

## **Draft report on the consultation on the use of Earth Observation for wetland inventory, assessment, monitoring and conservation**

### **Background**

1. The consultation on the use of Earth Observation for wetland inventory, assessment, monitoring and conservation was organized pursuant to Convention on Wetlands Resolution XIII.10 which, in paragraph 23, requests the Secretariat, subject to the availability of resources, to investigate the options and associated costs for working with earth observation organizations, including the Group on Earth Observations (GEO), to put earth observation (EO) data and monitoring tools at the disposal of Contracting Parties for national wetland inventories (NWI) or monitoring of changes to Wetlands of International Importance; and Standing Committee SC63-30, which requests the Scientific and Technical Review Panel (STRP), working with the Secretariat, to organise a consultation with the earth observation community on development of an initiative to foster dialogue, knowledge exchange and guidance for earth observation in support of wetland inventory, assessment, monitoring and conservation.

### **The consultation on Earth Observation**

2. The purpose of the consultation was to contribute to and strengthen the use of Earth Observation in development and use of National Wetland Inventories and in wetland assessment, monitoring and conservation, thereby supporting Contracting Parties in protection and wise use of wetlands, delivering and reporting on commitments under the Convention on Wetlands as well as other relevant global environmental agreements.
3. The consultation was carried out building on in-depth interviews with 13 Contracting Parties on the development of national wetland inventories, priorities and needs (presented in SC63 Inf.2), and ongoing efforts under the Convention to support development of national wetland inventories (presented in SC64 Doc. 10, SC63 Doc.10 and SC62 Doc.9). Semi-structured interviews were conducted with Earth Observation experts from five organisations, UN Environment Programme-Danish Hydraulic Institute (UNEP-DHI), Wetlands International, Japan Aerospace Exploration Agency (JAXA), Digital Earth Africa, and Tour du Valat, to discuss the technical and capacity needs of the Convention's Contracting Parties, particularly in relation to integrating Earth Observation technologies into wetland inventory, assessment, monitoring and conservation. This provided the basis for a dedicated Earth Observation Day held on 6 December 2024, in association with STRP27, bringing together Earth Observation experts, STRP members, observers and National Focal Points.
4. Earth Observation Day was opened by Dr. Hugh Robertson, STRP Chair, and Jerker Tamelander, Director of Science and Policy, Secretariat of the Convention on Wetlands. Flore Lafaye de Micheaux (Senior Advisor for Europe) and Filip Aggestam (Scientific and Technical Officer) presented the Secretariat's ongoing work on supporting Contracting Parties in relation to national wetland inventory and a summary of interviews conducted with Contracting Parties

and Earth Observation experts. Presentations by Earth Observation experts addressed the transformative potential of Earth Observation data and tools for wetland inventory and monitoring (Marc Paganini, European Space Agency, ESA); the capabilities of spaceborne radar for wetland mapping, with case studies from the Global Mangrove Watch and the ALOS Wetland Inundation Mapping initiative (Åke Rosenqvist, JAXA); use of machine learning towards creating a global wetland dataset through Global Wetland Watch (Christian Toettrup, DHI, and Stuart Crane, UNEP); the development of operational and sustainable Earth Observation services through Copernicus, the Earth Observation flagship programme of the European Union (Michel Massart, EU-JRC); as well as experiences of regional programmes that have been successful in supporting application of Earth Observation tools (Anis Guelmami, Mediterranean Wetlands Observatory; and Lisa-Maria Rebelo and Mpho Sadiki, Digital Earth Africa). The day concluded with a panel discussion, moderated by Jerker Tamelander. The Earth Observation Day [background document](#), [programme](#) as well as [presentations](#) are available on the Convention website.

5. This report summarizes the main findings and recommendations arising from the consultation. It is provided to the 64th meeting of the Standing Committee of the Convention as an information document. The final consultation report will be provided to COP15.

