3. RGI

3.1 Methodology of the RGI

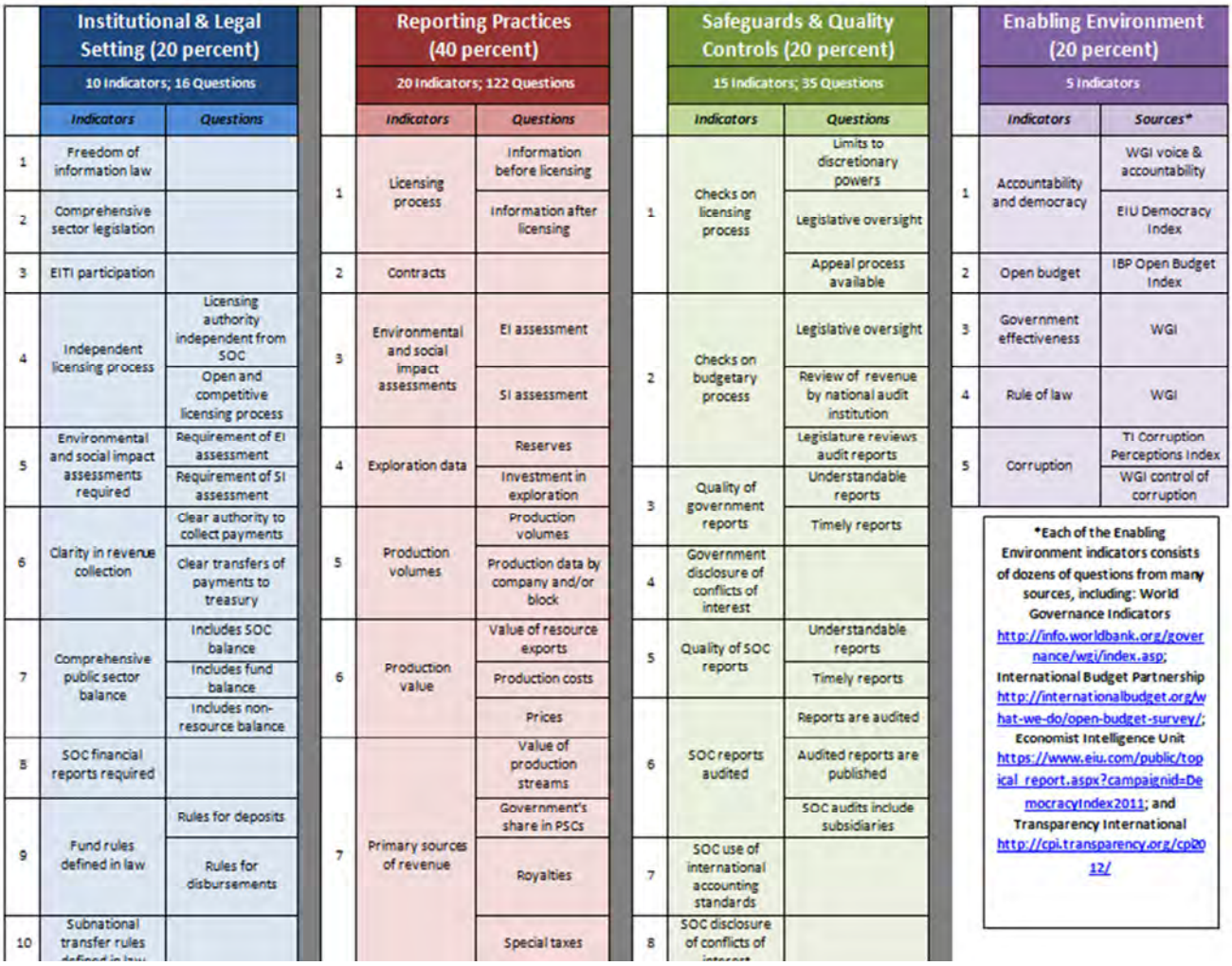
This section is based on the methodology note published by NRGI on their official website that is also included as a section of the full RGI report.

The RGI is a composite index that falls under the category of international transparency policy indexes (Michener 2015). In the words of NRGI it "evaluates the governance of the oil, gas and mining sector in 58 countries" (NRGI 2015). The RGI is presented as a single value score for each country that is assessed and this section will summarize how this score is calculated.

The 58 countries that make up the RGI have not been chosen arbitrarily. They are all hydrocarbon and/or minerals producers. 37 are defined as resource-rich by the International Monetary Fund (IMF) (extractive sector makes up at least 25 per cent of total fiscal income, GDP, or export earnings), four are prospective resource-rich countries, nine have mineral reserves that hold great potential for future fiscal revenue, two (Ghana and Liberia) participate in the Extractive Industries Transparency Initiative (EITI) but are not resource-rich and six of them are among the top 20 producers of hydrocarbons and minerals. Together, they produce 85 per cent of the world's petroleum, 90 per cent of diamonds, and 80 per cent of copper (Revenue Watch Institute 2013).

Three countries (United States, Canada, and Australia) included in the RGI have a federal government structure implying a decentralized governance of natural resources and so the assessment is applied to only one region (Gulf of Mexico, Alberta, Western Australia, respectively). Furthermore, for India, the assessment is focused on the federally governed gas sector.

An important detail to keep in mind is that the index score does not reflect the governance in all three sectors (oil, gas, and mining) in all countries but rather the sector that generates the most revenue in a given country. Each country is evaluated on one sector in particular. While this is mentioned in the methodology section of the RGI report it is not explicitly stated in the individual country fact sheets. While the sector can be implied from the context it would be useful to specify which sector exactly is being evaluated. Figure 6 provides a preview of the index structure by indicator and component.



