Report
Integrated Monitoring for SDG 6 (GEMI) Work in Progress Workshop

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Delft

Content

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The report is meant as a working document for internal use, and as such is only meant for the participants.

This workshop was organised by the Netherlands Ministry of Infrastructure and the Environment, with the support of the Netherlands IHP-HWRP Committee, the German IHP-HWRP Committee, and UNESCO-IHE:

Ministry of Infrastructure and the Environment

NETHERLANDS NATIONAL IHP-HWRP COMMITTEE

United Nations Educational, Scientific and Cultural Organization

International Centre for Water Resources and Global Change under the auspices of UNESCO

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Summary

From 7 to 9 September 2016, the Netherlands hosted a Work in Progress Workshop to discuss the monitoring process of the Water SDGs in the framework of GEMI. The aim of the meeting was to discuss (1) whether the Proof of Concept process is on track, (2) share feedback and discuss the proposed methods and indicators, and (3) identify which additional actions need to be undertaken in the context of the Proof of Concept activities. The workshop also provided a good occasion for the Proof of Concept countries present to exchange pilot country experiences and share updates on the national processes and data that is already being gathered. The workshop provided a platform where both GEMI and POC representatives could discuss struggles as well as opportunities in an open manner.

Present at the workshop were the Dutch indicator coordinators, representatives of GEMI-Target Teams from UN organisations, key representatives of all Proof of Concept countries and experts from the Netherlands and abroad. The workshop was organised by the Netherlands Ministry of Infrastructure and Environment, supported by the Netherlands IHP-HWRP Committee, the German IHP-HWRP Committee, and UNESCO-IHE. The GEMI team of UN Water and UNESCO-IHP as liaison of the Netherlands for GEMI provided input in the design of the programme.

On the first day the SDG indicators 6.3.1, 6.3.2, 6.4.1, 6.4.2, 6.5.1, 6.5.2, 6.6.1, and indicators in target 11.5 were discussed separately during break-out sessions. Although 11.5 is not part of GEMI, the Netherlands takes special interest in this target since it deals with water-related disasters, and was therefore also discussed in the workshop. These sessions resulted in detailed feedback on the proposed methodologies for each GEMI indicator, including insights in the struggles and achievements of the separate Proof of Concept countries concerning these indicators. For some indicators additional data was discussed that could be suitable for the ladder approach.

During the second day, insights were gained in the lessons learned during the GEMI Proof of Concept implementation process from the perspective of Peru, Uganda, Senegal, the Netherlands and Jordan. How well could they relate to the challenges heard from colleagues; which specific challenges did they need to have clarified or did they see in the future; what role could they as Proof of Concept Countries play in the region?

Time was then dedicated to discuss how the experiences of the POC countries can benefit the further implementation of GEMI. These questions were; how do you make monitoring for SDG6 useful for policy; how do you build intersectional communication and what institutional arrangements are set up to facilitate this; what kind of technical support would be needed for base line reporting; and how do we get political support from countries for monitoring SDG6?

Eventually, all data provided, including data from SDG6, needs to be disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts. This was discussed by members of UN WWAP, GEMI, and Netherlands Statistical Bureau. The discussion was especially relevant since gender disaggregation is only explicitly mentioned in indicator 6.5.1, and options are not clear on how to implement it into the other indicators.

The last day was used to discuss and define next steps for GEMI and the Proof of Concept countries. This was done in groups separated by country, where follow up steps were defined for the next month until upcoming year. The presentation on the SDG synthesis report resulted in a lively discussion which showed the importance of a well-balanced and useful report, even though the process has just started.

Some main messages and remarks were mentioned several times during the workshop and are thus important to highlight:

- First of all, the indicators were often stated to be UN indicators, while they have been decided upon globally. It was requested to start talking about we, and stop using them and us.
- A general conclusion was that SDG data need to support policy and operations at a country level otherwise collecting the data is a waste of time. The way that it is used needs to be worked out at a country level however. ‘Not collecting data for data, but data for policy’.
- It was stressed that the SDGs are not management tools, but management tools will grow from them at a country level.
- Reporting was another point of discussion, which showed the problem of not knowing how often to report in what fashion.

- The methodologies furthermore showed some terminology issues, which showed that they were not universally understood and that clear definitions are needed.
- A discussion started on including innovations and testing new technologies. Certainly not everybody agreed, mentioning that it should be kept in mind that validation is not the goal of the SDGs.
- Remote sensing as a source of data was regularly proposed, and often the question arose whether to offer the possibility for countries to use it, or add it to the data delivered by the countries to the UN.
- It was also remarked that the indicators give little feedback to policy makers on how to adjust policies and activities. This needs to be adjusted in the methodologies.
- Finally, it was mentioned and agreed upon that integration of the indicators under SDG 6 is key.

At the end of the workshop, the participants were invited to define their three most important messages from the GEMI workshop. These are demonstrated on page 31 of this report.

Introduction

Water is at the core of sustainable development and sustainable management of freshwater and sanitation are vital elements of the 2030 Agenda. Next to the global governance that enhances implementation, monitoring is another crucial element to support the implementation. Now the Global ambition has been set, national action by member states is needed on the monitoring, to produce information that responds to their needs and really helps them to secure sustainable development.

In the past months, experts and policymakers from the GEMI proof of concept (POC) countries have been busy, testing, reflecting and contributing to new Water SDG indicators and proposed monitoring methods in close cooperation with the GEMI-team.

From 7 to 9 September 2016, five GEMI proof of concept countries and UN representatives of GEMI came together in the Netherlands to exchange pilot country experiences, updates on the national processes, and feedback on the monitoring methods. The workshop provided a platform where both GEMI and POC representatives shared feedback, results and conclusions, learned and identified together which additional actions need to be undertaken, so all countries can benefit from these Proof of Concept activities.

The workshop was hosted by UNESCO-IHE, as a natural home for water expertise, housing students and staff from around the world bringing their own local water challenges and collectively discovering solutions.

This report gives an overview of the discussed experiences, updates on national processes, and feedback on monitoring methods. The report aims to be a working document for internal use, and as such summarizes all discussion groups and panels separately in order to fully consider all outcomes.

The report furthermore documents the internal discussions in the Netherlands previous to the Workshop, which have been used as input for the break-out sessions on the different water SDG indicators. Presentations given during the Workshop have been added as Appendices, in order to give a full overview.

The Appendices demonstrate the input provided during the break-out sessions, presentations (where a Dropbox-link can be found which redirects to the files), some pictures taken during the workshop, focal points for the different SDG6 indicators in the UN and the Netherlands, and a final list of attendees including interested followers.





Break-out sessions

For each indicator, a break-out session was organised of almost two hours. In this session, Dutch representatives provided insight in the preparatory discussions that were organised with Dutch experts to analyse each indicator. Representatives of Senegal, Uganda, Peru and Jordan divided themselves over the sessions, and provided their feedback and insights in their experiences, after which the UN representatives reacted. The outcomes of these discussions are given below. Participants for the break-out sessions can be found in the Final list of attendees outlined in Annex 4. Dutch coordinators of these sessions can be found in Annex 4.

Overviews of the outcomes of the Dutch preparatory meetings can be found in Annex 5.

