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Big Data for the SDGs

Country examples in compiling SDG indicators using non-traditional data sources

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ABSTRACT

To support implementation at all levels, the 2030 Agenda for Sustainable Development recognises the need to exploit the contribution to be made by a wide range of data including Earth Observations and geospatial information. Five years on, there are few examples of countries exploiting non-traditional data sources for the global SDG monitoring framework. Furthermore, where examples do exist, they are making use of only two types of non-traditional data: Earth Observations and geospatial information, and citizen-generated data. And in the case of citizen-generated data, only examples from one country (the Philippines) are found. Significantly, the examples found were all classified as experimental. This paper encourages countries to make more use of a wide range of data for addressing the data challenges of the 2030 Agenda for Sustainable Development.

Key words: big data, SDG targets, SDG indicators

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The Working Paper Series of ESCAP Statistics Division disseminates latest developments and analysis of statistical measurements, methodologies and concepts to users and producers of statistics.

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Introduction

The 2030 Agenda for Sustainable Development adopted a comprehensive global monitoring framework comprising 231[1] unique indicators across 169 targets and 17 Goals. The framework calls for data which is "high quality, accessible, timely, reliable and disaggregated by income, sex, age, race, ethnicity, migration status, disability and geographic location and other characteristics relevant in the national contexts" (A/RES/70/1).

To support implementation at all levels, the 2030 Agenda included the need to exploit the contribution to be made by a wide range of data, including Earth Observations and geospatial information.

The purpose of this paper is to share country examples of Sustainable Development Goal (SDG) indicators which have exploited the contribution of non-traditional data sources or big data. By focussing on country examples, the paper provides transparency on where non-traditional data sources have been exploited and by whom. Cooperation opportunities can also be identified, particularly between countries, as well as areas for further exploitation of particular types of big data.

Global Working Group on Big Data for Official Statistics Task Team on Big Data for the SDGs

The UN Statistical Commission agreed, at its 45th session, to create the Global Working Group on Big Data for Official Statistics.[2] The Global Working Group investigates the benefits and challenges of big data, including the potential for monitoring and reporting on the SDGs.

The Global Working Group has multiple Task Teams progressing its mandate, including a Task Team on Big Data for the SDGs. The Task Team comprises three countries (Denmark, INEGI and Colombia), five academic institutions (University of Pennsylvania, NASA/Jet Propulsion Laboratory, MIT, Harvard), nine international agencies (World Bank, UNSD, UNECE, UNESCAP, ITU, Global Pulse, ODI, DESA, Paris21), Positium, Orange, WEF and Data-Pop Alliance.[3]

The main objective of the Task Team on Big Data for the SDGs is to provide concrete examples of the potential use of Big Data for monitoring the indicators associated with the SDGs.

The Task Team led a global survey in 2015 to assess big data for official statistics, including the SDGs. The survey found only 2% of country respondents were using big data for the SDGs indicators. In contrast, nearly 30% were using big data for price statistics.[4] 60% saw an urgent need for guidance on the linkage between big data and the SDG indicators.

Which SDG indicators can benefit from big data sources?

This paper presents a comprehensive overview of the potential of big data sources for SDG indicators.

Most of the previous research conducted by the UN[5] and non-UN organizations either focuses on (i) SDG goals or targets rather than specific indicators or (ii) specific data sources, such as geospatial or citizen-generated data. This paper brings together the results of existing research and draws an overall picture on where big data sources can directly or indirectly support the compilation of SDG indicators.

The following studies were consulted for this paper: the UN Global Geospatial Information Management (UN-GGIM)[6] and Group on Earth

[1] The global SDG indicator framework adopted in 2015 originally had 232 unique indicators (244 non-unique). The indicator list was revised in 2020 and now includes 231 unique indicators.

[2]. *https://unstats.un.org/bigdata/about/index.cshtml*.

[3] *https://unstats.un.org/bigdata/task-teams/sdgs/index.cshtml*.

[4] *https://unstats.un.org/unsd/trade/events/2015/abudhabi/presentations/day1/04/UNSD%20-%20Global%20Survey%20on%20Big%20Data.pdf*.

[5] Steve MacFeely, The Big (data) Bang: Opportunities and Challenges for Compiling SDG Indicators, *https://unctad.org/webflyer/big-data-bang-what-will-it-mean-compiling-sdg-indicators*.

[6] *http://ggim.un.org/meetings/GGIM-committee/7th-Session/documents/Agenda%2012%20-%20Initial%20short-list%20(Review%20of%20global%20indicator%20framework%20with%20geographic%20lens).pdf*.

Observations (GEO)[7] mapping of geospatial data contribution to the SDGs, mapping citizen science contributions to the UN SDGs[8] performed by academic researchers, and mapping of big data solutions for SDGs[9] performed by LIRNEasia, a pro-poor, pro-market think tank based in Sri Lanka.

Figure 1 and Table 1 identify in blue the SDG indicators to which big data sources could directly or indirectly contribute.

This research found that 65 SDG indicators could directly or indirectly benefit from big data sources. These indicators appear in 16 of the 17 SDGs – no indicators were found in peace, justice and strong institutions (Goal 16), which could be identified as benefiting from big data sources.

Figure 1 also visualises the full list of SDG indicators belonging to each Goal, based on the findings from the above-mentioned studies. Goals which have the most potential to benefit from alternative sources of data include no poverty (Goal 1), good health and well-being (Goal 3), clean water and sanitation (Goal 6) and sustainable cities and communities (Goal 11).

The research found the most promising big data sources are geospatial data and citizen-generated data. Other big data sources, such as mobile phone data, online data (e.g. on prices or employment), postal and electricity data could contribute, mostly indirectly, to only a few SDG indicators.

Noting a common view that the environment-related SDG indicators can benefit most from big data sources, Table 1 highlights in green those SDG indicators identified by UNEP that can benefit from geospatial data.

Which SDG indicators are countries exploiting big data for?

