SEEA

Monitoring for Sustainability

Chapter 6
SEEA – Monitoring for Sustainability

Introduction

1. The future of human being is completely dependent on the actions taken today. A path for sustainable development can only be charted by the integration of economic, social and environmental aspects and by understanding their interlinkages. Recognizing this, the UN General Assembly in its 70th Session in 2015 considered and adopted the 17 Sustainable Development Goals (SDGs) and associated 169 targets for the next 15 years. The 17 SDGs, built on the principle of "leaving no one behind", came into force with effect from 01st January, 2016, emphasizing a new Agenda that promotes an all-inclusive approach for achieving sustainable development for all.

Figure 1: Sustainable Development Goals[1]

2. At the core of the concept of sustainable development, is the recognition that environmental commons—such as the atmosphere, forests and oceans—must be safeguarded

[1] United Nations Sustainable Development Goals Knowledge Platform; https://www.un.org/sustainabledevelopment/news/communications-material

as crucial sources of ecosystem services and natural resources. **The Stockholm Conference, 1972** was one of the initial steps towards putting environmental concerns on the global agenda. It resulted in the **Stockholm Declaration** which contained **principles** and **Action Plan** with recommendations for environmental policy. Subsequently, a number of Multilateral Environmental Agreements (MEAs) came into practice. Complementing national legislation and bilateral or regional agreements, multilateral environmental agreements form the overarching international legal basis for global efforts to address particular environmental issues.

3. The role of multilateral environmental agreements in achieving the 2030 Agenda and the Sustainable Development Goals is indisputable. There are direct and indirect references to the multilateral environmental agreements in the Goals and targets adopted. This includes Goals 12 and 17, which are applicable across the board, and in specific Goals such as Goal 12, on chemicals and wastes, Goal 13, on climate change, and Goals 14 and 15, on ecosystems and biological diversity. Multilateral environmental agreements have a key role in fulfilling the need for the Goals to be appropriately understood and to extend support putting in place mechanisms for implementing the Goals.

4. Critical to this progress towards the SDGs and the multilateral environment agreements, is the availability of a tool that can be used for compiling cohesive statistics and for deriving coherent and comparable indicators that can help assess the progress. In this context, the System of Environmental-Economic Accounting (SEEA) is the most suited candidate framework, with its internationally agreed concepts and definitions, as also the underpinning accounting structure. The framework helps define relationships between indicators and provides a strong basis for data compilation and confrontation. As a result, the SEEA Framework represents an important information base from which indicators can be chosen for use in populating different sets of indicators.

5. Be it the MEAs, the post-2020 biodiversity agenda, the international climate policy, or the overarching SDGs, the SEEA can be used to measure several of the indicators directly and provide supplemental information for numerous others. The SEEA framework is designed to support mainstreaming the environment into economic and development planning and therefore, there are multiple entry-points for SEEA-compliant accounts to support reporting for these frameworks. **Table 1** gives some of the SEEA accounts which are of relevance to the various MEAs including the SDGs.

Table 1: Linkage of SEEA Accounts with Multilateral Environment Agreements & SDGs

S. No.	MEAs/International Obligations	SEEA accounts
1	Sustainable Development Goal	• Land cover/Land use accounts • Ecosystem service supply and use accounts • SEEA-Water, Waste Accounts • Material Flow account • Environment Expenditure accounts • Ecosystem condition account • Biodiversity accounts • SEEA-EEA Extent accounts
2	UN Convention to Combat Desertification (UNCCD)	• Land cover or land use accounts • ecosystem condition accounts • carbon accounts
3	UN Framework Convention on climate Change (UNFCCC)	• Land cover or land use accounts • Carbon accounting • Residual Flow Accounts • SEEA-Water
4	Convention on Biological Diversity (CBD) - Aichi Targets	• Biodiversity accounts • Carbon accounts • SEEA-Water • Ecosystem extent and condition accounts • Material Flow accounts • Urban ecosystem accounting
5	Ramsar Convention	• Ecosystem extent and condition accounts • SEEA- Waste
6	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	• Biodiversity accounts
7	Reducing Emissions from Deforestation and Forest Degradation (REDD+)	• Carbon accounts • Ecosystem extent account • Forest asset account