The sessions were conducted following guiding questions, to ensure all questions from GEMI-partners were answered and PoC country experiences were discussed. The questions covered:

- **Methodology:** the clarity and usefulness of the step-by-step guide
- **Feasibility:** Is applying the methodology feasible? (Was the data already available, and if not, can it be measured without heavy investments of time and funding?
- **Applicability:** Is applying the methodology useful? (Do you measure what you want to measure?)
- **Effectiveness:** Can the indicator be measured in a more effective, efficient and low-cost way?
- **Ladder approach:** Can opportunities to apply the ladder approach be identified? Which extra relevant data can be gathered/is already gathered?
- **Indicator:** Should the indicator be adapted during the implementation period of the SDGs, and can already advised how the indicator might be adapted during the implementation phase of the SDGs?

In the text below, we will indicate which part of the discussions link to the guiding questions. There where they are not mentioned, the questions were not discussed.
Where it was discussed, we highlight the experiences of different countries.

Target 6.3 Water quality and waste water

By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.

This workshop provided a first moment where indicator 6.3.1 and 6.3.2 were discussed with a larger group of Dutch experts. The discussions summarised below reflect opinions of both Dutch and international experts.

Indicator 6.3.1 Percentage of wastewater safely treated

The discussion on the percentage of wastewater safely treated focused on fine-tuning the methodology. There was no discussion on the indicator proposed or the opportunities to apply the ladder approach as this approach is integrated in the methodology.

Methodology:

- Semantics: What is de definition of hazardous or safely treated? It was mentioned that at global level, the discussion on what 'safely treated' means should be raised, but the reality is that there are different standards for each country. This can be part of the monitoring ladder: there will be different standards for different parts of development.

Feasibility:

- The Dutch feedback on the monitoring of wastewater focused on water from households and wastewater stemming from economic activities. The Central Bureau of Statistics can provide the figures requested by the WHO and UN Habitat and for the Netherlands we end up with 100% of wastewater safely treated.
- Several questions arose on the implementation and how to ensure all countries can provide the data requested.

Applicability:

- How to incorporate information on leakages of wastewater in the methodology?
- For policy makers, it is important to know what the source of pollution is. For this end, it was requested if it is possible to differentiate between sewage from households and industry. WHO has a methodology on this and will share the spreadsheet.

Effectiveness:

- What is the availability of statistics? Is data gathered on an annual, or multi-annual basis and which spatial scale will be covered? What is useful, what is manageable in terms of costs and other resources.

The time in the workshop was also used by the WHO to gain insights in national policies in the Netherlands and Senegal on waste water, to check if the monitoring methodology provides a good fit with the local reality.

Indicator 6.3.2 Proportion of bodies of water with good ambient water quality

The discussions on measuring indicator 6.3.2 focused on feasibility and which possibilities exist to include other sub-indicators to define the water quality.

Feasibility:

- The Netherlands felt that, due to the reporting requirements for the European Water Framework Directive, indicator 6.3.2 would not be difficult. Reference conditions have already been defined for different water bodies and the core parameters recommended in 6.3.2 are easy to monitor. The same situation is likely to apply to all countries of the European Union.
- One issue for the Netherlands is that currently the data for this indicator are not held in the national statistics database, but are only present in authorized (nationally and regionally) and public databases.
- Peru reported that information already exists for the core parameters, especially if data are collected from various water sectors.
- The likely difficulty for small island states was raised as many do not currently measure the core parameters.

- Senegal has decided to select only two water bodies to test this indicator. These water bodies are important because they supply most of the water used within the country. They anticipate to be able to report the core parameters every two years and to add additional parameters such as metals every five years. A baseline value for the indicator will be produced.
- Uganda reported that chemical and biological parameters are already monitoring and that the data exist. A data collection framework is also in place. The main constraints for Uganda with respect to this indicator are capacity issues, specifically human resources, tools and systems.

Applicability:

- It was felt that more guidance was needed on the density of monitoring stations in the step by step guide. The possibility of adding a weighting to stations in the calculation was suggested but this could lead to political issues. The need for translation of the methodologies into other languages was stressed by Peru.

Ladder approach:

- The application of the indicator to groundwater was briefly raised. Senegal is including groundwater in their national monitoring but many of the monitoring stations are currently not functioning. Groundwater is difficult because there are many other organisations involved, such as the private water sector. Groundwater bodies have been delineated but additional resources are needed to increase the monitoring.

Indicator:

- The Dutch experts propose to improve the indicator by including ecological parameters. These offer better integration of environmental conditions and a good indication of water body functioning. There was a discussion about the potential inclusion of biological methods. Uganda agreed that some species, such as fish could be useful as surrogate indicators for water quality because they are easily monitored. In many countries fish catch data are already available. Peru felt quite strongly that it can be difficult to link biological monitoring to water quality in some situations. There was no overall consensus. The Netherlands provide some concrete arguments and possibilities for the use of fish as indicator (see Annex 6, a memo from Deltares, 2016).
- For the indicator to be of use to Peru, some country specific parameters such as heavy metals would be beneficial, especially in a regional context within Peru.

A big challenge for many countries will be the setting of “target values” because few countries have these for ambient water quality. Senegal does not have target values but Peru has some objectives for water quality through their national “norms” which are optimum ranges for some physical, chemical and microbiological parameters. Currently Peru is struggling with a wide range of pollutants entering rivers and they plan to prioritise certain water bodies to address the current water crisis. The need for good environmental law to facilitate ‘sustainability’ in the decision making process is discussed e.g. the role of regulations to control discharges, or assessment of new developments (e.g.. hydropower).

Target 6.4 Water use and scarcity

"By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity"

The Netherlands had held two internal workshops on indicators 6.4.1 and 6.4.2. For more information on the results of these workshops, see Annex 5. The following discussion built on these results.

Indicator 6.4.1 Change in water use efficiency over time

This was a SDG indicator that was very relevant to the involved parties. The meeting started by an introduction to the monitoring approach of the different countries. It became clear that in the Netherlands the data comes from the private sector, research institutes and the government and they will be gathered at CBS. In the other countries the data gathering is largely dependent on the government and involved ministries. The measured data might be skewed due to broken measuring equipment.

Methodology:

- The definition of water efficiency was unclear. Water efficiency can be defined in different ways. A common way to define it is water productivity. This is the amount of value added (for a certain industry) or total GDP (of the whole country) divided by the use of water in physical terms.
- The methodology to derive water productivity can be based on the water accounts (SEEA), and international statistical standard.
- Jordan was speaking of the amount of water that is lost when you transport water from A to B and/or use water for specific functions.

Feasibility:

- A lot of experience worldwide is already available to implement water accounts (including in the Netherlands).
- An idea was pitched for Dutch experts to come to Jordan, Peru, and Senegal in order to demonstrate best practices in the Netherlands and support setting up national systems. A workshop in the Netherland does not work, it is better if an expert comes to them and works with them.

Applicability:

- The countries want to be supported by a designated person/department they can call when they have questions or problems. At the moment it is unclear who is responsible for what. They want to have a 'hotline' they can always reach and know how to reach with questions on this SDG indicator (or SDG's in general).

Effectiveness:

- It was felt that the indicator could be very useful for country use. Measuring and information gathering appears to be the challenge for most countries. Parties also suggested to keep trend with new innovations to collect data.
- In the agricultural sector, most water is used. It might thus be interesting to use "water consumed" instead, since this is a widely used term for calculations in the water efficiency of the agricultural sector.