A desk-top study to locate country examples of the compilation of the official SDG indicators from big data sources was undertaken during October-December 2020. The study was extensive and benefitted from presentations at the 6th International Conference on Big Data for Official Statistics hosted by the Republic of Korea in conjunction with the Statistics Divisions of UN Department of Economic and Social Affairs, and UN Economic and Social Commission of Asia and the Pacific. The scientific programme of the 2019 World Statistics Congress of the International Statistics Institute was also reviewed for country examples. Knowledge documents from the UN Global Working Group on Big Data for Official Statistics and its Task Teams were also a valuable resource. General searches were also undertaken.

The wide searches identified country examples of experimentation with the use of geospatial data and citizen-generated data. No country examples were found of the use of mobile phone data, scanner data, smart meter data or social media data for the compilation of the SDG indicators. However, multiple country examples of the use of these big data sources could be found for other, non-SDG related purposes such as for compiling Consumer Price Index (CPI) or tourism statistics, as well as other areas across environment, economic and social statistics.

Figure 1 displays **in bold** the SDG indicators with country examples. 23 country examples could be identified. Country examples of the use of citizen-generated data were found from only one country, the Philippines. In contrast, country examples of the use of geospatial data were found from 22 countries. Figure 1 takes a conservative approach and only identifies the 22 SDG indicators for which country examples of the use of geospatial data were found.

Most of the country examples found focus on three SDG goals: clean water and sanitation (Goal 6), sustainable cities and communities (Goal 11) and life on land (Goal 15).

[7] *https://www.earthobservations.org/documents/publications/201704_geo_unggim_4pager.pdf*.

[8] Fraisl, D., Campbell, J., See, L. et al. Mapping citizen science contributions to the UN sustainable development goals. Sustain Sci 15, 1735–1751 (2020). https://doi.org/10.1007/s11625-020-00833-7.

[9] *http://lirneasia.net/wp-content/uploads/2013/09/Mapping-Big-Data-Solutions-for-the-Sustainable-Development-Goals.pdf*.

Are there any countries assessing the potential of big data for the SDG indicators?

In the Asia-Pacific region, China has conducted a comprehensive overview of the use of geospatial data for the SDG indicators. At the national level, the Chinese Academy of Science developed pilots and methodologies for monitoring 12 SDG indicators using Earth Observation data. At the local level, Deqing integrated geospatial data into 14 SDG indicators for reporting on the SDGs. Deqing county, Zhejiang province, used geospatial data for several SDG indicators including SDG indicators beyond those identified by the IAEG-SDG Working Group on Global Geospatial Information and/or GEO as being supported by geospatial data.

The Philippines has conducted a comprehensive overview of the use of citizen-generated data for the SDG indicators. In 2019, the Philippines Statistics Authority (PSA) in collaboration with Paris21 and members of a task force on citizen-generated data (CDG) for official reporting comprised of representatives from the government, CSOs, NGOs, development partners, private sector, and academia identified 81 SDG indicators that can be supported by potential CDG and CSO/NGO data holdings for different and varying regions of the country. Examples from the PSA are provided in Table 1, but not reflected in Figure 1 for reasons noted earlier.

The Data Research Center for the SDGs Research under the Statistics Research Institute of the Republic of Korea is also conducting research on the use of innovative techniques and big data sources, such as GIS information, satellite imagery, public service transit data and others for the production of SDG indicators.

Further research opportunities

This paper is an initial attempt to provide a comprehensive overview of which SDG indicators could benefit directly or indirectly from various big data sources. It is based on desk top research.

Further research could complement the list of SDG indicators that could benefit from big data sources and the list of country examples.

The research in this paper has deliberately focussed on country examples compiled by countries themselves, not country examples compiled by development partners. The intent is to understand the extent of country leadership on data innovation for the country-led 2030 Agenda for Sustainable Development.

Further research could also be undertaken to assess the metadata compiled for each SDG indicator by global SDG data custodians (e.g. UNCTAD, WHO) and their assessment of which SDG indicators could exploit the contribution to be made by a wide range of data, including Earth Observations and geospatial information. This research could then provide a reconciliation between assessments by countries and assessments by the global data custodians.

This is a living document and will be completed with more country examples as they arise.

Figure 1. SDG indicators that can be supported by big data and that have specific country examples

