Review of draft monitoring methodologies for SDG 6 global indicators – **Summary of feedback and responses – 6.3.2**

About the review

Between April and November 2016, the draft monitoring methodologies for SDG 6 global indicators were pilot tested at scale in five countries (Jordan, the Netherlands, Peru, Senegal, and Uganda), with the objective to collect feedback on technical feasibility, usefulness for policy making, institutional models for implementation, and capacity requirements.

In addition, between August and October 2016, UN-Water carried out an external review of the draft monitoring methodologies, to collect feedback from country and international experts.

The objective of both of these exercises was to improve the methodologies and inform the process of global rollout of the methodologies starting in 2017.

Below follows a summary of the feedback received for a specific indicator and the response from the indicator's custodian agenc(ies).

Indicator: 6.3.2

Custodian agency/agencies: UNEP

Summary

There was very limited feedback from most of the countries in which the indicator was tested, with the exception of Uganda and Netherlands. However, both Uganda and Senegal attempted to gather existing data and calculate the indicator, which resulted in some specific comments relating to issues with gathering the relevant monitoring data, issues with setting target values and the complexity of the calculation of the indicator (see below). During the pilot testing phase, discussions were also held with additional countries during GEMS/Water workshops and country visits which reinforced some of the issues raised by reviewers. Feedback below incorporates comments from pilot countries and reviewers who specifically addressed the methodology document. Therefore all comments have been arranged according to the sections of the original methodology, together with responses that relate to how these have been addressed in the revised methodology document.

The key revisions to the methodology for the indicator include modification of the core parameter list, according to waterbody type, and removal of the Proximity to Target method of calculation. The revised global indicator includes only the core parameters, although it is suggested countries undertake further monitoring with nationally relevant parameters. These parameters are to be considered separately to the global indicator during the baseline phase (2017), while further consideration is given to whether, and how, to incorporate them into the indicator in future. Greater guidance has been provided on how to select the monitoring network and develop or select target values. A simplified calculation method for the indicator has also been provided and illustrated with an example.

List of sources of feedback

Proof of Concept Countries

Country	Organization	Name
Jordan	none received	
Netherlands	Ministry of Infrastructure and the Environment, Rijkswaterstaat, Deltares, Statistics Netherlands, Informatiehuis water	Marcel van den Berg
Peru	Autoridad Nacional del Agua, Dirección General de Salud Ambiental	Carla Karina López Olivos, Melissa Giuliana Salbatier Portugal, Lorenzo Cubas Parimango, Magaly Guevara
Senegal	Ministere de l'hydraulique et de l'assainissement, Direction de la Gestion et de la Planification Des Ressources en Eau	
Uganda	Ministry of Water and Environment	

UN-WATER Members and Partners and others

Abbreviation	Organization	Name	Position
CEO-WM	UN-Global Compact CEO Water Mandate, Pacific Institute	Tien Shiao, Peter Schulte, Jason Morrison	-
UNCEEA	UNCEEA - United Nations Committee of Experts on Environmental-Economic Accounting	UNCEEA	-
UN-ESCAP	Economic and Social Commission for Asia and the Pacific, Environment Development Division	Aneta Nikolova / Nina Schneider	Environment Affairs Officer / Data and Policy Analyst
UniD'Av	Hydrogeology Laboratory, University of Avignon	Marc Leblanc	Director
WaterLex	WaterLex	Florian Thevenon	Scientific Officer

Feedback and responses

Key feedback received This should include both feedback on the methodology as well as other feedback on institutional processes, capacity, etc.	**Source(s) of feedback** Name of organisations/ individuals/countries	**Response and rationale** How the feedback will be used to revise the methodology or in plans for rollout; in cases where the feedback cannot be used, an explanation of why
1.1 Introduction of the indicator		
"Ambient" needs to be defined better	Netherlands	In introduction ambient described as: *Ambient water quality refers to natural, untreated water in rivers, lakes and groundwaters and represents a combination of natural influences together with the impacts of all anthropogenic activities.*
Link the monitoring process to policy making and emphasise how it can be used to improve local situations	Netherlands	New sentence in introduction: *Over time, or with increased availability of resources, the monitoring programme can be expanded to give a more detailed description of water quality that will provide better information for management and the development of water-related policy.*
Focus more on drivers of water quality in order to support decision-making	Netherlands	The value gained at the national level of implementing national monitoring programmes is outlined in the introduction more fully.
Important to highlight the purpose of the indicator - especially for the business community	CEO WM	The importance of the indicator at global and national levels, in establishing a baseline against which to measure the impacts on water quality is given in the introduction. Additionally, the involvement of the private sector is encouraged by suggesting a national assessment of the existing water quality monitoring capacity. This covers the inclusion of data held by private sector.
Emphasise more the role of sanitation on creating water pollution	CEO WM	The link between 6.3.2 and 6.3.1 is outlined in the second paragraph of the introduction.
The indicator represents a "Pressure" rather than a "State" indicator	UNCEEA	Spot measurements of water quality, as will be largely used in the calculation of this indicator, typically represent the "State" of the water body