	Institutional & Legal Setting (20 percent)	
	10 Indicators; 16 Questions	
	Indicators	*Questions*
1	Freedom of information law	
2	Comprehensive sector legislation	
3	EITI participation	
4	Independent licensing process	Licensing authority independent from SOC
		Open and competitive licensing process
5	Environmental and social impact assessments required	Requirement of EI assessment
		Requirement of SI assessment
6	Clarity in revenue collection	Clear authority to collect payments
		Clear transfers of payments to treasury
7	Comprehensive public sector balance	Includes SOC balance
		Includes fund balance
		Includes non-resource balance
8	SOC financial reports required	
9	Fund rules defined in law	Rules for deposits
		Rules for disbursements
10	Subnational transfer rules	

	Reporting Practices (40 percent)	
	20 Indicators; 122 Questions	
	Indicators	*Questions*
1	Licensing process	Information before licensing
		Information after licensing
2	Contracts	
3	Environmental and social impact assessments	EI assessment
		SI assessment
4	Exploration data	Reserves
		Investment in exploration
5	Production volumes	Production volumes
		Production data by company and/or block
6	Production value	Value of resource exports
		Production costs
		Prices
7	Primary sources of revenue	Value of production streams
		Government's share in PSCs
		Royalties
		Special taxes

	Safeguards & Quality Controls (20 percent)	
	15 Indicators; 35 Questions	
	Indicators	*Questions*
1	Checks on licensing process	Limits to discretionary powers
		Legislative oversight
		Appeal process available
2	Checks on budgetary process	Legislative oversight
		Review of revenue by national audit institution
		Legislature reviews audit reports
3	Quality of government reports	Understandable reports
		Timely reports
4	Government disclosure of conflicts of interest	
5	Quality of SOC reports	Understandable reports
		Timely reports
6	SOC reports audited	Reports are audited
		Audited reports are published
		SOC audits include subsidiaries
7	SOC use of international accounting standards	
8	SOC disclosure of conflicts of	

	Enabling Environment (20 percent)	
	5 Indicators	
	Indicators	*Sources**
1	Accountability and democracy	WGI voice & accountability
		EIU Democracy Index
2	Open budget	IBP Open Budget Index
3	Government effectiveness	WGI
4	Rule of law	WGI
5	Corruption	TI Corruption Perceptions Index
		WGI control of corruption

***Each of the Enabling Environment indicators consists of dozens of questions from many sources, including: World Governance Indicators** http://info.worldbank.org/governance/wgi/index.asp; **International Budget Partnership** http://internationalbudget.org/what-we-do/open-budget-survey/; **Economist Intelligence Unit** https://www.eiu.com/public/topical_report.aspx?campaignid=DemocracyIndex2011; **and Transparency International** http://cpi.transparency.org/cpi2012/

Figure 6 Partial preview of the RGI structure by indicator (refer to the RGI website for the full structure)

3.2 RGI Questionnaire

RWI Index Questionnaire: Democratic Republic of the Congo 2012

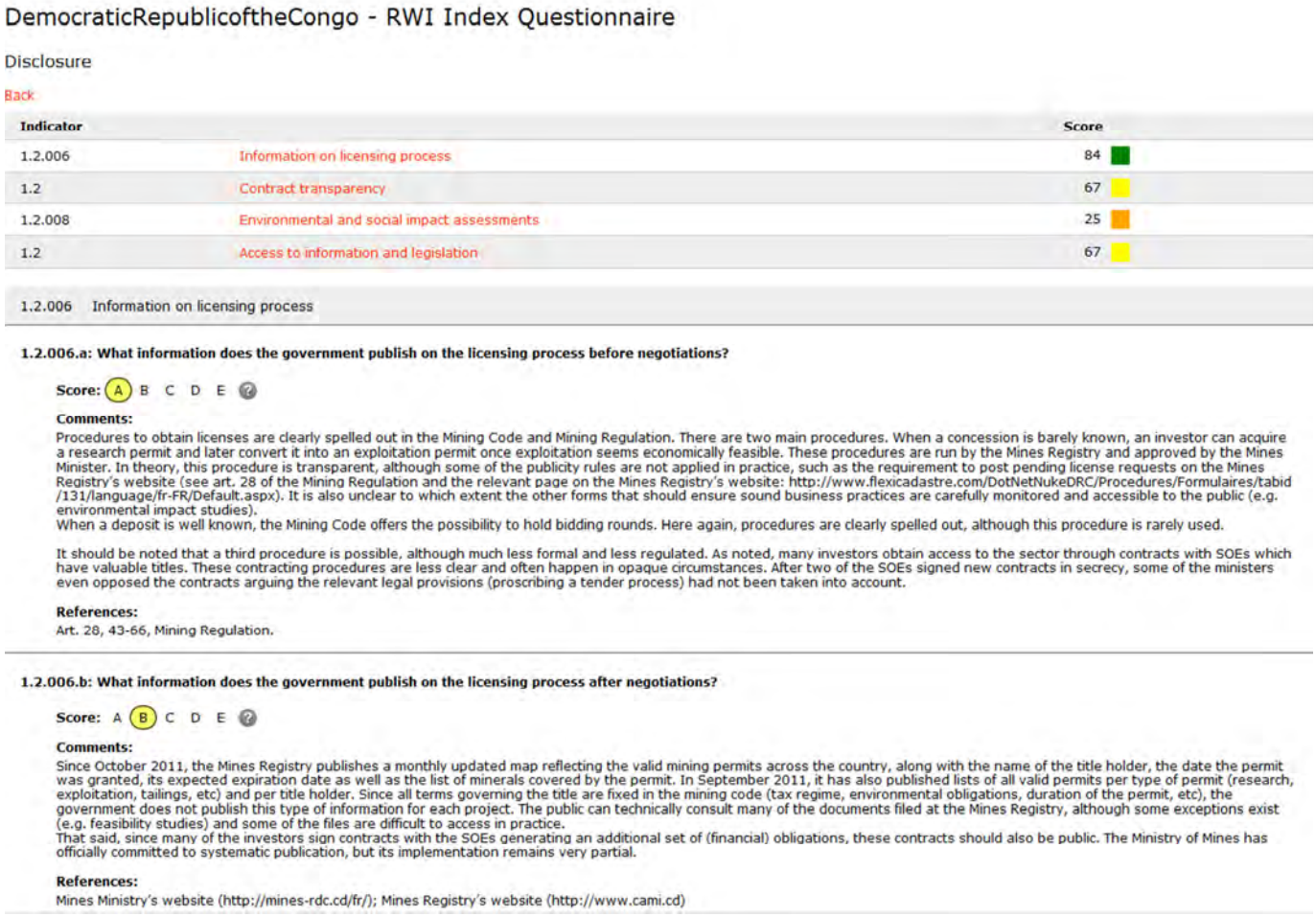
Category I	**Access to Resources**	
1.1	Context	
1.2	Disclosure	61
1.3	Legal Framework and Practices	67
Category II	**Revenue Generation and Collection**	
2.1	Context	
2.2	Disclosure	29
2.3	Legal Framework and Practices	62
Category III	**State Owned Companies**	
3.1	Context	
3.2	Disclosure	22
3.3	Legal Framework and Practice	50
Category IV	**Natural Resource Funds**	
4.1	Context	
4.2	Disclosure	N/A
4.3	Legal Framework and Practice	N/A
Category V	**Subnational Transfers**	
5.1	Context	
5.2	Disclosure	33
5.3	Legal Framework and Practice	50

