# The SDG 6.6.1 reporting workflow

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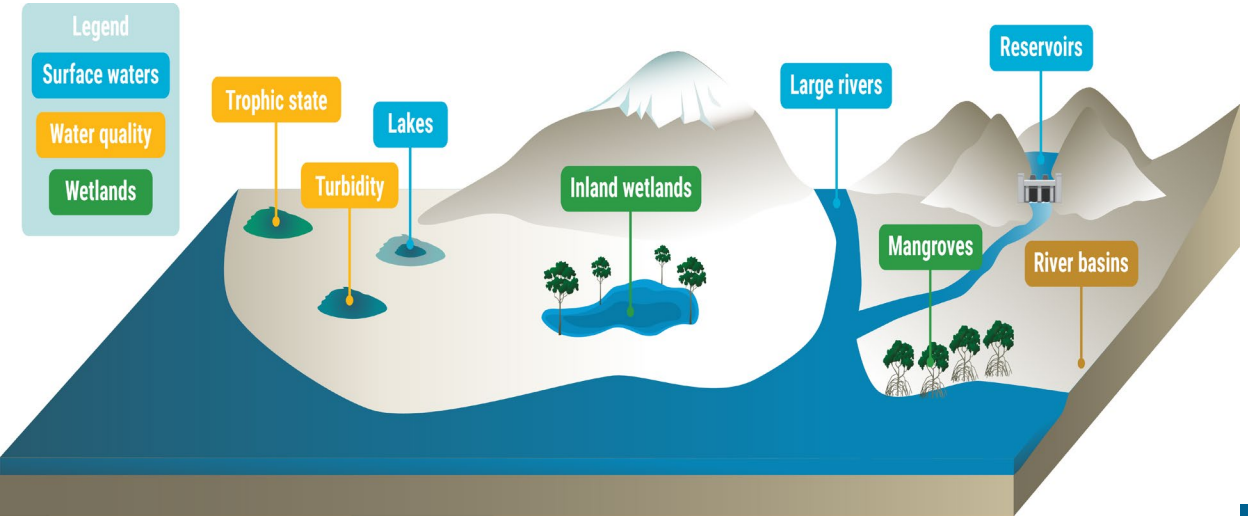
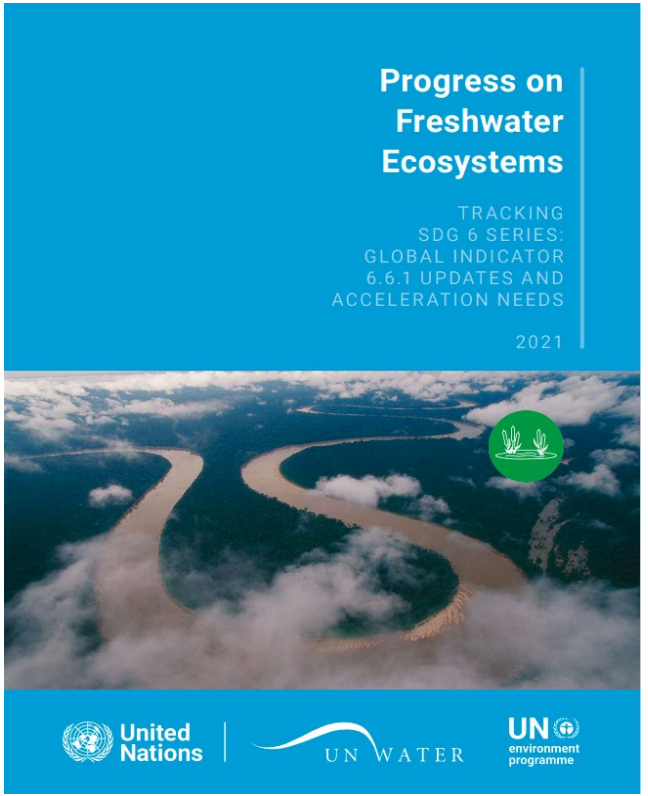
# *SDG Target 6.6 protect and restore freshwater ecosystems*

*Recent Global Freshwater Trends*

- *1 in 5 river basins are currently experiencing rapid changes in available surface water*
- *80% of wetlands are estimated to be lost*
- *1 in 4 large lakes surveyed in 2019 had extreme turbidity conditions*

