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**Committee of Experts on  
Global Geospatial Information Management**  
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Item 13 of the provisional agenda\*  
**Integrated marine geospatial information.**

## Integrated marine geospatial information

### Note by the Secretariat

#### Summary

The present paper contains the report of the Working Group on Marine Geospatial Information for consideration by the Committee of Experts on Global Geospatial Information Management.

At its thirteenth session, held from 2 to 4 August 2023, the Committee of Experts adopted decision 13/111, in which it welcomed the report of the working group and the productive efforts and leadership in continuing to raise awareness, provide guidance and encourage the availability, accessibility and integration of marine geospatial information for the benefit of society, the environment and the economy. The Committee adopted the two parts of the Operational Framework for Integrated Marine Geospatial Information Management, comprising Part One – The Strategic Overview, and Part Two – The Strategic Pathways, and encouraged the working group to provide practical support for countries to extend the nine strategic pathways of the Framework into the hydro domain and the integration of marine geospatial information into the broader national geospatial information ecosystem.

The Committee of Experts emphasized that it was strategically crucial for any national hydro, hydrographic or marine programmes to increase their value and recognition within the broader national geospatial information management programmes that supported national development priorities, including the ability to address climate-related challenges and improve resilience, the land-sea interface, coastal zones and the pressing need to monitor sea level rise, recognizing their importance in mainstreaming the blue economy and achieving sustainable coastal resilience and development. The Committee further welcomed the updated workplan for the period 2023–2024, and encouraged the working group to raise awareness and promote the implementation of the Operational Framework for Integrated Marine Geospatial Information Management at the country level and ensure that the Framework remained relevant through regular review and updates, as necessary.

The Committee of Experts congratulated the working group for the proclamation of the Operational Framework for Integrated Marine Geospatial Information Management as a Decade Action by the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization under the United Nations Decade of Ocean Science for Sustainable Development.

In this present report, the working group provides information on its progress, including a review of its workplan and activities. It discusses the focus areas of its updated workplan for the period 2023–2024 and efforts to continue raising awareness, providing guidance and encouraging the availability, accessibility and integration of marine geospatial information for the benefit of society, the environment and the economy. The working group reports that it is advancing the

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\* E/C.20/2024/1

integrated marine geospatial information agenda through its workplan and fostering robust collaboration with partners, including the International Hydrographic Organization, technical committee 211 of the International Organization for Standardization, the Open Geospatial Consortium and the United Nations Global Geodetic Centre of Excellence.

This report details to the Committee of Experts three priority areas of the working group: (a) understanding the impact of the Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction; (b) implementation of the Operational Framework for Integrated Marine Geospatial Information Management at the country level; and (c) the integration of terrestrial, maritime, built and cadastral domains. Recognizing the profound implications of the Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction, the working group highlights its efforts to clarify the consequential impact of the Agreement with a focus on informing integrated marine geospatial information management strategies. The working group also highlights the use of artificial intelligence to facilitate implementation of the Operational Framework for Integrated Marine Geospatial Information Management, in alignment with General Assembly resolution [78/265](#) on seizing the opportunities of safe, secure and trustworthy artificial intelligence systems for sustainable development. It further discusses efforts towards integration across diverse domains and developing a comprehensive guidance document aligned with the strategic pathways of the United Nations Integrated Geospatial Information Framework in collaboration with the expert group on land administration and management and leveraging the International Hydrographic Organization-Singapore Innovation and Technology Laboratory as a crucible for experimentation.

The report provides the Committee of Experts with an account of the sixth expert meeting of the working group, held in March 2024 together with an international seminar on United Nations global geospatial information management with the theme “Effective and integrated marine geospatial information management”. The keynote presentation at the international seminar illuminated critical areas, including underwater sea space utilization and the designation of marine protected areas in the Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction. The international seminar underscored the importance of integrated marine geospatial information for marine protection, and for enhancing the availability and accessibility of marine geospatial information through the implementation of the Operational Framework for Integrated Marine Geospatial Information Management at the country level for the sustainable utilization of the marine resources vital for addressing climate-related challenges and improving resilience, which is particularly relevant to small island developing States.