Figure 7 Screenshot of the questionnaire structure for the DRC

Each individual country score is produced as a result of a specially designed questionnaire that is composed of a total of 191 questions. Every country questionnaire is accessible online and available for download on the NRGI website. Figure 7 shows an example of a country questionnaire and its general structure. However, some questions have been excluded from the calculation of the final score: 16 questions that are referred to by NRGI as context questions[2], a question on the disclosure of the names of companies operating in the country (duplication), a question on the disclosure of beneficial ownership (incomplete data), and any questions scored as "not applicable". This brings us to the final number of 173 scored questions that are subsequently grouped into 45 indicators. The format and questions are based on standards and guidelines put forth by several external bodies: the IMF's 2007 Guide on Resource Revenue Transparency, EITI, and the Publish What you Pay coalition. "The RGI is therefore a hybrid index largely based on primary data collected through the questionnaire that assesses the governance and transparency of the specific sector, but incorporating several external measures of the context in which oil, gas and mining governance take place." (NRGI 2015) Each question is answered by an expert with comments supporting and explaining the answer, followed by relevant references and links that point to the original sources of information. Figure 8 shows an example of a country questionnaire and individual questions and answers in a particular category.

[2] For example, questions about the authority that grants mining licenses, the existence of state-owned company in the extractive sector, etc.

Given the fact that the individual questions do not have the same structure and categorization of the final indicators it is sometimes difficult navigating between questions and the corresponding indicators. It would be useful to create a diagram that links questions to indicators.



DemocraticRepublicoftheCongo - RWI Index Questionnaire

Disclosure

Back

Indicator		Score
1.2.006	Information on licensing process	84
1.2	Contract transparency	67
1.2.008	Environmental and social impact assessments	25
1.2	Access to information and legislation	67

1.2.006 Information on licensing process

1.2.006.a: What information does the government publish on the licensing process before negotiations?

Score: (A) B C D E

Comments:

Procedures to obtain licenses are clearly spelled out in the Mining Code and Mining Regulation. There are two main procedures. When a concession is barely known, an investor can acquire a research permit and later convert it into an exploitation permit once exploitation seems economically feasible. These procedures are run by the Mines Registry and approved by the Mines Minister. In theory, this procedure is transparent, although some of the publicity rules are not applied in practice, such as the requirement to post pending license requests on the Mines Registry's website (see art. 28 of the Mining Regulation and the relevant page on the Mines Registry's website: http://www.flexicadastre.com/DotNetNukeDRC/Procedures/Formulaires/tabid/131/language/fr-FR/Default.aspx). It is also unclear to which extent the other forms that should ensure sound business practices are carefully monitored and accessible to the public (e.g. environmental impact studies).
When a deposit is well known, the Mining Code offers the possibility to hold bidding rounds. Here again, procedures are clearly spelled out, although this procedure is rarely used.

It should be noted that a third procedure is possible, although much less formal and less regulated. As noted, many investors obtain access to the sector through contracts with SOEs which have valuable titles. These contracting procedures are less clear and often happen in opaque circumstances. After two of the SOEs signed new contracts in secrecy, some of the ministers even opposed the contracts arguing the relevant legal provisions (proscribing a tender process) had not been taken into account.

References:

Art. 28, 43-66, Mining Regulation.

1.2.006.b: What information does the government publish on the licensing process after negotiations?

Score: A (B) C D E

Comments:

Since October 2011, the Mines Registry publishes a monthly updated map reflecting the valid mining permits across the country, along with the name of the title holder, the date the permit was granted, its expected expiration date as well as the list of minerals covered by the permit. In September 2011, it has also published lists of all valid permits per type of permit (research, exploitation, tailings, etc) and per title holder. Since all terms governing the title are fixed in the mining code (tax regime, environmental obligations, duration of the permit, etc), the government does not publish this type of information for each project. The public can technically consult many of the documents filed at the Mines Registry, although some exceptions exist (e.g. feasibility studies) and some of the files are difficult to access in practice.
That said, since many of the investors sign contracts with the SOEs generating an additional set of (financial) obligations, these contracts should also be public. The Ministry of Mines has officially committed to systematic publication, but its implementation remains very partial.

References:

Mines Ministry's website (http://mines-rdc.cd/fr/); Mines Registry's website (http://www.cami.cd)

Figure 8 Example of individual questions and answers in the questionnaire

3.3 Calculating the RGI

The 45 indicators are given a score on a scale from 0 to 100 and are grouped thematically into three so-called components of the final index (Institutional and Legal Setting, Reporting Practices, and Safeguards and Quality Control). However, the amount of questions and indicators per component is not equally distributed with the Reporting Practices component, which is highly transparency focused, containing the majority of questions. There is also a fourth component (Enabling Environment) that is constructed using over 30 external measures and indices created by third parties[3] that are combined into 5 indicators of the broader governance environment. It is worth noting that Michener (2015) warns against "index cannibalism" where indexes incorporate other indexes into their scores. However, the RGI report does contain a section arguing for and against the inclusion of the Enabling Environment external

[3] Economist Intelligence Unit, International Budget Partnership, Transparency International, and Worldwide Governance Indicators

component indicating that the authors are aware of the risks present. Finally, the RGI data tool allows for custom weighting of the 4 components so users can exclude this component from the score.

If an indicator contains more than one question the score is a simple average of the question scores. The component score is also a simple average of the indicator scores. The values of the external indicators for the Enabling Environment component are first normalized to a 0-100 scale. Finally, the RGI score is a weighted average of the four components' scores and is also presented in the form of a single figure on the 0-100 scale that is divided into four performance ranges: 71-100 is satisfactory, 51-70 is partial, 41-50 is weak, and 0-40 is failing.

Table 1: The four components of the RGI

Institutional and Legal Setting	10 indicators calculated from 16 questions that evaluate whether the laws, regulations, and institutional practices enable comprehensive disclosures, open and fair competition, and accountability; 20 per cent weight in the final score.
Reporting Practices	20 indicators calculated from 122 questions that evaluate the actual disclosure of information and reporting practices by government agencies; 40 per cent weight in the final score.
Safeguards and Quality Controls	15 indicators calculated from 35 questions that evaluate the checks and oversight mechanisms that guard against conflicts of interest and undue discretion, such as audits; 20 per cent weight in the final score.
Enabling Environment	Five indicators calculated from more than 30 external sources that evaluate accountability, government effectiveness, rule of law, corruption, and democracy. This component evaluates the extent to which the broader environment will help or hinder transparency and accountability efforts in the extractive industry; 20 per cent weight in the final score.

