculture is one of the most important sectors in Ukraine from an economic standpoint [75]. It enjoys rich black soils, is a major agricultural exporter [76] and is considered to hold the biggest agricultural potential worldwide [77]. The country reached the world news in 2013–2014 as the Revolution of Dignity unfolded, toppling the head of state and his kleptocratic regime. It was hypothesised that the rampant corruption amongst the country's elite were major contributors to the people's uprising [78].

The agricultural sector in Ukraine transitioned from public to private ownership after the fall of the Soviet Union at the turn of the last decade of the 20th century. Accelerated soil degradation followed [79], and degradation of land was a consequence of improper management of natural capital, including soil and water [80]. As soils are a conditionally renewable resource, they need to be managed in a way that maintains soil fertility to foster sustainable agricultural development, which has implications for both the national economy, as well as the natural environment [81].

The legislation on soil protection in Ukraine tasks two ministries; the Ministry of Environment and Natural Resources and the Ministry of Agricultural Policy and Food to formulate how the legislation should be operationalised at an institutional level [82]. Provincial Centres for Soil Fertility Protection (CSFP) solely carry out soil monitoring tasks that reflect the application of fertilisers and related chemical land improvement measures, while regional Departments of Agro-Industrial Development (DAID) monitor agricultural production by collecting data about what crops are being cultivated, what fertilisers are used etc [79]. The Institute for Soil Science and Agrochemistry Research is a research and methodology centre, and an important link for producing knowledge on soil science in the agricultural sector in the country [83].

Despite the presence of such an institutional structure, the few rules regarding regulating soil protection that are in place do not address the problem of erosion [82]. According to Stupak [79], there are no legally binding obligations regarding soil protection measures in Ukraine, contrary to Soviet times, when it was strictly controlled by public officials. What that means is that there is currently no public institution tasked with monitoring and enforcing compliance, as there are only guidelines that apply to the sector. Soil protection is, therefore, not ensured through means of enforcement mechanisms or strong incentives for the implementation of legal rules [79,82]. The case of soil in Ukraine, therefore, differs from fisheries in Iceland and forestry in Romania, as there is an absence of a strong legal framework surrounding the sector. A public official in Ukraine stated that land monitoring could not work without standards, but that there was cooperation with universities under way to develop standards. However, in that process, transparency was brought up as a challenge, as it was hard to track developments in the sector.

Data on the status of soil health is vital, but many interviewees recognized that it was lacking. A current/former member of academia, for example, claimed that the last mass soil surveys in Ukraine were conducted in 1989 and that the soil maps currently in use resulted from the Soviet era. As a result, "the state for example, or society knows

almost nothing about what happens with the soils now. But we can expect that they are still degrading, and they are degrading very fast". This was confirmed by a current/former public official that said that the main research mapping out of the soils in Ukraine had been conducted in the 80s and 90s, but that scientists went from time to time into the field to "check whether it's still there and how it is there". Another public official that was currently, or had formerly, worked on soil protection discussed some of the challenges involved in doing the research, including the need for updating of laboratory equipment for soil analysis. Good staff members also tended to be recruited by the private sector.

5.4. Media Environment

We rely on information flows to gain knowledge on, and process the conditions of, the environment in which we live, whether social, economic, or ecological, to form perceptions. It is, therefore, important that the information we acquire is accurate and received without much delay, and it is in this regard that the media plays a crucial role [84]. With the emergence of the 24-h news cycle and social media, that role becomes increasingly important. Studies from social psychology tell us that most people do not have well-defined and precise preferences on every single issue, and it can, therefore, be easy to influence people's decision making [85]. People tend to be exposed to a great deal of information and opinions daily but consume and process only a limited part of it all [84]. Selective exposure and/or cognitive biases have been found at fault, as people tend to take in information obtained from media sources they perceive to align with their own values. Such biases or selective exposure have the potential to cause fragmentation amongst the public [86–89], although studies on the topic have found mixed results [90].

