→ MWBS | MAPPING WATER BODIES FROM SPACE 2015 CONFERENCE

MWBS 2015 recommendations

Wetlands Session

18–19 March 2015 | ESA-ESRIN | Frascati (Rome), Italy

European Space Agency

Workshop Recommendations Wetlands

Societal challenges

- Wetlands are **critical for basic needs of society** (ecosystem function and services): water provision and purification, flood supply, biodiversity, climate mitigation (carbon storage/sequestration), climate resilience, disaster risk reduction (floods).
- Cover **1.5 Billion ha** (almost size of Russia)
- Global and local **water cycles are strongly depending on wetlands**. Policies don't take into account these inter-dependencies => needs for wetland indicators.
- **Wetland loss**: 64% loss since 1900, 76% population loss of wetland species in last 40y.
- **Knowledge gaps**. Despite its 40y of existence, Ramsar still does not have a global **inventory** of wetlands. Wetland **degradation** (including **drivers**) need to be better identified and understood.
- Wetlands are **important for climate studies** (e.g. methane and carbon cycles). Wetlands insufficiently taken into account.
- **Wetlands Restoration** high on the agenda of Ramsar.
  Where to restore wetlands? Can EO help identifying restoration hotspots?

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Scientific challenges

- Wetlands is one of the most **difficult land cover to map**.
- Different **definition of wetlands** (Ramsar definition, transitional zones between land and aquatic ecosystems … although not always) = problem of mapping.
- Wetlands are **highly dynamic in surface water extent (seasonally to ephemerally flooded)**=> needs for high temporal resolution to capture seasonality.
- Wetlands can be **small Water Bodies** (e.g. ephemeral ponds) => needs for high spatial resolution to detect small WBs.
- **WQ in shallow waters** is a challenge.
- Wetlands are **very different in types** (peatlands, temporary artic lakes, ephemeral ponds in drylands, forested wetlands, highlands/lowlands etc.) => needs for regional customization.
- Wetlands are **complex habitats** (forested wetlands & mangroves, water saturated land, seasonally flooded WB, flooded vegetation) => needs for robust multi-sensor approaches.
- Derivation of pertinent **Indicators** for decision makers (e.g. on climate change).

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Recommended R&D Activities

- Reliable methods for **wetland delineation/inventory** with a consistent mapping of Wetlands and Water Bodies.
- **Synergetic use of SAR/optical data** in wetland mapping (multi-sensor approach) High complementarity of optical and radar, also C-, X- and L-band observations.
- Integration of wetland maps in **river basin hydrology** and water balance studies (e.g. water balance modeling in the sahel region).
- Characterization of **wetland seasonality's** (flooding dynamics, separation seasonal from long-term component).
- **WQ in shallow waters** (indicative can be enough, turbidity and alga blooms) => needs for good Atmospheric Correction with S2/L8.
- Comparison **of multi-scale approaches** (careful with the scale of analysis).
- **Combined use of Surface Water Extent, Digital Elevation Model** and **Water Heights** (S3, Jason-3, Jason-CS/Sentinel 6 in preparation of SWOT) in hydrological modeling and Water Balance studies, and relation to ground waters.

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Satellite Data Requirements

- Access to SAR/Optical data in particular during rainy seasons to capture temporally ponds and seasonally flooded areas
- **Sentinel 1**: higher repetition of S1 20m IWS (better every cycle, at least every 2 cycles), in dual polarisation (VV/VH enough?), globally.
- **Sentinel 2**: short ramp-up phase, access to Level 2A (surface reflectances), seamless mosaicking between tiles.
- Access to **Sentinel archive** (not only rolling archive).
- Low-cost access to **commercial satellite data** to complement freely available datasets such as Landsat/Sentinels.
- Needs for **additional data**: precipitation (usually not at the right scale), soil moisture, land surface temperature, drainage networks, river networks, soil types.

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Approaches and tools to meet scientific/societal challenges

- **Large bulk data processing (**freely available Sentinels and Landsat 8**)** => infrastructure to facilitate access and processing of satellite data.
- Provision of **pre-processed data** to reduce data throughput (Level 3 composite? S2 sub-tiles?)
- **Opportunistic approaches** (take what is available to add information)
- Development of **open-source toolboxes** facilitates EO adoption by wetland community.
- Development of **indicators** facilitates EO adoption by decision makers.