Finally, margins of error are also calculated as part of the RGI methodology. Margins of error are estimated based on the extent of disagreement across indicators and components. First the simple average of the standard deviation is calculated within and across components providing an average standard deviation across the sample of 8. The implied margin of error around a country's point estimate is calculated to be +/- 13 with a 90 per cent confidence interval. There is also variance across individual countries with a range of 6.5–9.5 which creates different confidence intervals; the top and bottom performers have lower standard deviations in general while those in the middle have higher ones.

It is important to point out that this is the second edition of the RGI index. However, the first edition was a pilot index in 2010 developed solely by the Resource Watch Institute, included only 41 countries, used less questions, and did not estimate margins of error. Given these changes, in the words of

the authors themselves, the 2010 index is not comparable with the current edition. This is rather unfortunate because being able to evaluate the evolution of scores through time is a rather useful feature and would create a more robust measure. It will be interesting to see whether the results of the 2016 RGI will be comparable with the current edition and how this feature will be used.

3.4 Collecting the data

The primary data for the questionnaires, answering all 191 questions for the 58 countries, was collected by a team of researchers composed of 20 local civil society experts, 12 independent consultants based in-country, and 14 experts based outside the country they assessed. However, it is not clear whether these numbers refer to the experts per country or they refer to the totality of the human resources working on all countries. It is not specified in the methodological section at any point which is unusual since there is a big difference between the two cases.

Michener (2015) also warns about the pitfalls of relying on in-country experts that have been documented in the literature, which can create risks of feedback loops and biased information based on perceptions. It is also not clear whether the team of experts filling out the questionnaires is permanent or the team is composed every time a new edition of the RGI is being made and therefore different experts can work on different editions.

4. INCORPORATING GIS TOOLS INTO THE RGI METHODOLOGY

4.1 Critical review of the RGI

While not aiming to discredit the work of the NRGI and the success of the RGI as a resource governance measure several areas for improvement have been identified in the scholarly literature and some interesting geospatial applications in this field have motivated the following proposals for an improved index.

One important recommendation stemming from the literature, directly applicable to the RGI, is the fact that most transparency initiatives and measures focus on resource revenues and not expenditures. The argument is that if we want to measure corruption, development effects, and equitable distribution of resource wealth it is much more important to focus on expenditures rather than revenues (Bleischwitz 2009, Mejia Acosta 2010, Kolstad and Wiig 2009). "There is thus something of a disconnect between prominent current transparency initiatives, and the literature on the resource curse." (Kolstad and Wiig p527, 2009)

Michener (2015) provides a salient analysis of international transparency policy indexes (including the RGI) and looks at their validity from several perspectives. Two of the more important aspects

discussed are content validity[4] and variable substitutability[5]. The RGI receives a positive evaluation of its content validity because it measures several dimensions of transparency as well as de jure and de facto elements. However, it does not go far enough on the question of substitutability since when looking at the production of transparent information it uses categories[6] that do not sufficiently characterize the transparency of information: "The problem here is not only the concept of "distributed to the public", which should be specified, but also the difficulty of differentiating between the first two – "not produced" from "produced for internal purposes" (Michener 2015). An important positive aspect of the RGI is the fact that it disaggregates the data used on the sub-national level. This feature makes it particularly interesting as a candidate for a deeper and potentially spatial use as a governance measure.

Finally, one could argue that the RGI focuses too heavily on transparency as a measure of good governance since 122 out of the 170 questions focus on transparency. It is as much about transparency as it is about governance or rather transparency is put forth as the main measure of good governance known as governance by disclosure or regulation by revelation in the literature (Michener 2015). Furthermore, a significant amount of questions are not applicable to all countries. Because of different institutional arrangements some questions simply do not correspond to the context of certain countries. A section on state-owned companies, for example, cannot be applied to a country like the United Kingdom which does not have state-owned companies and so the score for that country will be based on a smaller number of indicators. Another example are the 20 "reporting practices" questions which are not applicable to Canada (Alberta) because of the institutional arrangements in that case meaning that "Canada's reporting score is based on nearly half as many evaluative queries as other countries" (Michener 2015). This type of mismatch dampens the legitimacy of the measure, creates possible biases toward certain institutional settings, possibly spreads policy isomorphism, and creates inflexible indexes that undermine comparability and applicability across countries (Michener 2015).

As mentioned before, the question of scale has been identified as one of high importance within the context of governance of natural resources. Mechanisms of cause and effect, stakeholder interactions, historic, national and regional contexts, and many other aspects of the extractive industry exist across temporal and spatial scales. In order to evaluate the governance of the sector and potentially improve development outcomes a multi-scale analysis is needed (Gilberthorpe and Papyrakis 2015, Ostendorf 2011). The RGI focuses on the national scale and for the moment is a score of a single year. It would therefore seem that this score does not take into account spatial and temporal scale complexities which makes it vulnerable to missing the whole picture.

[4] Content validity is a measure of how completely indexes measure their respective policy domains and concepts: "the RGI provides a good example of multi-dimensional coverage of transparency throughout different stages of the policy cycle" (Michener 2015).

[5] The concept of substitutability is about whether policies have provisions that are interchangeable or there are provisions without which the policy makes no sense and whether this is taken into account in the index. "Lacking public accessibility, a public transparency policy can hardly qualify as transparent" (Michener 2015)

[6] The categories for published documents are: not produced, produced for internal purposes, produced and available on request, produced and distributed to the public

The RGI therefore does not have major gaps in its methodology and seems to adequately capture the evaluation of transparency in the extractive industry. However, transparency is only one measure of governance and the RGI focuses perhaps too much on this proxy. There is definitely potential for a wider scope and improvements can be made to capture more dimensions of governance. Furthermore, the RGI report does not give any room to a theoretical framework of the concepts it purports to measure and it would surely benefit from an in-depth theoretical analysis of these concepts. It is nevertheless a relatively recent project with limited resources which can explain some of these shortfalls and it will be interesting to see its evolution in the future.

4.2 GIS and the RGI

Figure 9 Countries tab on the RGI website

Currently, the RGI website includes a "Countries" tab that presents a visualization of the RGI scores on a global scale and provides links to individual country and regional fact sheets and reports. Figure 9 presents a screenshot of the "Countries" tab on the RGI website. These sections are summaries of the country score broken down by component with graphs visualizing the data, links to download data and to view or download individual questionnaires. There is also a basic online data tool application that allows for interactive data visualization and manipulation. Figure 10 provides a screenshot of an individual country fact sheet and score analysis.