Indicator:

- It was discussed that the indicator combines all sectors while there are for instance huge differences in water efficiency in industry and agriculture.
- The current indicator might also stimulate countries moving from basic food crops to money making crops because the higher price results in a higher water efficiency. This might cause food scarcity.
- The System of Environmental-Economic Accounting (SEEA) for water allows for the differentiation of the different sectors. The UN has to look critically at how this system is useful to sharpen the UN methodology for indicator 6.4.1 and link to efforts already made locally to gather information for this or other programmes.
- It is important for the countries to have sub-indicators for the indicator
    a. Agriculture (maybe even divide between rain fed and irrigated)
    b. Domestic/service water
    c. Industry & mining
- There was concern how the ecosystem as a water user is being dealt with. Efficiency is also a matter of water allocation.

As a general remark it was mentioned that the Netherland parties in charge of collecting data (CBS, Private parties and knowledge institutions) proposed a quick scan identifying the best data collection method from surveys, modelling and satellites.

Indicator 6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources

Before the GEMI workshop, the Netherlands had organized a Dutch workshop with scientists, statisticians, policy makers and implementation agencies. The outcomes were shared during the GEMI workshop as basis for the discussion.

Methodology:

- There is not enough guidance in the method for the implementers:
    - This will affect the outcomes considerably depending on how one measures and includes the various variables in the division (for instance. the streams needed for nature). The different inputs can use different methods e.g. groundwater recharge can be estimated in different ways. There is a need for greater direction, possibly depending on data availability.
    - There is also a need for clearer terminology. The methodology for instance mentions exploitable water vs. total resource; which of these is the freshwater?

Feasibility:

- The indicator will be possible but difficult to calculate, given the variety of sources of water e.g. transboundary, virtual etc. It will also depend on already available data (for example, in AQUASTAT).
- Jordan mentioned that they routinely abstract more than their renewable resource: their coping mechanism was to use other types of water supply. The risk is in costs of this including depletion of non-renewable resources. They furthermore stated that measuring Water Stress is meaningless when a country is already over-stressed: how does it help a

country to light up “red” (alarming) while this is already well-known by everyone inside and outside the country? UN responded that it would help to put their needs to the global agenda and it was therefore suggested that documentation of this stress is the necessary outcome of the measuring process of 6.4.2.

Applicability:

- Local scale and sub-annual information would be of more use to assist with policy and management. The wish to disaggregate the indicator to regions and even crops was mentioned; but this would be part of a ladder approach, as it will not be feasible for every country to apply this disaggregation.
- Disaggregation needs to be time sensitive e.g. water stress may be very different in the dry season to the wet – and averaging of annual data may be meaningless.
- The water stress of surface water will be different to groundwater (Vladimir’s original method had groundwater included separately), and same so for the consequences of withdrawal. This needs to be elaborated.
- It was agreed that special attention needs to be given to hyper-arid countries in this index.
- It was noted that stress may be natural or caused by society. FAO however, felt that this method is not about people but just about withdrawals.

Effectiveness:

- It was agreed that the effectiveness would be enhanced if disaggregation would be applied.

Ladder approach:

- It was proposed to include a measure of water quality into 6.4.2, as this is also relevant to water stress. FAO felt that water quality should be dealt with in 6.3.2, not in 6.4.2.
- Disaggregation in spatial and time scales (see above).

Indicator:

- Dutch experts suggested that the indicator focused too narrowly on water resources. They suggested that the indicator should include a measure of human suffering or coping as a part of water stress. Given the international process, this entails an additional indicator for target 6.4 should be created if human suffering is included.
- Senegal is very interested in renewable water vs. fossil water. It hence seems very important to see what the indicator states if a country uses more fossil water than renewable (i.e. when the outcome of the division as suggested by the method is >100%).
- The Water Footprint Network noted that the Water Footprint is a possible alternative to the Water Stress indicator. The Water Footprint measures only what is removed from the water cycle and not returned, thus fossil water etc. do not become issues. However it was pointed out that withdrawal is already fixed wording in the Target, making it impossible to introduce the water footprint in the indicator.

Target 6.5 Integrated Water Resources Management

"By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate"

Indicator 6.5.1 Degree of integrated water resources management implementation (0-100)

During the break out session, general experiences were shared on the implementation. In the second part of the meeting, the methodology was reviewed question per question. The indicator is very important as it is the only one targeting policy – and water crises are often seen as a governance crisis.

Methodology:

- The Dutch experts who have worked with this method deemed the method practical, providing quite a lot of insight without having a large reporting burden. Uganda confirmed that this method can be implemented without posing a big burden on the countries.

Feasibility:

- The indicator is very important as it is the only one targeting policy – and water crises are often seen as a governance crisis.

Applicability:

- It is challenging to assess if data provided by countries is correct, or an interpretation of individuals. Suggestions were to include control questions, provide the opportunity for countries to send in reports to support the claims made if they are available, and UNEP indicated to provide space for concise qualitative information in the methodology.
- It became clear that the method was interpreted differently by the Netherlands and Uganda. Where the Netherlands worked with a group of senior experts to fill in the questionnaire, Uganda sent the methodology to different regional stakeholders to assess their knowledge and insights in IWRM as to assess where additional activities are needed.

Effectiveness:

- Questions arose on the framework used – an alternative framework was proposed based on the 4 layer model of the Netherlands Water Governance Centre to start the discussion on the framework and definitions chosen. As IWRM as a science is still developing, there are different ideas on definitions and approaches. UNEP needs to choose a clear framework and definitions for the methodology.
- Many activities linked to IWRM take place at the regional level – this methodology focuses mostly on the national and federal level. Tweaking of the questions can support a wider approach.
- It is unclear how non-filled questions will influence the indicator.

Ladder approach:

- The question arose if it was possible to distil key questions – which questions should a country focus on when it has limited resources?

UNEP indicated to identify if developing an online tool facilitates answering the survey. If it is developed, thought should be given to who has access to this online tool. This methodology will be connected to instruments for policy makers to improve IWRM in their country.

Indicator 6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation

The discussion on indicator 6.5.2 started with emphasising how important this indicator is for the SDGs and better water management and that it needs to be included in the monitoring of SDG6.

Feasibility:

- An elegant and simple indicator. Information for the indicator is available in most countries.

Applicability:

- For the case of Netherlands, the information to measure the indicator was easy to find and the method is easy to apply.

Effectiveness:

- Constructive criticism was provided from the experts on the 'one strike you're out' approach on the 4 criteria. This is not felt as a supportive method to encourage countries to reach more criteria, if they fail to reach all 4 of them.
- The 4 criteria are suitable to measure the level of cooperation:
    - There is a joint body, joint mechanism or commission (e.g a river basin organization) for transboundary cooperation.
    - There are regular formal communications between riparian countries in form of meetings.
    - There is a joint or coordinated water management plan(s), or joint objectives have been set.
    - There is a regular exchange of data and information.

Ladder approach:

- An idea for the ladder approach would be to provide insight in the quality of cooperation. However, there were no suggestions on how to do this.

