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Spatial Data Are Key to Sustainability Standards Increasing and Demonstrating Their Impact

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Abstract

Spatial data are increasingly ubiquitous and accessible. Understanding precisely where certified farms are located in relation to other variables can help uncover their potential to influence biodiversity, forest cover, and local livelihoods. Spatial mapping opens up many opportunities for sustainability standards organizations to test, understand, and demonstrate their impact. However, the potential of spatial data remains largely unrecognized and underdeveloped. For our recent analysis, we mapped certified farms for tropical commodity crops in unprecedented detail. We review ways in which spatial data are being used to enhance the positive impacts of certification on rural development and biodiversity conservation and suggest four steps by which standards organizations could build on this work to make the most of spatial data.

Keywords

Certification, transparency, traceability, commodities, sustainability standards

Commentary to: Tayleur, C.; Balmford, A.; Buchanan, G. M.; Butchart, S. H. M.; Corlet Walker, C.; Ducharme, H.; Green, R. E.; Milder, J. C.; Sanderson, F. J.; Thomas, D. H. L.; Tracewski, L.; Vickery, J.; Phalan, B. Where are commodity crops certified, and what does it mean for conservation and poverty alleviation? *Biological Conservation* 2018, 217, 36–46, doi:10.1016/j.biocon.2017.09.024.

Introduction

We mapped the locations of more than 1 million farms from 13 different sustainability schemes to create the first global map of tropical commodity certification (Tayleur et al., 2018). We found that globally, certification tends to be located in areas important for biodiversity, while it is less well represented in areas where poverty alleviation is most needed. These broad patterns disguised much variation within different crops and regions. Analyzing and understanding such patterns through the judicious collection, analysis, and sharing of spatial data could help standards organizations to enhance (and demonstrate) their positive impacts. The tools to facilitate this are becoming widely available, but to date, few standards organizations are making the most of them. Here, we discuss the value of spatial data for sustainability standards and outline some steps toward using such data more effectively.

The spatial data revolution is well underway with an increasing number of freely available global data sets that provide opportunities for the spatial analysis of supply chain risks and benefits at increasingly fine resolutions. The global distributions of most birds, mammals, amphibians, and some other taxa have been mapped, and Key Biodiversity Areas for their protection have been defined (Brooks et al., 2016). Spatial data on protected areas are accessible through Protected Planet (www.protectedplanet.net). Areas of likely and potential Critical Habitat have been mapped (Brauneder et al., 2018). Forests and other ecosystems are now mapped in increasingly fine detail through a combination of lidar and satellite imagery (e.g., Asner et al., 2014; Jucker et al., 2018). Many of these data can now be

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accessed through user-friendly interfaces aimed at the public and civil society (e.g., Global Forest Watch, http://www.globalforestwatch.org) and the commercial sector (e.g., the Integrated Biodiversity Assessment Tool, https://www.ibatforbusiness.org/). Transparency platforms or scorecards such as Trase (http://www.trase.earth/) are beginning to provide the detailed information on supply chain impacts to a range of users (Grimard, Lake, Mardas, Godar, & Gardner, 2017).

The Value of Spatial Data

The primary value of spatial data to sustainability standards is to interrogate the spatial context in which an organization operates. Spatial data can be used to understand risk, to monitor and demonstrate compliance, and to target interventions, among other applications. Mapping the locations of proposed agricultural developments can help lenders, buyers, and regulators better understand the risks to biodiversity, forest carbon, and local people. Screening large-scale agricultural plans using detailed data on forest cover, forest condition, indigenous land rights, and biodiversity values could help to reduce the risk of inappropriate developments receiving support. As data sets improve, it will become easier to implement the avoidance stage of the mitigation hierarchy—the avoid-minimize-restore-offset framework used by many decision makers (Phalan et al., 2018). Expensive, lengthy battles between companies and civil society (e.g., Linder, 2013; Mann & Payne, 2016) might be avoided.

There is great potential for standards organizations to make better use of spatial data to monitor and demonstrate compliance with standards. Governments already use satellite-based methods to monitor compliance with the law (Rajão, Moutinho, & Soares, 2017). Standards organizations are beginning to do the same. For example, the Roundtable on Sustainable Palm Oil (RSPO) uses its GeoRSPO platform to assess compliance by its member producers with criteria relating to deforestation and fires (see: https://www.rspo.org/news-and-events/news/how-gis-technology-helps-keep-rspo-members-accountable). Analyses of these data have shown that most fires in Kalimantan and Sumatra did not occur in oil palm concessions and that certified concessions had lower fire incidence in wet years and on nonpeat soils (Cattau, Marlier, & DeFries, 2016). However, RSPO certification did not reduce the risk of fire when the likelihood of fire was high (in dry years and on peat soils), highlighting room for improvement. A rigorous accountability system with sanctions for noncompliance contributes not only to sustainability but also to the credibility of good actors.

Much as precision agriculture can improve the targeting and efficiency of agricultural inputs at a fine scale within fields, targeted interventions can help strengthen, consolidate, and expand certification in regions and landscapes where it is most needed. One standards organization using spatial data in this way is UTZ. In a pilot project, they have examined the proximity of certified coffee farms to national parks and deforestation (https://tinyurl.com/ycle3krz). They then use this information to provide focused training and technical advice, benefiting farmers, and strengthening the auditing process. The World Wildlife Fund identified smallholders encroaching on the edges of a national park in Indonesia and helped them achieve RSPO certification (https://tinyurl.com/y8nl6l3y)—expanding certification where it can help prevent forest clearance and support the farmers to adopt more sustainable and high-yielding practices. The Rainforest Alliance and UTZ also developed an approach to identify non-certified cocoa, including cocoa coming from deforested areas, potentially entering certified cocoa supply chains in Côte d'Ivoire (https://tinyurl.com/ycxq9ef7) using spatial proximity to protected areas and deforestation to assess risk. Much more can be done to strengthen, consolidate, and expand certification in priority areas identified with the aid of spatial data—for example, making biodiversity and land clearance criteria mandatory where farms operate in a context important for biodiversity.