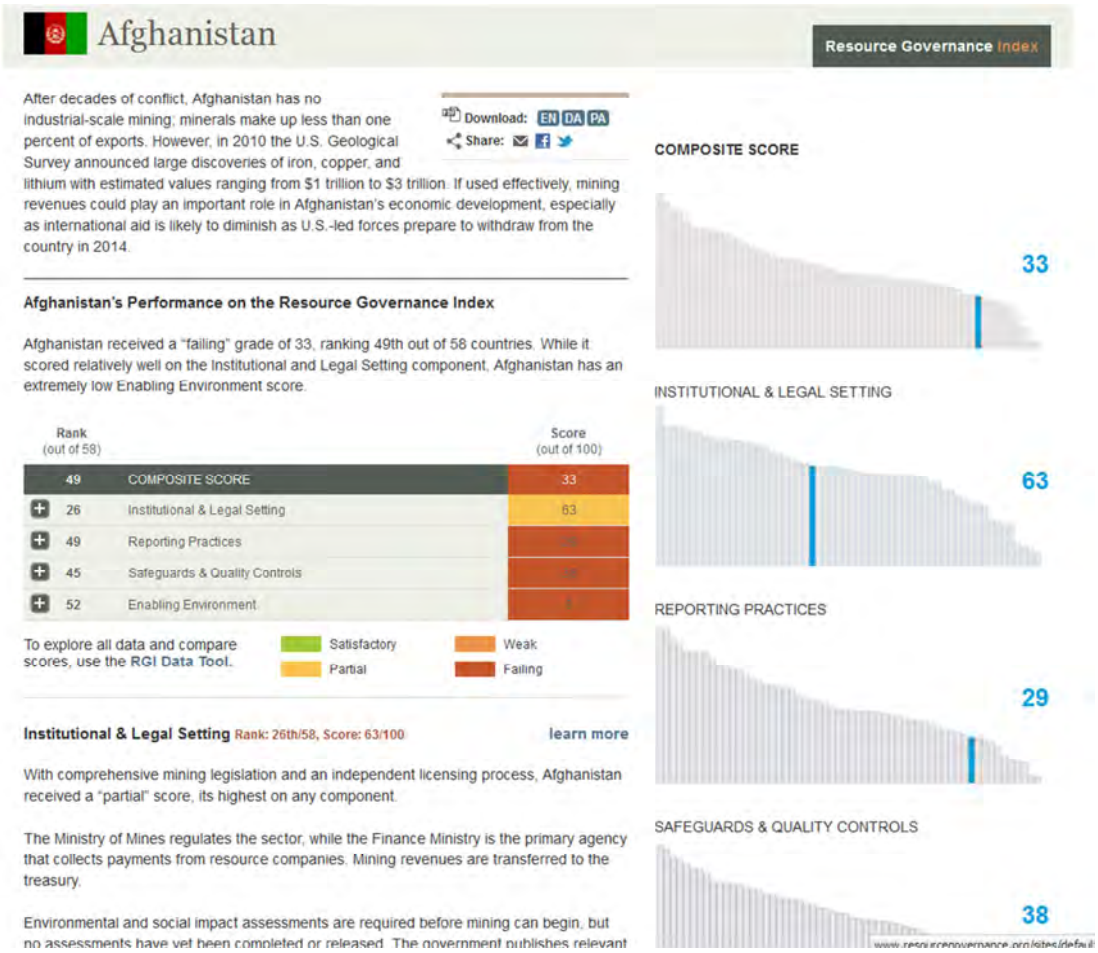


Figure 10 Example of an individual country fact sheet on the RGI website

In parallel, many countries already have or are putting in place online cadaster registries or portals that map data on concessions, licenses, individual mines, geological information, protected areas, and others. This is a very positive development but ideally all of this information on the extractive industry could be centralized. The Open Government Guide[7] already has the creation of a public online registry of all natural resources concessions as an advanced commitment in the transparency of the extractive industry. Their website is a good example of centralization of existing information from multiple sources. As a first step, the RGI could include a question on the existence of such an online tool in their questionnaire or even a whole section on spatial data and tools available. The argument being that spatial data and tools to use it are very important in the context of governance of natural resources (extractive industries and resources are first of all physical, spatial phenomena). Therefore, the existence of an online mining registry or cadaster can surely be seen as a positive point for natural resources governance. The

[7] Developed by the Transparency and Accountability Initiative in support of the Open Government Partnership the guide presents standards, commitments, and recommendations that governments can undertake in order to achieve transparency and accountability in a range of different domains. Each domain is developed in collaboration with relevant experts and organizations. For each domain it presents relevant organizations, illustrative commitments that can be undertaken separated into three categories (initial, intermediate, and advanced), and existing standards and guidelines.

fact that such a tool exists and is usable by the public also attests to the commitment to transparency of the government providing it. The RGI could, therefore, first of all evaluate whether such tools exist, their quality, and also point to their location so that RGI users can quickly find them.

FlexiCadastre is a company that provides the service of development and management of online mining cadaster portals to governments and has already produced a number of such tools (Botswana, DRC, Kenya, Namibia, Mozambique, Papua New Guinea, Rwanda, South Sudan, Tanzania, Uganda, and Zambia)[8]. Their website even acknowledges the link between the EITI and their work arguing that their tools support the EITI goals. Western Australia's (WA) Department of Mines and Petroleum has a very advanced website with lots of information and spatial data available for their extractive industry. According to McHenry et al. (2015) this is due to policy reform and the resulting Mining Securities Fund. Unfortunately their online map application requires the installation of Microsoft Silverlight which may prevent some users from accessing this tool. However, the main limiting factor of such applications is data availability; figure 11 illustrates this point. "Too often critical spatial information layers are difficult to come by at the appropriate spatial resolution and extent, hence reducing the overall strength of the combined evidence" (Ostendorf 2011). It seems somewhat strange then that the RGI website does not point users to such existing resources that could support the evaluation of resource governance and complement the numerical score. Collaboration between such efforts would greatly improve overall evaluation.

In the words of McHenry et al. (2015): "better outcomes can be achieved by linking voluntary international transparency commitments from governments with mandatory monitoring, analysis, and enforcement of compliance with jurisdictional laws." It is hard to refute this argument when one looks at the level of detail and amount of information present in the WA Department of Mines and Petroleum online map tool. However, the multitude of data makes the tool somewhat harder to navigate, slows down its performance and interestingly enough it is much easier to find individual concessions, owners and operators, and minerals present in the concession on the DRC online map than the WA one (also illustrated in the figure).

[8] Look at http://www.spatialdimension.com/Cadastre-Portals for a list of existing portals and hyperlinks to the respective websites.

