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Determination of global fundamental geospatial data themes

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Note by the Secretariat

Summary

The present paper contains the report prepared by the Regional Committee of United Nations Global Geospatial Information Management for Europe on determining global fundamental geospatial data themes for consideration by the Committee of Experts on Global Geospatial Information Management.

At its fourth session, held in New York from 6 to 8 August 2014, the Committee of Experts adopted decision 4/104, in which it agreed that global fundamental geospatial data themes need to be integrated and harmonised from the national to global levels and that actions should be taken in order for Member States and the international community to work jointly towards the preparation, improvement and maintenance of fundamental geospatial data themes, building on existing national and regional fundamental datasets. It acknowledged the need to explore harmonization at the global level, including by identifying strategic priorities, and invited the Bureau to consult with existing working groups as to whether that work could be integrated into their work prior to creating a separate working group. In its report, the Regional Committee indicates that its working group on core data is investigating the definition and use of core data, also referred to as fundamental data. It describes consultations with the Bureau to consider integrating global fundamental geospatial data themes into the work of the working group, the progress of the working group in its efforts to fulfil its regional objectives and the proposals of the Regional Committee on how the work can be developed at the global level. The Regional Committee considers that engagement with the other regional entities is essential to developing a harmonised set of global fundamental geospatial data themes that can address the needs of the sustainable development agenda.

* E/C.20/2015/1

I. Introduction

1. At its fourth session, held in August 2014, the Committee of Experts considered the report on determination of global fundamental geospatial data themes (E/C.20/2014/4/Add.1), and agreed that such data themes need to be integrated and harmonised from the national to global levels, and that actions should be taken in order for Member States and the international community to work jointly towards the preparation, improvement and maintenance of fundamental geospatial data themes, building on existing national and regional fundamental datasets. The Committee suggested that, as a first step, the preparation of an inventory of existing themes, core data sets, data models and practices, would be useful in determining current arrangements. However, the Committee acknowledged the need to first explore harmonization at the global level, including by identifying strategic priorities, and invited the Bureau to consult with existing working groups as to whether that work could be integrated into their work prior to creating a separate working group.

2. In the course of such consultation the Regional Committee of United Nations Global Geospatial Information Management for Europe (UN-GGIM: Europe) indicated to the Bureau and Secretariat that its working group on core data is investigating the definition and use of core data, also referred to as fundamental data, and that the work could possibly be expanded and developed at the global level.

3. The present report describes consultations with the Bureau and Secretariat to consider integrating global fundamental geospatial data themes into the work of the working group on core data, the progress of the working group in its efforts to fulfil its regional objectives, and the proposals of the Regional Committee on how the work can be developed at the global level. The Regional Committee considers that engagement with the other regional entities is essential to developing agreement of a set of global fundamental geospatial data themes that can address the needs of the sustainable development agenda. The Committee of Experts is invited to take note of the report and to express its views on the way forward in addressing the issues relating to global fundamental geospatial data themes. Points for discussion and decision are provided in paragraph 41.

II. UN-GGIM: Europe Working Group on Core Data[1]

4. The Working Group on Core Data (WG) is focusing on an issue which is considered to be highly important for European geospatial information management agencies: i.e. increasing data interoperability and harmonisation by proposing core geospatial data which meet essential user needs.

5. In terms of a concept, core data can be seen as the authoritative, harmonised and homogeneous framework data which both national and international users need to either fulfil their requirements or to geo-reference and locate their own thematic data. In the latter case, core data may be used as a framework on which other richer, more detailed, thematic geospatial and statistical data would rely. UN-GGIM: Europe believes that core data should be produced once for national and regional

[1] Core data has been used in Europe in preference to fundamental data. In carrying forward this work UN-GGIM: Europe will adopt the term Fundamental Data

uses with maximum resolution, and would then be provided to international users if necessary through generalizing and aggregating processes.

6. The WG proposes that core data can be defined as the minimum set of authoritative data, following a bottom-up approach from authoritative data of Member States, and needed to meet common requirements for applications at cross-border, European and global levels.