Indicator:

- Present experts proposed that a deeper reflection about the weights given for the number of criteria is needed. In the proposed equation, the percentage of the transboundary territory is multiplied by 1 if all 4 criteria are met, and by 0 if no criteria are met. The weight 0 is also given if 2 or 3 criteria are met. However, if another approach is chosen than the 'one strike you're out', it is not possible to calculate the proportion of transboundary basin area. It was proposed to discuss the indicator at a later stage in the process, when a possibility arises to change the indicator.
- The quality of cooperation is not included in the indicator. It is a challenge to do so, but can be part of future discussions on the indicator and measuring water cooperation.

All experts and PoC representatives present in the session agreed that this indicator is feasible and important for any country.

Target 6.6 Water-related ecosystems

"By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes"

This target was not discussed before in the Netherlands, thus this session was a first in order to start the discussion in the Netherlands.

Indicator 6.6.1 Change in the extent of water-related ecosystems over time

After an introduction by Chris Dickens from UNEP, it was discussed how Uganda and the Netherlands were handling the current indicator:

1. The Netherlands can use the data collected for the Water framework directive, which holds for all EU countries.
2. In Uganda they mapped the existing amount of data, the requirements needed for data on ecosystems, and the recourses required. And although forests are not included as a water related ecosystem into the current indicator, they included this as an ecosystem, since its function to protect against floods is highly important.

Methodology:

- The question was raised whether any ecosystem can be chosen to be included. As Uganda had for example included forests since they were important for them. It was mentioned by UNEP that any choices made by a country to include something were welcome.

Feasibility:

- Frequency of *monitoring* and *reporting* will be different. The frequency will differ per indicator. Furthermore, interpretation of the monitoring and reports will be much more important. A yearly report for 6.6.1 will be a challenge, and neither will it be useful.

Effectiveness:

- Is it possible to add DPSIR (Driver, Pressure, Status, Impact, Response), which is currently used for the Water Framework Directive? It could add to the understanding of changes necessary to improve condition.
    - It was mentioned that including DPSIR may not fit to the global reporting.
    - Suggested was to include this into indicator 6.5.1, where legislations on ecosystem could be taken into account.
- Remote sensing would be very convenient to use, especially for mapping all the areas. Mentioned was that the UN organisations are afraid that the use of remote sensing is politically sensitive. Countries might not like the results that remote sensing give and thus refer to it as untrustworthy. After the workshop a method was shown to several participants of a running application to estimate differences in land and water based on aerial photographs, developed by Deltares. Although a direct application by the UN may be not appropriate, it can help countries to use this information for their own interpretation and report.

The objective of the UN for receiving the data is that countries change their policies to reach the targets. The data baseline for the end of 2017 was also discussed, and it was decided that for the Netherlands, as well as the EU, and Uganda, this was a realistic baseline. However, for non-PoC countries it was probably a bit too soon.

Target 11.5 (Water-related) disasters

By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations

- *11.5.1 Number of deaths, missing persons and persons affected by disaster per 100,000 people*
- *11.5.2 Direct disaster economic loss in relation to global GDP, including disaster damage to critical infrastructure and disruption of basic services*

The Sendai Framework for Disaster Risk Reduction 2015-2030, under which the development of methodologies takes place, now stands:

1. Definitions and methodologies are in process
2. Indicators are pending (there are a number of indicator candidates for each target)
3. There is a different "perception" and availability of data in different countries (e.g. Japan)
4. Quantitative versus qualitative information is a point of discussion

In the Netherlands:

1. The Ministry of Security & Justice has a mandate on UNISDR-Sendai implementation
2. The Ministry of Infrastructure and environment reports on data related to flood defences and water management
3. There is no a structural database on "losses and damages"

Methodology[1]:

- There is a differentiation across natural disasters and in particular water-related ones.

Feasibility:

- Disaggregation on data is a possibility, think of poor populations and most vulnerable ones who are more effected by water related disasters.

Applicability:

- Importance of awareness for disaster response. A high amount of extra casualties can be caused due to a lack of awareness and education on the risks and effects of a disaster
- When the allocation of roles and responsibilities is unclear, it can influence the amount of prevention and protection during disaster immensely (e.g. Belgium)
- Resilient communities that are used to disasters are less affected by a similar disaster then for example Dutch communities would be since we are not used to it.

Effectiveness:

- There were no issues raised concerning the effectiveness of the indicator.

Ladder approach:

- "Output" vs. "input" indicators, where it was discussed whether or not it would be good to include for example measures taken to prevent disasters as input indicator.

Indicator:

- Indicators on impact reduction could be included as a useful indicator. Costs of investments in preventive measures could, as an indicator, provide a stimulus for this return on this investment is regularly stated as many-fold (4-8 times). How to measure and monetise this return on investment (e.g. "avoided costs in case a disaster would have happened"), however, is not an easy one to harmonize over many different countries and cultures.

[1] Note: almost automatically most participants relate disasters and targets/indicators to rapid events, for water mostly floods. Slow-onset disasters (drought) have been mentioned less frequently in this workshop.

Reflections of the Dutch Ministry on SDG 6.1 and 6.2

A presentation by Jelka Appelman, Senior Policy Advisor at the Ministry of Infrastructure and Environment.

For SDG 6.1 and 6.2 no thorough discussions on monitoring have taken place yet in the Netherlands. The presentation gives first reflections. SDG 6.1 and 6.2 are important goals with strong interlinkage and dependency with the other SDG 6 goals. Data for 6.1 and 6.2 will be gathered by the Joint Monitoring Programme (JMP) of WHO and UNICEF. Although the JMP runs already for a longer period for the MDG on drinking water and sanitation also for SDG 6.1 and 6.2 the process should be followed to identify data need and availability. It should be noted that the target elements of 6.1 and 6.2 go far beyond the MDG (like *"safe", "adequate", "equitable", "affordable"*), have additional indicator elements and data requirements, which give need for further discussion and guidance.

More information can be found in the presentation, which can be downloaded in Annex 2.

SDG 6.1 – "By 2030, achieve universal and equitable access to safe and affordable drinking water for all"

Methodology:

- The methodology as described in the JMP methodology gives as proposed global indicator safely managed water. The methodology also gives several service ladders with distinction to household services and extra-household services. This gives information about vulnerable situation and special groups (schools and health care facilities). The methodology does not give instructions how to assess for example equitability and affordability. The methodology seems to be not complete yet.

Indicator:

- How to measure safely managed drinking water. The definition given in the JMP methodology is population using an improved drinking water source, which is located on premises, available when needed and free of faecal and priority chemical contamination. WHO/UNICEF are preparing a questionnaire for countries concerning data to be submitted. With regard to drinking water quality the data requirements are focused on fluoride, arsenic and microbial standards. These are the global data needs. Countries can add other data when appropriate. The question is however if the data in the questionnaire cover the target safely managed. It would be good to add information like Water Safety Planning in place, which gives an indication that drinking water is safely manged from source to tap.
- It is not clear yet which indicator with data is needed to monitor affordability and equitability.
- A water safety planning comment was given by WHO: Historically, under MDG a lot of criticism was put forward that *improved drinking water* is not s*afe drinking water.* E-coli for instance. WSP is a good alternative. It is not possible yet however to roll this out globally. But for the Netherlands, and other countries when possible, it would be great if that could be incorporated on how we report on safety.
- Comments were give on data needs. Countries need further information and instruction, like the JMP questionnaire, for discussion and prepare reporting.