This report includes several suggestions for enhancing collaboration, which are intended for the consideration of the Committee of Experts, with the aim of progressing the three priority areas of work. The working group is committed to promoting the implementation of the Operational Framework for Integrated Marine Geospatial Information Management in conjunction with the United Nations Integrated Geospatial Information Framework, and to promoting the advancement of integrated marine geospatial information management. This is in recognition of the necessity for coordinated efforts to achieve sustainable and integrated solutions, which are crucial for addressing climate impacts and for the benefit of society, the environment and the economy.

## I. Introduction

1. Approximately seventy percent of the Earth's surface is covered by water - lakes, rivers, deltas, coastal zones, seas, and oceans. Water is critical to socio-economic development, food and energy production, including renewable energy, healthy habitats and ecosystems, and human survival overall. Water is at the heart of adaptation to climate change and serves as the crucial link between society, the environment and the global economy. More than four billion people depend on maritime waters for fish as a primary source of protein, and an estimated ninety percent of the world's trade is conducted on the seas and oceans. An increasing number of civilian vehicles, both manned and unmanned, are conducting activities in the underwater sea space. Deep seabed habitats, which played a key role in the development of life on Earth, host an extraordinary diversity of marine organisms with properties having actual or potential applications in drug development. Water connects us geographically and digitally, with marine geospatial information being integral to achieving all the sustainable development goals.

2. At its thirteenth session, held from 2 to 4 August 2023, the Committee of Experts adopted decision [13/111](#). This decision emphasized the strategic importance of enhancing the value and recognition of hydro, hydrographic, and marine programs within broader national geospatial information management programs. These efforts support national development priorities by addressing climate-related challenges, improving resilience, managing the land-sea interface and coastal zones, and monitoring sea-level rise. It recognizes the important role of marine geospatial information in mainstreaming the Blue Economy and achieving sustainable coastal and marine resilience and development.

3. The Committee noted the continuing efforts of the Working Group to advance the United Nations Integrated Geospatial Information Framework (UN-IGIF) and its nine strategic pathways through the Operational Framework for Integrated Marine Geospatial Information Management (UN-IGIF-Hydro). These efforts aim to provide practical guidance for countries to extend these pathways to the marine domain. Ultimately, strives to integrate marine geospatial information into the global geospatial information ecosystem. This integration enhances the ability to leverage marine geospatial information for informed decision-making, supports the protection and preservation of the marine environment, and promotes the conservation and sustainable use of marine resources.

4. The Working Group highlighted the need for greater efforts to raise awareness of the UN-IGIF and the UN-IGIF-Hydro. It also acknowledged the importance of maintaining and sustaining the UN-IGIF-Hydro as a living document and promoting its relevance for strengthening national marine geospatial information management and national hydrographic projects. This report provides information and updates on the Working Group's progress and activities during this reporting period, including the development of the UN-IGIF-Hydro at the country level.

5. Beyond the maritime domain, as global reliance on water and its resources increases, marine geospatial information<sup>1</sup> becomes essential for data-driven, evidence-based management and administration of land areas that interface with water bodies. Knowing where people, marine life, events, and activities are, and their relationships to one another, is crucial for informed policy and decision-making. The timeliness of such data is equally important. Access to real-time marine geospatial information is necessary to prepare for and respond to emergency situations, such as natural disasters. The Working Group encouraged national efforts to improve the availability and accessibility of marine geospatial information for various purposes, through the repurposing of existing data and the development and implementation of open marine geospatial data and metadata standards.

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<sup>1</sup> Encompassing inland water bodies and waterways, coastal zones, seas and oceans

6. The Committee of Experts is invited to express its views on the progress of the Working Group in its efforts to provide practical guidance and encourage the availability, accessibility and integration of marine geospatial information. This information is crucial for the sustainable development of the world's resources, for responding to the impacts of climate and for the benefit of society, the environment and the economy. Points for discussions and decisions are provided in paragraph 25.

## **II. Meetings and activities during the intersessional period**

7. The Working Group convened four virtual meetings during the intersessional period. They successfully held its formal in-person sixth expert meeting in Bali, Indonesia, from 4 to 8 March 2024, together with the International Seminar on United Nations Global Geospatial Information Management with the theme "Effective and integrated marine geospatial information management". During its meetings, the Working Group continued to consider the UN-IGIF-Hydro, deliver the work items within its work plan, and collaborate with the International Hydrographic Organization (IHO), International Standards Organization (ISO) and Open Geospatial Consortium (OGC) to ensure synergies and avoid duplication.

