Breakout Group 2 - Indicator Analysis

INDICATOR	DESCRIPTION	POTENTIAL/RANK	METHODOLOGIES	DATA AVAILABILITY	SOURCE
6.3.2	Proportion of bodies of water with good ambient water quality	Significant opportunity for EO/remote sensing technology As support/enhancement of in situ analyses (CATEGORY 2) Possible primary proxy for inaccessible sites	Remote sensing product Algal Pigment Index 1 (API 1) from the for ocean colour products can be effectively validated with *in situ* data	HIGH AVAILABILITY/ consistency/periodicity Potential holdout on processing and interpretation steps	MEdium Resolution Imaging Spectrometer (MERIS) sensor of the European Space Agency GlobeLand 30 (water/wetlands) (2000, 2010, maybe 2015) Copernicus, GEOSS

PARTNERS	TASKS for WGGI	Notes		INDICATOR
WHO, GEO, UNEP, UN-WATER (Coalition), Other partners (e.g. GPSDD)	Look into data sources & methodologies with partners to complement proposed indices	Water quality indices include: a core set of five determinands that inform on major water quality impairments present in many parts of the world: total dissolved solids (TDS); percentage dissolved oxygen (% DO); dissolved inorganic nitrogen (DIN); dissolved inorganic phosphorus (DIP); and Escherichia coli (E. coli). https://www.researchgate.net/publication/268042441_Remote_Sensing_Techniques_to_Assess_Water_Quality	Remote sensing techniques depend on the abil- ity to measure these changes in the spectral signature backscattered from water and relate these measured changes by empirical or analytical models to a water quality parame- ter. The optimal wavelength used to measure a water qual- ity parameter is dependent on the substance being mea- sured, its concentration, and the sensor characteristics. Major factors affecting water quality in water bodies across the landscape are suspended sediments (turbidity), algae (i.e., chlorophylls, carotenoids), chemicals (i.e., nu- trients, pesticides, metals), dissolved organic matter (DOM), thermal releases, aquatic vascular plants, pathogens, and oils. Suspended sediments, algae, DOM, oils, aquatic vascu- lar plants, and thermal releases change the energy spectra of reflected solar and/or	**6.3.2**

Breakout Group 2 - Indicator Analysis

INDICATOR	DESCRIPTION	POTENTIAL/RANK	METHODOLOGIES	DATA AVAILABILITY	SOURCE
6.6.1	Change in the extent of water-related ecosystems over time	Significant opportunity for EO technology, especially highly frequent micro-satellites HIGH priority INDICATOR in ITSELF	See metadata file at http://unstats.un.org/sdgs/files/metadata-compilation/Metadata-Goal-6.pdf		
9.1.1	Proportion of the rural population who live within 2 km of an all-season road	Potential additional use of GI technology and crowd sourcing Combination of GIS/Statistics	Methodology: description of GIS analysis Example (INEGI - Mexico) 1) From a Topographic dataset (scale 1:50,000), paved and unpaved road information is extracted, generating a buffer area of 2 Km from each feature. 2) From the Catalog of Territorial/Land Integration (ITER), localities with 2500 inhabitants or less are extracted. 3) Through a cartographic superposition, localities with 2500 inhabitants or less are selected. 4) The proportion of population between rural localities with access to all weather roads, and total rural localities, is calculated.	High Resolution Population and Digital road data available for most parts of the world Paucity in certain countries/regions Issues with availability at national/local level, particularly on road data	NSOs, Census Mapping & transportationagencies http://www.worldpop.org.uk/ (visualization tool getting data from Global Population Database –best estimates) Terrapop could be good resources for augmenting population/settlement data