Feasibility:

- In the NL there is a Drinking Water Quality database which is also used for EU reporting. Also for other EU Member States reporting of drinking water quality is probably not a problem. However effort for other MS might be more dependent on alignment of reporting systems. In the Netherlands there are only 10 drinking water companies, which serve approximately 100% of the Dutch population. The effort will be more for Member States with a lot of smaller (and thus many) drinking water supplies.
- In the NL in the quality data base no distinction is made between households and extra household services. The Netherlands will probably not be able to submit disaggregated data for these service levels. It is not clear which data are needed for disaggregation of data for equitability (f.e. gender). Therefore it is not possible at this moment to conclude on feasibility for this target element. Further instructions and discussion with regard to data need is needed. The same applies for affordability.

Effectiveness:

- Adding qualitative data would be good to provide better monitoring.

SDG 6.2 – "By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations"

Methodology:

- The methodology as described in the JMP methodology gives as proposed global indicator population using safely manged sanitation services. The methodology also gives several service ladders with distinction to household services and extra-household services. This gives information about vulnerable situation and special groups (schools and health care facilities). The methodology does not give instructions how to assess for example equitability and vulnerable situations. The methodology seems not to be complete yet.
- It was discussed how one monitors hand washing. Availability of water and soap are the indicators. It is difficult to measure if it's actually used though. Currently there are pilots being performed that try to actually follow what people do.

Indicator:

- For SDG 6.2 two indicators are proposed: 6.2.1 Population using safely manged systems and 6.2.2 hand washing facilities.
- How to measure people using safely managed sanitation services. The definition given in the JMP methodology is population using an improved sanitation facility which is not shared with other household and were excreta are safely disposed in situ or transported and treated of site. WHO/UNICEF will develop a questionnaire for countries concerning data to be submitted comparable to the questionnaire for SDG 6.1. With regard to 6.2.2 availability of basic handwashing facilities and menstrual facilities are data to be submitted. Handwashing is an important facility to avoid diseases.
- It was discussed how one monitors hand washing. Availability of water and soap are the indicators. It is difficult to measure if people actually use these facilities. Currently there under Protocol on Water and health pilots being performed that try to actually follow what people's handwashing behaviour.

- It is not clear yet which indicator and data is needed to monitor equitability and the position of vulnerable groups (also special cases).
- Comments were given on data requirements. Countries need further information and instruction, like the JMP questionnaire for 6.1, for discussion and prepare reporting.

Feasibility:

- More information is needed to assess feasibility to monitor population using safely manged sanitation services. There is a clear overlap with SDG 6.3.1, so the monitoring of 6.3.1 and 6.2.1 should be aligned. A distinction is made between household services & schools facilities. NL can probably not give this disaggregation of data. The same applies for hand washing and menstrual hygiene facilities. There is however legislation in place with regard to hygiene in various situations which probably can be referred to.
- It is not clear which data are needed for disaggregation of data for equitability (f.e. gender). Therefore it is not possible at this moment to conclude on feasibility for this target element. Further instructions and discussion with regard to data need is needed.

Effectiveness:

- Adding qualitative data would be good to provide better monitoring.
- A general remark was made about the different institutions with various questionnaires. With regard to lower the administrative burden a request was made for alignment.

Proof of Concept Country - panel

Panel discussion: country reflections on the indicators, methodologies and the implementation process.

- *Peru; Tomás Alfaro Abanto (Autoridad Nacional del Agua)*
- *Jordan; Ali Subah (Ministry of Water and Irrigation, Jordan)*
- *Uganda; Callist Tindimugaya (Ministry of Water and Environment)*
- *The Netherlands; Monique Berendsen (Ministry of Infrastructure and Environment)*
- *Sénégal; Niokhor Ndour (Ministére de l'hydraulique et de l'assainissement)*

Question for Jordan - *How well can you relate to the challenges that you have heard from colleagues in the room?*

This workshop gives the opportunity to understand more about methodology and targets. Through the discussions, I gained insight and saw other views on the definitions. More explanation for definitions of indicators is needed. During the 6.4.1 & 6.4.2 break-out sessions I saw a complete different side of looking at the SDGs. What we discussed there is completely different than what I initially thought.

We appreciated the presentation of Jelka Appelman regarding SDG 6.1, and would like to receive this questionnaire copy.

In Jordan some people only receive water once every 2 weeks, so they store water in the tanks, which creates water quality problems (e.g. due to dirty tanks). There is an erratic supply of drinking water. To be able to monitor this, we need to understand what the definition is of a population using safe drinking water. Is that:

- That they have access to piped water?
- Or that they have water in their house itself?
- Or, what is the meaning of safe sanitation services?

Sludge management is not mentioned. However, it is a big issue in Jordan. Probably also in other countries. For industrial waste water management schemes we will need clear guidelines.

Question for Uganda - *Could you give us some insights that you received in the last 1.5 days? Are there specific challenges you need to have clarified?*

- We've learned more about the capacity and budget required for the monitoring.
- We will make sure that all information gathered here is put together and used in Uganda.

- When we report at a global level we should not forget that the data is needed at a country level.
- The Netherlands has approached it very interesting. The message I take back home is that we need a comprehensive assessment of each team. I was really impressed by the details.
- Get everyone involved into what the SDGs are, and how to move forward with them. People do not know SDG 6.1 & 6.2 yet. Maybe we should also bring them on the table so we can complete the whole 6th SDG.

Question for Sénégal - *Taking a regional perspective. Is there a role that Senegal can play in the region to help the others get the momentum you already have?*

- Sénégal has learned a lot through this GEMI process. First in Stockholm and now in Delft. We have learned that there are clear linkages between water and all other targets.
- Indeed Sénégal can play a good role in the region. Senegal is active in regional organizations (like Sénégal River basin commission and the Regional economic commission), and they will transfer these experiences to the region.
- Also during a recent meeting of the African ministry of counsel & water platform it was discussed that POC countries (Sénégal & Uganda) will have a big role to play for the rest of the African countries in implementing SDG6.

Question for Peru - *Many data collection methods and data processing methods are in place, and a good understanding of the SDG's is gained. Yet there remain challenges. What future challenges do you have to address to still get there?*

By using the methodologies of the SDG's countries have a good gauge to assess whether they are improving their water management. National instruments for monitoring can be well combined with GEMI indicators. They overlap with mostly all indicators. The country will be able to monitor the indicators with or without GEMI. Good opportunity because Peru has the ambition to become an OECD organisation.

There already exists a good database, we just need to enhance the data collection to monitor the SDG's. For example, it is a big challenge to manage the data and to analyse it. An amount of 45 m^3 of water can mean a flooding or it can be normal, depending on the region. Contextual and geographical differences are important to take into account.

With regards to indicator 6.4.1 we have to be careful on how to interpret the results, because industrial, agricultural & domestic water use differences can be high. They should disaggregate sectors; for example in mining we have been able to improve the efficiency, while in agriculture the efficiency has remained the same. Disaggregation is needed to understand which sector is improving.

Contextualisation is important. For example, there is an abundancy of water in the Amazon, but people are still lacking access.

Question for the Netherlands - *Your perspective in terms of a Proof of Concept Country, what have you heard and what can the Netherlands learn from this?*

I was impressed by how the other Proof of Concept countries structured their processes. In the Netherlands we have just started to connect political lines and engage the stakeholders into this process.