8. The Working Group's priority pertains to the integration of terrestrial, maritime, built and cadastral domains. On 2 November 2023, a technical discussion was arranged by the Singapore Land Authority in its capacity as a co-Chair of the Expert Group on Land Administration and Management (EG-LAM), supported by the Maritime and Port Authority of Singapore, as a co-Chair of the Working Group on Marine Geospatial Information. This discussion aimed to enhance understanding of collaborative projects and activities across these domains and initiate the development of a discussion paper outlining key considerations and good practices. Diverse participants from governments, public and academic research institutions, and the private sector, along with representatives from the IHO and the United Nations Global Geodetic Centre of Excellence (UN-GGCE), contributed virtually. Discussions encompassed experiences in data capture, data processing, data management, and data modelling across the terrestrial, maritime, built and cadastral domains.

9. Informed by the outcomes of the technical discussion, the Working Group and EG-LAM agreed to jointly develop a paper that gathers the good practices and lessons learned from the integration of terrestrial, maritime, built and cadastral domains. The proposed paper would include a series of interrelated "bite-size" focus efforts such as vertical reference, data interoperability and integration, data and metadata standards, and how domain integration has supported climate resilience, coastal development and disaster management efforts. In this regard, the Working Group acknowledged the leadership of the EG-LAM in leveraging focused group modality to progress this priority work. This joint effort now includes the Working Group on Policy and Legal Frameworks for Geospatial Information Management, and the IHO-Singapore Innovation and Technology Laboratory (IHO-Singapore Lab). The ongoing consideration would be through the "lens" of the nine strategic pathways of the UN-IGIF and initially, will seek to address the technical complexities related to addressing the land-sea interface and the vertical reference frame (height datum). The work will, initially, seek to learn from: (a) Geoscience Australia Vertical Motion of Pacific Island Tide Gauges under the Pacific Sea Level and Geodetic Monitoring (PSLGM) Project; (b) Baltic Sea Chart Datum 2000 (BSCD2000) (Baltic Sea Hydrographic Commission/Swedish Maritime Administration); as well as other efforts by Members States and experts in land-sea integration, including case studies and good practices from other disciplines and cross-cutting perspectives such as policy and legal aspects, as well as governance and institutions.

10. The Working Group discussed exploring the test-bedding of Large Language Models (LLM) with publications and resource materials adopted or endorsed by the Committee of Experts to support knowledge management and increase the accessibility of geospatial frameworks, norms, principles and guides. They also noted the potential to leverage LLMs when considering efforts to operationalize the UN-IGIF and the UN-

IGIF-Hydro at the country level, tailoring the nine strategic pathways to Member States' national circumstances and priorities. The Working Group welcomed a demonstration and emphasized the importance of input quality, methodology, and instructions when using generative artificial intelligence tools. Furthermore, they underscored the necessity to ensure the reliability and authoritativeness of LLMs inputs and outputs, suggesting exploration of some mechanism towards global governance frameworks in AI – such as those outlined in General Assembly resolution [78/265](#) on “Seizing the opportunities of safe, secure and trustworthy artificial intelligence systems for sustainable development” adopted on 21 March 2024.

11. The Working Group also discussed the OGC Federated Marine Spatial Data Infrastructure Pilot conducted in 2023 across three locations: Singapore, the Arctic, and the Caribbean. This pilot involved five sponsors and ten participants, successfully addressing issues such as datum relationships and vertical land motion monitoring. Challenges surfaced during the pilot, including: (a) harmonization of land and sea datums; (b) low and varying resolutions of datasets; (c) management of large dataset sizes; (d) integration of OGC Application Programming Interface (API) open standards for 3D access, storage and visualization. The Working Group noted that the IHO-Singapore Lab intends to leverage the outcomes of the Pilot and investigate how the integration of land and sea datums can improve the consistency and accuracy of efforts evaluating the impact of changing climate, natural disasters and extreme weather events along the coastlines.

