

StatEO

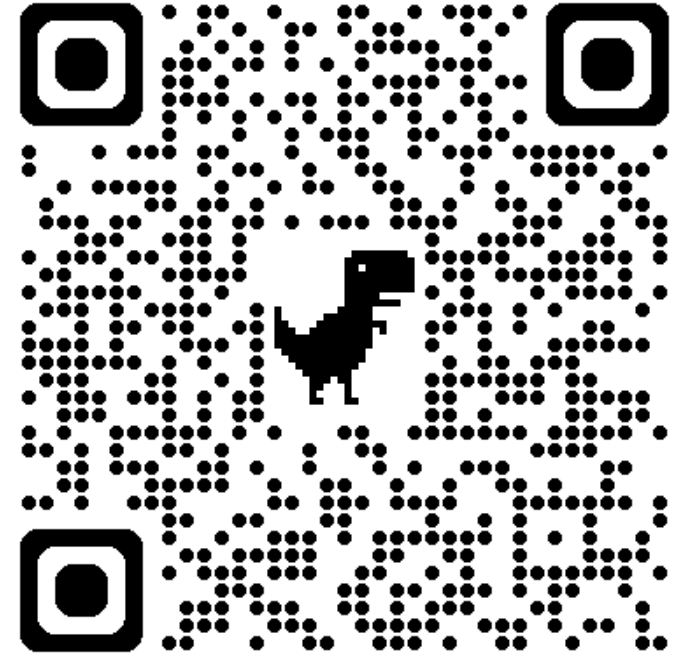
5-7 May 2026 | ESA-ESRIN | Frascati (Rome), Italy

Mapping Urban Realities: Integrating Citizen Science and Earth Observation for the UMF

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Opportunities for citizen science within the Global Urban Monitoring Framework (UMF)

- UMF tracks 77 urban sustainability indicators.
- 5 domains: Society, Economy, Culture, Environment and Governance & Implementation.
- 4 objectives: Safe and peaceful, Resilient, Inclusive and Sustainable Cities.
- Major data gaps in timeliness and disaggregation.
- CS & EO can help address these gaps.



Citizen science contributions to UMF

- Citizen science supports 3 UMF indicators (or around 4%) and it can support 49 more
- Total potential: 52 of 77 (68%)

	Safe & Peaceful				Inclusive				Resilient				Sustainable		
Society	1	2	3	4	9	10	11	12	17	18	19	20	23	24	
	5	6	7	8	13	14	15	16	21	22					
Economy	25	26			27	28	29	30	31	32	33	34	38	39	
									35	36	37				
Environment	40	41	42	43	44	45			46	47	48	49	50	51	52
Culture	53	54			55	56			57	58			59	60	61
Governance & Implementation	62	63	64	65	67	68	69	70	72	73	74		75	76	77
	66				71										

Already contributing
 Could contribute
 No alignment

Citizen science contributions to UMF domains

- **Environment: Strongest alignment with 85% potential**
 - Already contributing to one indicator (protected natural areas) and could support 10 additional indicators such as air quality and access to open public spaces.
- **Society: 83% potential**
 - Neighborhood safety, access to safe drinking water and basic services.
- **Culture: 56% potential**
 - Can support indicators on heritage & access to cultural spaces.
- **Economy: 53% potential**
 - Relevant for employment rate & public transport.
- **Governance & Implementation: 50% potential**
 - Supports 2 indicators and could contribute to 6 more, including violence public participation in city planning.

Citizen science and Earth Observation for UMF: Top-down & bottom-up citizen science

Top-down: Picture Pile

Picture Pile

Sort pictures and help scientists tackle big problems for humanity.

Human Infrastructure
0.6% by 5 sorters

Clouds
0.1% by 3 sorters

Sorted
Hurricane Matthew
100.0% by 190 sorters

Rank	Name	Score
1	Anonym	225206
2	M.F	84929
3	Guest 3123	82700
4	thgttl	43754
5	Hailey	43150
6	Guest	42600
7	Anonym	32472
8	casey_lapp	26200
9	Karin	24449
10	Tobias	23806
11	Guest 3056	22850
12	burkhard	22101
13	popithefox	20845
14	enya	12711
15	Guest 2449	11603
16	mhsmyrl	10192
17	nimeob	10134
18	Lets	10093
19	terandula	8317
20	pia conrad	8280
21	Ger173	8069
22	hhavel	7768
23	Guest 2561	7754
24	...	7407

BACK

Complemented by bottom-up citizen science: Geo-Quest

←

About Geo-Quest

Description

Geo-Quest is developed by the International Institute for Applied Systems Analysis (IIASA) based in Laxenburg, Austria.
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Funding

This project was funded by the Austrian Research Promotion Agency (FFG) and the European Space Agency (ESA).