It seems that the Netherlands can work with the methodologies and the indicators. However, definitions are important, for example what does safely treated water or good ambient water quality actually mean? It is hard to say if there should be more direction to the definitions in the indicators. Asking questions and discussing these questions is an important part of policy making.

We need to make sense of all information gained to create policies, for example by using the DPSIR model. Maybe we can use such a tool to combine the information of all indicators, to create an Integrated Water Management approach. We should pay attention to the needed tools, not to just to the required data.

World café discussions

In the World Café, time was dedicated for four groups to discuss four pressing issues linked to the implementation of GEMI that were not extensively covered. The questions discussed are introduced, and the main points are summarised.

1. **How do we get political support from countries for monitoring SDG6?**
    - By providing economic incentives, showing opportunities to inform decision making arising from the gained insights through monitoring. Show how the data is relevant for national decision making.
    - Clear communication is needed with regard to the methodologies and process and to ensure expectations of countries match the reality. This concerns clear definitions at the technical level to ensure the political level is informed of what is expected and what is possible additionally with regard to monitoring and providing data.
    - Clarify how the data will be used, where it will be published, in what detail.
    - Build on existing structures within countries and strengthen national governance structures.
    - Develop the ladder approach and emphasise this option more, which will reduce the monitoring burden

2. What kind of technical support would be needed for base line reporting?

- A question which arose was what the baseline is – is it already set?
- A helpdesk for exchange of information and support would facilitate countries to know to whom to ask questions, and to have questions answered quickly.
- Additional support from experts in pilot countries
- Facilitation of access to data and information for all countries that can support implementation, for instance by sharing best practices from the PoC countries
- Develop the methodologies into a more step by step guided methodology. Additional information is needed for this.
- Extra workshops needed for new PoC countries.
- Prepare the pilot countries so these can be advocates for the SDG6.




1. **Organisation within a country. How do you build intersectional communication and what institutional arrangements are set up to facilitate this?**
    - The activity of gathering data is not an intersectoral activity. The approach to the SDGs should be an integrated one, both for the implementation of the SDGs as well as monitoring. Monitoring should be connected to policy and decision making.
    - Indicators involve many stakeholders. Starting point is to map out who the stakeholders are and get them involved. Acknowledge that SDG 6 is connected to other SDGs.
    - Need to build on existing structures and facilitate interministerial exchange within countries
    - Identify the champions in the different sectors in order to work with the different institutions.
    - The SDGs are to align with existing policies if to succeed. Question is if we are measuring in a sustainable way.

2. **How do you make monitoring for SDG6 useful for policy?**
    - The SDGs guide policy making, and monitoring should facilitate policy decisions.
    - Disaggregation of data also needed to go deeper, for more meaning
    - Cross-sectoral cooperation is a key to make monitoring useful.
    - Capacity building efforts remain needed throughout the process to reinforce national institutions - How to ensure you have capacity to track and report on the indicators. Twinnings and exchanges among countries can facilitate this as well.
    - Intersectional communication within countries but also on global level needs to take place. That recognition has policy implications. To get sectors working together.
    - Understanding of the methodology and clarity in the indicators is needed to inform policy.
    - We need to have a critical mass of capacitated people. If you only have a few people, or one organisation, it is fragile. Need multiple to be more robust.
    - It is important to have central leadership and resources to do it.

Disaggregation panel

The review process of the SDGs is guided by the aim to disaggregate data by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts. What data can be delivered now, and what do we expect will come available in the future?

Participants in the panel where:

- *Lucilla Minelli, UNESCO WWAP*
- *Kees Baas, Netherlands Central Bureau of Statistics*
- *Karen Frenken, Food and Agriculture Organization of the United Nations*
- *Kate Medlicott, World Health Organisation*

The discussions were open for input from the audience.

The review process of the SDGs is guided by the aim to disaggregate data by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts. What data can be delivered now, and what do we expect will come available in the future? The discussion on disaggregation of data

The discussion started with insights in the WWAP toolkit on gender and water. Although there is growing attention for the role of women in water, the lack of sex-disaggregated data is a major obstacle to production of scientific evidence on gender related inequalities in the water realm. The question was if other domains could get inspired by the progress made in the monitoring of gender and water.

The presentation and question of if, and how, disaggregated data should be gathered sparked an animated discussion. Gathering disaggregated data is important to highlight inequality issues and to know what to adjust. We have to make sure to collect data to protect the vulnerable, but doing this is not an easy exercise. It entails an extra monitoring burden. Additionally, it is a matter of political will to address the issues to identify the vulnerable and to develop policies to improve the situation.

It is important also for data disaggregation to learn from ongoing monitoring efforts, such as the Joint Monitoring Program. Additionally, as disaggregation of data requires additional work for countries, it is required to know what kind of data already exists, than assess what is needed and what is feasible.

Important is also to look into monitoring methodologies, linking quantitative and qualitative data and models.

From the discussion it became clear that the work on disaggregation of data is just starting. The focus will be first and foremost on establishing strong methodologies linked to the indicators. An important next step is the disaggregation of data.

UN-Water Synthesis report

A presentation by Stefan Uhlenbrook, Coordinator and Director of the UN World Water Assessment Programme (WWAP) at UNESCO.

The UN-Water Synthesis report will give an In-depth review of SDG 6 in 2018. The SDG6 Synthesis Report will be the analysis and combination of processed information and data with other information and intelligence for full interpretation to inform policy making. Further information on how the Synthesis report will be an addition to other reports and how it will be formed can be found in the presentation which can be downloaded in Annex 2.

After the presentation, several topics were discussed in more detail:

Purpose of the report

1. Currently, the proof of concept countries did not receive the final methodology. And although this step has not been finished, we are already moving to the next five steps, of which the synthesis report is one. We should therefore finalise the methodology as fast as possible. A deadline has been set to finalize the methodology. In the meantime it is good to start thinking about the steps that will follow.
2. It is interesting to make a synthesis report. Policy measures after collecting the data is extremely relevant. The report will not be written by scientists only, since it is not a scientific exercise. Furthermore, it will be necessary to have a qualitative data section and not merely quantitative data included into the report.
3. The focus will lie on a global synthesis report to inform global policies. From this, we hope that countries can find what should be learned nationally. Countries can also use this synthesis report to make their own national synthesis report.
4. The deadline for the report is 2018, otherwise it will be a missed opportunity for the water sectors if we are not ready.
5. There are many inter-linkages already with the other sectors. We have to deliver a balance picture about SDG6, and we will link this to all other water-related goals. We can get the opportunity to show the critical role of water in the other sectors. The synthesis process will show the bigger picture. Linkage is essential, there are lots of concerns which are very essential. It is important to gain momentum and to mobilise ourselves.

Setting up the report

6. The countries and other stakeholders have been involved since day 1 into the process of making the report, in order to use an integrated approach which will suit most. It will be a four year cycle. In the report the whole system and process can then be reviewed. Taking into consideration the countries different concerns, views and even abuses. It is also necessary for countries to get guidance.
7. It might be necessary and very useful to include in what way the implementation of the methodologies worked out for each Proof of Concept country, in order to use this for the implementation and roll out in other countries.

Synthesizing data

8. The purpose of this report is not to collect new data. We need to start thinking on what data is needed to improve policies, and those together with what is already available will be synthesised in the report.
9. Channelling data through focal persons in each country is necessary to structure the system of collecting data, and a good idea.