Breakout Group 2 - Indicator Analysis

PARTNERS	TASKS for WGGI	Notes		INDICATOR
GEO, UNEP, UN-WATER (Coalition)	Engage with: EO Specialist on Wetlands and freshwater ecosystems GEO Land Cover activity UNGGIM Asia Pacific GEOGLOWS			**6.6.1**
NSOs and NMCAs UNGGIM Google (part of GWG on Big Data for Official Statistics) Society at national/subnational levels (crowdsourcing)	Request/highlight need for definition of "rural population" Propose methodological adjustment for data normalization Propose case studies as examples for countries with different definitions Need for adjustments to account for differences in topography, transportation time and other limits to access Possibility to suggest an accessibility index (accounting for time) to complemet or replace indicator	Adjustments/suggestions by other members Level of geographic disaggregation would vary: e.g. Denmark would go down to geographic address polygon/grid level		**9.1.1**

INDICATOR	DESCRIPTION	POTENTIAL/RANK	METHODOLOGIES	DATA AVAILABILITY	SOURCE
14.1.1	Index of Coastal Eutrophication (ICEP) and Floating Plastic debris Density	Opportunity for EO technology Proxy for inaccessible areas	Remote sensing Sensor array already being run viable method, expectation Sensor arrays (See 6.3.2) Better in freshwater, but adaptable (?) New hyperspectral tools under development (for plastic) Shortwave infrared spectrum Research underway	Remote sensing product Algal Pigment Index 1 (API 1) from the for ocean colour products can be effectively validated with *in situ* data Log10 [Chlorophyll] □ a + b (□Log10G) (3) where a and b are empirical constant derive from in situ measurements and G is [(R2)2/(R1*R3)]. R1 is radiance at 460 nm, R2 is radiance at 490 nm, and R3 is radiance at 520 nm. Using this algorithm, Harding et al. (1995) mapped total chlorophyll content in the Chesapeake Bay (Plate 2).	HIGH AVAILABILITY/ consistency/periodicity Potential holdout on processing and interpretation steps

PARTNERS	TASKS for WGGI	Notes		INDICATOR
MEdium Resolution Imaging Spectrometer (MERIS) sensor of the European Space Agency GlobeLand 30 (water/wetlands) (2000, 2010, maybe 2015) Copernicus, GEOSS	WHO, GEO, UNEP, UN-WATER (Coalition), Other partners (e.g. GPSDD)	Look into data sources & methodologies with partners to complement proposed indices Contact research teams (e.g. Wageningen U) For methodologies/adaptability Potential for extensibility/Industrialisation Remote Sensing Techniques to Assess Water Quality Paul V Zimba Texas A&M University - Corpus Christi Article in Photogrammetric Engineering and Remote Sensing · June 2003 DOI: 10.14358/PERS.69.6.695 http://www.gfz-potsdam.de/en/section/remote-	Monitoring the concentrations of chlorophyll (algal/phyto- plankton) is necessary for managing eutrophication in lakes (Carlson 1977). Remote sensing has been used to mea- sure chlorophyll concentrations spatially and temporally. As with suspended sediment measurements, most remote sensing studies of chlorophyll in water are based on empir- ical relationships between radiance/reflectance in narrow bands or band ratios and chlorophyll. Thus, field data	**14.1.1**

Breakout Group 2 - Indicator Analysis

INDICATOR	DESCRIPTION	POTENTIAL/RANK	METHODOLOGIES	DATA AVAILABILITY	SOURCE
14.2.1	Proportion of national exclusive economic zones managed using ecosystem-based approaches	"Green field indicator" with very minimal current description, clear GI potential Validating administrative/national records Lower priority			
15.3.1	Proportion of land that is degraded over total land area	Significant opportunity for reviewing the use of EO technology and official geospatial data	For refinement/viability analysis, see methodology proposal in metadata document http://unstats.un.org/sdgs/files/metadata-compilation/Metadata-Goal-15.pdf		

PARTNERS	TASKS for WGGI	Notes		INDICATOR
	Need for clarification/definition of what ecosystem-based approaches are in this case			**14.2.1**
	Request GEO for assessment of proposed methodology and data sources	Clear links to indicator 15.4.2 (Tier II) FAO will seek guidance from GI/EO Flagship example of indicator heavily reliant on GI/EO		**15.3.1**