Spatial Data Collection Is Underdeveloped and Underappreciated

Many sustainability schemes collect some form of spatial data, although not all do so in a rigorous, standardized or targeted manner. In our study, the majority of schemes were able to provide spatial coordinates for a proportion of their certificates. Organic standards were a striking exception. Despite certifying more land than all other standards combined (Tayleur et al., 2017), most standards were either unwilling or unable to provide spatial data on the locations of organic farms. This raises concerns about their ability to monitor aspects of sustainability such as land clearance and deforestation (Tayleur & Phalan, 2016).

Even within standards that collected some spatial data, these data had limitations. In the case of group certificates, for crops such as cocoa and coffee, a single coordinate sometimes represented thousands of individual farms. We also found that coordinates were not always associated with a crop-growing area, perhaps representing the location of an administrative office instead. Some schemes had no explicit spatial data but did collect farm addresses. Geocoding can transform these into spatial locations, but the process is error-prone, particularly in countries that do not use postal codes. Only the RSPO collected the *gold-standard* of spatial data—polygons outlining the boundaries of certified concessions. This was facilitated by the fact that concessions were often large (thousands of hectares), and even in this instance, maps typically failed to identify the areas protected as high conservation value areas within concessions.

To our knowledge, at the point when we collected data for our paper in 2014, none of the standards organizations used spatial data for any systematic analyses of the context in which they were operating. The challenges appear very similar to those identified by Bull et al. (2018) for biodiversity offsets: data transparency is undermined by "a perceived lack of necessity, lack of common protocols for collecting data, and a lack of resources to do so (p. 64)." Despite much interest in landscape and jurisdictional approaches as a way to scale up the impacts of sustainability schemes, development of the spatial data frameworks needed to underpin these approaches has lagged behind.

Four Steps Toward Better Use of Spatial Data in Crop Certification

We suggest four steps by which standards organizations and other actors can leverage spatial data for better sustainability outcomes. The first is to explore, share, and recognize the value of spatial data for helping to solve specific problems. We hope that the examples given in this commentary provide an initial indication of the benefits of spatial data for standards organizations, lenders, civil society, and supply-chain actors. Developing a community of shared practice and experience would expose further opportunities and enable learning from failures or limitations.

The second step we suggest is to develop common protocols for the collection, storage, and use of spatial data (Milder et al., 2015). These protocols will need to address issues we identified during our study, and others that have been highlighted in related contexts (Joppa et al., 2016). Such issues include deciding on appropriate data formats (points or polygons), collecting data with a high level of precision, ensuring quality control and error checking, maintaining a data management system, navigating issues of privacy and consent, and developing interfaces for the analysis and display of data. Bodies such as the ISEAL Alliance and the International Federation of Organic Agriculture Movements, which coordinate multiple standards, could play a key role in convening standards organizations to define common protocols. The standards community might also benefit from adopting or adapting protocols and data sets already in place, for example, in the collection of cadastral data for national land registries. One group already working to develop common protocols is the Accountability Framework Initiative (https://accountability-framework.org/).

The third step is to seek the right level of transparency: transparency of what information, for what purpose, and provided to whom? It may be that increased transparency will improve the sustainability outcomes of certification, but this is a hypothesis that remains to be rigorously tested. As Gardner et al. (2018) have noted, there is also a risk that in some situations increased transparency could exacerbate inequalities and empower those who already hold most of the power in supply chains. Ensuring that transparency is transformative while minimizing the risks of harm will entail finding the right balance between withholding and releasing data. Not all data need to be made public, and personally identifying information such as names and locations (while essential for in-house analysis and auditing) might be best obscured in public data sets, as we did in our paper. However, making data as open as possible builds trust. Openness is increasingly expected by consumers, and retailers are responding. In the United Kingdom, the Marks and Spencer supermarket chain has a supply-chain map showing the approximate location of every single farm from which it sources dairy, along with details of each farms' latest performance against animal welfare standards.

Finally, underpinning the other steps is the need for standards organizations to invest in spatial data by allocating sufficient human and other resources. The benefits to be gained from doing so are clear. As some of these benefits accrue to wider society, or facilitate decisions by other actors, such as lenders and governments, the possibility of co-financing improvements in spatial data infrastructure merit consideration. In an era of hybrid governance, much can be achieved by working together.

Conclusion

At a time when every smartphone functions as a personal GPS unit, spatial data have become an integral part of our lives. Spatial data can be used to support sustainability in a variety of ways: to better understand risk, for monitoring and evaluation, and as a decision-support tool to strengthen, consolidate, and expand certification in the places where it is most needed. However, spatial data are still underappreciated and underutilized by sustainability standards organizations. This can change, if organizations recognize the benefits, identify specific problems where spatial data can help, and devote sufficient resources. To be most effective, organizations will need to work together to create common protocols, define the right level of transparency, and develop financing mechanisms. By putting certified farms on the map, sustainability standards will be better able to monitor and improve their impacts on forests, human well-being, and biodiversity.

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