The interviewees in this study were asked about their thoughts on the media environment in his or her country, often with a follow up question regarding where they personally sought reliable information. Journalists were included as a stakeholder group, and we were able to conduct interviews with one individual in each country that currently, or had previously, worked as a journalist, which provided further insights into the media environment.

In all cases, interviewees discussed issues that were acting as constraints for producing high quality news material, such as operating conditions, working environment, salary level, time constraints and difficulties accessing information from authorities. The subject of media ownership was also brought up as a constraint, as independent news media were generally considered to be struggling, or even absent. In Ukraine, a perception that oligarchs mainly controlled the media was prevalent, and that they, therefore, had the ability to influence what was covered. This was, for example, brought up in an interview with a current, or former, NGO member: "And some, sometimes, some topics are silenced. Some channels are reluctant to show something. Because, it's about their owner or affiliator of the owner. So it's ... it's tough". Such views were also detected in Romania, but according to a current/former member of an NGO there:

> "I mean, most of the media is controlled by politicians or people who have clear economic interests, or financial interests. There is ... it is very hard to determine if there is any independent, kind of independent media outlet, especially mainstream media outlets".

In Iceland, it was generally recognized that independent media were present, although struggling financially, and that fishing companies held ownership shares in certain media outlets and were, thus, perceived to have the ability to influence media coverage.

Many interviewees in all cases expressed concerns over how issues related to the natural resource sector in question were portrayed in the media. There was interest in the topic, and it was covered in the media, but the coverage was superficial, and journalists were not able to convey and communicate the intricate and complex issues in the sector in a manner that the public understood. As described by a current/former member of parliament in Iceland: "Everything is somehow portrayed as black or white". The discourse in each society therefore tended to be polarized, and it was expressed that the media needed

to do a better job of presenting balanced opinions and interests. Interviewees in all cases generally identified that when they themselves were obtaining information from media, they evaluated the content based on their perceptions of the media outlet in question, and their intentions.

Interviewees in Iceland generally considered the population to be informed and educated, and that the public was using social media platforms to exchange information. As described by a current/former academic "I feel like there's just so much information on Facebook and whatever else, especially in Iceland, I mean everything is shared through Facebook". People of all age groups, not just younger generations, were seen to use social media to obtain and exchange information. In Ukraine and Romania, however, the situation was generally perceived to be different, as a less informed public, misinformation and a generational divide were brought up. As a current/former academic described it:

> "44% of the Romanians are living in the rural areas. So, their access to information, their access to education, their access to understanding things . . . are not the same as educated urban people. So therefore, the speed created some differences. There are maybe two Romanians. Two Romania. Two countries".

Rural population was largely perceived to rely on TV media channels for information, perceived to operate according to their own agenda, contributing to misinformation, while the younger generation relied to a greater extent on social media. A current/former NGO employee in Romania stated that:

> "I think that generational divide, it's mostly determined by the source of information that different generations have. And you would have whole generations being tied more to TV or to traditional press, newer generations is maybe over-relying on Facebook or some alternative news sources. And then they get access to different discourse, different stories and different . . . this creates a clash".

The situation was perceived in a similar manner in Ukraine, where the rural population now mainly consisted of older generations, since younger people were moving to the cities. As described by a current/former NGO member: "People in village they don't read in internet. Don't read articles. Don't watch cable TV. They just watch TV on three channels and see the local newspaper". Politicians using populism were using that fact to their advantage with the result being that rural and older populations were perceived to be more receptive to misinformation, or, as described by a current/former academic, "I don't know how to say it . . . too much crazy ideas in the heads of most of the population". The individual further explained that if the state would clearly explain to the public its vision of what they hoped to achieve with agriculture and land policy reforms and what their aim was, the situation would change "the understanding of the problem for the average citizen". Ukrainian interviewees from younger generations stated that they either relied on social media or international media for obtaining information. As described by a current/former small business owner: "Also Facebook and social networks. It is probably one of the main sources of information because you always can subscribe to all people you believe". Ukrainian media mainly explored news with the objective of seeing what debate was taking place, and which arguments were being used and by whom. These dynamics could contribute to polarisation of the debate and to a generational divide.