Next steps of the Proof of Concept countries

All countries present were invited to take the opportunity to assess which next steps should be take to finalise the GEMI PoC phase by the end of October.

Netherlands

This is a summary of the discussion on next steps for the Netherlands GEMI PoC process. Deadline for activities is 31 October 2016. At that point, the Netherlands need to report to GEMI on the results of the PoC activity.

Several questions remain: Who do we need to report to? How do we report? It is unsure yet if all indicators will be accepted by the AIEG SDG. The Netherlands have confirmed to support GEMI in its quest to ensure all indicators are adopted. During the workshop it became clear countries have freedom to decide how and which data is gathered.

- The methodologies provided by the UN are a constructive starting point to monitor the SDGs.
    - We will support optimising the methodologies where needed
    - Elaborate on the ladder approach

- Important for the Netherlands is the holistic approach of the water SDGs, entailing the inclusion of 6.1, 6.2 and 11.5.

Activities that need to be developed until 31 October 2016 – aim is then to have identified the best resources for each indicator

- CBS can supply data for indicators 6.3.1, 6.4.1 and 6.4.2
- We need to find lead institutions who can provide data for 6.3.2, 6.5.1, 6.5.2, 6.6.1
    - Based on group discussions and preparations for the GEMI Work in Progress workshop, + an extra analysis to identify who holds which data
    - We need to identify if budget (time) is needed for experts and lead institutions
- Need to identify if the CBS will be the organisation leading the gathering of data for 6.3.1, 6.4.1, 6.4.2
- It is important to better link to the Netherlands overall SDG process and the ministerial steering group.
- It is important to better link to the EU.
- Discuss with Ministry of Foreign Affairs if funding is available for a project on which methods provide the best data (remote sensing, surveys, modelling), using 6.4.1 as reference.
- Report outcomes and next steps to Dutch partners who have been involved in the process so far – and identify if/how they can remain involved.

We will identify if a Dutch national closing workshop is needed.

The Netherlands are discussing with GEMI if/how to support the international closing workshop of the GEMI Proof of Concept phase.

Jordan

- Political willingness is there for the GEMI process, GEMI is seen as process, not a project.
- Focal points and committees have been set up
- Definitions and direct coaching for each indicator is required from the UN side
- Experts will work closely with the ministries to clear all definitions and define which date is available before the end of October.

Senegal

- Translate all relevant documents to France (should have been done already)
- Continue collecting data for 6.3.1, 6.3.2, 6.4.1, 6.4.2, 6.6.1 – with a deadline of 30 September
- Validation meetings with technical department as well as the national statistics office on 5 October
- Obtain baseline values and define target values as to form a future action plan, deadline 10 October
- Report on experience 20 October
- Have a national GEMI meeting, 31 October

Uganda

- Week 1 (Sept) collect additional data and analyse the data
- Week 2 (Sept)- compile reports (individual Task Teams)
- Week 3 (Sept) - Draft consolidated report
- Week 4 (Sept) final workshop
- 31 October - Final consolidated report
- Support needed:
    - Guide task teams in data analysis and reporting for individual indicators (either online or physically)
    - Financial and technical support to hold the final GEMI workshop
    - Participate in final GEMI workshop to provide final guidance to the team and discuss progress made
    - Technical and financial support to prepare the final consolidated report

Peru

- Make official translations
- Set up meetings with the working groups on each target
- Gather information and provide technical support
- Consolidate and analyse data
- Validate the methodologies
- Have a baseline set the 19th of September

Concluding messages

At the end of the workshop, all participants were invited to define the three most important messages from the GEMI workshop. During the final hour of the workshop, the participants were asked to split up into four different groups. They were asked to list two or three last messages for GEMI which were either extremely important or not taken into account enough during the workshop.

These messages deserve extra attention and are shown below, grouped according to their theme.

- Integration of the SDG6 indicators is key; do not separate SDG6 from other SDG's too much, and approach SDG6 in an integrated manner.

- It's important to have face to face meetings and opportunities to exchange new insights and methods to monitor the indicator.
- The Proof of Concept Countries are to be nucleus of a CoP learning platform, provided that there is support from the UN agencies.
- More targeted support for Proof of Concept countries to help build capacity for the entire process of monitoring the SDGs.
- It is all about inclusive participation throughout the whole process.

- It is needed to develop and include the ladder approach into more indicators.
- A successful SDG reporting does not require all data.

- The SDG process is dynamic; it has a time span of 14 years and it evolves. This is valid for the SDGs, the indicators and the methods. GEMI is not a project, it is a process.
- Currently, there is limited attention for sustainability in the indicators.
- Additional indicators on regional variations should be included: e.g. coping mechanisms in water stressed areas. Contextual reality: How does a method/indicator perform in hyper arid areas?

- There is a need to ensure that there are resources for the SDG process. How to keep the monitoring burden limited. There should be a balance of efforts and benefits for countries
- Need to know: Frequency of monitoring and reporting! What is feasible and what is relevant/necessary.
- There is a need to balance global and local needs.

- The importance of linking the monitoring process to policies in countries, enabling policy makers to identify where action is needed, and how to improve the local situation.
- The SDGs are not management tools, but management tools will grow from them at a country level.
- Absolute clarity for definitions and terminology is needed.
- Translation of the methodologies in French and Spanish is required for a good implementation.
- The step by step guides are useful, but more detail is needed

- Groundwater needs to be considered

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Vanessa de Oliveira	UNESCO-IHE	Netherlands	v.deoliveira@unesco-ihe.org
William Reidhead	UN-Water	Switzerland	william.reidhead@unwater.org
Xander de Bruine	Water Footprint Network (WFN)	Netherlands	xander.debruine@waterfootprint.org

Annex 2: Presentations

You can download the presentations delivered at the workshop by using the following link to the Dropbox-file *Presentations delivered at GEMI workshop*:

https://www.dropbox.com/sh/tsnsz4mr5jbuc7c/AAC4w5H6Aseb-0yVKrq8PfrXa?dl=0

Annex 3: Programme

Wednesday 7 September 2016

The aim of this day is to gain insights in the different PoC country processes, and provide detailed feedback on the proposed methodologies for each GEMI indicator.

Time	Session
09:00	Opening Official welcome by the Netherlands *By Elaine Alwayn, Director Water and Soil, Ministry of Infrastructure and the Environment* Official welcome by UNESCO-IHE *By Fritz Holzwarth, Rector ad interim* Official welcome by UNESCO-IHP *By Blanca Jiménez-Cisneros, Secretary, International Hydrological Programme* Introduction of participants *Facilitated*
09:50-10:20	Insights in the current developments of the water SDGs and monitoring *by William Reidhead, UN Water*
10:20-10.40	Presentation of Netherlands GEMI process: Goals and expected outcomes of the Workshop *by Monique Berendsen, Netherlands Ministry of Infrastructure and the Environment*
10:40-11.00	*Coffee break*
11.00-12.20	Presentations of the national Proof of Concept GEMI processes Sénégal Uganda Peru Jordan
12.20-12.30	Summary of the morning
12.30-13.30	Lunch at UNESCO-IHE

Time	Session
13.30-17.30	Working group discussions on GEMI SDGs targets *discussing proposed methodologies per indicator with UN and country experts in two rounds*
13:30-15.15	Round 1: Discussions on SDG target 6.3.1, 6.4.1, 6.5.1, 6.6.1
15:15-15:45	*Coffee break*
15:45-17:30	Round 2: Discussions on SDG target 6.3.2, 6.4.2, 6.5.2, 11.5
17.30-18.30	Drinks and snacks
18.30	Invitation to go the restaurant
19.00	**Dinner at the Prinsenkelder -** *offered by organizers*

Thursday 8 September 2016

The aim of this day is to dive deeper in the GEMI process: We want to ensure all participants are informed of the feedback on each indicator, gain insights in the lessons learned during the GEMI PoC implementation process from a country perspective, and provide space to address additional questions on the process of implementation. Furthermore, options to disaggregate data are explored.