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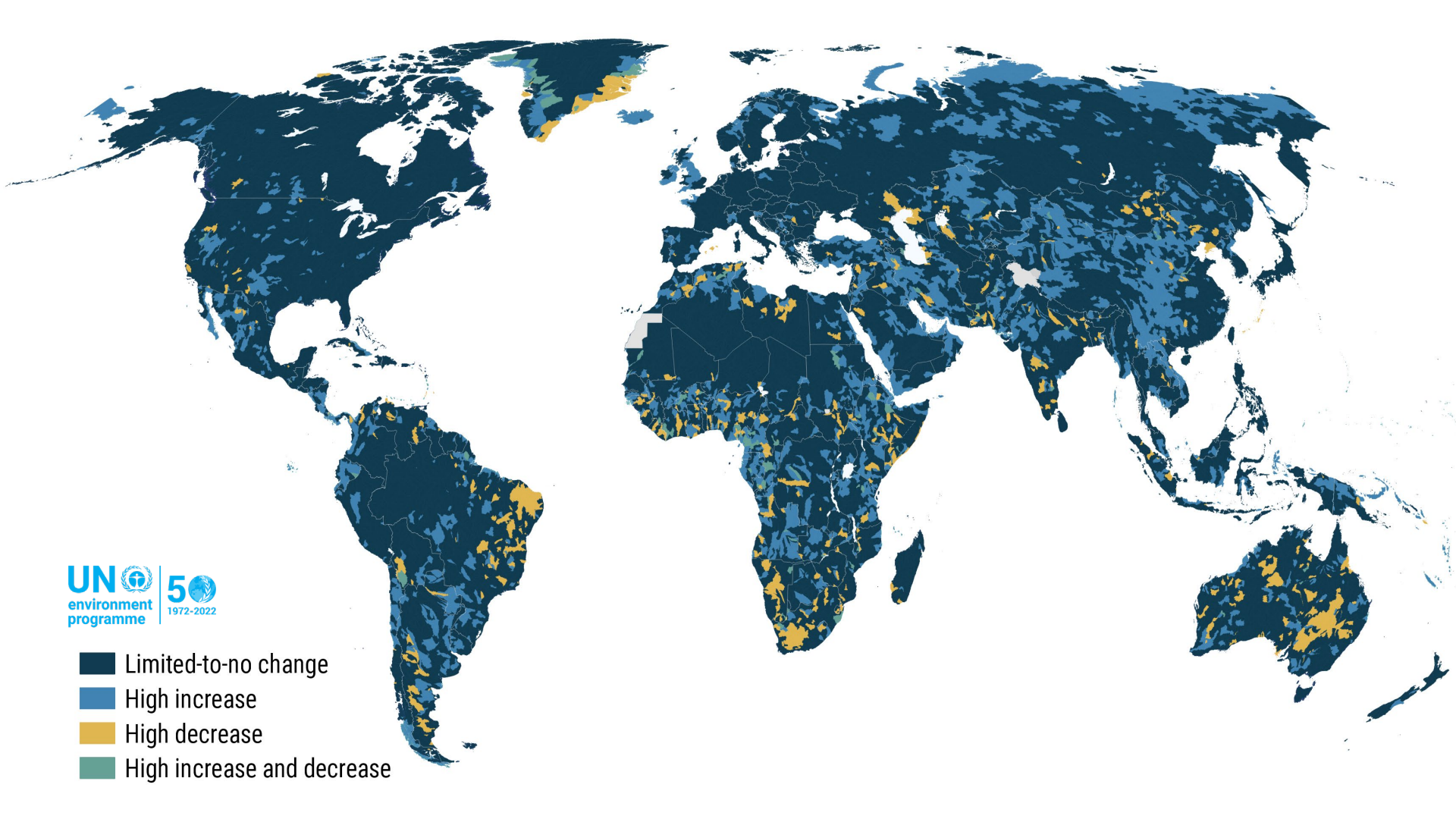
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50
1972-2022
Limited-to-no change
High increase
High decrease
High increase and decrease

## 6.6.1 ECOSYSTEMS

# Turbidity

is the **amount of cloudiness in the water.**

It can be caused by:

- **silt, sand and mud**
- **bacteria and other germs**
- **chemical precipitates**

**High turbidity** is often an indication of **water pollution.**

From a sample of **2,300 lakes,** a **quarter recorded high to extreme turbidity** readings during 2019.

The large volume of **suspended particles** act as **hosts for pollutants** such as **metals** and **bacteria.**

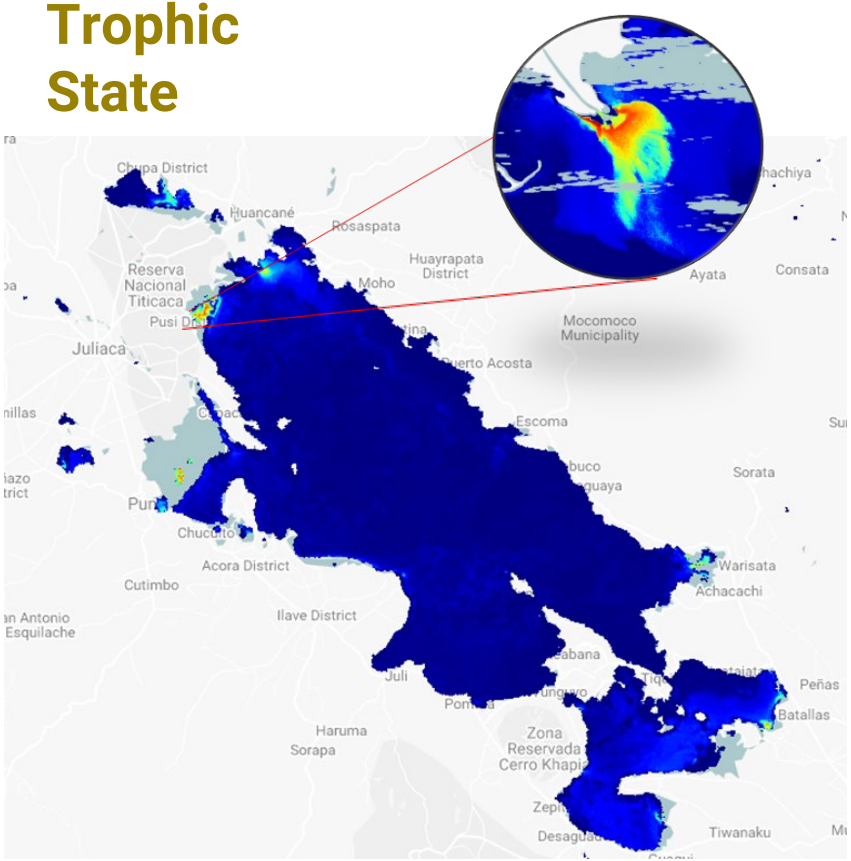
**21 million people** live near these high-turbidity lakes

including

**5 million children**

Lakes with high tubidity can adversely **impact human and ecosystem health** and must be improved to prevent this.

