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Open and Collaborative Initiatives for tackling the Geospatial Data Inequalities in achieving the SDGs

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Abstract:

This abstract examines the role of open and collaborative data platforms, such as OpenStreetMap, in addressing the global inequalities in geospatial data availability and their impact on achieving Sustainable Development Goals (SDGs). Spatial data is crucial for monitoring SDG indicators; however, detailed data is often available only to countries with more resources, leading to inequalities in access to essential geospatial information. The Inter-agency and Expert Group on SDG Indicators (IAEG-SDG) developed a global framework of SDG indicators, emphasising the importance of disaggregating data by income, sex, age, race, ethnicity, migratory status, disability, and geographic location. This approach is aligned with the Fundamental Principles of Official Statistics, which strengthen the relevance of the spatial dimension in measuring and monitoring the SDGs since this framework design. However, SDG indicators are generally still relatively poorly represented cartographically (Dao 2022). Existing initiatives, such as (Kraak et al. 2020), rely on aggregate data from authoritative sources, often representing only the country level. However, large-scale data is crucial to propose and monitor public policies.

In this context, the UN-GGIM (United Nations Global Geospatial Information Management) plays a crucial role in steering discussions on geospatial information in the global policy framework for the SDGs. The organisation has produced key documents, such as the Fundamental Data Themes and the SDGs Roadmap, which detail the geospatial information vital for achieving the SDGs, including potential data sources and the link with the SDGs most strongly supported by such information. However, this framework relies heavily on each country's official sources, including the demand for data aggregated nationally from local governments. The UN-GGIM's responsibility is to seek through these documents to strengthen local agencies and raise awareness among national governments to invest in these essential activities for sustainability. However, the scenario is quite uneven among countries when comparing geospatial data availability, updating and level of detail. A solid alternative is to use Open and Collaborative data available globally at the local level (Brovelli, Codrina, and Coetzee 2019). From a broad perspective, it is not an issue of replacing official sources but of identifying alternatives to create, complement and make available spatial data, even when local resources are scarce. For example, the OpenStreetMap global base can be a straightforward solution in at least five of the 17 themes (Addresses, Buildings and Settlements, Geographical Names, Physical Infrastructure and Transport Networks). Additionally, it can support other relevant themes, such as Land Use and Land Cover. Furthermore, other open and collaborative data alternatives can contribute to themes such as Orthoimagery, like OpenAerialMap.

Data from National Mapping Agencies can depict the inequalities of topographic mapping among countries. A joint project by the ISPRS and UN-GGIM (Konecny, Breitkopf, and Radtke 2016) detailed some of these heterogeneities, despite the somewhat limited scope due to the questionnaire-based nature of the research. According to them, 69 countries, adapted to current boundaries, declared that more than 90% of their territory had topographic maps at scales greater than 1:25,000. Around 65% of them are classified as High Income by the World Bank. Historical grounds explain this, as over 80% of this group area was already mapped at some scale in 1944 (Platt 1945).

In contrast, the other countries had only around 35% of their area mapped in this period. These results can be observed in Figure 1, where World Bank regions group the countries' count. In the first line of the graph, we see the distribution of topographic mapping in 1945. Countries in Europe and Central Asia have predominantly more than 75% of their territories mapped. The opposite is true for Sub-Saharan Africa, Latin America, the Caribbean, East Asia and the Pacific. In 2016, coverage was even more extensive in Europe and Central Asia. The situation in East Asia and the Pacific has improved significantly. The situation in the rest of the world remained very precarious. However, the OpenStreetMap data in 2022 shows a different distribution, especially in Sub-Saharan Africa and South Asia, where more countries have a complete

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set of buildings mapped. This distribution shows us how collaborative data can fill historical gaps of missing topographic mapping data.

In particular, many countries in the global south may not have the same capacity for investment, access to technology, or political stability needed to create reliable, up-to-date, well-distributed official open data (Fisher and Streinz, 2021). Fortunately, there are ways to overcome the inequalities between countries, even starting with unequal national infrastructures. For example, Open Street Map data distribution is much less concentrated. For illustration, (Zhou et al. 2022) found that 81 countries had building completeness in their cities above 50%. Of the countries with high topographic mapping coverage mentioned previously, 75% are also in this category, many of which usually perform well in open data policy indexes. In this case, the official data available contributed to open platforms. Nevertheless, 21 sub-Saharan African countries are also in this intensively OSM-mapped group. OSM distribution is less unequal among world regions, including 39 classified as Lower Middle Income and Lower Income.