7. The WG aims at identifying essential data for sustainable development, i.e. the core data needed by UN, European and national activities related to sustainable development, in order to get political and financial support to fulfil this need. This is a vast scope of use, hence a core list is required to balance the long-term user needs in all relevant sectors with the possibility for realising the core data, and with the need to simplify and prioritise for easy communication to decision makers. The WG is using a three-pronged approach in its methodology to identify and scope the minimum core data required.

8. The first approach is by using the UN Sustainable Development Goals (SDGs) as the basis for the assessment of user data requirements. This has led the WG to structure usages by identifying three major usage themes: technological and natural hazard prediction; availability of natural resources and maintenance of biodiversity; and sustainable economy and facilities.

9. The second approach is by focussing on the Infrastructure for Spatial Information in Europe (INSPIRE) Directive[2]. This Directive aims to create a European Union (EU) spatial data infrastructure to assist policy-making across boundaries. It is a legislative framework that came into force on 15 May 2007 and will be implemented in various stages, with full implementation required by 2019. The WG focuses on using INSPIRE specifications and analysis for specifying core data and selecting the INSPIRE theme which meets user requirements for core data.

10. The third and final methodology being examined by the WG is for the Member States participating in the WG to present their national conception of core data.

11. By collating and consolidating the outputs gained from the three methodologies described above, the WG will produce a proposal for the minimum core datasets required for the SDGs. The specifications of core data needs for Europe are planned to be delivered by the WG by the end of 2015.

III. The Importance of Geospatial Data for the SDGs

12. There is an ever increasing awareness that geospatial information is now more important than ever for providing the content and context for understanding natural and human systems. There is a need for a set of global fundamental geospatial data themes that can be harmonised in order to be able to measure, monitor and manage sustainable development in a consistent way over time and for evidence-based decision and policy making.

13. The importance and need for global fundamental geospatial data has been highlighted in a number of reports in the past few years. As was discussed in more

[2] http://inspire.ec.europa.eu/index.cfm

detail at the fourth session of the Committee of Experts (E/C.20/2014/4/Add.1) these include: the 2012 report to the United Nations Secretary-General '*Realizing the Future We Want For All*'[3] that stated that global environmental sustainability requires "improving access to geographical information and geospatial data"; the Doha Declaration[4] issued on the 6th February 2013 at the conclusion of the Second High Level Forum on Global Geospatial Information Management which affirmed the importance of an agreed set of core global reference datasets; and the 2014 report of the African Union '*Common African Position on the post-2105 development agenda*'[5] which noted that a key enabler for effective sustainable development is regional investment in national statistical capacities and geospatial information systems.

14. The Outcome Document of the Rio+20 Conference called for a Global Sustainable Development Report, in order to bring together dispersed information and existing assessments and to strengthen the science-policy interface at the High-level Political Forum. The Global Sustainable Development Report (GSDR) is a UN system effort focusing on global sustainable development in terms of issues, impacts, institutions and technology. It maps sustainable development assessments and related processes and highlights emerging issues identified by scientists; assesses sustainable development progress; tells the "stories" of future pathways toward sustainable development based on the literature and discusses investment and technology needs; assesses various approaches to measuring sustainable development progress; identifies lessons learnt from national, regional and global case studies of the climate-land-energy-water-development nexus; presents illustrative science digests for decision-makers; and suggests a number of issues for consideration.

15. The Prototype GSDR was released in July 2014. Following the approach piloted for the preparation of the Prototype and the mandate given at Rio+20, the general approach to the 2015 edition of the GSDR report is that of an assessment of assessments, documenting and describing the landscape of information on specific issues. The report is global in coverage while taking into account the perspectives of the five UN regions. Extensive inputs were sought from the UN system, government officials and stakeholders at all levels, including representatives of academies of sciences, of key international assessments, and relevant UN expert groups.

16. The 2015 Edition of the GSDR[6] includes a Chapter on 'New Data Approaches for Monitoring Sustainable Development Progress: The Case of Africa'. Providing a snapshot of innovative uses of data for improving the science-policy interface for sustainable development in Africa, the Chapter captures the role and increasing use of geospatial information and its need to continue. It particular, the report notes that "Geospatial information is increasingly being used in Africa, but more capacity building will be needed to scale up existing initiatives and to bring innovative applications from other parts of the world to Africa. While the lack of consistent up-to-date base mapping – fundamental geographic datasets such as geodetic control, elevation, drainage, transport, land cover, geographic names, land tenure,

[3] http://www.un.org/millenniumgoals/pdf/Post_2015_UNTTreport.pdf
[4] https://ggim.un.org/docs/meetings/2ndHighLevelForum/Doha%20Declaration%20of%206-2-13%20Final.pdf
[5] http://www.africa.undp.org/content/dam/rba/docs/Reports/RBA-common-position.pdf
[6] https://sustainabledevelopment.un.org/content/documents/1758GSDR%202015%20Advance%20Unedited%20Version.pdf

etc. – across Africa remains a challenge, individual countries are making progress" (page 170).