S. No.	MEAs/International Obligations	SEEA accounts
8	United Nations Forum on Forests (UNFF)	• Ecosystem condition accounts • Forest asset accounts • Carbon accounts • SEEA-Water • Accounts of the Protected Areas
9	Waste related MEAs (Rotterdam Convention, Stockholm Convention, Basel Convention, Minamata Convention)	• Residual Flow Accounts
10	IPBES	• Biodiversity accounts • Ecosystem service supply accounts • Residual Flow Accounts for fertiliser applications and CO2 emissions
11	IUCN	• Biodiversity Accounts with focus on threatened species

SEEA and biodiversity

6. Building support for biodiversity protection among key decision makers is likely to be much easier if there are clear and understandable links to economic and social development. The SEEA provides a consistent monitoring framework that produces actionable indicators on ecosystem extent and condition, as well as the supply and use of ecosystem services, all of which can reflect the status of biodiversity. It can also be used to track expenditures on conservation efforts in both the public and private sectors. Its integrated systems approach can assist in clarifying the major drivers of biodiversity loss and ecosystem changes, identify key trade-offs, and support the development of "win-win" conservation approaches.

SEEA and climate change

7. SEEA accounts can be used to inform a wide range of policy questions on climate change related to climate impacts and adaptation strategies. They can also help with mitigation strategies by providing consistent information by economic sector on energy use (by type) and resulting development of emissions, the value of investments in mitigating technologies, as well as the distribution of emission (or carbon) credits.

SEEA and ecosystems

8. Ecosystem accounts formed under the ambit of SEEA framework, whether they are extent accounts, condition accounts or ecosystem services accounts; provide an underpinning connection between the former and the Sustainable Development Goals. Amongst them, ecosystem extent accounts are an essential determinant for several SDG indicators, as it is comparatively easy to assess and provides a good indicator for broader sustainable development concerns. For example, the extent of freshwater ecosystems is a good first proxy for water provisioning services. Similarly, forest extent is a good first proxy for conservation of forest biodiversity and the delivery of forest ecosystem services.

SEEA and sustainable cities

9. SDGs also recognize that sustainable urban development and management are crucial to the quality of life of our people. There is focus to reduce the negative impacts of urban activities and of chemicals which are hazardous for human health and the environment, through environmentally sound management and safe use of chemicals, the reduction and recycling of waste and more efficient use of water and energy. SEEA can be used to produce several consistent indicators which can help in understanding the trends in these aspects and also help frame policies for effective urban management.

SEEA for SDGs – an illustration using SDG 11.3.1

10. Land is a finite resource and land cover today is altered principally by direct human use: by agriculture and livestock raising, forest harvesting and management and urban and suburban construction and development. A defining feature of urbanization in many areas is an outward expansion far beyond formal administrative boundaries. However, cities require an orderly urban expansion that makes the land use more efficient. They need to plan for future internal population growth and city growth resulting from migrations. They also need to accommodate new and thriving urban functions such as transportation routes, etc., as they expand. However, frequently the physical growth of urban areas is disproportionate in relation to population growth and this results in land use that is less efficient in many forms. This type of growth is often not sustainable due to its negative impact on the environment, like the increased pressures of water and waste management mechanisms.

11. Goal 11 of the SDGs focuses on sustainable cities, and one of the global indicators defined therein, 11.3.1, endeavours to help assess the progress made in respect of 'sustainable human settlement planning and management'. Indicator 11.3.1 is defined as the 'Ratio of land consumption rate to population growth rate' and data on this indicator can help inform on

the manner in which cities and other urban settlements are rapidly expanding and significantly changing the natural and urban environments.

12. It is expected that the rates of change in urban land consumption varies significantly across regions, with faster growth recorded in the developing regions. The key outcomes of the recorded fast rates of urban sprawl include, among others, inefficient land use, which negatively impacts the environment, increased costs of providing basic services to populations, increased demand for and use of energy, challenges associated with waste management, and growth in the number of unplanned settlements, some of which are located in environmentally sensitive areas.

13. In order to help assess the status of million plus cities in India with respect of SDG Indicator 11.3.1, experimental estimates for these cities were compiled using the Land Use Efficiency (LUE) tool[2] developed for this purpose by Joint Research Centre of the European Union.

14. The tool uses the Global Human Settlement Layer (GHSL), which is an open and free dataset for assessing the human presence on the planet. Creation and updating of the GHSL is supported by the Joint Research Centre (JRC) and the DG for Regional and Urban Policy (DG REGIO) of the European Commission, together with the international partnership GEO Human Planet Initiative. The tool gives the flexibility to select any area of interest and hence, the million plus cities of India were selected.