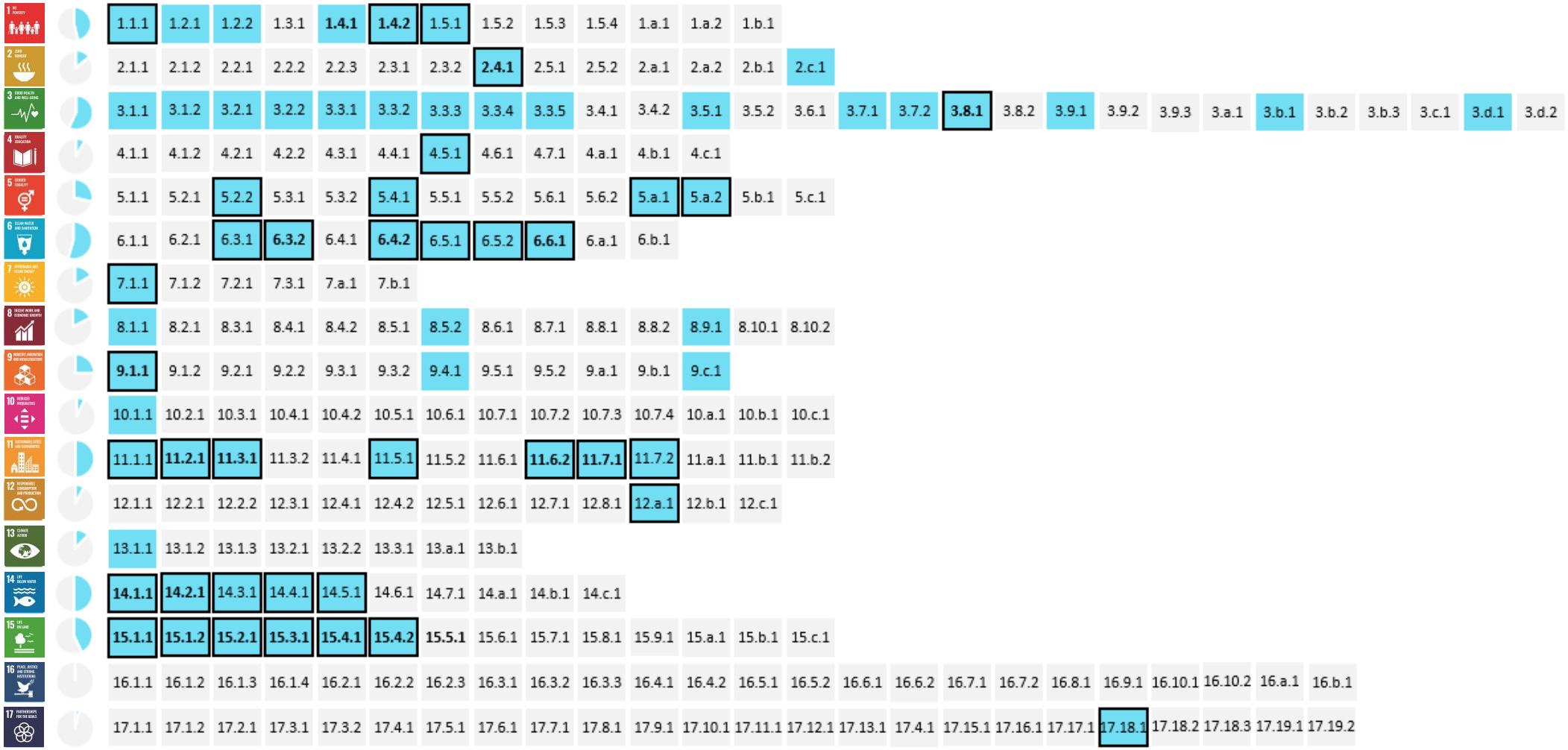

Table 1. List of SDG targets that could be supported with big data sources

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
Goal 1. End poverty in all its forms everywhere					
1.1 By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day	**Mobile phone data** for socioeconomic status and wellbeing: • human mobility and socioeconomic levels • estimating poverty and wealth • socioeconomic status **Satellite data** for poverty mapping: • identifying the poor • urban poverty	1.1.1 Proportion of the population living below the international poverty line by sex, age, employment status and geographic location (urban/rural)	**Geospatial data** can support compilation for this indicator (UN-GGIM) **Citizen-generated data** could provide supplementary information	**Citizen-generated data** Philippines[12]	
1.2 By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions	**Mobile phone data** for socioeconomic status and wellbeing: • human mobility and socioeconomic levels • estimating poverty and wealth • socioeconomic status **Satellite data** for poverty mapping: • identifying the poor • urban poverty	1.2.1 Proportion of population living below the national poverty line, by sex and age	**Citizen-generated data** could provide supplementary information	**Citizen-generated data** Philippines	
		1.2.2 Proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions	**Citizen-generated data** can have a direct contribution		
1.3 Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable		1.3.1 Proportion of population covered by social protection floors/systems, by sex, distinguishing children, unemployed persons, older persons, persons with disabilities, pregnant women, newborns, work-injury victims and the poor and the vulnerable		**Citizen-generated data** Philippines	

[10] Insights in this column are compiled from Mapping Big Data Solutions for Sustainable Development Goals, LIRNEasia, 2017 *https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/56906/IDL-56906.pdf?sequence=2*. This study contains references to research papers exploring the potential of big data sources in the identified areas.

[11] Insights based on GEO, IAEG-SDGs:WGGI and Mapping citizen science contributions to the UN sustainable development goals. *https://link.springer.com/article/10.1007/s11625-020-00833-7*. Please refer to Table S1 for specific data source examples, links to references and rationale for mapping.

[12] Examples of the use of citizen-generated data by the PSA in the Philippines were sourced from Use of Citizen-generated data for SDG reporting in the Philippines: A Case Study, June 2020: *https://paris21.org/sites/default/files/inline-files/PSA-report-FINAL.pdf*. Data for individual indicators was sourced from different non-government actors and for different and varying regions of the country. Please refer to the report for the list of data contributing organizations to each of the identified SDG indicator. The examples from the Philippines in Table 1 all refer to this resource, except for SDG 9.1.1.

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance	**Mobile phone data** for financial inclusion: • creditworthiness of the unbanked (airtime credit data)	1.4.1 Proportion of population living in households with access to basic services	**Citizen-generated data** could provide supplementary information	**Citizen-generated data** Philippines **Geospatial data** China (Deqing)[13]	
		1.4.2 Proportion of total adult population with secure tenure rights to land, (a) with legally recognized documentation, and (b) who perceive their rights to land as secure, by sex and type of tenure	**Geospatial data** can support compilation for this indicator (UN-GGIM/GEO) **Citizen-generated data** can have a direct contribution	**Geospatial data** Ukraine[14] **Citizen-generated data** Philippines	
1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters	Mobile phone data for disaster response: • human mobility after disasters	1.5.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population *(same as indicators 13.1.1 and 11.5.1)*	**Geospatial data** can support compilation of this indicator (GEO) **Mobile data** can contribute indirectly towards the measurement of this indicator **Citizen-generated data could provide supplementary information** or can have a direct contribution	**Citizen-generated data** Philippines	Sendai Framework Indicators A1 and B1
		1.5.2 Direct economic loss attributed to disasters in relation to global gross domestic product (GDP)	**Citizen-generated data** can have a direct contribution		
		1.5.4 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies		**Citizen-generated data** Philippines	
		1.a.2 Proportion of total government spending on essential services (education, health and social protection)		**Citizen-generated data** Philippines	

[13] *http://ggim.un.org/unwgic/presentations/SS3-20Nov-Jun_Chen.pdf*. The following references to China (Deqing) refer to this presentation.