IV. National and regional examples of fundamental data theme initiatives

17. As outlined in the report presented to the Committee of Experts at its fourth session on determination of global fundamental geospatial data themes (E/C.20/2014/4/Add.1), there are a number of existing regional examples which are considering and defining geospatial data themes. It is proposed here that the national and regional examples of fundamental data theme initiatives must be the basis for developing agreement of a set of global fundamental geospatial data themes that can be harmonised to address the needs of the sustainable development agenda. These examples included:

The European Union

18. In the European Union the INSPIRE Directive already adopted by the EU introduced 34 reference geographies and environmental datasets, Annexes I and II of the Directive lists 13 core reference geographies which provide a framework for linking and integrating other geo-referenced information, as well as providing key contextual information. The core reference geographies are key datasets that form common information frameworks which are defined, endorsed and used by all data holders in both the public and private sector, and should be collected and maintained once and used many times. The 13 core reference geographies of INSPIRE are: Coordinate reference systems; Geographical grid systems; Geographical names; Administrative units; Addresses; Cadastral parcels; Transport networks; Hydrography; Protected sites; Orthoimagery; Elevation; Land cover and Geology.

Africa

19. In Africa the 2007 report by the United Nations Economic Commission for Africa '*Determination of Fundamental Datasets for Africa: Geoinformation in Socio-Economic Development'* [7] made recommendations on "candidate" fundamental data sets for Africa. The premise was that, as geospatial data are widely accepted as essential components of the body of knowledge that informs national development strategies, then a pan-continental and common definition of what constitutes a minimally necessary core of geospatial data and information products is required. Therefore the purpose of the report was to identify and enumerate those core or fundamental geospatial data sets required to support Africa's development agenda. In addition, the advance unedited edition of the 2015 GSDR lists some of the fundamental geographic datasets that are required in order to continue with the capacity building and further development of the region.

20. The two reports identified the following as fundamental data themes for Africa: Geodetic control network; Imagery; Hypsography; Hydrography; Boundaries; Geographic names; Land management units/areas; Transportation; Utilities and services; Natural environment; Drainage; and Land Tenure.

[7] http://www.uneca.org/sites/default/files/PublicationFiles/geoinformation_socio_economic_dev-en.pdf

Australia and New Zealand

21. Australia and New Zealand, through ANZLIC – the Spatial Information Council, is developing an agreed '*One ANZ Foundation Spatial Data Framework*'[8] that will provide easy access to authoritative government spatial data over the geographic extents of Australia and New Zealand. ANZLIC has recognized that spatial information users, and locally-maintained information systems and applications across almost every discipline have a recurring need for a defined number of spatial datasets or foundation data.

22. The ten foundation spatial data themes agreed by ANZLIC, are: Geocoded addressing; Administrative boundaries; Positioning; Place names; Land parcel and property; Imagery; Transport; Water; Elevation and depth; and Land cover.

23. In addition to the above regional examples already put forward by the (E/C.20/2014/4/Add.1) on determination of global fundamental geospatial data themes, other initiatives and projects are working towards determining the global geospatial fundamental data themes and their coverage. These include:

The UN-GGIM Working Group on National Institutional Arrangements

24. The UN-GGIM Working Group on National Institutional Arrangements (UN-GGIM NIA), in carrying out its work in identifying best practice in national institutional arrangements and production system analysis,[9] has selected nine geospatial reference information themes required to satisfy the SDGs. These are: Geographical names; Administrative units; Cadastral parcels; Transport networks; Hydrography; Elevation; Land Cover; Imagery; and Settlements.