### **III. Sixth Expert Meeting of the Working Group on Marine Geospatial Information and International Seminar on United Nations Global Geospatial Information Management with the theme “Effective and Integrated Marine Geospatial Information Management”**

12. The Government of Indonesia and its Geospatial Information Agency and Navy's Hydrographic and Oceanographic Centre hosted the sixth expert meeting of the Working Group together with the International Seminar on United Nations Global Geospatial Information Management with the theme “Effective and integrated marine geospatial information management”. The Seminar welcomed international speakers and participants representing diverse domains and fields of expertise, notably the maritime, hydrographic, legal, marine and GIS science. Presenters and participants also included those from the terrestrial and cadastral domains, private sector, academia, and international and regional organizations. The sixth expert meeting, in person, was held in conjunction with the meetings of the fifteenth meeting of the IHO Marine Spatial Data Working Group (IHOMSDIWG) and the meeting of the Joint IHO-OGC Marine Domain Working Group (MDWG).

13. The Working Group hosted Singapore's Ambassador for Oceans and Law of the Sea Issues, who delivered a keynote address at the International Seminar. Her address illuminated critical topics, including underwater sea space utilization and the designation of area-based management tools, including marine protected areas, in areas beyond national jurisdiction. She presided over the successful United Nations [Intergovernmental Conference](#) convened under General Assembly resolution 72/249, which, on 19 June 2023, adopted by consensus the Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction (BBNJ Agreement). Her keynote address, themed “from what to do to how to do”, encouraged the Working Group and its partners to consider its relevance and contribution to integrated marine geospatial information management in relation to the BBNJ Agreement's implementation and to focus on enabling an environment where practical guidance and methodologies are available to support Member States with the “how to do”.

14. The co-Chair highlighted, in the context of implementing the UN-IGIF-Hydro at the country level, the importance of aligning the management of marine geospatial

information with strategic pathways 4 – Data, and 6 – Standards, focusing on marine geospatial data and metadata standards for data interoperability and discoverability. Additionally, in alignment with strategic pathways 4 – Data, and 5 – Innovation, the co-Chair discussed the integration of AI in marine geospatial technology to enhance port operations. Regarding strategic pathways 3 – Financial, 8 – Capacity and Education, and 9 – Communications and Engagement, the Working Group was encouraged to identify gaps and barriers in members’ efforts across these pathways. Emphasizing the importance of “leaving no one behind”, the co-Chair underscored the need to address these issues within the Working Group’s activities and initiatives.

15. At the meeting, the importance of collaboration at the national and sub-national levels was emphasized, particularly in integrating the terrestrial, maritime and cadastral domains. The signing of a cooperation agreement between Indonesia’s Geospatial Information Agency and Navy’s Hydrographic and Oceanographic Centre during the International Seminar underscored the need for collaboration and was well applauded. This type of data sharing and exchange would support the wider application of geospatial information. The exchange of data between national agencies for achieving national development strategies and priorities was also commended by participants.

16. The Working Group emphasized the critical importance of stakeholder engagement and inclusion for effective and integrated marine geospatial information management. Drawing on regional initiatives, exemplified by the Pacific Community (SPC), which leveraged indigenous knowledge, expertise and resources to enhance marine geospatial capabilities. It was highlighted that similar approaches could benefit other Small Island Developing States. It was suggested that national entities with sufficient resources could consider supporting and contributing to similar sub-regional or national initiatives on a bilateral basis, further reinforcing the need for partnerships to allow for effective and integrated marine geospatial information management.

17. The Working Group also discussed the role of partnerships and integrated geospatial information in disaster response and management. Recognizing the frequency and severity of disasters and the need for disaster resilience, the Working Group recognized the necessity to develop the geospatial capacity and capabilities of authorities and communities to effectively address potential crises and meet their future needs. This enhancement could be achieved by adopting technologies and tools such as those afforded by AI and machine learning to manage limited resources. In addition to efforts to develop capacity in effective geospatial information management, national marine geospatial information entities also need to proactively communicate and publicize their work to reach a broader audience beyond their community. In this regard, the Working Group underlined the need to develop coordinated outreach programmes and share the knowledge, experience, and projects that have been and are being undertaken.

18. Collaboration and partnerships were shared, including the IHO-Singapore Lab support to the Working Group on the integration of terrestrial, maritime and cadastral domains, as well as the vertical height datum related to the land-sea interface. The IHO-Singapore Lab is test-bedding the deployment of digital hydrographic products for the broader maritime community, beyond traditional navigation users. The Working Group acknowledged the laboratory’s ongoing efforts to enhance the consistency and accuracy of assessing climate change, natural disasters, and extreme weather impacts along coastlines through integrated land and sea datums. The IHO-Singapore Lab was encouraged to raise awareness of the UN-IGIF and the UN-IGIF-Hydro, and promote nationally integrated marine geospatial information management.