### Key findings

6. The key findings of the consultation are summarized below:
  - a. **Earth Observation data generation and data quality are increasing rapidly.** The range of satellites and sensors generating data relevant to wetland inventory, assessment, monitoring and conservation has increased rapidly over many years, and continues to increase. This provides more, and more accurate data, at high temporal and spatial resolution. Ongoing developments in artificial intelligence and machine learning is expected to further contribute to increasing the availability and applicability of Earth Observation for identifying and mapping wetlands, assessing condition and ecosystem service provision.
  - b. **Earth Observation data is often freely available.** Earth Observation data is, for the most part, readily and freely available for application in wetland inventory, assessment, monitoring and conservation. Space agencies put a very large part of the data they generate in the public domain or make it available for non-commercial applications for free. This includes raw data, as well as derived products and services. This is an exceptionally valuable 'public service', also bearing in mind that many countries may not have the infrastructure and technical capability for generating, storing and processing large volumes of Earth Observation data, and that developing and maintaining such capability at national level can be very costly as well as impractical. Commercial Earth Observation data with very high spatial resolution, while not freely available, can also play a crucial role in enhancing wetland inventory, assessment and monitoring efforts, offering spatial details that can justify their cost for specific local-scale applications (e.g. monitoring of small or fragmented wetland habitats or human-made wetlands, monitoring of wetland restoration projects, environmental impact assessment etc.).
  - c. **Earth Observation data is a valuable but underused asset.** While use of Earth Observation data in national wetland inventory, assessment, monitoring and conservation is increasing, it is not keeping pace with the rapid growth in data availability. The significant potential of Earth Observation (and the investment made in it) is under-utilized. While capability on the

supply side of Earth Observation data is very advanced, it remains constrained at the demand side. Availability of data does not in itself catalyze its application by authorities responsible for wetlands, and in many cases the institutional and policy environment is not keeping up with the supply of data and derived products.

- d. ***User-driven design is key to enhancing use of Earth Observation in wetland inventory.*** Enhancing application of Earth Observation in national wetland inventory requires increased focus on the needs of national authorities responsible for wetland inventory, monitoring and management, as well as requirements of other end users, including authorities responsible for relevant sectoral policies or for tracking and reporting on global biodiversity, climate and sustainable development targets. An active involvement of end-users in the co-design and development of Earth Observation data products and tools for wetland inventory is fundamental to fostering genuine ownership, and in order to ensure that Earth Observation products and services are relevant, appropriate to the context, and that technical and other capacity needs are well understood and addressed. Adopting a user-driven approach will help ‘democratize’ Earth Observation, making its benefits more accessible and impactful.
- e. ***Limitations to Earth Observation data remain but can increasingly be addressed.*** Some wetland types, such as small wetlands and forested inland wetlands, have for long been challenging to identify, map and assess using Earth Observation technology. Similarly, some wetland characteristics are challenging, such as depth of peat soil in peatlands, as well as extent and condition of wetlands with high seasonal or inter-annual dynamics. Inventory of human-made wetlands is uneven. Some of these limitations can increasingly be overcome with innovative use of currently available Earth Observation technologies, whereas others require further development of Earth Observation sensors and products. Space agencies can play a critical role in bridging these gaps by directing effort towards advancing Earth Observation capabilities. They can align their priorities with the recommendations from intergovernmental processes, such as those of the Convention on Wetlands, to ensure that Earth Observation developments meet the critical needs of wetland inventory, monitoring, assessment and conservation globally.
- f. ***Effective use of Earth Observation is dependent on ground-based data.*** Unlocking the power of Earth Observation data is dependent on high-quality in-situ data for ground validation and to train models. This is important both to sufficiently consider bioregional/local characteristics of wetlands, and for the development of Earth Observation solutions for wetland types that to date have been difficult to map using Earth Observation. Much field data is already held by national authorities as well as e.g. academic institutions and civil society organizations, and further field data will be required in many locations and/or for specific wetland types. Enhanced sharing of data suitable for ground validation and model training is needed, requiring trust as well as appropriate cooperation mechanisms. There is also a need for further gap analysis to identify ground validation and training data deficiencies for specific wetland types. This can draw on what has been done for some wetland types, such as mangroves.
- g. ***A common wetland classification system supports data interoperability and reporting.*** A common classification system is an important element for interoperability of data and enables global compilation and presentation of data based on reporting by individual Contracting Parties. The ability of Contracting Parties to pick and choose from among a variety of interoperable wetland data layers aligned with a common classification system can contribute to increased application of Earth Observation data in NWI. The Convention

on Wetlands Classification System for Wetland Type was created to provide a broad framework for rapid identification of the main wetland habitats represented in Wetlands of International Importance. However, as noted in the 'Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance of the Convention on Wetlands', its usefulness for any specific wetland inventory should be carefully assessed. Many Contracting Parties have their own national classification systems, but these are not always coherently mapped against the Convention's classification system. Work by the STRP is underway to undertake scoping and planning for a review of the Convention's classification system in the 2025-2027 triennium (SC63 Decision 30).