15. The GHSL is a set of georeferenced layers that provides information on human settlements and population with global coverage. It has produced elaborate historical satellite images and data from open sources. The main datasets consist of gridded layers of built-up area and number of inhabitants for four dates: 1975, 1990, 2000, and 2015. The GHSL allows measuring the growth of cities and towns over time, including information on population, urbanization rate and land consumption. In the context of GHSL, a global layer on built-up surfaces (GHS-BU) was produced from Landsat image collections. The information generated with the GHS-BU was then used to downscale population as available in the population censuses for the administrative units to the grids. Population estimates for the further years are nationally adjusted to population totals from the United Nation's World Population Prospects: The 2015 Revision, so as to get population (GHS-POP) for the same years and grids as the GHS-BU.

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[2] https://ghsl.jrc.ec.europa.eu/tools.php

16. ***Experimental estimates*** of SDG 11.3.1 were compiled using the GHSL for the million plus cities of India to help understand the rate of growth of population vis-à-vis the built-up area. Since these estimates have been compiled using the data available in the GHSL, these are likely to be at variance with the official estimates of growth of population and built-up area in these cities. **These estimates should, therefore, not be cited as official estimates of the NSO for SDG 11.3.1 for any of these cities.** Experimental estimates of SDG 11.3.1, as well as the foundational data **as per the GHSL**, is given in **Table 2** below.

Table 2: SDG 11.3.1 for the million plus cities of India

S. No.	Name of the city	Built-up Area (sq. km)		Population growth rate (PGR)*	Land consumption rate (LCR)*	SDG 11.3.1
		2000	2015			
1	Agra	65.19	90.96	1.79	2.22	1.24
2	Ahmedabad	195.71	260.95	1.70	1.92	1.13
3	Allahabad	31.96	39.66	1.76	1.44	0.82
4	Amritsar	78.79	103.76	1.25	1.84	1.47
5	Asansol	336.76	401.19	0.95	1.17	1.23
6	Aurangabad	60.37	79.58	2.21	1.84	0.83
7	Bangalore	281.08	398.79	3.68	2.33	0.63
8	Bhopal	65.56	85.28	2.36	1.75	0.74
9	Chandigarh	13.39	16.47	1.32	1.38	1.05
10	Chennai	376.26	450.97	1.97	1.21	0.61
11	Coimbatore	114.35	142.58	1.52	1.47	0.97
12	Delhi	535.95	574.37	1.76	0.46	0.26
13	Dhanbad	92.86	96.51	0.94	0.26	0.27
14	Durg-Bhilainagar	67.22	82.10	1.58	1.33	0.84
15	Faridabad (NCR)	95.04	108.24	2.62	0.87	0.33
16	Ghaziabad (NCR)	122.90	140.91	3.18	0.91	0.29
17	Greater Mumbai	317.59	327.95	1.24	0.21	0.17
18	Gwalior	34.67	44.28	2.05	1.63	0.80
19	Hyderabad	383.65	477.89	1.81	1.46	0.81
20	Indore	94.40	138.72	2.65	2.57	0.97
21	Jabalpur	25.43	30.75	1.22	1.27	1.04
22	Jaipur	165.19	215.58	2.18	1.77	0.81
23	Jamshedpur	44.86	46.41	1.40	0.23	0.16
24	Jodhpur	74.40	93.57	2.31	1.53	0.66
25	Kannur	100.81	122.66	0.33	1.31	3.93
26	Kanpur	81.13	98.40	0.85	1.29	1.51
27	Kochi	211.78	269.15	0.45	1.60	3.55
28	Kolkata	1669.63	1801.05	0.88	0.51	0.57