19. The Working Group noted it has met on five occasions jointly with the IHOMSDIWG and the Joint IHO-OGC MDWG, further strengthening the coordination and partnership between these bodies and avoiding duplication. Throughout these meetings, all working groups have sought to address the “why”, “what” and “how” for effective integrated marine geospatial information management and efforts to ensure marine geospatial information is available, accessible and integrated. These joint meetings also promote greater awareness and encourage the operationalization of the

UN-IGIF and UN-IGIF-Hydro amongst Member States, relevant stakeholders and partners.

20. The Working Group observed the growing interest and usage of marine geospatial information to address areas beyond traditional navigational safety purposes. Besides protecting the marine environment, they highlighted the importance of integrated land and sea data to study the impact of climate change and rising sea levels. Some potential new areas of interest include the protection of human life, the marine environment and critical infrastructures, such as cables and pipelines, from unregulated use of the underwater sea space by an increasing number of civilian-manned or unmanned – sub-surface vessels. Another area of interest is the designation of area-based management tools, including marine protected areas, under the BBNJ Agreement.

21. The Working Group recommended convening a combined side event during the Fourteenth session to discuss issues related to the integration of terrestrial, maritime, built and cadastral domains. The expected outcomes include a better understanding of the issues, approaches and good practices in the integration of terrestrial, maritime and cadastral domains, addressing technical complexities related to the land-sea interface, and gathering new perspectives and additional views for the proposed paper to be developed jointly with the EG-LAM, the Working Group on Policy and Legal Framework for Geospatial Information Management, UN-GGCE, IHO, and the IHO-Singapore Lab.

#### **IV. Next steps and considerations**

22. The Working Group considers, going forward, its priority areas are: (a) implementation of the Operational Framework for Integrated Marine Geospatial Information Management at the country level; (b) the integration of terrestrial, maritime, built and cadastral domains; and (c) understanding the impact of the BBNJ Agreement vis-à-vis integrated marine geospatial information management. The Working Group recognizes the profound implications of the BBNJ Agreement and that it may be opportune for the Working Group to clarify the consequential impact of the BBNJ Agreement with a focus on informing integrated marine geospatial information management strategies.

23. The integration of terrestrial, maritime, built and cadastral domains should be approached through the "lens" of the nine strategic pathways of the UN-IGIF, addressing the technical complexities of the land-sea interface and the vertical reference frame (height datum) as the initial focus. It should draw on case studies and good practices from other disciplines and consider cross-cutting perspectives such as legal, regulatory and policy aspects, and governance arrangements, all according to national circumstances. The Working Group joins efforts to address this need for integration of domains noting its implications for addressing climate related challenges, climate and disaster resilience, and sustainable coastal development.

24. The Working Group is considering the test-bedding of tools in Large Language Models to increase the accessibility of the Committee's publications and resource materials. The Working Group is of the view that leveraging such tools will also promote the implementation of the UN-IGIF-Hydro alongside the UN-IGIF, as well as the responsible use of artificial intelligence to facilitate and realize integrated marine geospatial information management, in alignment with General Assembly resolution [78/265](#) on "Seizing the opportunities of safe, secure and trustworthy artificial intelligence systems for sustainable development".

#### **V. Points for discussion**

25. **The Committee of Experts is invited to:**

- (a) **Take note of the present report, express its views and provide guidance to the Working Group on its progress and efforts in providing guidance,**

raising awareness and promoting integrated marine geospatial information management;

(b) Take note of, express its views and provide guidance on the priority areas and next steps as discussed by the Working Group, including the collective efforts to address the integration of terrestrial, maritime, built and cadastral domains;

(c) Express its view on the needed collaboration and partnerships to support better appreciation and coordination for the implementation of the UN-IGIF-Hydro that will meet the operational requirements of Member States; and

(d) Express its appreciation to the Government of Indonesia, its Geospatial Information Agency and Navy's Hydrographic and Oceanographic Center for successfully hosting the sixth expert meeting of the Working Group together with an international seminar from 4 to 8 March 2024 in Bali.