- h. **Essential wetland variables can inform wetland conservation and wise use.** Wetlands are dynamic ecosystems, and provide multiple services based on e.g. their biodiversity, hydrography and carbon storage and flux. Wetland functions and services are significantly influenced by wetland degradation, not just loss of area. In addition to tracking change in wetland extent over time, it is therefore also important to be able to track the condition of wetlands, or changes in specific characteristics of wetlands. For example, Convention on Wetlands COP resolutions have called on Contracting Parties to update National Wetland Inventories to support estimation of carbon storage and fluxes, in order to update greenhouse gas accounts and include wetland actions in Nationally Determined Contributions and other climate change plans (Resolution XII.11 and Resolution XIII.14). Further development of appropriate essential wetland variables which can be measured using Earth Observation is important for conservation, restoration and wise use of wetlands, and to support implementation and monitoring of biodiversity, climate and land degradation neutrality targets.
- i. **Enhanced use of Earth Observation in wetland inventory will strengthen reporting on wetland extent and condition in the context of the Convention.** Contracting Parties have benefited from long-standing engagement of space agencies in activities under the Convention. This includes their contributions to the work of the STRP and their support to Contracting Parties in relation to wetland inventory, as well as in the designation and management of Wetlands of International Importance. However, less than half of Contracting Parties report progress in developing National Wetland Inventories and even fewer provide data from these inventories through national reports under the Convention on Wetlands and towards tracking of SDG indicator 6.6.1. Additionally, the Convention on Wetlands is yet to produce a comprehensive and coherent global map of wetland extent. Support to the Contracting Parties needs to be significantly increased, in line with the approach established by the Secretariat (as outlined in SC62 Doc.9, SC63 Doc.10 and SC64 Doc. 10), and ensuring contracting parties have access to guidance, knowledge and support for development and gradual refinement and use of National Wetland Inventories. There is a need for a periodically updated global inventory of wetlands (noting relevant ongoing efforts such as Global Wetland Watch and the GEO Global Ecosystem Atlas), including their condition and the extent of wetlands under restoration or restored. Such an inventory would support the Global Wetland Outlook, the Convention's flagship product, enhance the work of the STRP, and contribute to other international policy frameworks.
- j. **Global datasets of specific wetland types are crucial to support development of National Wetlands Inventories as well as global reporting.** The availability of global datasets of specific wetland types, such as the Global Mangrove Watch, play a critical role in advancing wetland inventory, monitoring, and assessment efforts worldwide. These global datasets can serve as a valuable starting point for countries that lack their own National Wetland Inventories, providing baseline information to guide national efforts. Additionally, they

enable standardized intercomparison of wetland extent, condition, and trends across countries and regions. Such datasets can also be instrumental in supporting international reporting requirements, such as those under the Convention on Wetlands and SDG Indicator 6.6.1. Strengthening the quality, accessibility, and updating of these global datasets is vital for their effective use by Contracting Parties as well as other entities.

- k. ***Enhanced international coordination and cooperation, and identification of policy requirements and gaps, are essential to accelerate the uptake and maximize the impact of Earth Observation initiatives.*** One of the findings of the GEO Wetlands initiative under the GEO Work Programme 2023-2025 was that there are many scientific initiatives that could contribute better to international efforts on wetlands inventory, monitoring, assessment and conservation if there was a clear expression of need from the Convention on Wetlands. There are many initiatives underway to map, classify and assess wetlands using Earth Observation, including global, regional and national initiatives. While many of these generate a wealth of data and tools, greater coordination across initiatives could facilitate better sharing of knowledge and data across initiatives and, importantly, support Contracting Parties in the application of Earth Observation data, products and tools in national wetland inventory, monitoring, assessment and conservation. There is a need for a mechanism or a community for ongoing exchange, engaging and supporting Contracting Parties / national authorities as end users but also facilitating engagement with other stakeholders including academia and civil society organizations e.g. in relation to *in situ* data and to support integration of Earth Observation tools. Such cooperation may be pursued with the Group on Earth Observations (GEO). A regional approach may be particularly useful in providing technical support and capacity building support to Contracting Parties, leveraging regional mechanisms, centres or initiatives established under global conventions, including Ramsar Regional Initiatives, as well as initiatives such as Digital Earth Africa.

## Recommendations

7. Recommended actions through the Convention on Wetlands towards strengthening the use of Earth Observation in wetland inventory, monitoring, assessment, and conservation arising from the consultation include the following:
  - a. ***Develop an initiative dedicated to supporting use of Earth Observation in wetland inventory, monitoring, assessment, and conservation.*** It is recommended that such a mechanism would:
    - i. Facilitate access to and utilization of Earth Observation technology. Enhance access to and effective use of existing and emerging Earth Observation data, derived products, and tools from diverse sources to support the development, maintenance, and use of National Wetland Inventories. Where relevant, contribute to their continued development including by promoting the exchange of ground validation and training data.
    - ii. Develop/strengthen global wetland datasets. Develop and maintain new global datasets of wetland types for which this is lacking, and support/promote further development of existing global datasets for specific wetland types. This may also encompass focus on Wetlands of International Importance.