All Quests

Opportunistic Tree-Quest

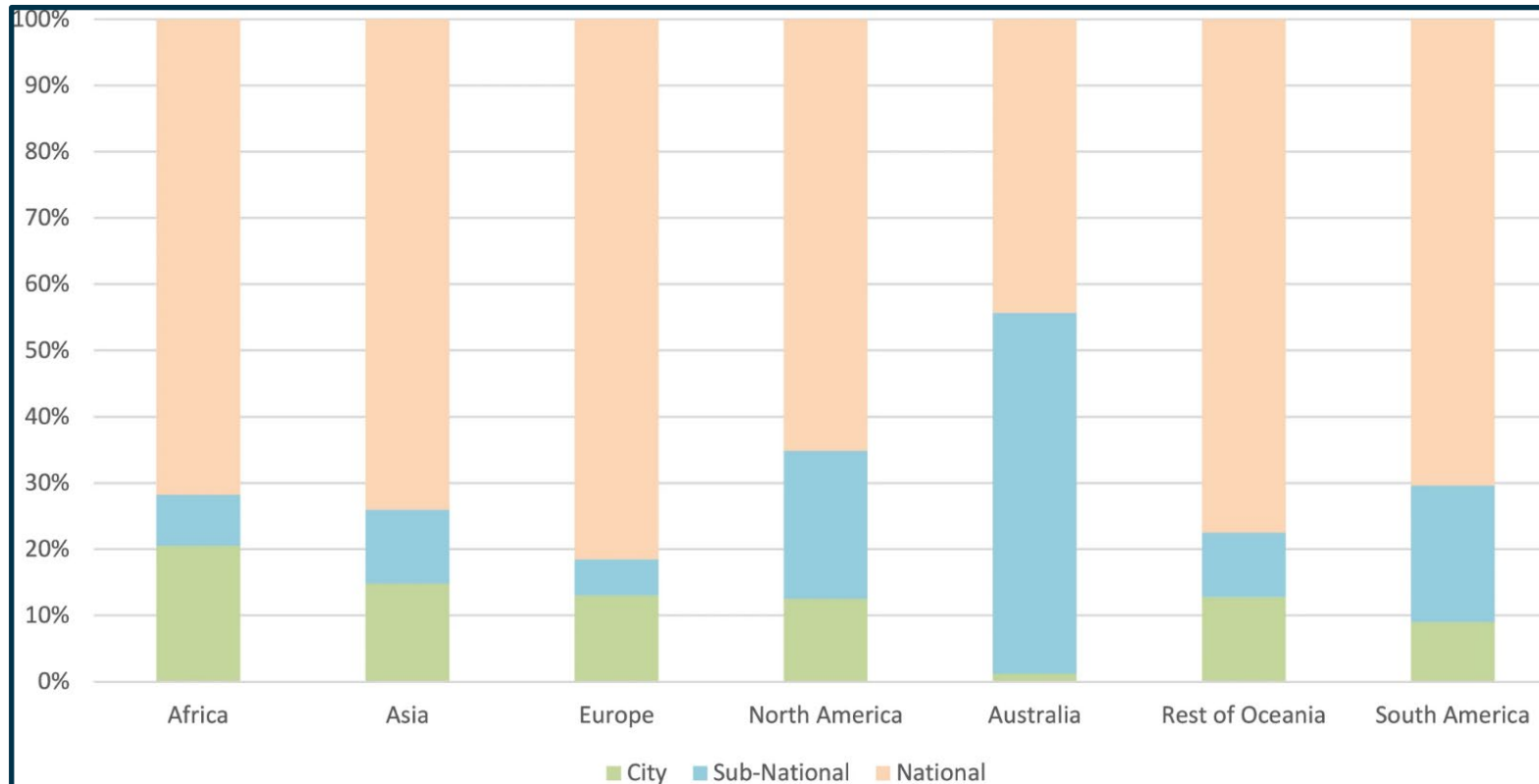
Opportunistic Crop Capture

Opportunistic Forest-Quest

Quests Map My Quests Settings

UMF monitoring needs city-level data

- 466 cities analyzed
- <20% city-level reporting
- Most data still national
- **UMF implementation is limited by a lack of city-level data.**
- **Citizen science and EO can make urban monitoring more local, timely, and actionable.**

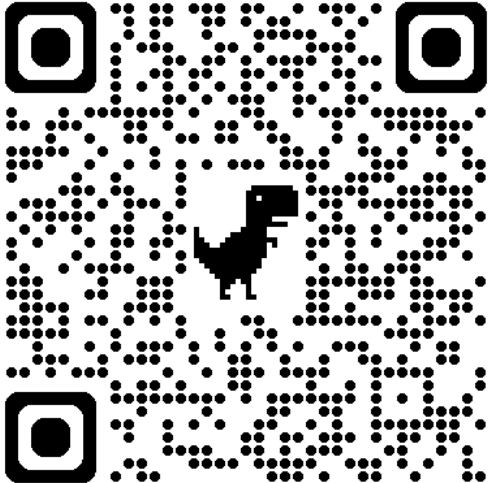


Data completeness of UMF indicators across continents and domains.

Key barriers

- **Misalignment with UMF requirements**
 - Citizen science projects are often not designed around standardized data, quality, and validation requirements.
- **Limited resources for alignment**
 - Meeting official standards requires training, technical support, financial resources, and long-term planning.
- **Trust and awareness gaps**
 - Public authorities and statistical agencies may question accuracy, credibility, and relevance, or may be unaware of the value of citizen science data.
- **Data access and documentation gaps**
 - Data, protocols, definitions, and metadata are not always openly available or well documented.
- **Comparability across cities**
 - Differences in protocols, participant demographics, and representativeness can limit consistency across urban contexts.

Key steps for transitioning citizen science into an essential resource for official statistics



Standards & Quality Assurance

Align rigorous methods with the participatory and adaptive nature of citizen science



Government & Institutional Endorsement

Build trusted partnerships to co-develop methods that meet official standards and leverage public input



Global Data Governance

Engage citizen science communities in global data discussions via networks like the Citizen Science Global Partnership



Sustainable Financing

Incentivize National Statistical Offices and participants, especially in underserved communities, through context specific support

Future work and recommendations

Future Work:

- Demonstrate and expand the role of citizen science in monitoring and advancing urban sustainability.
- Support high-potential citizen science initiatives for scaling
- Support the development of a research infrastructure for excellent citizen science through the RIECS Concept.

Recommendations:

- Establish dedicated citizen science tracks at future conferences.
- Foster greater collaboration and exchange among the citizen science, Earth Observation, official statistics, data, and policy communities.
- Integrate citizen science into future research, development, and policy agendas.

StatE0

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Thank you!

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