# Trophic State

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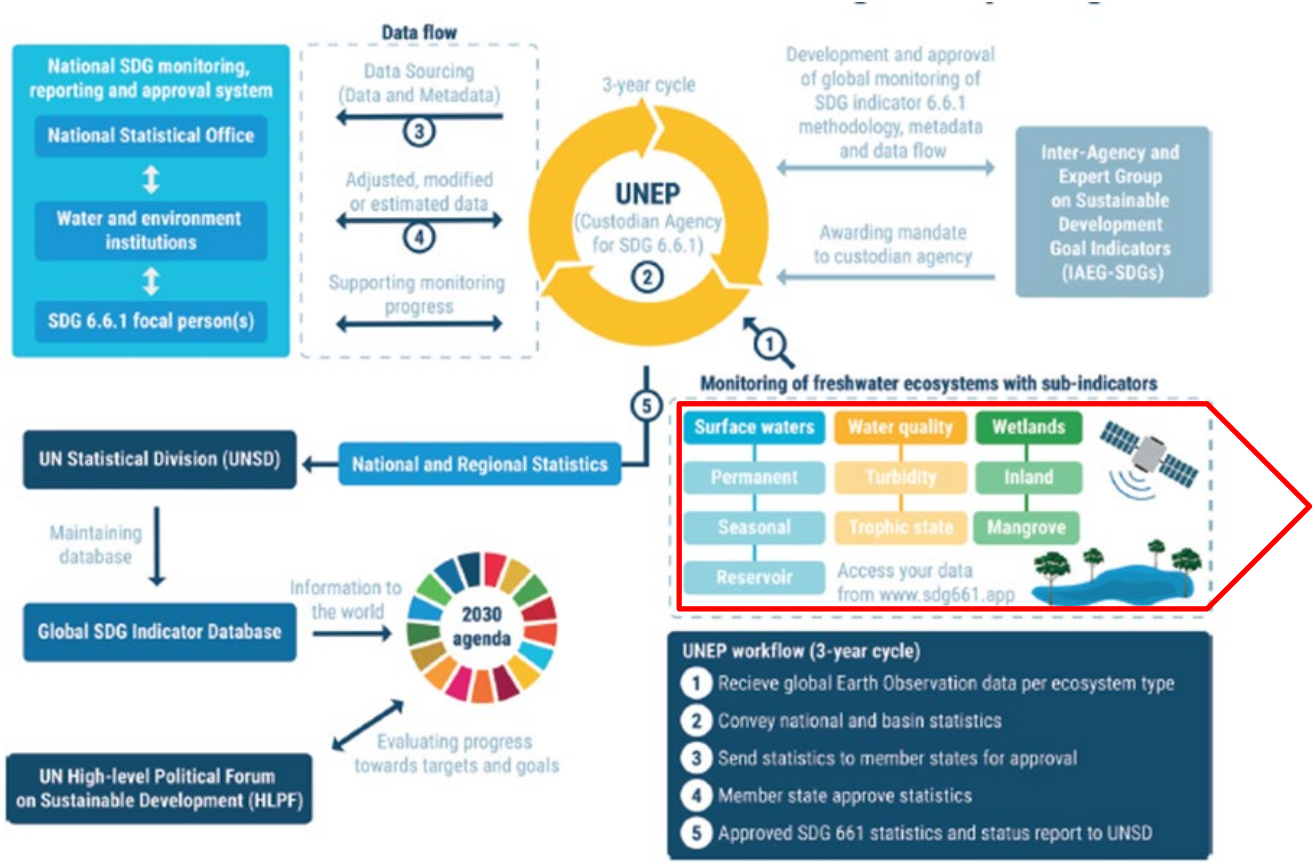
# The SDG data flow




3 sub-indicators, all suited to map and monitor with satellite data

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# 3-sub indicators – different data

| Ecosystem type | Satellite data source | Website |
|---|---|---|
| Permanent, seasonal, reservoir | NASA Landsat (1984–present) | United States Geological Survey (USGS) Earth Explorer (https://earthexplorer.usgs.gov/) |
| Inland vegetated wetlands | European Sentinel-1 (2014–present)<br>European Sentinel-2 (2016–present) | Copernicus.eu (https://www.copernicus.eu/en/access-data) |
| Water quality | European Sentinel-3 (2017–present)<br>European Envisat Medium Resolution Imaging Spectrometer (MERIS) (2002–2012) | Copernicus.eu (https://www.copernicus.eu/en/access-data) |
| Mangroves | Japanese L-Band SAR satellites:<br>JERS-1 SAR (1992–1998)<br>Advanced Land Observing Satellite (ALOS) Phased Array type L-band Synthetic Aperture Radar (PALSAR) (2006–2011)<br>ALOS-2 PALSAR-2 (2014–present) | Jaxa.jp (https://www.eorc.jaxa.jp/ALOS/en/dataset/dataset_index.htm) |