Media coverage of corruption in the sectors could contribute to public pressure for corruption to be addressed. However, it could increase perceptions of corruption and, thus, shape ideas of what could be expected of others. Negative portrayal of resource sectors in the media can influence the image of a sector, as well as its stakeholders. For example, online revelations on the Schweighoefer scandal in Romania, exposed by the Organized Crime and Corruption Reporting Project [91], brought corruption in forestry management and illegal logging onto the public agenda [92]. Foresters, therefore, faced a negative image in the country and, while this image could partly be attributed to the fact that revelations brought misdeeds to light, misinformation also contributed negatively to that image. In Iceland, the Namibian Fishrot files scandal, revealed by Wikileaks [93], contributed to an

ongoing debate on ethics and revenue management in the Icelandic fisheries sector, and revelations in the media exposed efforts being made to discredit critics [94]. Perceptions of corruption in the agricultural sector in Ukraine have also been shaped by media reports of scandals [95], as, according to Keyzer et al. [76], it is common knowledge that large companies tend to underreport their earnings to receive government subsidies and utilize offshore company registration to minimize taxation.

Interviewees also brought up the fact that we were now living in an age where the amount of information available is enormous, and the speed in which the information is directed at one is becoming faster, making it increasingly difficult to decipher reliable information from misinformation.

6. Discussion

By approaching transparency as a policy measure to alleviate risks of corruption through Meadows' [19] leverage point framework, we gained insights into the level of potential that transformative change transparency could bring. Meadows lists 12 stages of leverage points, placed in a hierarchical order, based on how effective they would be. They range from shallow points, including measures such as changing parameters, to deeper ones, such as changing the structure of information flows to altering the system's goals. Transparency measures belong to the category of deeper leverage points.

Transparency measures in resource management involve access to inform on different aspects of the resource value chain, such as ownership, the way in which the resources are managed and revenue management. The results from the three case studies shed light on different challenges related to transparency measures. Interestingly, interviewees in Romania discussed how lack of access to information could breed an environment of mistrust surrounding the forestry sector, while interviewees in Iceland did not perceive access to information to be an issue, per se, but rather the accuracy of the data surrounding the fisheries sector. Interviewees in Ukraine then brought up issues regarding lack of recent and holistic data on soil health, referring to old soil maps. This could imply that even if countries are well equipped to produce data surrounding the resource sector in question, this does not necessarily facilitate an environment of trust between stakeholders.

Our findings suggested that transparency in one aspect did not compensate for lack of transparency in another. For example, access to information regarding ownership and resource conditions did not address the prevalence of perceptions of corruption in the sector if transparency in resource revenue management was lacking. Moreover, if there was a mismatch between the reported status of the resource and how the sector was portrayed in media, it could contribute to scepticism towards authorities or facilitate mistrust between stakeholders in the sector.

Even though there have been calls for increased transparency in soil management in Ukraine, the fact remains that there is a lack of accountability mechanisms in the country when it comes to detection of soil degradation. Increased data transparency and access to information on soil degradation could potentially act to influence public perceptions and raise awareness on ecological conditions, but we suggest that a higher order intervention is needed. In Meadows' terms, targeting deeper leverage points than information flows is needed, such as changing the rules of the system. Generating and accepting legal standards for soil management would be the first step.

We question whether policy measures directed at enhancing transparency can act as a silver bullet to ensure sustainable resource management, unless the disclosed information is delivered by an independent and professional media, to an informed public. These are factors that need to be considered in each context. It is important that appropriate accountability mechanisms are designed before transparency measures are chosen and implemented as policy leverage points. Addressing how the disclosed information is communicated to the public and how it helps in developing a common understanding of the problem would facilitate a policy making process to achieve the desired outcome.