[14] *https://eo4sdg.org/wp-content/uploads/2020/04/Ukraine_2.4.1_15.1.1_15.3.1.pdf.*

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture					
2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round	**Mobile phone data** and social media data for expenditure on food: • proxy indicator for food expenditure **Satellite data** for drought monitoring • severity and extent of drought conditions	2.1.1 Prevalence of undernourishment		**Citizen-generated data** Philippines	
2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons		2.2.1 Prevalence of stunting (height for age <-2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age		**Citizen-generated data** Philippines	
		2.2.2 Prevalence of malnutrition (weight for height >+2 or <-2 standard deviation from the median of the WHO Child Growth Standards) among children under 5 years of age, by type (wasting and overweight)		**Citizen-generated data** Philippines	
2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment		2.3.1 Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size		**Citizen-generated data** Philippines	
		2.3.2 Average income of small-scale food producers, by sex and indigenous status		**Citizen-generated data** Philippines	
2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	**Satellite data** for early crop yield assessment: • developing vegetation health indices	2.4.1 Proportion of agricultural area under productive and sustainable agriculture	**Geospatial data** is needed to compile this indicator (UN-GGIM/GEO) **Citizen-generated data** can have a direct contribution	**Geospatial data** China[15] China (Deqing)	

[15] *https://www.fmprc.gov.cn/mfa_eng/topics_665678/2030kcxfzyc/P020200927650108183958.pdf*, page 22.

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
2.c Adopt measures to ensure the proper functioning of food commodity markets and their derivatives and facilitate timely access to market information, including on food reserves, in order to help limit extreme food price volatility	**Online price data, scanner data**, and **social media data** for constructing consumer price index	2.c.1 Indicator of food price anomalies	**Citizen-generated data** can have a direct contribution **Online price data, scanner data** and **social media data** could contribute to this indicator	*Note: whereas no country examples have been identified for this indicator, there are multiple examples in the region on the use of scanner data and online price data for compilation of CPI.*	
Goal 3. Ensure healthy lives and promote well-being for all at all ages					
3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births		3.1.1 Maternal mortality ratio	**Citizen-generated data** could provide supplementary information	**Citizen-generated data** Philippines	
		3.1.2 Proportion of births attended by skilled health personnel	**Citizen-generated data** could provide supplementary information		
3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births		3.2.1 Under-5 mortality rate	**Citizen-generated data** could provide supplementary information	**Citizen-generated data** Philippines	
		3.2.2 Neonatal mortality rate	**Citizen-generated data** could provide supplementary information	**Citizen-generated data** Philippines	
3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases	**Mobile phone data** could be used for monitoring disease propagation: • mobility from regions of disease outbreak • sources and sinks for diseases • seasonal trends of diseases **Search engine data**: • seasonal trends of diseases	3.3.1 Number of new HIV infections per 1,000 uninfected population, by sex, age and key populations	**Citizen-generated data** could provide supplementary information		
		3.3.2 Tuberculosis incidence per 100,000 population	**Citizen-generated data** could provide supplementary information	**Citizen-generated data** Philippines	
		3.3.3 Malaria incidence per 1,000 population	**Citizen-generated data** could provide supplementary information		
		3.3.4 Hepatitis B incidence per 100,000 population	**Citizen-generated data** could provide supplementary information		
		3.3.5 Number of people requiring interventions against neglected tropical diseases	**Citizen-generated data** can have a direct contribution		

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being	Big data can help identify hotspots for traffic accidents and enable authorities to take preventive measures	3.4.1 Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease		**Citizen-generated data** Philippines	
3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol		3.5.1 Coverage of treatment interventions (pharmacological, psychosocial and rehabilitation and aftercare services) for substance use disorders	**Citizen-generated data** could provide supplementary information		
3.7 By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes		3.7.1 Proportion of women of reproductive age (aged 15–49 years) who have their need for family planning satisfied with modern methods	**Citizen-generated data** can have a direct contribution	**Citizen-generated data** Philippines	
		3.7.2 Adolescent birth rate (aged 10–14 years; aged 15–19 years) per 1,000 women in that age group	**Citizen-generated data** could provide supplementary information		
3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all		3.8.1 Coverage of essential health services	**Citizen-generated data** could provide supplementary information	**Citizen-generated data** Philippines **Geospatial data** China (Deqing)	
3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination		3.9.1 Mortality rate attributed to household and ambient air pollution	**Geospatial data** can have a direct contribution (GEO)		
3.b Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all		3.b.1 Proportion of the target population covered by all vaccines included in their national programme	**Citizen-generated data** can have a direct contribution	**Citizen-generated data** Philippines	
3.c Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States		3.c.1 Health worker density and distribution		**Citizen-generated data** Philippines	

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks		3.d.1 International Health Regulations (IHR) capacity and health emergency preparedness	**Citizen-generated data** can have a direct contribution		
Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all					
4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes		4.1.1 Proportion of children and young people (a) in grades 2/3; (b) at the end of primary; and (c) at the end of lower secondary achieving at least a minimum proficiency level in (i) reading and (ii) mathematics, by sex		**Citizen-generated data** Philippines	
4.2 By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education		4.2.1 Proportion of children aged 24-59 months who are developmentally on track in health, learning and psychosocial well-being, by sexi		**Citizen-generated data** Philippines	
		4.2.2 Participation rate in organized learning (one year before the official primary entry age), by sex		**Citizen-generated data** Philippines	
4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university		4.3.1 Participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex		**Citizen-generated data** Philippines	
4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship		4.4.1 Proportion of youth and adults with information and communications technology (ICT) skills, by type of skill		**Citizen-generated data** Philippines	
4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations		4.5.1 Parity indices (female/male, rural/urban, bottom/top wealth quintile and others such as disability status, indigenous peoples and conflict-affected, as data become available) for all education indicators on this list that can be disaggregated	**Geospatial data** can support compilation for this indicator (UN-GGIM)		
4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy	Mobile phone data could be used to predict areas of low literacy MOOCs data could inform policy relating to education.	4.6.1 Proportion of population in a given age group achieving at least a fixed level of proficiency in functional (a) literacy and (b) numeracy skills, by sex		**Citizen-generated data** Philippines	
4.a Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all		4.a.1 Proportion of schools offering basic services, by type of service		**Citizen-generated data** Philippines	