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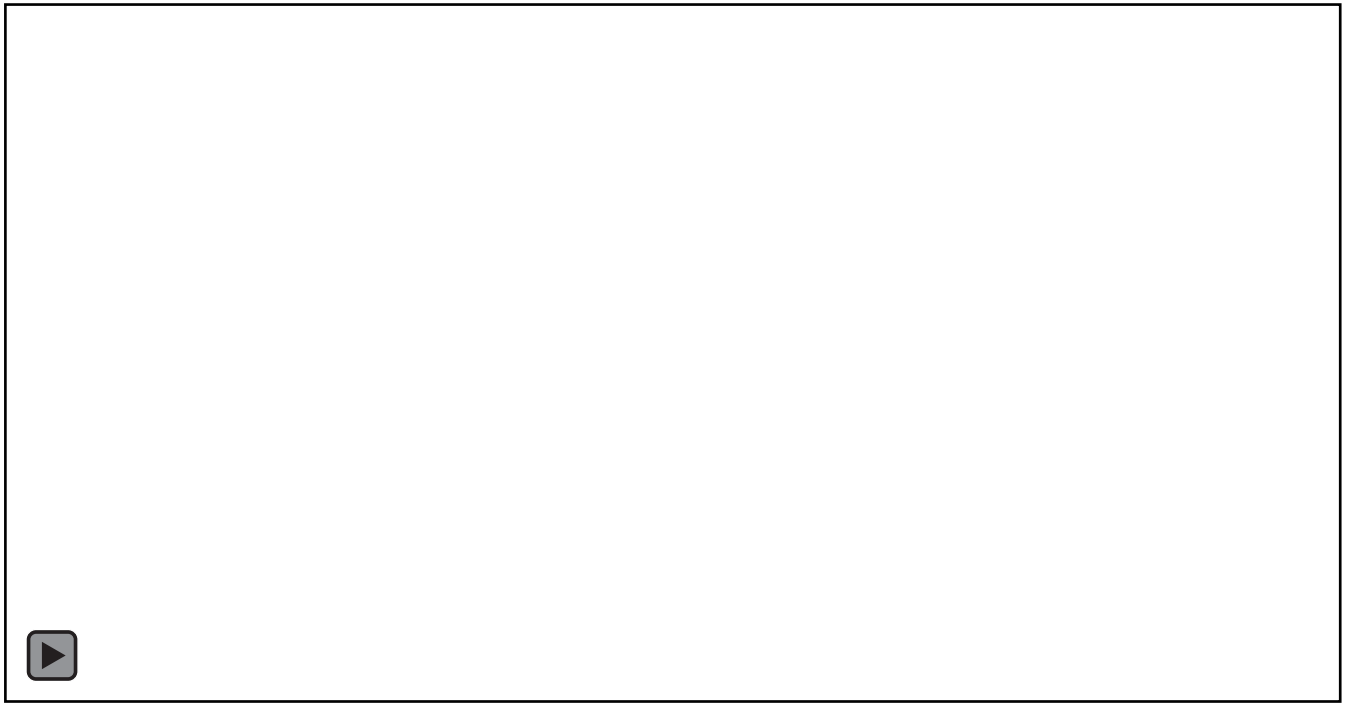
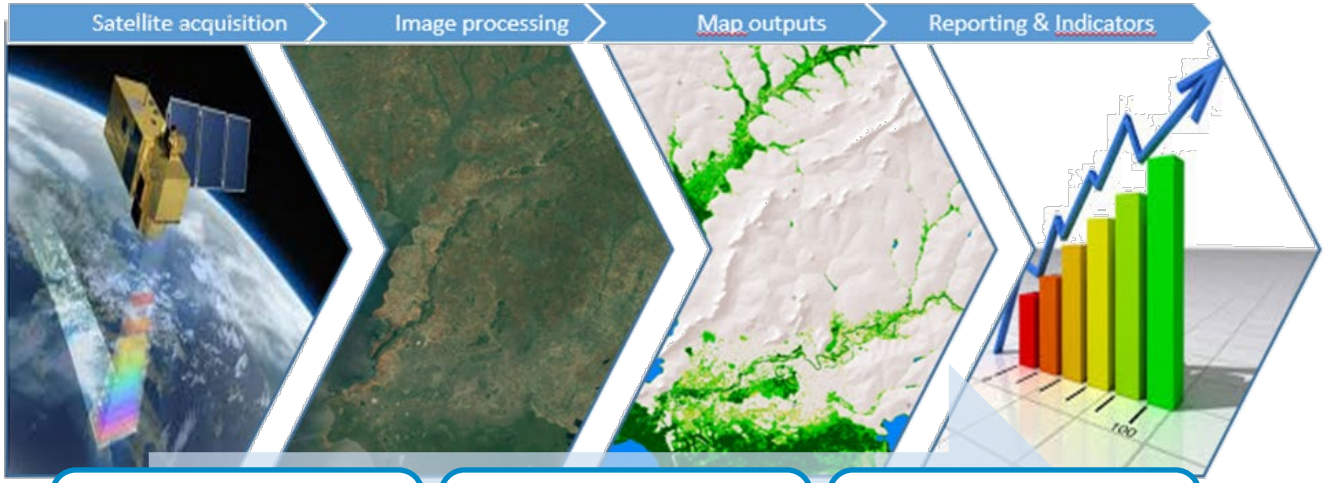
# Example: Sentinel 2 Observation Scenario

- Landsat (every 2-weeks) otherwise similar; several terabytes of data collected each day



# SDG reporting on indicator 6.6.1




Retrieve, manage and process EO data

Produce information products and indicators

Supporting decisions with online reporting and analysis functionality

Google Earth Engine

Provides access to planetrary scale satellite data archives

Joint Research Centre JRC

GLOBAL MANGROVE ALLIANCE

DHI

Information providers

Freshwater Ecosystems Explorer

Leverage the best available science to track, monitor, and improve the health of freshwater ecosystems.