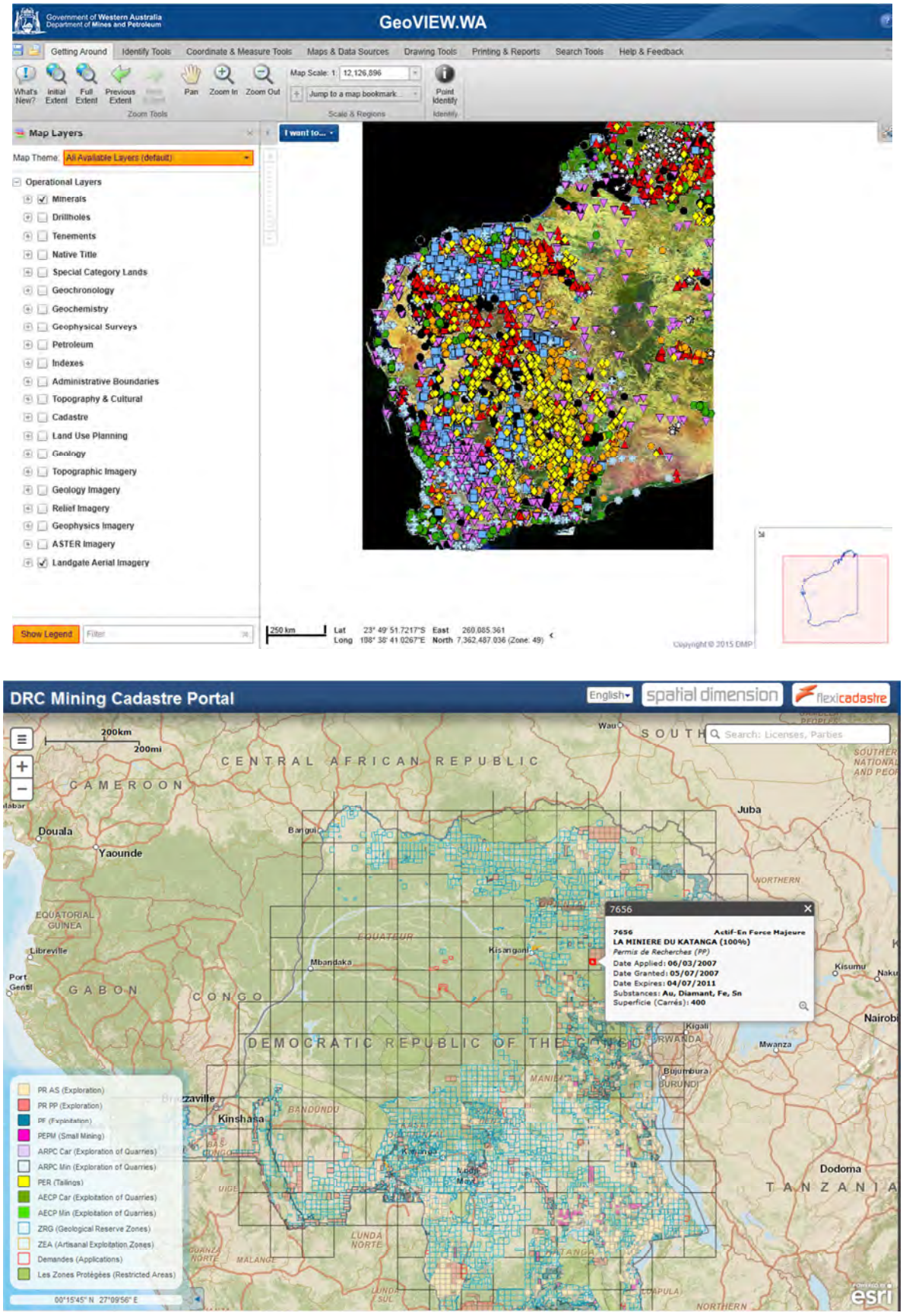


Figure 11 Comparison of available layers and data for the DRC online mining cadastre and the WA mining online map application

As mentioned earlier there have also been academic efforts to tap into spatial information and GIS tools in the context of resource governance and the extractive industry. Norris (2014) argues in favor of the capacity of participatory GIS to bridge the gap between civil society and the state and foster stakeholder interaction. Baynard (2011), Hinojosa and Hennerman (2012), Aistrup et al. (2013), Cuba et al (2014), and Emel et al. (2014) all deploy GIS tools and spatial data in an effort to evaluate impacts, dynamics, and governance of natural resources in specific areas. These studies show the potential of such information, however it is definitely beyond the reach of the RGI to systematically employ such methods and data. For the moment they are pinpoint studies that can hardly be copied to every case and used within the context of an index. Nevertheless, they show the realm of possible and the RGI website could at least point to such existing information and data. Another large effort worth mentioning is the EU EO-MINERS project. There is one example where the RGI report points to such information and that is the Peruvian civil society association Grupo Propuesta Ciudadana which has established an online map portal using public data that allows the viewing of individual mining concessions as well as their overlap with indigenous areas and natural protection zones.

As a first step the RGI should reinforce its theoretical framework and ground its evaluation in some recommendations and findings from academic literature. For example, McHenry et al. (2015) propose five aspects of an ideal mining transparency solution which could be used as a basis for benchmarking existing national solutions. A lot of the criteria are already included in the RGI but there are also many that are not. Considering the fact that most countries analyzed by the RGI have a relatively weak score this approach could further present the state of the sector in a negative light but it would also put things in perspective relative to an ideal solution and even the high performers could see areas where they are lacking. Furthermore, as mentioned before, the focus on revenue data should also be enlarged to include expenditure data (even though realistically this is a very optimistic goal).

Table 2: Five aspects of an ideal mining transparency solution (McHenry et al. 2015)

I.	What the activity is at the site (i.e. tenement, mine-site, downstream processing, infrastructure, pollution such as acid mine drainage, etc.) versus the company (e.g. EITI only considers company level, and the issue of transparency at the macro level, which makes it wholly insufficient for civil society to easily interrogate larger extractive operators with multiple sites on one jurisdiction);
II.	The level of environmental disturbance matched to a detailed plan to correct/rehabilitate the disturbance over time, any incentives to minimize disturbance and/or promote effective rehabilitation, and how success of rehabilitation activities will be determined/measured;
III.	Actual historical performance of correcting disturbance (i.e. disturbance and success of rehabilitation);
IV.	Social data—affected people are consulted and know of decisions, consultation about final post-mining land use and progression toward it, with the social data being available to interested third parties to enable the assessment of fairness (particularly for land owners and traditional custodians); and
V.	Financial flows and transfer of money such as royalties, taxes, any other payments from mining companies (or affiliated subsidiaries or parent companies) to government or community on an individual mine site basis.