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
4.b By 2020, substantially expand globally the number of scholarships available to developing countries, in particular least developed countries, small island developing States and African countries, for enrolment in higher education, including vocational training and information and communications technology, technical, engineering and scientific programmes, in developed countries and other developing countries		4.b.1 Volume of official development assistance flows for scholarships by sector and type of study		**Citizen-generated data** Philippines	
4.c By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States		4.c.1 Proportion of teachers with the minimum required qualifications, by education leveli		**Citizen-generated data** Philippines	
Goal 5. Achieve gender equality and empower all women and girls					
5.1 End all forms of discrimination against all women and girls everywhere	Mobile phone data, social media data and satellite data could be used for gender prediction.	5.1.1 Whether or not legal frameworks are in place to promote, enforce and monitor equality and non-discrimination on the basis of sex			
5.2 Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation		5.2.1 Proportion of ever-partnered women and girls aged 15 years and older subjected to physical, sexual or psychological violence by a current or former intimate partner in the previous 12 months, by form of violence and by age		**Citizen-generated data** Philippines	
		5.2.2 Proportion of women and girls aged 15 years and older subjected to sexual violence by persons other than an intimate partner in the previous 12 months, by age and place of occurrence	**Geospatial data** can support compilation for this indicator (UN-GGIM)	**Citizen-generated data** Philippines	
5.3 Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation		5.3.1 Proportion of women aged 20–24 years who were married or in a union before age 15 and before age 18		**Citizen-generated data** Philippines	
5.4 Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate		5.4.1 Proportion of time spent on unpaid domestic and care work, by sex, age and location	**Geospatial data** can support compilation for this indicator (UN-GGIM)		

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
5.6 Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences		5.6.1 Proportion of women aged 15–49 years who make their own informed decisions regarding sexual relations, contraceptive use and reproductive health care		**Citizen-generated data** Philippines	
5.a Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws		5.a.1 (a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure	**Geospatial data** can support compilation for this indicator (UN-GGIM/GEO)		
		5.a.2 Proportion of countries where the legal framework (including customary law) guarantees women's equal rights to land ownership and/or control	**Geospatial data** can support compilation for this indicator (UN-GGIM)		
Goal 6. Ensure availability and sustainable management of water and sanitation for all					
6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally		6.3.1 Proportion of domestic and industrial wastewater flows safely treated	**Geospatial data** can support compilation for this indicator (GEO)		SEEA Water Accounts
		6.3.2 Proportion of bodies of water with good ambient water quality	**Geospatial data** is needed to compile this indicator (UN-GGIM/GEO)	**Geospatial data** Australia[16], China[17], China (Deqing)	SEEA Water Accounts / Ecosystem Condition Account
6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity		6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	**Geospatial data** can support compilation for this indicator (GEO)	**Geospatial data** Canada[18], Netherlands[19]	SEEA Water Accounts
6.5 By 2030, implement integrated water resources management at all levels,		6.5.1 Degree of integrated water resources management	**Geospatial data** can support compilation for this indicator (GEO)		

[16] *https://www.earthobservations.org/documents/publications/201703_geo_eo_for_2030_agenda.pdf*, pages 9 and 10.

[17] *https://www.fmprc.gov.cn/mfa_eng/topics_665678/2030kcxfzyc/P020200927650108183958.pdf*, page 30.

[18] *https://eo4sdg.org/wp-content/uploads/2020/04/Canada_6.4.2.pdf* and *https://eo4sdg.org/wp-content/uploads/2020/04/Appendix-B_-Data-sources-and-methods.htm*.

[19] *https://www.cbs.nl/-/media/_pdf/2016/51/sdgs-6-4-monitoring%20nl-ladder%20approach.pdf*, page 29.

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
including through transboundary cooperation as appropriate		6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation	**Geospatial data** is needed to compile this indicator (UN-GGIM)		
6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes		6.6.1 Change in the extent of water-related ecosystems over time	**Geospatial data** is needed to compile this indicator (UN-GGIM/GEO)	**Geospatial data** China (Deqing), Germany,[20] Mexico[21] **Citizen-generated data** Philippines	Ecosystem Extent/ Land Cover Account/ SEEA Water Accounts
Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all					
7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	**Satellite data** could be used to detect nighttime luminosity **Smart meter data** can determine residential electricity consumption	7.1.1 Proportion of population with access to electricity	**Geospatial data** can support compilation for this indicator (GEO) **Electricity use data** could support this indicator		
		7.1.2 Proportion of population with primary reliance on clean fuels and technology		**Citizen-generated data** Philippines	
7.2 By 2030, increase substantially the share of renewable energy in the global energy mix		7.2.1 Renewable energy share in the total final energy consumption		**Citizen-generated data** Philippines	
Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all					
8.1 Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries	**Satellite data** can provide a proxy indicator for GDP and economic development **Postal data** can provide a proxy for GDP and economic and human development	8.1.1 Annual growth rate of real GDP per capita	**Satellite data** and **postal data** could indirectly support this indicator		
8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services		8.3.1 Proportion of informal employment in total employment, by sector and sex		**Citizen-generated data** Philippines	

[20] *https://geospatialworldforum.org/speaker/presentions2019/Copernicus-data-for-implementing-the-Sustainable-development-Goals-Gopika_Suresh.pdf*.

[21] *https://ggim.un.org/meetings/2020/WG-GI-Mexico-City/documents/5.Hugo-Sanchez.pdf*.

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	**Search engine data** can contribute to identifying unemployment trends and shocks in the workforce	8.5.1 Average hourly earnings of employees, by sex, age, occupation and persons with disabilities			
		8.5.2 Unemployment rate, by sex, age and persons with disabilities	**Online data** could indirectly support this indicator	**Citizen-generated data** Philippines	
8.6 By 2020, substantially reduce the proportion of youth not in employment, education or training		8.6.1 Proportion of youth (aged 15–24 years) not in education, employment or training		**Citizen-generated data** Philippines	
8.7 Take immediate and effective measures to eradicate forced labour, end modern slavery and human trafficking and secure the prohibition and elimination of the worst forms of child labour, including recruitment and use of child soldiers, and by 2025 end child labour in all its forms		8.7.1 Proportion and number of children aged 5–17 years engaged in child labour, by sex and age		**Citizen-generated data** Philippines	
8.9 By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products	**Mobile phone data** can support estimation of seasonal tourism and destination of tourists and inform policies for promote sustainable tourism	8.9.1 Tourism direct GDP as a proportion of total GDP and in growth rate	**Mobile phone data** could indirectly support this indicator		
8.10 Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial services for all		8.10.2 Proportion of adults (15 years and older) with an account at a bank or other financial institution or with a mobile-money-service provider		**Citizen-generated data** Philippines	
Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation					
9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all	**Mobile phone data, GPS data, Google Traffic data** can help understand patterns of road usage, pockets of congestion, and determine mobility patterns of population, key factors in the development of infrastructure	9.1.1 Proportion of the rural population who live within 2 km of an all-season road	**Geospatial data** is needed to compile this indicator (UN-GGIM/GEO)	**Geospatial data** China (Deqing), Colombia[22], Japan,[23] Philippines[24]	
		9.1.2 Passenger and freight volumes, by mode of transport			

[22] *https://ggim.un.org/meetings/2020/WG-GI-Mexico-City/documents/5.Sandra-Moreno.pdf*.