UN-GGIM - ISPRS Project

25. The ISPRS report '*The Status of Topographic Mapping in the World a UNGGIM - ISPRS Project 2012 – 2014'*[10] can be used as a useful reference to the existence already of a number of data themes considered 'candidates' in the fundamental data themes. These include national topographic mapping at various scale ranges, imagery and national surveying and cadastral coverage. It is noted that land cover is proposed for future study.

V. How the work can be developed at the global level

26. A first 'mapping' of the various geospatial data themes defined by the different initiatives outlined above is provided in Table 1 below. The themes are not listed in any order of priority or importance, though themes for INSPIRE are listed in the same order as the Directive.

[8] http://spatial.gov.au/system/files/public/resources/anzlic/ANZ_FoundationSpatialDataFramework_%28FinalWeb%29.pdf

[9] This report will be presented to the Committee of Experts at this session, summary of the report is located here http://ggim.un.org/docs/meetings/GGIM5/E_C.20_2015_5_trends%20in%20national%20institutional%20arrangements_en.pdf

[10] The full report will be presented at this session, the preliminary paper is located here - http://www.isprs.org/proceedings/2015/2015-WG-IV-2/4_2015-WG-IV-2.pdf

INSPIRE (Annex I & II)	Africa Reports	ANZLIC	UNGGIM NIA
Coordinate reference systems	Geodetic control network	Positioning	
Geographical grid systems			
Geographical names	Geographic names	Place names	Geographical names
Administrative units	Boundaries	Administrative boundaries	Administrative units
Addresses		Geocoded addressing	
Cadastral parcels	Land Tenure	Land parcel and property	Cadastral parcels
Transport networks	Transportation	Transport	Transport networks
Hydrography	Hydrography	Water	Hydrography
Protected sites	Land management units/areas		
Orthoimagery	Imagery	Imagery	Imagery
Elevation	Hypsography	Elevation and depth	Elevation
Land cover	Natural environment	Land cover	Land Cover
Geology			
	Utilities and services		
	Drainage		Settlements

Table 1

27. Table 1 above shows that there are some cross-regional similarities on which geospatial data themes are recognised as being fundamental. However it must also be acknowledged that there are likely regional differences in how these themes are prioritised in terms of importance and regional requirements.

28. The needs and requirements of the SDGs are transboundary and transnational, which demonstrates the importance of having an agreed set of global fundamental geospatial data themes. The aim is therefore to identify a minimum set of core fundamental geospatial datasets which can satisfy the regional and global requirements.

29. National and regional examples of fundamental data theme initiatives must therefore be the basis for developing agreement of a set of global fundamental geospatial data themes that can be harmonised to address the needs of the sustainable development agenda.

30. UN-GGIM: Europe proposes to review globally available resources in SDI development, liaise with the other Regional Committees of UN-GGIM to bring together information on the consideration of fundamental geospatial data themes and to lead discussions between interested Member States and Observers in order to develop agreement of a minimum set of global fundamental geospatial data themes required to address the needs of the sustainable development agenda.

VI. GlobeLand30 – a global fundamental dataset

31. The Regional Committee of United Nations Global Geospatial Information Management for Europe takes note that the report on determination of global fundamental geospatial data themes, presented to the Committee of Experts at its fourth session, also discussed land cover as a specific global fundamental geospatial data theme with direct and critical application to sustainable development. Representing the observed physical cover on the earth's surface, typically captured

from remotely sensed satellite imagery, land cover is effective in measuring and monitoring sustainable development and has been widely discussed as a key environmental dataset able to contribute to the targets and indicators of the SDGs. Determining and understanding land cover changes over time, particularly from local to global scales, comprehensively reflects the impacts of climate change, energy resources, land use, urbanisation, ecology, and human activities upon the natural environment.

32. It has been widely acknowledged by the scientific community that the present spatial resolution of global land cover data (typically 300m or lower) will not meet the future needs of global change studies and sustainable development applications. For this reason the EU has established the Copernicus Land Programme. Additionally, the National Administration of Surveying, Mapping and Geoinformation of China (NASG), has developed and produced the world's first global land cover datasets, global fundamental data, at 30m resolution (GlobeLand30) and containing 10 major land cover classes. The datasets present land cover pattern and change information, as well as the area of land cover elements and their change amount and rate through spatial statistics. This brings quantitative understanding to the extent of human activities influencing the natural environment.