SDG661.app

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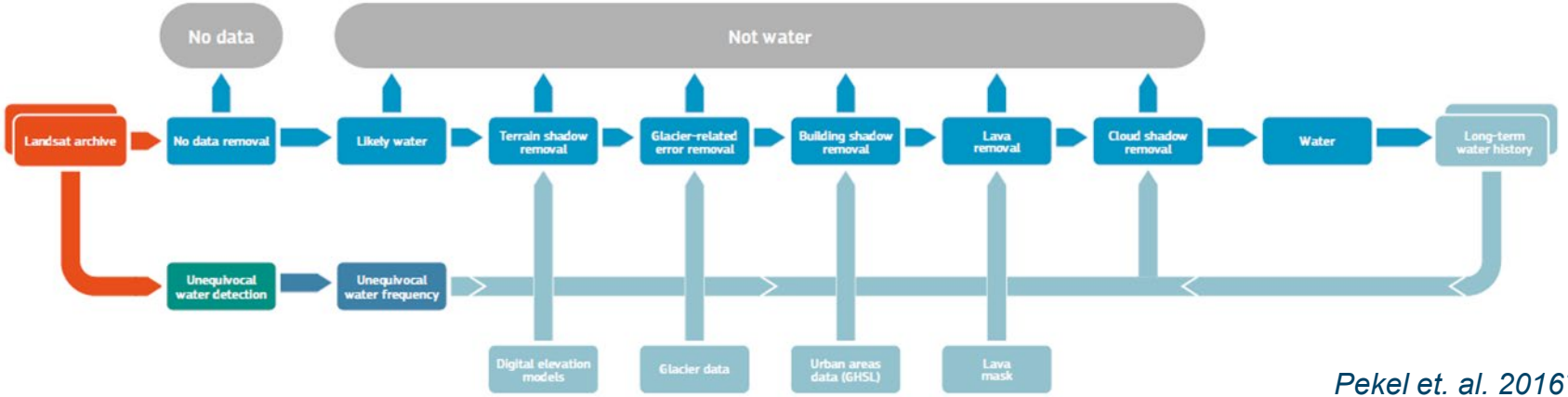
# Example: Expert system for global surface water mapping




*Pekel et. al. 2016**

- Each 30x30 m pixel in 1,823 terabytes of Landsat data was anlaysed

** Pekel, J.F., Cottam, A., Gorelick, N. and Belward, A.S., 2016. High-resolution mapping of global surface water and its long-term changes. Nature, 540(7633), pp.418-422.*

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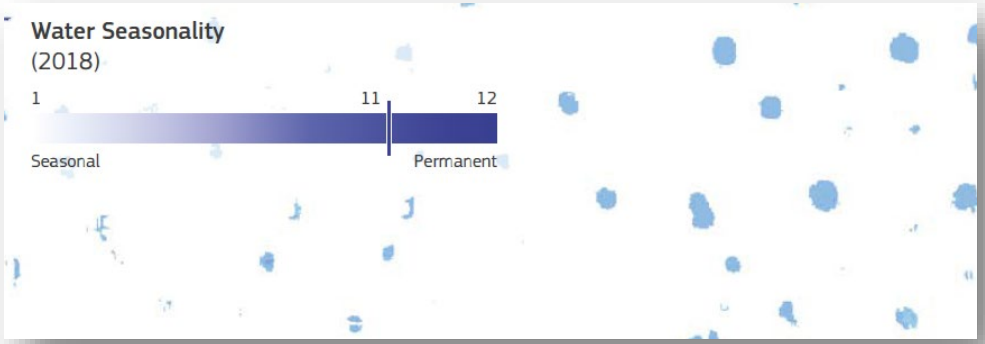
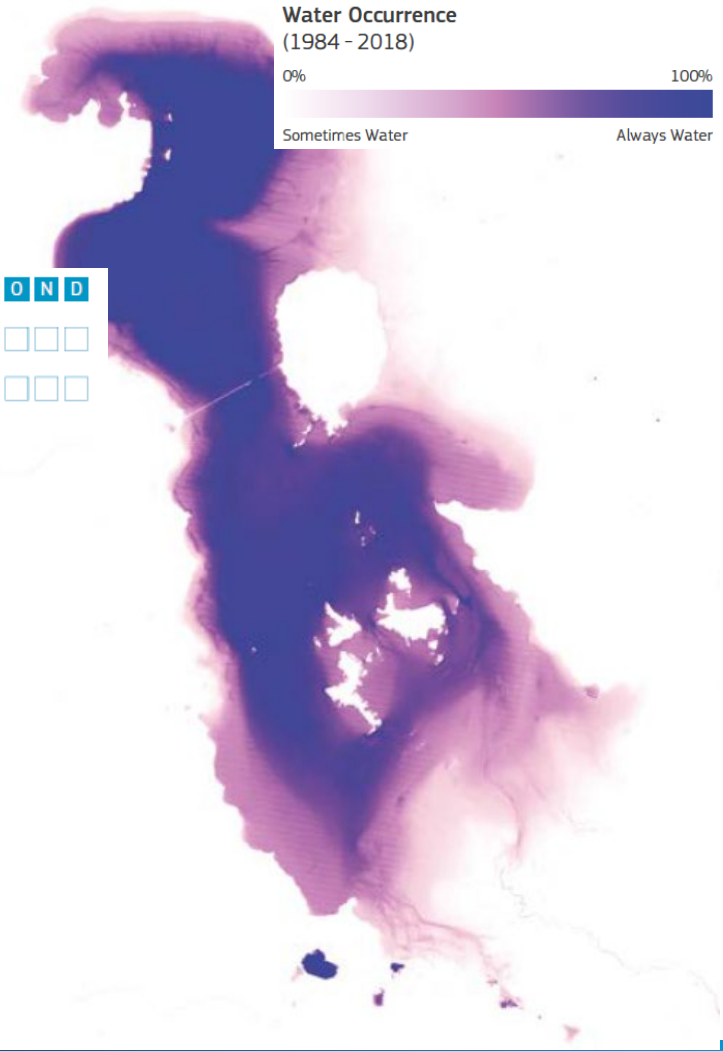
# Surface water

- Sub-indicator definition
  - Permanent
  - Seasonal water
  - Reservoirs (by overlay with GRanD*)