Rationale of the indicator needs to be "sellable" to non-technical people	Uganda	Agreed. As part of the GEMI roll out, the indicator will be "repackaged", including versions to be used as "policy primers". This methodology is aimed at the implementation level.
Justify the methodology in the Intro - show how it benefits countries (management for pollution control etc., gaps in current monitoring/knowledge)	Uganda	The introduction has been rewritten to include these suggestions.
Mention organic matter and chemical pollution both relevant - current focus of indicator is selected for domestic wastewater pollution	WaterLex	It is agreed that both chemical pollution and organic matter are important. The team do not agree that the indicator focuses on domestic wastewater pollution. The nutrients included can be derived from agricultural sources as well as domestic wastewater, low dissolved oxygen concentrations result from organic pollution, and electrical conductivity and pH measurements outside normal ranges can be used as proxy measurements for many sources of pollution.
1.2 Target setting for the indicator		
Targets not yet available but will be set in relation to water use	Uganda	Many countries appear to be lacking suitable target values. More advice is given in the revised methodology about how to derive, set or select target values (see below)
Specific recommendation on minimum data requirements for target setting would be helpful	Uganda	This has been included in Section 4.4.1, although it is suggested that more relevant target values can be set with a greater volume of data
Targets for international water bodies should be the same in each country	Uganda	Agreed. Section 4.4 states that efforts should be made to align target values for transboundary waterbodies amongst bordering countries
Water-body specific targets are most appropriate	Uganda	Agreed. In the absence of existing target values or standards, specific guidance is given on generation of target values based on measurements at unimpacted sites; thee can then be used throughout the waterbody. Additionally, a table listing examples of standards used

		in other countries is included in the Annexes
Target values for all five core parameters only available for lakes, for rivers no Nitrogen target values available	Peru	
Countries should set their own targets but understanding of what is good water quality should be the same for all countries	WaterLex	Agreed. This is addressed in Section 1.2 of the methodology
Must countries use the five parameters suggested - even if they are not the most appropriate in their situation	WaterLex	It was felt that prescribing the core parameters was the only way to devise a globally comparable indicator. Certain parameters, for example heavy metals, will be very appropriate for certain impacted waterbodies, but this isn't true globally. Excessive nutrient levels are of global concern in waterbodies, either from agricultural, domestic or industrial sources. EC and pH can be used to characterise waterbodies with measurements outside of normal ranges being indicative of pollution. DO is included as it serves as a measure of organic pollution.
Could countries mix parameters measured in different years - is simultaneous measurement important?	WaterLex	Simultaneous measurement is suggested in line with good practice for water quality monitoring.
2 Proposed monitoring methodology		
2.1 Monitoring concept and definitions		
Construct the indicator using the water emissions accounts system of the SEEA	UNCEEA	The SEEA-Water emission accounts can support the monitoring of target 6.3 with respect to a reduction of pollution and release of hazardous chemicals (outputs) and are embedded in an international statistical framework. However, they are not yet implemented in many countries and do not allow for monitoring the

		effects (outcomes) of measures to improve water quality. The development of water quality accounts is still on-going and requires more methodological work with respect to standardizing the choice of metrics, target values and measurement methodologies but could provide the statistical framework for indicator 6.3.2 in the future.
Water volume is important	UNCEEA	Is covered in 6.6.1 for surface (lentic and lotic) waters and groundwater
Mention that, if EC is not measured, chloride concentrations can be used and converted	Netherlands	T EC) measurement is more straightforward than chloride and is, therefore, the recommended method. This is backed up by experience from GEMS/Water, even in the less developed countries. At individual country level, conversion from chloride values is possible if necessary.
A biological/ecological parameter could be used such as fish	Netherlands	The section on biological monitoring has been expanded in Section 2.3.3. Countries are encouraged to develop their own biological monitoring programmes and the use of vertebrates would prove a useful addition to any programme.
Biological monitoring would be useful but methods would need time for development and validation	Uganda	Agreed. As above the section on biological monitoring has been expanded in Section 2.3.3.
Some parameters not relevant in some water bodies, e.g. DO in groundwater, or due to local conditions	UniD'Av Uganda	Dissolved oxygen has been removed as a core parameter for groundwater due to the complexities involved in collecting and analyzing samples and its lack of relevance for general groundwater quality.
Emphasise that other parameters can be measured e.g. pesticides (more progressive monitoring)	UniD'Av	Table 2.1 now lists all the Progressive monitoring Parameters. Pesticides are included in this table.
No routine collection of faecal coliform bacteria data in national water monitoring	Uganda	Faecal coliforms have been removed from the core parameter list. Monitoring of faecal coliforms is not globally implemented for ambient water quality and are