A method of using and representing spatial data that would seem particularly appropriate to be implemented in the RGI are so-called story maps. Some existing examples within the context of natural resources are Global Witness' Jade story (https://www.globalwitness.org/jade-story/) which explores the issues and conflicts surrounding jade mining in Myanmar (this example could use more spatial information however), the Twangiza report (http://crowdcover.github.io/geo-report/) done as a pilot example within the Map-X[9] project which explores artisanal mining issues in the Twangiza mine site in the DRC, and the Extractives and Fragile States (http://extractivesfragilestates.github.io/ExtractivesFragileStates/) initiative which maps available data related to the extractive industry in a select number of fragile states.

[9] Map-X is an open data platform developed in collaboration by UNEP, the World Bank and the g7+ secretariat that aims to use open geospatial data to create maps within the context of the extractive industry.

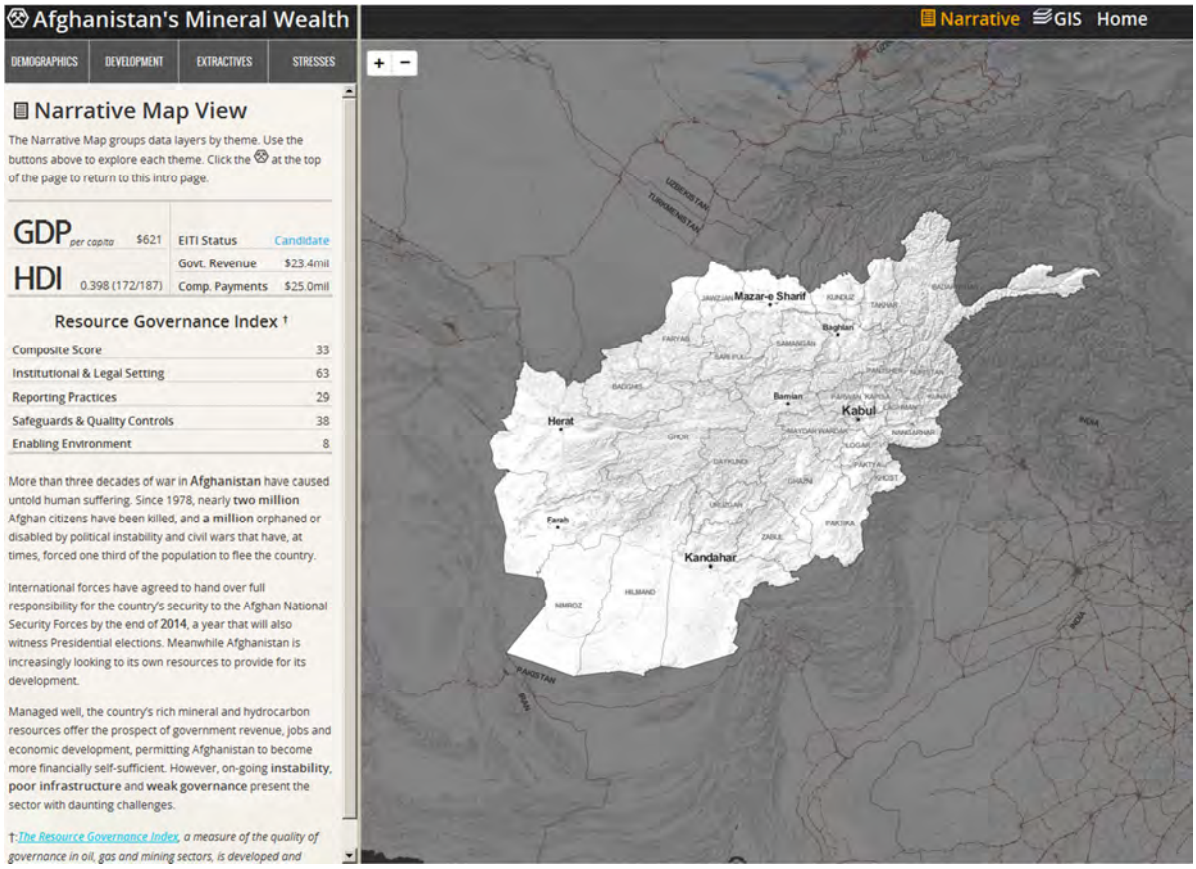


Figure 12 Extractives and fragile states online map application

Figure 12 shows a screenshot of the Extractives and Fragile States webmap tool. We can see that there is a narrative view and a GIS view which can be freely interchanged. The narrative view presents some relevant economic and social indicators, a bit of national context, and even includes the RGI score broken down by component. Furthermore the user can choose between several categories of information and in the GIS view the user can switch between available layers to analyze existing spatial information at a click of the mouse. Depending on existing data a lot of different information can be mapped; for example for the DRC mineral supply chains have been mapped as well as artisanal mines.

Figure 13 shows a screenshot of the Twangiza report story map developed as a pilot for the Map-X project. The screenshot illustrates how several layers of data can be visualized including infrastructure, artisanal mining sites, and protected areas. Yet again this kind of visualization is very powerful : it can transcend scales (in this example the user can zoom in to individual artisanal mining sites or zoom out to the national level), and can provide contextual information in the form of text, photographs, and explanations of particular national dynamics and issues. This kind of represenation can also be used to present time series or maps of the same area over a certain time period and thus expose the temporal dynamics.