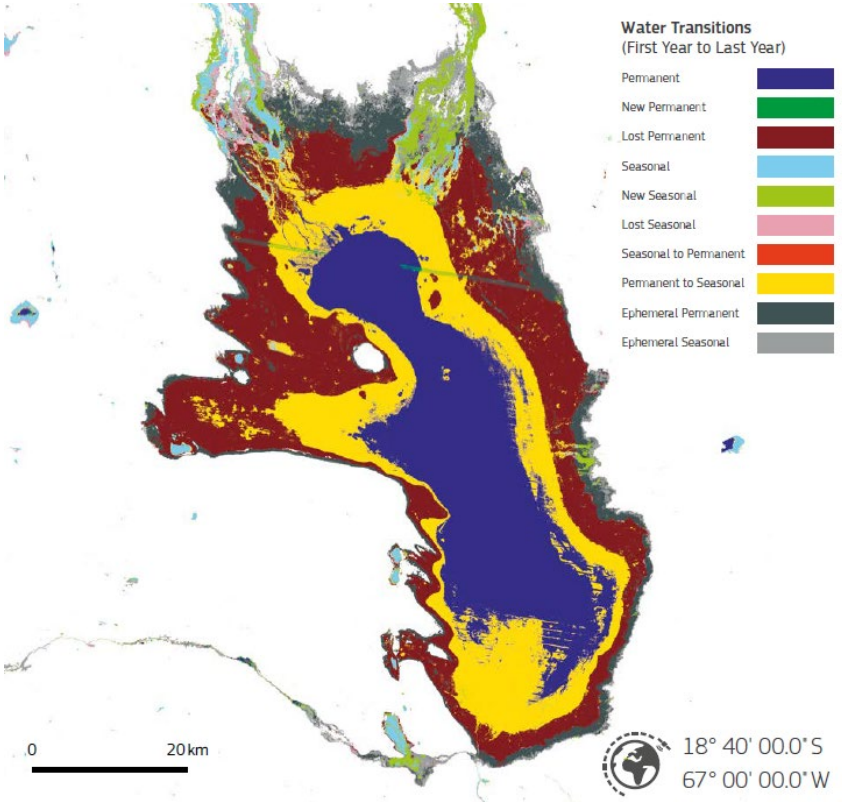




** Global Reservoir and Dam (grand) database*

# Surface water changes

- The data show the total change in extent of permanent and seasonal surface water area, measured against a historical baseline
- This methodology uses 2000-2004 as the 5-year baseline period and to be compared against any subsequent 5-year target period
- Reporting units:
  - Administrative boundaries (Currently using FAO Global Administrative Unit Layers [Admin Level 0,1,2] but will be updated with UN approved data
  - Hydrological basins (WWF HydroBASINS level 6)

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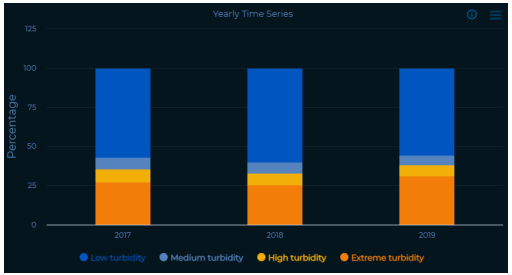
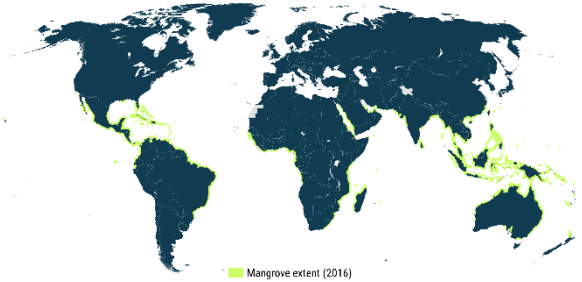
# Similar approach for other sub-indicators

1. Status mapping for reporting (year/period)
2. Access and report change relative to baseline



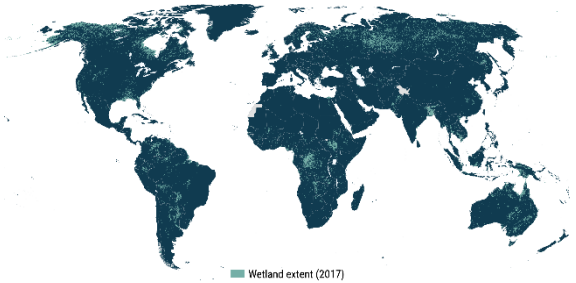

**Water quality**
*(turbidity and trophic state)*

- Reporting year: 2019
- Baseline: 2006-2010




**Mangroves**

- Reporting year: 2016
- Baseline (1996 -> 2000)




**Wetlands**

- Reporting year: 2017
- Currenly no baseline available

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# Country report (example)

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# Brazil

## Lakes and Rivers

| | | |
|---|---|---|
| Permanent water dynamics | -1.48 % | -942.56 Km² |
| Seasonal water dynamics | 9.87 % | 3873.91 Km² |

## Reservoirs

| | | |
|---|---|---|
| Minimum water extent dynamics | 2.02 % | 478.7 Km² |
| Maximum water extent dynamics | 3.48 % | 969.84 Km² |

## Mangroves

| | | |
|---|---|---|
| Mangroves | -3.2 % | 10859.67 Km² |

## Wetlands

| | |
|---|---|
| Wetlands | 214183.41 Km² |

## Water quality

| | | | |
|---|---|---|---|
| Turbidity State | 23 out of 132 lakes affected | 17.42 % | Deviation Percentage |
| Trophic State | 0 out of 132 lakes affected | 0 % | Deviation Percentage |

*Global lakes layer (Click on a lake to display analysis)*

# Brazil

## Lakes and Rivers

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### Water Transitions (1984-2018)

- *Permanent*
- *New Permanent*
- *Lost Permanent*
- *Seasonal*
- *New Seasonal*
- *Lost Seasonal*
- *Seasonal to Permanent*
- *Permanent to Seasonal*