		usually only monitored if the waterbody is used as a drinking water source or for recreation. They are difficult to monitor accurately and would impose logistical and financial pressures on countries if included as a mandatory core parameter. The lack of f historical data in ambient waters for this parameter in most countries would also make it difficult to develop target values
Methodology is inflexible - it shouldn't specify five core parameters	Uganda	The concept of using core parameters has been maintained to facilitate global comparability.
No chemical parameter in the first step - lack of parameter for industrial pollution	WaterLex	It would be difficult to include a "chemical parameter" which is globally relevant. Furthermore, the parameters chosen in the core list are relatively simple to analyse, unlike many chemical parameters such as heavy metals or hydrocarbons. The intention is to be inclusive for all countries, regardless of the level of development and economic status
Why not let countries choose their own method of measuring organic matter pollution, such as TOC	WaterLex	TOC (Total organic carbon) would be a useful parameter to include but for the indicator to be globally comparable specific parameters are needed in the core list. Countries can choose additional parameters such as TOC in the progressive steps.
Why not N **OR** P - why both?	WaterLex	It is hoped that most countries would be able to measure both N and P because they are important for different reasons and indicative of different pollution sources. The ratio between themcan inform the cause of observed impacts on waterbodies. .
Suggestion to include enteroccoci, PCR/DNA analysis, cyanobacteria and cyanotoxins	WaterLex	These parameters would add value to any monitoring programme, and should be considered in the progressive steps if financial resources and capacity allows.
PTT method, complex and not widely used - perhaps use enrichment factor	WaterLex	It was felt the PTT didn't add enough value to the methodology to warrant inclusion. The PTT (proximity

		to target) method of calculating the indicator has been removed from the methodology
Countries selecting their own target values does not allow comparability between sites, countries etc	WaterLex	The team agree with this point, but it is impossible to generate globally relevant target values for all waterbodies. In the absence of existing target values or standards, specific guidance is given on generation of target values based on measurements at unimpacted sites which should be used throughout the waterbody. Additionally, a table listing examples of standards used in other countries is included in the Annexes
P and N not part of national standards and monitoring programme; standards yet to be defined and parameters to be included in monitoring programme	Peru	Both phosphorus and nitrogen are included as core parameters. It is encouraged that countries include them in their monitoring programmes as Peru are planning to do.
There is a mismatch between the definition of good water quality to protect both aquatic ecosystems and human health and the national classification of water bodies which is based on different use classes.	Peru	The approach to classify water bodies by use and derive specific national target values for different uses is applied in many countries. If there are no waterbody specific target values available, countries are encouraged to apply the national target values they deem appropriate to protect both aquatic ecosystems and human health
2.2 Recommendations on spatial and temporal coverage		
More guidance needed on density of monitoring stations	Netherlands	Greater detail has been included on how to delineate surface waterbodies, and it is recommended that at least one monitoring location is used per waterbody, although more than one is advised. The methodology is deliberately not too prescriptive regarding the necessary density of monitoring locations because this has resource implications for countries. Further guidance will be provided in the planned accompanying technical document.
Annual measurement and reporting is most appropriate	Netherlands	A reporting period isn't specified in the methodology, although in the example (Section 5), data from one year

		is used.
Ensure sampling regime takes account of extreme climate events	UniD'Av	It is specified that countries should record hydrological conditions during monitoring.
Budget and funding do not allow regular collection of data - max twice but usually once a year for monitoring. Sites will have to be selected for inclusion	Uganda	Financial resources will be an issue for many countries. Hopefully as part of the SDG process the rewards from making evidence-based decisions, and the value of having a robust and reliable water quality monitoring programme will result in increased and more continuous funding being made available.
Three year reporting of indicator would be not be too onerous for country	Uganda	As above - A reporting period isn't specified in the methodology, although in the example (Section 5), data from one year is used.
Precision not achievable if sampling is only once a season	WaterLex	The team agree with this point, but the reality is that many countries cannot achieve more frequent sampling due to resource issues
Bi-annual monitoring in dry and wet seasons; 125 out of 159 hydrographic units are being monitored based on the National Protocol for Water Quality Monitoring including headwaters, upstream and downstream of pollution sources, lakes and reservoirs	Peru	
2.3 Steps for progressive monitoring		
Mention that the DPSI framework - more useful for sustainability	Netherlands	This indicator produces information that feeds into the DPSI framework
Chemical pollutants should be monitored as part of the first step	WaterLex	As above - It would be difficult to include a "chemical parameter" which is globally relevant. Each country will have specific parameters which are nationally relevant. Furthermore, the parameters chosen in the core list are relatively simple to analyse, unlike; this is not the case for many chemical parameters such as heavy metals or hydrocarbons. The intention is to be inclusive for all countries, regardless of the level of development and