33. On the occasion of the United Nations Climate Change Summit, the Chinese Government donated the GlobeLand30 datasets to the United Nations at the UN Headquarters in New York on 22 September 2014. H.E. Mr. Zhang Gaoli, Vice Premier of the People's Republic of China handed over the GlobeLand30 datasets to the Secretary-General, H.E. Mr. Ban Ki-moon as China's contribution to the global cause of sustainable development and combating climate change. The hand over was accompanied by the signing of a Joint Declaration on the China/UN cooperation in the field of Global Geospatial Information Management (UN-GGIM), between Under-Secretary-General for Economic and Social Affairs, Mr. Wu Hongbo and Ambassador Liu Jieyi, Permanent Representative of the People's Republic of China, on behalf of NASG of China.

34. An international cooperation mechanism is presently being put in place by the Secretariat to enable the GlobeLand30 datasets to be made freely available to Member States, the United Nations system organizations and the international community to assist in their scientific decision-making, and to measure and monitor critical environmental components of the SDGs and post-2015 development agenda. It will also allow the Member States and other actors to participate in collaborative data validation, analysis, verification, updating and maintenance of the GlobeLand30 datasets.

35. In order to provide overarching governance and sustainability of the GlobeLand30 datasets, the Secretariat is proposing that an International Advisory Committee (IAC) be established. The IAC will be a consultative body that decides on and sets the strategic directions, provides key advice and guidance in promoting the development, enhancement and collaboration between and among the UN and Member States, prepares its terms of reference, and an annual operational plan for the management and sustainability of GlobeLand30. The IAC will comprise subject matter experts and leaders in the global geospatial community, and will report to the Committee of Experts at its annual sessions.

VII. Summary

36. At its fourth session the Committee of Experts adopted decision 4/104, in which it agreed that global fundamental geospatial data themes need to be integrated and harmonised from the national to global levels, and that actions should be taken in order for Member States and the international community to work jointly towards the preparation, improvement and maintenance of fundamental geospatial data themes, building on existing national and regional fundamental datasets.

37. UN-GGIM: Europe indicated to the Bureau and Secretariat that its working group on core data is investigating the definition and use of core data, also referred to as fundamental data. The WG is using a three-pronged approach in its methodology to identify and scope the minimum core data required; the global perspective (through the SDGs), the regional (through the INSPIRE Directive), and the national (through consultation with Member States).

38. As has been highlight in a number of reports and papers issued in the last few years, there is an ever increasing awareness that geospatial information is now more important than ever for providing the content and context for understanding natural and human systems. There is a need for a set of global fundamental geospatial data themes that can be harmonised in order to be able to measure, monitor and manage sustainable development in a consistent way over time and for evidence-based decision and policy making. The needs and requirements the SDGs are transboundary and transnational, demonstrating the importance of an agreed set of global fundamental geospatial data themes.

39. There are a number of existing regional examples which are considering and defining geospatial data themes. It is proposed here that the national and regional examples of fundamental data theme initiatives must be the basis for developing agreement of a set of global fundamental geospatial data themes that can be harmonised to address the needs of the sustainable development agenda.

40. UN-GGIM: Europe proposes to review globally available resources in SDI development, liaise with the other Regional Committees of UN-GGIM to bring together information on the consideration of fundamental geospatial data themes and to lead discussions between interested Member States and Observers in order to develop agreement of a minimum set of global fundamental geospatial data themes required to address the needs of the sustainable development agenda.

VII. Points for discussion

41. The Committee is invited to:

(a) Take note of the report and express its views on the way forward in addressing the issues relating to global fundamental geospatial data themes;

(b) Consider the initiative being proposed by UN-GGIM: Europe to liaise with the other Regional Committees of UN-GGIM to bring together information on the consideration of fundamental geospatial data themes and to lead discussions between interested Member States and observers in order to develop agreement of a minimum set of global fundamental geospatial data themes;

(c) Consider establishing a working group to build upon this initial work, to determine an initial set of global fundamental geospatial data themes, and to report its findings back to the Committee at a future session; and

(d) Provide guidance on the modalities of the establishment of the GlobeLand30 International Advisory Committee (IAC), and consider appropriate subject matter experts and leaders in the global geospatial community to participate on the IAC.