## Reservoirs

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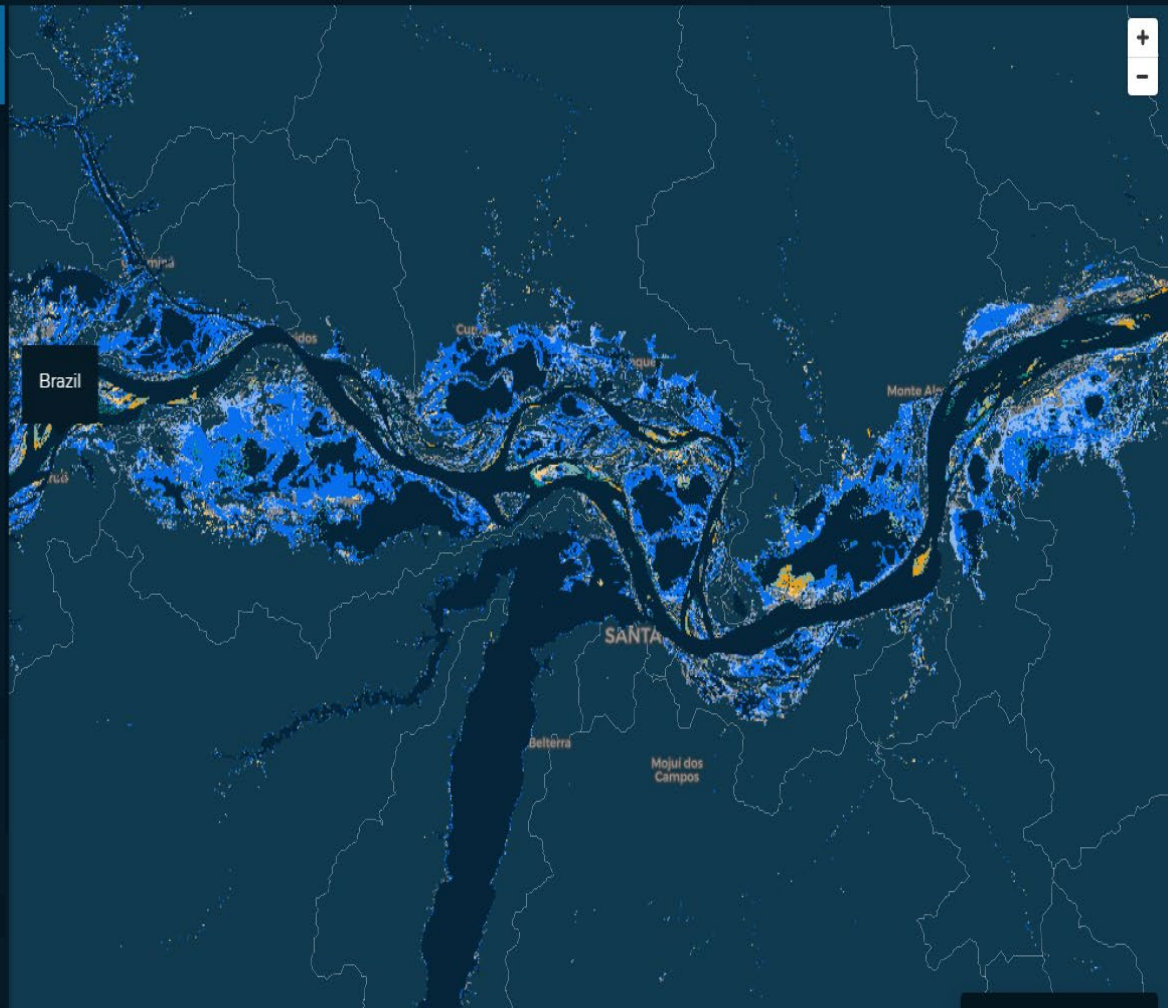

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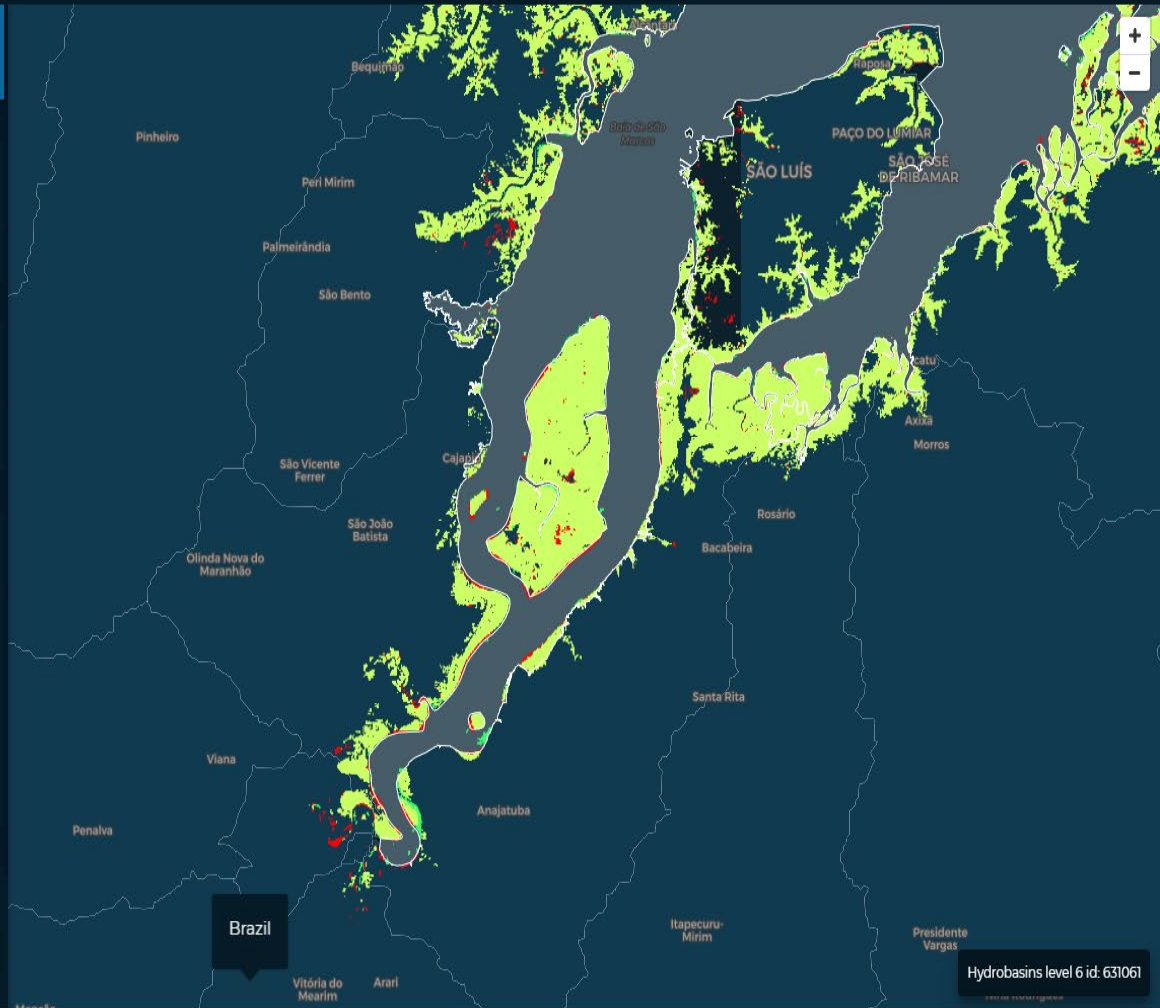
**Mangroves (1996-2016)**