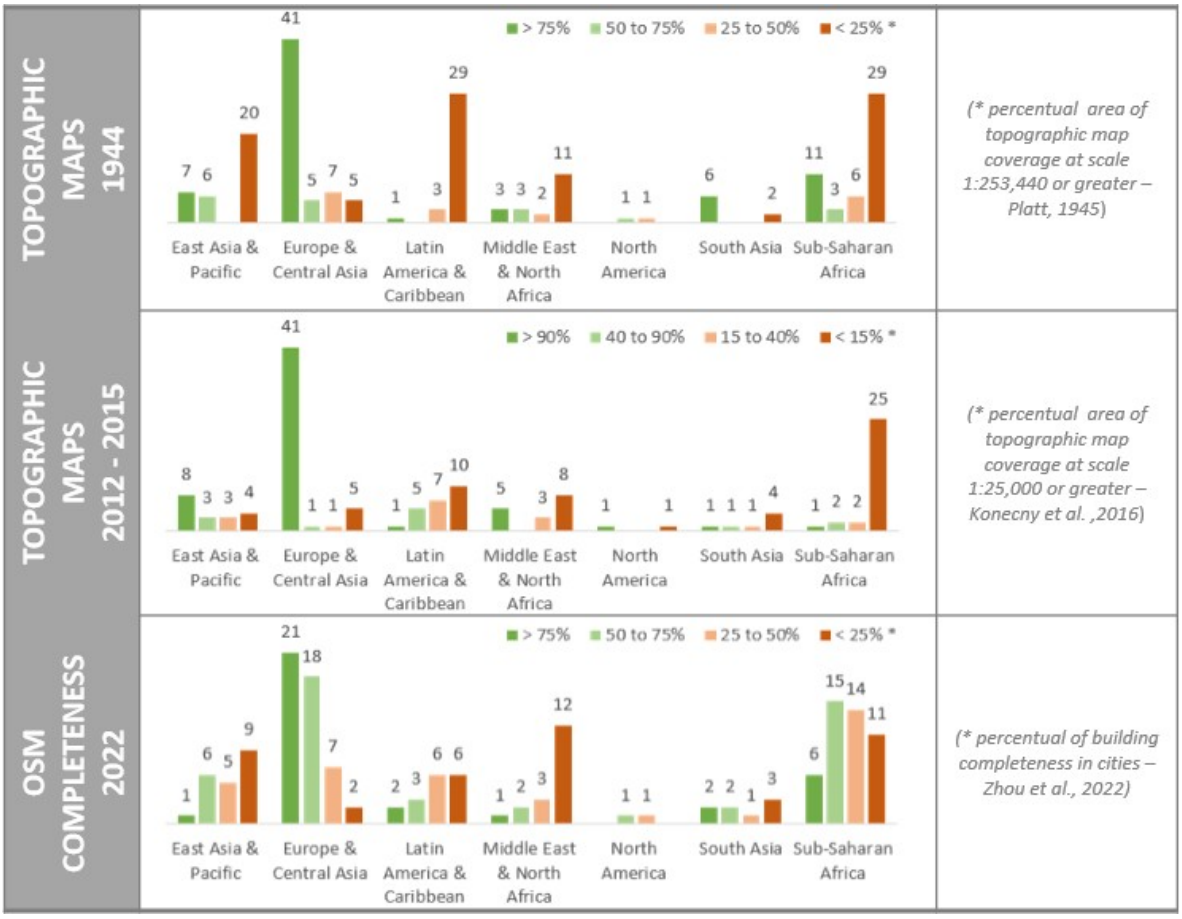

Figure 1. Distribution of the number of countries, at current borders, in each category, by World Bank region. The figure illustrates the historical evolution of topographic mapping coverage and OpenStreetMap data distribution, showing a more equitable distribution of collaborative data than traditional topographic mapping data.

There are some potential causes for the success of collaborative mapping in the global landscape. For example, there are community actions to create and update maps regardless of the availability of official data. In addition, some initiatives, such as the Humanitarian OpenStreetMap Team and the Missing Map Initiative, have been established to bridge the digital divide by providing access to geospatial data in underserved areas. Another remarkable initiative is YouthMappers, since creating local capacity is probably one of the most effective ways to reduce inequalities, in addition to open platforms and tools. In Solís and Zeballos (2023), YouthMappers chapters described their experiences involving several Sustainable Development Goals (SDGs). It is interesting to highlight the importance of student protagonism and the extent of the network's diversity. In conclusion, the availability and quality of geospatial data are essential for achieving SDGs, and it is crucial to address the unequal reality between countries. Open and collaborative data platforms like OpenStreetMap can significantly overcome these obstacles and ensure progress towards a more sustainable and equitable future.

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