[23] *https://speakerdeck.com/hfu/partnership-activities-for-geospatial-statistical-integration?slide=7*.

[24] *https://unstats.un.org/bigdata/events/2019/hangzhou/presentations/day2/3.%20RAI%20Presentation%20for%20International%20Symposium_Philippines.pdf*.

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities		9.4.1 CO2 emission per unit of value added	**Geospatial data** can support compilation for this indicator (GEO)		
9.c Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020		9.c.1 Proportion of population covered by a mobile network, by technology	**Geospatial data** is needed to compile this indicator (UN-GGIM)		
Goal 10. Reduce inequality within and among countries					
10.1 By 2030, progressively achieve and sustain income growth of the bottom 40 per cent of the population at a rate higher than the national average	**Mobile phone data** can contribute towards assessing changes in the socioeconomic status of populations	10.1.1 Growth rates of household expenditure or income per capita among the bottom 40 per cent of the population and the total population	**Mobile phone data** can contribute towards assessing changes in the socioeconomic status of populations		
Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable					
11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums	Satellite data can support poverty and slums mapping	11.1.1 Proportion of urban population living in slums, informal settlements or inadequate housing	**Geospatial data** can support compilation for this indicator (GEO)	**Citizen-generated data** Philippines	
11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons	**Mobile phone data** can inform population hotspots, social events and home locations, origin-destination flows, and geo-social radius	11.2.1 Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities	**Geospatial data** is needed to compile this indicator (UN-GGIM/GEO) **Mobile phone data** can indirectly support this indicator	**Geospatial data** Austria,[25] China,[26] China (Deqing) Colombia,[27] Ireland,[28] France,[29] Sweden,[30] Switzerland[31] **Citizen-generated data** Philippines	

[25] *https://un-ggim-europe.org/wp-content/uploads/2019/05/UN_GGIM_08_05_2019-The-territorial-dimension-in-SDG-indicators-Final.pdf*, page 42.

[26] *https://www.fmprc.gov.cn/mfa_eng/topics_665678/2030kcxfzyc/P020200927650108183958.pdf*, page 38.

[27] *https://ggim.un.org/meetings/2020/WG-GI-Mexico-City/documents/5.Sandra-Moreno.pdf*.

[28] *https://un-ggim-europe.org/wp-content/uploads/2019/05/UN_GGIM_08_05_2019-The-territorial-dimension-in-SDG-indicators-Final.pdf*, page 42

[29] Idem

[30] Idem

[31] Idem

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries	**Remote sensing data** can inform land cover/land use changes	11.3.1 Ratio of land consumption rate to population growth rate	**Geospatial data** is needed to compile this indicator (UN-GGIM/GEO)	**Geospatial data** Canada,[32] China,[33] Colombia,[34] Finland,[35] India,[36] Ireland,[37] Italy,[38] Mexico,[39] Portugal[40] Sweden[41]	
11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage		11.4.1 Total per capita expenditure on the preservation, protection and conservation of all cultural and natural heritage, by source of funding (public, private), type of heritage (cultural, natural) and level of government (national, regional, and local/municipal)		**Citizen-generated data** Philippines	
11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations	**Mobile phone data** can support the identification of human mobility after disasters	11.5.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population *(same as indicators 1.5.1 and 13.1.1)*	**Geospatial data** can support compilation for this indicator (GEO) **Mobile data** can indirectly support this indicator	**Citizen-generated data** Philippines	Sendai Framework Indicators A1 and B1

[32] *https://eo4sdg.org/wp-content/uploads/2020/04/Canada_11.3.1.pdf and https://eo4sdg.org/wp-content/uploads/2020/04/Appendix-B_-Data-sources-and-methods.htm.*

[33] *https://www.fmprc.gov.cn/mfa_eng/topics_665678/2030kcxfzyc/P020200927650108183958.pdf*, page 41.

[34] *https://ggim.un.org/meetings/2020/WG-GI-Mexico-City/documents/5.Sandra-Moreno.pdf and https://eo4sdg.org/wp-content/uploads/2020/04/Colombia_11.3.1.pdf.*

[35] *https://un-ggim-europe.org/wp-content/uploads/2019/05/UN_GGIM_08_05_2019-The-territorial-dimension-in-SDG-indicators-Final.pdf*, page 51.

[36] *http://mospi.gov.in/sites/default/files/reports_and_publication/statistical_publication/EnviStats2/b6_ES2_2020.pdf*, page 115.

[37] *https://un-ggim-europe.org/wp-content/uploads/2019/05/UN_GGIM_08_05_2019-The-territorial-dimension-in-SDG-indicators-Final.pdf*, page 51.

[38] Idem

[39] *https://ggim.un.org/meetings/2020/WG-GI-Mexico-City/documents/5.Abel-Coronado.pdf.*

[40] *https://un-ggim-europe.org/wp-content/uploads/2019/05/UN_GGIM_08_05_2019-The-territorial-dimension-in-SDG-indicators-Final.pdf*, page 51.