*Mangroves Loss*
*Mangroves Gain*
*Mangroves Stable*

## Wetlands

| | |
|---|---|
| Wetlands | 214183.41 Km² |

## Water quality



# EO integration into SDG implementation

| Global Datasets | Methodological Guidelines | Country Support | Capacity Building | EO Software Toolboxes | Knowledge Hub & Platforms |
|---|---|---|---|---|---|

## Custodian Agencies

- Access to global / regional datasets.
- in the absence of or to complement and enhance, national data sources.
- countries which face major difficulties in collecting national data

- Support custodian agencies to develop method. guidelines to countries.
- EO Best Practices.
- Scientifically sound approaches.
- Product validation.
- Show Cases.

## National Statistical Offices Governments / Agencies

- Targeted activities to support NSOs and line ministries to report on SDG indicators.
- Support country level efforts to apply EO to track, monitor and achieve SDGs.

- Build capacity to exploit EO
- Training courses
- Training material on EO best practices
- Mainly targeted to developing countries
- Critical mass of technical centers

## Key Stakeholders

- Free of charge
- Open source
- Easy to use
- EO Processing Toolboxes
- Thematic Toolboxes

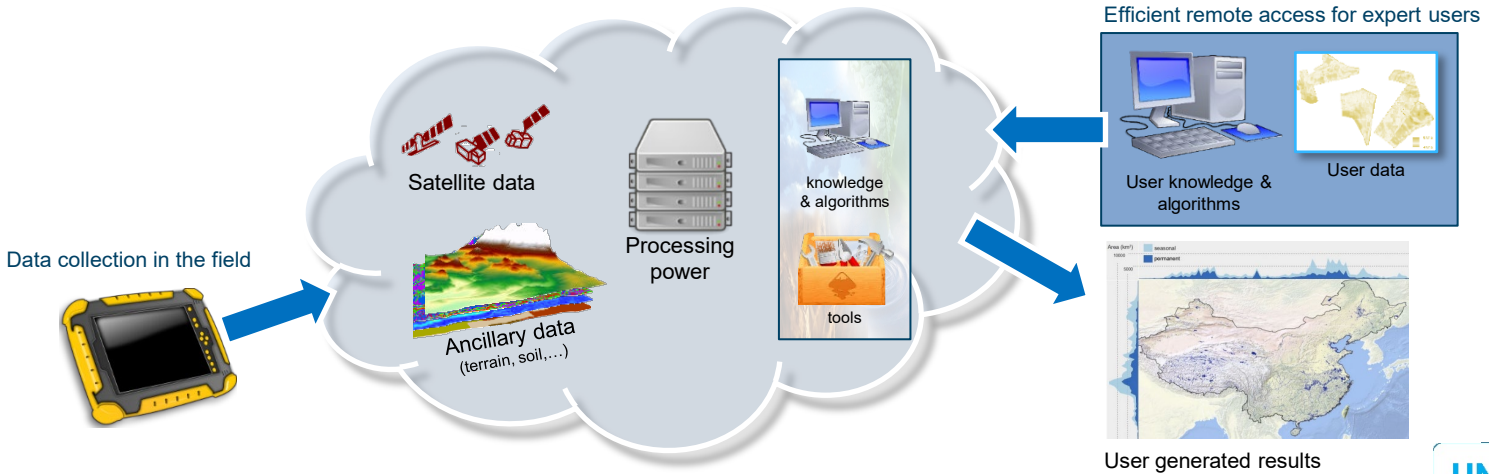
- Knowledge sharing
- Facilitate access to Sentinel data
- Access to global / regional datasets
- EO best practices
- Method. guidelines
- Visualisation and Analysis
- On-line processing
- Toolboxes

# Towards efficient “big data” exploitation platforms

The power of the Cloud
“Bringing the users to the data”

**Big Data challenge:**

The massive size of EO data generated by today´s sensors, in the order of daily Terabytes, means that cost-effective procurement of the computing infrastructure for archiving and processing is needed

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# Thank you

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