- iii. Develop Essential Wetland Variables. Advance the development of essential wetland variables to improve the utility of Earth Observation data in National Wetland Inventories, in wetland monitoring and assessment, and for reporting purposes. This includes monitoring of changes to Wetlands of International Importance, wetland conservation and restoration planning, and supporting national planning and reporting efforts within international policy frameworks such as the Convention on Wetlands and the Sustainable Development Goals.
- iv. Undertake capacity building. Strengthen capacity-building initiatives by developing training materials, tools, and activities in collaboration with end users. These efforts should include guidance on performing crosswalk analyses between national wetland classification systems, such as the Convention's Classification System for Wetland Type, and other relevant classification frameworks, such as the Global Ecosystem Typology (GET).
- v. Provide Technical Advice and Support. Offer technical advice and support to Contracting Parties of the Convention on Wetlands throughout their National Wetland Inventory processes. This support should be tailored to address specific technical, methodological, and operational challenges faced by individual countries.
- vi. Strengthen International Coordination and Cooperation. Actively engage with and strengthen the coordination and collaboration among international initiatives to ensure synergies in addressing wetland-related challenges. Foster partnerships across global, regional, and national efforts to enhance the impact of Earth Observation data, derived products, and tools in wetland inventory, monitoring, assessment and conservation.

The initiative should complement and support the Convention's ongoing national wetland inventory support mechanism, and be formally mandated by the Convention's governing body, to ensure impact and sustainability. It can be developed building on the tentative proposal for a GEO Wetlands initiative submitted for inclusion in the Group on Earth Observations (GEO) Post-2025 Work Programme, drawing on existing models such as the GEO Flagship Initiatives. It would be developed and implemented in close collaboration with space agencies and Earth Observation organizations. It should give consideration to how relevant regional mechanisms including those established under the Convention on Wetlands (Ramsar Regional Initiatives), or other global agreements or processes can be leveraged, and may entail identifying and engaging with 'champion countries' to help ensure solutions are built to address national needs, enable testing and fine tuning of approaches, facilitate peer-to-peer exchange and support broader application. Findings of this Earth Observation consultation provides a basis for its further technical development.

Development of the initiative can be led by the Secretariat, working with the STRP and relevant partners. In the first instance, it is critical that start-up financial resources are secured for development of the initiative, including to identify requirements and modalities for its longer-term operation.

- b. ***Establish or strengthen bilateral cooperation with space agencies and Earth Observation initiatives.*** This may include, inter alia, expanding the long-standing collaboration with individual space agencies contributing to the work of the STRP and the Convention's programme to support national wetland inventory, including to strengthen the applicability of existing Earth Observation products and services (such as those of Copernicus, the

Global Mangrove Watch and Global Wetland Watch) in national wetland inventory, and to develop new tools and global wetland datasets to address current gaps. This can be done through exchange of letters or cooperation agreements between the Secretariat of the Convention on Wetlands and relevant partner organizations.

- c. ***Undertake in-depth assessments to identify further technological development needs.***  
This may include identification of wetland types or wetland areas/regions for which further technical development of Earth Observation based approaches, including dedicated systematic observation strategies for wetlands, are required in order to better support wetland inventory, and identification of wetland types that require additional or better ground validation and training data, or enhanced exchange of such data. Such assessments/analyses may be pursued by the STRP in the context of its work plan for the 2025-2027 triennium, with findings addressed through collaboration with space agencies or Earth Observation initiatives. As an initial action, the Secretariat can encourage development of RS approaches and products for mapping e.g. forested inland wetlands, small wetlands, and human-made wetlands as well as assessing depth of peat soils and extent and condition of wetlands with high seasonal or inter-annual dynamics, through formal liaison with the Committee on Earth Observation Satellites (CEOS).
- d. ***Disseminate the findings of the Earth Observation consultation, identified needs and recommended actions.*** This may include, inter alia, outreach to space agencies and Earth Observation initiatives; international and national funding agencies and philanthropies; relevant international organizations; as well as other MEAs, through their respective secretariats and as appropriate through contributions to meetings of their governing or subsidiary bodies, and may invite contributions towards or collaboration in the implementation of the recommendations arising from the Earth Observation consultation. This can be done by the Secretariat of the Convention on Wetlands, with the STRP.

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