[41] *http://ggim.un.org/meetings/2018-International-Seminar-Kenya/documents/02_5th%20IAEG-SDG_WGGI_Swedish_example_Haldorson.pdf.*

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management		11.6.1 Proportion of municipal solid waste collected and managed in controlled facilities out of total municipal waste generated, by cities		**Citizen-generated data** Philippines	
		11.6.2 Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)	**Geospatial data** can support compilation for this indicator (GEO)	**Geospatial data** China[42]	
11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities		11.7.1 Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities	**Geospatial data** is needed to compile this indicator (UN-GGIM/GEO)	**Geospatial data** China,[43] China (Deqing) Colombia,[44] Germany,[45] Ireland,[46] Sweden,[47] Switzerland[48]	Ecosystem Extent / Land Cover Account
		11.7.2 Proportion of persons victim of physical or sexual harassment, by sex, age, disability status and place of occurrence, in the previous 12 months	**Geospatial data** can support compilation for this indicator (UN-GGIM)	**Citizen-generated data** Philippines	
Goal 12. Ensure sustainable consumption and production patterns					
12.3 By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses	**Satellite data** can inform crop yield estimation	12.3.1 (a) Food loss index and (b) food waste index			
12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse		12.5.1 National recycling rate, tons of material recycled		**Citizen-generated data** Philippines	
12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature		12.8.1 Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment		**Citizen-generated data** Philippines	

[42] *https://www.fmprc.gov.cn/mfa_eng/topics_665678/2030kcxfzyc/P020200927650108183958.pdf*, page 48.

[43] *https://www.fmprc.gov.cn/mfa_eng/topics_665678/2030kcxfzyc/P020200927650108183958.pdf*, page 50.

[44] *https://ggim.un.org/meetings/2020/WG-GI-Mexico-City/documents/5.Sandra-Moreno.pdf*.

[45] *https://eo4sdg.org/wp-content/uploads/2020/04/Germany_11.7.1.pdf*.

[46] *https://un-ggim-europe.org/wp-content/uploads/2019/05/UN_GGIM_08_05_2019-The-territorial-dimension-in-SDG-indicators-Final.pdf page 64 and https://un-ggim-europe.org/wp-content/uploads/2019/03/SDG_11.7.1_Average-share-of-built-up-areas-of-cities-that-is-open-space_0.pdf.*

[47] Idem

[48] Idem

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
12.a Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production		12.a.1 Installed renewable energy-generating capacity in developing countries (in watts per capita)	**Geospatial data** can support compilation for this indicator (GEO)	**Citizen-generated data** Philippines	
12.b Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products		12.b.1 Implementation of standard accounting tools to monitor the economic and environmental aspects of tourism sustainability		**Citizen-generated data** Philippines	
Goal 13. Take urgent action to combat climate change and its impacts[12]					
13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	Mobile phone data can support estimation of human mobility after disasters	13.1.1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population *(same as indicators 1.5.1 and 11.5.1)*	**Geospatial data** can support compilation for this indicator (GEO) **Mobile phone data** can contribute towards measurement		Sendai Framework Indicators A1 and B1
		13.1.2 Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030		**Citizen-generated data** Philippines	
13.2 Integrate climate change measures into national policies, strategies and planning		13.2.1 Number of countries with nationally determined contributions, long-term strategies, national adaptation plans, strategies as reported in adaptation communications and national communications		**Citizen-generated data** Philippines	
13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	Satellite data can inform changes in the water-related ecosystem and drought monitoring	13.3.1 Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment			
13.b Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities		13.b.1 Number of least developed countries and small island developing States with nationally determined contributions, long-term strategies, national adaptation plans, strategies as reported in adaptation communications and national communications		**Citizen-generated data** Philippines	

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development					
14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution		14.1.1 (a) Index of coastal eutrophication; and (b) plastic debris densityi	**Geospatial data** can support compilation for this indicator	**Geospatial data** Australia[49] China[50] **Citizen-generated data** Philippines	SEEA Central Framework Asset Accounts (Fisheries)
14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans		14.2.1 Number of countries using ecosystem-based approaches to managing marine areas	**Geospatial data** is needed to compile this indicator (UN-GGIM)	**Geospatial data** China[51] **Citizen-generated data** Philippines	
14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels		14.3.1 Average marine acidity (pH) measured at agreed suite of representative sampling stations	**Geospatial data** can support compilation for this indicator (GEO)		
14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics		14.4.1 Proportion of fish stocks within biologically sustainable levels	**Geospatial data** can support compilation for this indicator (GEO)	**Citizen-generated data** Philippines	
14.5 By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information		14.5.1 Coverage of protected areas in relation to marine areas	**Geospatial data** is needed to compile this indicator (UN-GGIM/GEO)	**Citizen-generated data** Philippines	Ecosystem Condition Account / Biodiversity Account

[49] *https://www.earthobservations.org/documents/publications/201703_geo_eo_for_2030_agenda.pdf*, pages 21 and 22.

[50] *https://www.fmprc.gov.cn/mfa_eng/topics_665678/2030kcxfzyc/P020200927650108183958.pdf*, page 58.

[51] *https://www.fmprc.gov.cn/mfa_eng/topics_665678/2030kcxfzyc/P020200927650108183958.pdf*, page 61.

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
14.6 By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation4	**AIS data** can help identify illegal fishing and if ships cross protected marine areas	14.6.1 Degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing			
14.7 By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism		14.7.1 Sustainable fisheries as a proportion of GDP in small island developing States, least developed countries and all countries		**Citizen-generated data** Philippines	
Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss					
15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements	**Satellite data** can be used for forest mapping	15.1.1 Forest area as a proportion of total land area	**Geospatial data** is needed to compile this indicator (UN-GGIM/GEO)	**Geospatial data** Austria, [52] China (Deqing) Finland,[53] France,[54] Germany,[55] Italy,[56] New Zealand,[57] Spain,[58] Ukraine[59] **Citizen-generated data** Philippines	Ecosystem Extent / Land Cover Account

[52] *https://www.fmprc.gov.cn/mfa_eng/topics_665678/2030kcxfzyc/P020200927650108183958.pdf*, page 70.

[53] Idem

[54] Idem

[55] *https://www.fmprc.gov.cn/mfa_eng/topics_665678/2030kcxfzyc/P020200927650108183958.pdf*, page 70 and *https://eo4sdg.org/wp-content/uploads/2020/04/Germany_15.1.1.pdf*.