We argue that emphasising transparency as a policy measure could be a meaningful endeavour when a criterion is fulfilled, as we discovered in the cases of Iceland and Romania. Firstly, the information needs to be accessible in a timely manner and the purpose of the information should be clear. Questions regarding what role this information serves in the context of enhancing sustainable resource management, and how that information shapes perceptions and expectations of stakeholders in the system, should be asked. Secondly, the disclosed information needs to reach and be understood by the wider public. Lastly, clear and accepted standards need to accompany such measures to allow for comparing the disclosed action against an agreed upon benchmark.

Furthermore, clear accountability mechanisms are needed, should the increased access of information reveal any acts of wrongdoing. If not, transparency could have adverse effects, as it could bring to light acts of wrongdoing that end up going unpunished and, thus, increase perceptions of the prevalence of corruption. As in the case of Iceland, where a few interviewees raised concerns as to perceptions of the ease with which rulings by the DoF on fishing vessels, that had been appealed to the Ministry of Food, Agriculture and Fisheries, were overturned. Perceptions of ease in getting DoF rulings overturned could contribute to perceptions of weak accountability mechanisms, in that limited effort was necessary to 'get off the hook.' As Rothstein [34] points out, perceptions of others are stable and not easily changed. Therefore, in the absence of widely accepted standards and accountability mechanisms, prioritising transparency as a policy to address corruption risks might be misplaced, as it can conflict with the hierarchy of leverage points as laid out by Meadows' [19] framework. Targeting deeper leverage points in such instances, such as changing rules and incentives, or the intent of the system, should offer a higher chance of positive functional change.

7. Conclusions

In this paper we explored if, and then how, transparency is an effective policy measure to alleviate corruption risks when it comes to management of renewable resources. In doing so, we applied the leverage point framework put forth by Donella Meadows to three case studies, the agricultural sector in Ukraine, the fisheries sector in Iceland, and the forestry sector in Romania. Despite several limitations to the study, such as lack of female representation amongst the interviewees and a greater chance for bias, since the main researcher both conducted and coded the interview data, we argue that the findings of this research can be generalized. The results highlight that tackling corruption in resource management through transparency mechanisms is complex, due to various competing interests amongst stakeholders. It involves considering ecological, legal, social, and economic aspects of the transparency measures. Our findings suggest that transparency can serve as a leverage point for sustainable resource management if it meets certain criteria. Transparency measures need to be complemented by clear legal standards for resource management and accountability mechanisms. The media environment serves an important role in both shaping perceptions regarding the sectors and delivering information regarding how they are managed in a manner that can be understood by the wider public. The complex interests involved in natural resource sectors can be challenging to balance in media coverage. This research highlighted that universal solutions to address corruption risks could be based on agreed upon values, such as transparency, but needed to be formulated by taking into consideration the specific context in each case. In cases where deeper leverage points are needed, pursuing transparency to alleviate corruption risk and unsustainable resource management might be misplaced. To enhance generalisability of the findings, further research on additional management frameworks and cases that rank differently on the Corruption Perception Index would be of value.

Author Contributions: Conceptualization, J.G.; methodology, J.G., S.S., K.V.R. and I.S.; analysis, J.G., S.S., K.V.R. and I.S.; investigation, J.G.; data curation, J.G.; writing—original draft preparation, J.G.; writing—review and editing, J.G., S.S., K.V.R. and I.S.; supervision, S.S., K.V.R. and I.S.; project administration, S.S., K.V.R. and I.S.; funding acquisition, K.V.R. and I.S. All authors have read and agreed to the published version of the manuscript.

Funding: This project received funding from the European Union's Horizon 2020 Research and Innovation Programme under the Marie Sklodowska-Curie grant agreement No. 675153.

Institutional Review Board Statement: This research was conducted according to the guidelines of the Declaration of Helsinki, and a reference was obtained from the Research Ethics Committee of University of Iceland (protocol code 17-026, 23 November 2017).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data are not publicly available to ensure promised anonymity of interviewees.

Acknowledgments: The authors would like to extend gratitude to all the interviewees and translators who made this research possible.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

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