S. No.	Name of the city	Built-up Area (sq. km) 2000	2015	Population growth rate (PGR)*	Land consumption rate (LCR)*	SDG 11.3.1
29	Kota	66.50	80.99	1.99	1.31	0.66
30	Kozhikode	88.98	103.53	0.59	1.01	1.70
31	Lucknow	75.49	98.98	2.18	1.81	0.83
32	Ludhiana	201.75	233.30	1.24	0.97	0.78
33	Madurai	33.06	41.91	1.51	1.58	1.05
34	Malappuram	107.99	127.86	1.05	1.13	1.07
35	Meerut	58.37	90.06	1.28	2.89	2.27
36	Nagpur	125.54	148.07	1.19	1.10	0.92
38	Nashik	72.92	107.59	1.83	2.59	1.41
39	Patna	61.50	66.54	1.92	0.53	0.27
40	Pune	191.33	300.29	2.47	3.01	1.22
41	Raipur	59.00	73.60	2.76	1.47	0.53
42	Rajkot	89.95	114.90	1.65	1.63	0.99
43	Ranchi	39.02	45.49	1.96	1.02	0.52
44	Surat	72.39	94.11	3.37	1.75	0.52
45	Thiruvananthapuram	131.96	144.06	0.04	0.58	13.01
46	Thrissur	125.32	165.91	0.31	1.87	5.96
47	Tiruchirapalli	29.67	59.24	1.06	4.61	4.34
48	Vadodara	88.35	103.72	1.18	1.07	0.91
49	Varanasi	70.84	85.52	1.42	1.26	0.88
50	Vasai - Virar (MMR)	129.80	139.47	2.89	0.48	0.17
51	Vijayawada	216.59	251.74	0.67	1.00	1.50
52	Vishakhapatnam	85.32	102.44	1.10	1.22	1.10

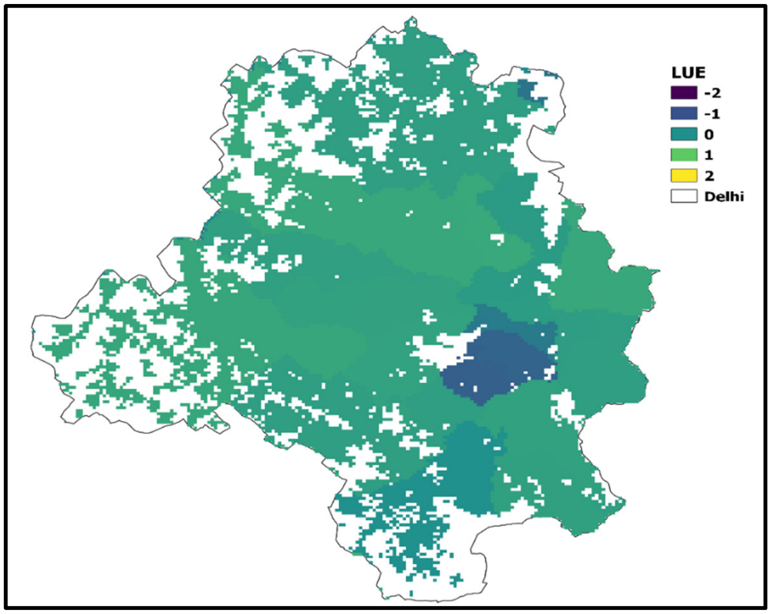
* Note: the growth rate is for the period 2000-2015.

17. The main limitation of this tool is its inability to capture the vertical development of constructions, which is primarily due to the fact that the available input data represents 2D information of built surface and population.

18. Another interesting output of the JRC tool is the map of Land Use Efficiency for each of these cities. In the tool, Land Use Efficiency is defined as the average annual rate of change of built-up area per capita. The map shows the negative, zero and positive values of LUE. Negative values generally indicate a loss of population and constant built-up surface, while positive values indicate a faster increment of population than built-up increment (due to the increment of the density or because of the expansion of the urban area). Values around zero

indicate stable zones with a linear increment of built-up surfaces and population. As an example, the map for Delhi is shown below in **Figure 2**.

Figure 2 - Land Use Efficiency Map for Delhi



Conclusion

19. SEEA can be the basis for the development of coherent environmental-economic SDG indicators. There are several indicators that could in part (e.g., the numerator or denominator of a ratio indicator) or completely, be generated by the SEEA framework (e.g., SDG Indicator 15.1.1 on Forest area as a proportion of total land area), or that could provide input data to the SEEA framework (e.g., SDG Indicator 14.3.1 on marine acidity for ecosystem condition accounts). The systems approach of the SEEA can enable development of statistics and indicators on both natural resources (e.g. timber, water) and ecosystems and how they relate to the economy. Using the SEEA framework can increase the efficiency of data collection and compilation, and at the same time, can provide policy makers with relevant information.

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