

UNESCO/IHA Greenhouse Gas (GHG) Research Project Measurement Questionnaire

In collaboration with UNESCO, IHA is working on a Greenhouse Gas (GHG) Research Project, which aims to improve understanding of the impact of reservoirs on natural GHG emissions. Currently, the main activity of the Project is to develop a measurement specification guidance that will be applied to a representative set of reservoirs.

This questionnaire serves to complete the measurement specification guide with applicable descriptions on methods, equipments, measuring points, etc. Furthermore, we are expecting an overview on average emissions and how to make these comparable.

Section 1:

This section serves for the identification of your reservoir and helps us to understand the findings in their climatic and regional context and make the data comparable.

Reservoir:

Name:	
Country:	
Location (x°N/y°E):	
River/Basin:	
Start of construction:	
End of construction:	
Commissioning date:	

Reservoir Purpose:

<input type="checkbox"/> Hydropower	<input type="checkbox"/> Water Supply
<input type="checkbox"/> Irrigation	<input type="checkbox"/> Flood management
<input type="checkbox"/> other (specify)	<input style="width: 500px;" type="text"/>

From the list below, please chose the climatic zone, which best describes the region of your reservoir (List according to Koeppen-Geiger climate classification):

- | | |
|--|--|
| <input type="checkbox"/> Tropical rain forest climate (Af) | <input type="checkbox"/> Maritime temperate climate/Oceanic climate (Cfb) |
| <input type="checkbox"/> Tropical monsoon climate (Am) | <input type="checkbox"/> Maritime subarctic climate/Sub-polar oceanic climate (Cf) |
| <input type="checkbox"/> Tropical wet and dry or savannah climate (Aw) | <input type="checkbox"/> Hot summer continental climate (Dfa, Dwa, Dsa) |
| <input type="checkbox"/> Dry arid climate (Bw) | <input type="checkbox"/> Hot summer continental climate (Dfa, Dwa, Dsa) |
| <input type="checkbox"/> Semiarid climate (Bs) | <input type="checkbox"/> Warm summer continental climate(Dfb,Dwb,Dsb) |
| <input type="checkbox"/> Mediterranean climate (Cs) | <input type="checkbox"/> Continental subarctic or boreal climate (Dfc,Dwc,Dsc) |
| <input type="checkbox"/> Humid subtropical climate (Cfa Cwa) | <input type="checkbox"/> Continental subarctic climate with severe winters (Dfd,Dwd) |
| | <input type="checkbox"/> Polar climate (Et) |

Topobatymeric information:

Drainage Area (km ²):		<input style="width: 95%;" type="text"/>
Flooded Area (km ²):	Min:	<input style="width: 95%;" type="text"/>
	Max:	<input style="width: 95%;" type="text"/>
	River bed:	<input style="width: 95%;" type="text"/>
Reservoir volume (m ³ x10 ⁶):	Min:	<input style="width: 95%;" type="text"/>
	Max:	<input style="width: 95%;" type="text"/>
Shoreline length (km):		<input style="width: 95%;" type="text"/>

Depth (m):	Annual	Season	
		wet	dry
mean	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>
max	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>	<input style="width: 95%;" type="text"/>

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Contact details of the measuring institution /
department of company:

Start of measurements:	
End of measurements:	
Budget in national currency:	
Budget in USD:	

Section 2:

This section serves to identify which parameters were measured in the reservoirs and it helps us to generalize observations from different regions.

Have you measured any of the following parameters in the reservoir?

	frequency of measurements per year	Min	Max	Mean
Mean Annual Rainfall (mm)				
Mean Long Term Incoming Flow (m ³ /s)				
Mean wind speed (m/s)				
Residence time (in days)				
Current speeds in rivers and streams (m/s)				
Concentrations of organic matter (mg/L)				
Concentrations of nitrogen (mg/L)				
Concentration of phosphorus (mg/L)				
Concentration of iron (mg/L)				
Supply nutrients (mg/L)				
Biomass of plants, algae, bacteria and animals in the reservoir (t/ha)				
Biomass of plants, algae, bacteria and animals in the drawdown zone (t/ha)				
Water temperature (°C)				
Turbidity (NTU - Nephelometric Turbidity Units)				
Total Alkalinity (mg CaCO ₃ /L)				
Conductivity (mS/cm)				
pH-Value				
Carbon in sediments (%)				
DO – Dissolved Oxygen (mg/L)				
BOD – Biochemical Oxygen Demand (mg/L)				
COD – Chemical Oxygen Demand (mg/L)				
TOC – Total Organic Carbon (mg/L)				
DOC – Dissolved Organic Carbon (mg/L)				
DIC – Dissolved Inorganic Carbon (mg/L)				
POC – Particulate Organic Carbon (mg/L)				
other (specify)				

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Please describe the characteristics of the reservoir with regards to the following components!

Stratification

Stability of density stratification in the water

Sediment Load

Reductions in hydrostatic pressure as water is released through reservoir outlets

Increased turbulence downstream of the dam associated with ancillary structures e.g. Weirs

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Section 3:

This section serves to summarize the findings. Please specify the equipment you used, the frequency of emissions that were measured and the quantities you were able to identify.

Which of the following did you measure?

- Pre-impoundment
- Post-impoundment
- Terrestrial
- Aquatic
- Upstream
- Downstream
- Diffusive fluxes (specify method)
- Degassing (specify method)

In case you measured the pre-impoundment emissions at reference sites, please indicate their name and location:

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When were measurements taken in your reservoir and why?

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Which terrestrial measurement systems did you use?

- Incubator
- Eddy-covariance tower
- Chambers
- other (specify)

Which aquatic measurement systems did you use

- Surface floating chamber
- Thin Boundary Layer
- Bubbling
- other (specify)

Why did you use the chosen equipments? Please specify advantages and disadvantages for your reservoir:

Gross measurements of Greenhouse Gases (Grams of GHG per m ² per day (g x m ⁻² d ⁻¹)):	frequency of measurement per year	Min	Max	Mean
Carbon dioxide (CO ₂)				
Methan (CH ₄)				
Nitrous oxide (N ₂ O)				
Other (specify)				

Solids in water (mg/L):	frequency of measurement per year	Min	Max	Mean
Total solids				
Suspended solids				
Dissolved solids				
Other (specify)				

Thank you for taking the time to fill in this questionnaire!