		economic status
Add new column to Table 2 giving the context for including the given parameters, e.g. agriculture, sewage, etc.	WaterLex	The reason for parameter inclusion is covered in Section 2.3.1
3.1 Data requirements to compute the indicator		
Check text agrees with Table 6	WaterLex	Rewritten and now agrees
Add heavy metals to core parameters in Table 3	WaterLex	As above – Heavy metals are not relevant for all waterbodies in a country and to include them as a core parameter would be to impose an unnecessary financial pressure on countries
3.2 Sources of data – short and long term		
Data can be collected from existing reporting but may be gathered from different institutions	Netherlands	Included in Section 4.1 an assessment of the existing national capacity is advised. This may reveal sources of data held in institutions outside of the monitoring authority.
Other institutions, e.g. research institutes may also have data available for specific parameters	Uganda	As above
Delete reference to Secchi disk - not widely used and imprecise	WaterLex	Transparency has been included in the Progressive Monitoring Parameters for lakes. The Secchi disk is a useful measure of this parameter and is simple to use and is applicable in developed and less developed countries. However, it hasn't been specified in the methodology.
3.3 Recommendations on data management		
No current link with National Statistics Office for ambient water quality data	Uganda	It is encouraged that countries establish links with statistical offices as early as possible in the process
Data Sharing agreements will be needed if raw data provided	Uganda	Agreed. Needs to be clarified with Custodian Agency
3.3.1 Add store FCB samples at T degrees	WaterLex	Not necessary because no longer recommended in the methodology

3.3.1 Replace with "Sample blanks **must** be used"	WaterLex	*"Sample blanks **can** be used"* is maintained because the methodology advises countries on best practice rather than instructs.
3.3.2 Standard deviation should be reported	WaterLex	Can be reported with metadata on analytical methods used
3.3.3 Add Reference to Standard Methods to reference list. Could add alternative definition of limit of detection	WaterLex	Reference included; Rice, E.W., Baird, R.B., Eaton, A.D. and Clesceri, L.S. [Eds] 2012 Standard Methods for the Examination of Water and Wastewater.22nd Edition. American Public Health Association., American Water Works Association., Water Environment Federation. Available at: https://www.standardmethods.org/
4.1 Step 1 Categorisation of water bodies		
4.2 Step 2 Delineation of water bodies		
Clarify delineation of water bodies - more detail and references needed	WaterLex	More detail on the delineation of waterbodies is included in Section 4.2.1
4.3 Step 3 Selection of target values		
Suggest have a range of values for targets to allow for natural variation	WaterLex	Ranges have been included for certain parameters
Table 4 - why not use WHO guidelines for FCB	WaterLex	Faecal coliforms have been removed from the core parameter list
Table 4 CFU - what is it?	WaterLex	As above - Faecal coliforms have been removed from the core parameter list. But this is the standard reporting unit for FCB and *E.coli* with filtration method
The grading system does not take into account the state of water quality related to the parent rock.	Senegal	Countries are encouraged to set their own target values. This has been emphasised in the revision
4.4 Step 4 Classification of water quality at site level		
PTT method required too much data	Uganda	The PTT (proximity to target) method has been dropped

4.4.1 Suggest mean of each parameter for each station and water body	WaterLex	See section 5.1
4.4.2 Very complex - why not use an enrichment factor?	WaterLex	The PTT (proximity to target) method has been dropped
4.4.2 What is winsorisation?	WaterLex	The PTT (proximity to target) method has been dropped
4.5 Step 5 Aggregation		
The indicator calculation system does not take into account the weighting between waterbody and aquifer and at the level of the aquifers between the different aquifers.	Senegal	Weighting is not applied to different waterbodies, nor to parameters in the aggregation. There will be differences in the significance of the core parameters between the national and global level.
5 Example		
5.1 Simplified method		
Table 6 Better to use mean for each parameter for each station	WaterLex	Rather than the mean of recorded values, the proportion of times that any given measurement meets targets is proposed.
5.2 Proximity-to-target method		
6 References		