[56] *https://www.fmprc.gov.cn/mfa_eng/topics_665678/2030kcxfzyc/P020200927650108183958.pdf.* page 70.

[57] *https://eo4sdg.org/wp-content/uploads/2020/04/NZ_15.11_15.4.2.pdf*.

[58] *https://un-ggim-europe.org/wp-content/uploads/2019/05/UN_GGIM_08_05_2019-The-territorial-dimension-in-SDG-indicators-Final.pdf page 69 and https://un-ggim-europe.org/wp-content/uploads/2019/03/SDG_11.7.1_Average-share-of-built-up-areas-of-cities-that-is-open-space_0.pdf*.

[59] *https://eo4sdg.org/wp-content/uploads/2020/04/Ukraine_2.4.1_15.1.1_15.3.1.pdf*.

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
		15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type	**Geospatial data** is needed to compile this indicator (UN-GGIM)	**Geospatial data** China[60] China (Deqing) **Citizen-generated data** Philippines	
15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally		15.2.1 Progress towards sustainable forest management	**Geospatial data** can support compilation for this indicator (GEO)	**Geospatial data** China (Deqing) **Citizen-generated data** Philippines	Ecosystem Condition Account and Ecosystem Extent / Land Cover Account
15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world	Satellite data can be used to assess changes in vegetation	15.3.1 Proportion of land that is degraded over total land area	**Geospatial data** is needed to compile this indicator (UN-GGIM/GEO)	**Geospatial data** China (Deqing) Mexico[61] Ukraine[62]	Ecosystem Condition Account and Ecosystem Extent / Land Cover Account
15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development		15.4.1 Coverage by protected areas of important sites for mountain biodiversity	**Geospatial data** is needed to compile this indicator (UN-GGIM/GEO)	**Geospatial data** China (Deqing) **Citizen-generated data** Philippines	
		15.4.2 Mountain Green Cover Index	**Geospatial data** can support compilation for this indicator (UN-GGIM/GEO)	**Geospatial data** Germany,[63] Japan,[64] New Zealand,[65] Turkey[66]	Ecosystem Condition Account and Ecosystem Extent / Land Cover Account
15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species		15.5.1 Red List Index		**Citizen-generated data** Philippines **Geospatial data** China[67]	

[60] *https://www.fmprc.gov.cn/mfa_eng/topics_665678/2030kcxfzyc/P020200927650108183958.pdf*, page 70.

[61] *https://ggim.un.org/meetings/2020/WG-GI-Mexico-City/documents/5.Abel-Coronado.pdf*.

[62] *https://eo4sdg.org/wp-content/uploads/2020/04/Ukraine_2.4.1_15.1.1_15.3.1.pdf*.

[63] *https://eo4sdg.org/wp-content/uploads/2020/04/Germany__15.4.2.pdf*.

[64] *https://speakerdeck.com/hfu/partnership-activities-for-geospatial-statistical-integration?slide=7*.

[65] *https://eo4sdg.org/wp-content/uploads/2020/04/NZ_15.11_15.4.2.pdf*.

[66] *https://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/ge.32/2019/mtg2/S_2_4_Mountain_Green_Cover_Index__MGCI__Turkey.pdf*.

[67] *https://www.fmprc.gov.cn/mfa_eng/topics_665678/2030kcxfzyc/P020200927650108183958.pdf*, page 77.

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts		15.9.1 (a) Number of countries that have established national targets in accordance with or similar to Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011–2020 in their national biodiversity strategy and action plans and the progress reported towards these targets; and (b) integration of biodiversity into national accounting and reporting systems, defined as implementation of the System of Environmental-Economic Accounting		**Citizen-generated data** Philippines	
Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels					
16.1 Significantly reduce all forms of violence and related death rates everywhere	**Mobile phone data** and **social media data** can support crime prediction	16.1.2 Conflict-related deaths per 100,000 population, by sex, age and cause		**Citizen-generated data** Philippines	
		16.1.3 Proportion of population subjected to (a) physical violence, (b) psychological violence and (c) sexual violence in the previous 12 months		**Citizen-generated data** Philippines	
16.2 End abuse, exploitation, trafficking and all forms of violence against and torture of children		16.2.1 Proportion of children aged 1–17 years who experienced any physical punishment and/or psychological aggression by caregivers in the past month		**Citizen-generated data** Philippines	
		16.2.2 Number of victims of human trafficking per 100,000 population, by sex, age and form of exploitation		**Citizen-generated data** Philippines	
16.3 Promote the rule of law at the national and international levels and ensure equal access to justice for all		16.3.1 Proportion of victims of violence in the previous 12 months who reported their victimization to competent authorities or other officially recognized conflict resolution mechanisms		**Citizen-generated data** Philippines	
16.6 Develop effective, accountable and transparent institutions at all levels		16.6.1 Primary government expenditures as a proportion of original approved budget, by sector (or by budget codes or similar)		**Citizen-generated data** Philippines	
16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels		16.7.2 Proportion of population who believe decision-making is inclusive and responsive, by sex, age, disability and population group		**Citizen-generated data** Philippines	

SDG Target	Big data sources for the SDG target[10]	SDG Indicator	Big data needed or could support?[11]	Country examples	Relevance to other statistical frameworks
16.9 By 2030, provide legal identity for all, including birth registration		16.9.1 Proportion of children under 5 years of age whose births have been registered with a civil authority, by age		**Citizen-generated data** Philippines	
Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development					
17.6 Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge-sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism		~~17.6.1 Fixed Internet broadband subscriptions per 100 inhabitants, by speed~~[68]	~~**Geospatial data** can support compilation for this indicator (GEO)~~		
17.18 By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts		17.18.1 Statistical capacity indicator for Sustainable Development Goal monitoring	**Geospatial data** can support compilation for this indicator (GEO)		

[68] The initial SDG indicator 17.6.1 Number of science and/or technology cooperation agreements and programmes between countries, by type of cooperation was deleted and replaced by 17.6.2 Fixed Internet broadband subscriptions per 100 inhabitants, by speed following the 51st Session of the Statistics Committee in 2020. Indicator 17.6.2 did not count among the geospatial-enabled SDG indicators identified by either IAEG SDG Working Group on Geospatial Information or GEO.