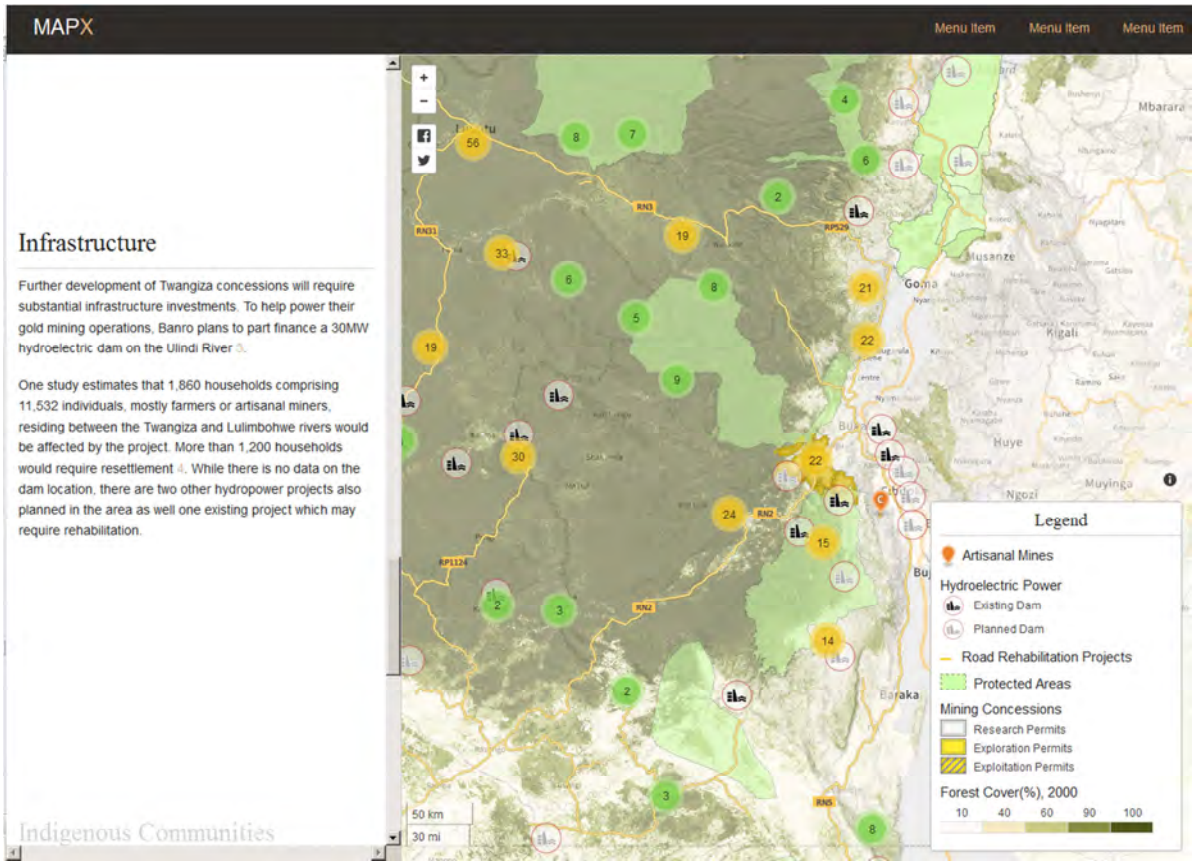


Figure 13 Pilot Twangiza story map from the Map-X project

The RGI "Countries" tab already has a structure resembling that shown in Figures 12 and 13. Each country profile already provides contextual information, other economic and social indicators, and breakdown of RGI indicators. This could be modified and improved to resemble something like the examples above. This would greatly increase the robustness and scope of the RGI and would provide a much more valuable tool to all interested users and parties. Of course, the main problem in this approach is the availability of data. Where there is no available spatial data there can be no maps and considering the low level of transparency and data collection present in most resource rich countries the biggest hurdle is to motivate governments to collect and publish such data or to collect it oneself. This means that this tool would not be used for comparison across countries but would rather provide a more context specific view into the social, economic, environmental, and governance issues of each country. The numerical RGI is comparable and looks at broad factors that can be compared across countries but it does not give us the full picture. Furthermore, the lack of spatial data in certain countries would be immediately evident because the map for that country would be empty. This could be seen as an incentive for that country to populate its map by publishing data but would also clearly communicate the level of governance in that country to the user if even the most basic spatial information is not available.

There is evidence that NRGI is aware of the importance of data availability, especially disaggregated project and contract level spatial data, and that they are advocating its use and following its development. In one communication from their website they announce a new project called

ResourceProjects.org which will be an open repository of project-level identifiers and accompanying data, they refer to spatial data and two academic papers that used it, and even link to a spatial data repository[10] and repositories of other open, relevant data. Even though spatial data is briefly mentioned and the NRGI should focus more on it, this is certainly a very positive development and very close to the efforts argued for in this paper. In another communication[11] they announce the production of an open dataset that has been built from EITI PDF format reports which contains project level data and is free to use. This definitely shows that the RGI authors are well aware of developments around them and are motivated to expand their work and improve the evaluation of resource governance in all ways possible.

It also shows that they already have a certain level of collaboration with the EITI and ways in which these two efforts can mutually benefit from each other's work. Echoing a recent UNEP consultation[12] EITI data could be used to its full potential if it would be adapted to an open data standard. Collaboration between the EITI, projects like MAP-X, and the NRGI would benefit everybody by fostering cooperation and interdisciplinary work, improving the dissemination and use of data, while providing better tools for the evaluation of governance in the extractive industry. A further step would be to include the private sector in this collaboration.

5. CONCLUSION

As we have seen there are many ways in which spatial information and GIS tools can be leveraged for more efficient and robust resource governance evaluation across scales and many sources advocating for its use within this context. It is not a question of whether this approach is pertinent and useful but rather of how it can be best put to use. The authors of the RGI are in a unique position where they can embrace GIS and exploit its potential to become first movers in a world where there is no systematic concerted effort to employ spatial information in combination with a numerical index as of yet. However, the evident barriers to such a positive development are the resources available to use and deploy such data by an organization like the NRGI on the one hand and the production and publication of such data by relevant private and public stakeholders on the other. The answer to this barrier is collaboration between multiple entities and the best way to achieve this is through open data and open source projects in order to leverage the power of many users.

The main questions posed by this paper have been explored through a literature review of relevant concepts and a review of existing GIS methods and efforts deployed in the context of the extractive industry. Several recommendations have been put forth and positive new developments highlighted. Unfortunately, taking into account the time constraints of this paper, some aspects were not treated in as much detail as they merit and further research needs to be done. The two working

[10] See http://a.tiles.mapbox.com/v3/helsinki/maps.html
[11] See : http://www.resourcegovernance.org/news/blog/open-project-data-matters-resourceprojectsorg-how-we-can-make-it-useful and http://www.resourcegovernance.org/publications/dataset-unlocking-eiti-data-meaningful-reform
[12] See : https://eiti.org/files/input_from_unep_on_eiti_open_data_policy.pdf

hypotheses have been confirmed by providing ample arguments and examples of why it is necessary to develop a multi-dimensional and multi-component tool to measure resource governance in addition to or in combination with the RGI and by demonstrating that elements for such a tool already exist. It was not the aim of this work to develop or implement these recommendations, considering it would be a sizeable effort, but rather to start a debate on the matter, analyze several possibilities and offer a direction in which further work on this subject could follow.

While resource governance is a complex and multifaceted issue that is hard to operationalize there are many efforts made to eliminate this problem and GIS tools and spatial information seem to be particularly suited to at least improve the current situation. The transparency movement is well underway and it does not seem overly optimistic to expect more and more data on all levels being made available and put to good use in the coming years. While the RGI is not without gaps and is still relatively young it is a good base for comparative resource governance evaluation that could be (and surely will be) improved by integrating spatial information and further developing individual country profiles. All the stars are aligned for further developing systematic and holistic resource governance evaluation tools that have the potential to profoundly influence and change for the better this industrial sector in need of efficiency and sustainability.