Time	Session
09:00	*Welcome by facilitator*
09:10-11.10	Presentation of outcomes of the discussions on each SDG indicator of 7 September *Can general trends and lessons be distilled?*
	Reflection on SDG target 6.1 & 6.2 monitoring process
11.10-11.30	Coffee break
11.30.12.30	Panel discussion: country reflections on the indicators, methodologies and the implementation process *By the Netherlands, Senegal, Peru, Jordan, Uganda as main speakers* *Questions and reflections from the audience are welcome*
12.30-14.00	Lunch at UNESCO-IHE

Time	Session
14.00-15.30	Review Framework discussion Presentation of the Review Framework prepared by GEMI, and addressing questions arising from the experience of pilot testing the methods on: the most appropriate frequency of measurement, the link to existing processes and the likely usefulness for policy. There will also be space to address questions that arise during the discussions on the methodologies. *Facilitated by Deirdre Casella*
15.30-16.00	Coffee break
16.00-17.15	Panel discussion on the disaggregation of data The review process of the SDGs is guided by the aim to disaggregate data by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts. What data can be delivered now, and what do we expect will come available in the future? By *UN WWAP, GEMI, Netherlands Statistical Bureau*
17.15-17.30	Closing by Ministry of Infrastructure and the Environment

Friday 9 September 2016

The aim of this day is to discuss next steps for GEMI and formulate concrete advice for the implementing agencies

Time	Session
09:00	Welcome by facilitator
09:00-09:20	Presentation on the SDG synthesis report *By WWAP and GEMI*
09:20-10:45	Group discussion: What is needed to set up a GEMI monitoring system in countries? Building on best practices and lessons learned: What would be the advice for the countries joining the 2nd PoC phase as well as for the monitoring agencies? *Facilitated by Deirdre Casella*
10.45-11.15	Coffee break
11.15-12.15	Next steps for the GEMI process *Facilitated by UN Water*
12.15-12:30	Official Closing by Ministry of Infrastructure and the Environment and UN Water

Annex 4: Overview of Dutch focal points per indicator

The coordinators guide the process linked to 'their' indicator. They have identified which organisations can support the data gathering and provided feedback on the methodologies together with experts.

They are supported by the Netherlands Central Bureau of Statistics:

- Cor Graveland - c.graveland@cbs.nl
- Kees Baas - k.baas@cbs.nl

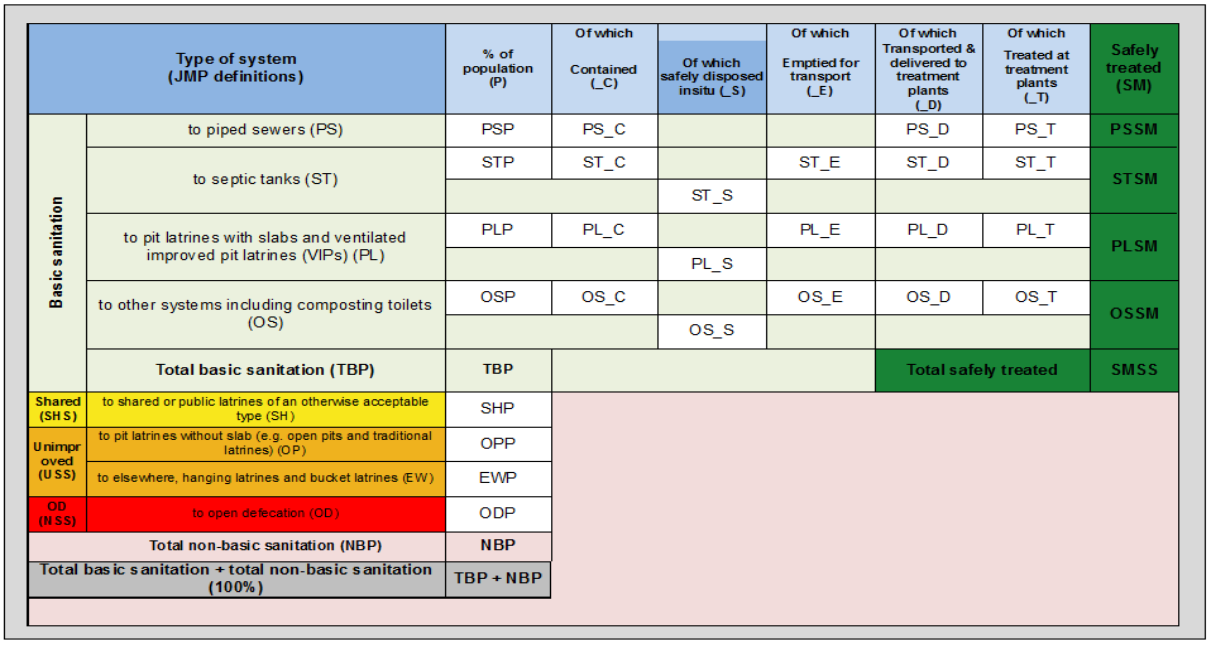
Indicator	Name - Organisation	E-mailaddress
Overall focal point and process coordinator	Monique Berendsen - Ministry of Infrastructure and Environment Supported by the Netherlands IHP-HWRP Committee	Monique.berendsen@minienm.nl ihp.hwrp@unesco.nl
6.1 & 6.2	Jelka Appelman - Ministry of Infrastructure and Environment	Jelka.appelman@minienm.nl
6.3.1 Proportion of wastewater safely treated	Marcel van den Bergh, Rijkswaterstaat Meinte de Hoogh - Ministry of Infrastructure and Environment - European Water Framework Directive	marcel.vanden.berg@rws.nl meinte.de.hoogh@minienm.nl
6.3.2 Proportion of bodies of water with good ambient water quality	Diederik van de Molen - Ministry of Infrastructure and Environment - European Water Framework Directive	Diederik.vander.Molen@minienm.nl
6.4.1 Change in water-use efficiency over time	Job Kleijn (Ministery of Foreign Affairs)	job.kleijn@minbuza.nl
6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	Ellen van Lindert - Ministry of Infrastructure and Environment - Delta programme fresh water	ellen.van.lindert@minienm.nl
6.5.1 Degree of integrated water resources management implementation (0- 100)	Jentse Hoekstra, supported by Inge Koolen (Ministry of Infrastructure and Environment, policy department)	Jentse-hoekstra@minienm.nl
6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation	Jos Timmermans (University of Wageningen) Carien van Zwol (Ministry of Infrastructure and Environment) Ronald van Dokkum (Rijkswaterstaat)	jos.timmerman@wur.nl, ronald.van.dokkum@rws.nl, Carien.van.Zwol@minienm.nl
6.6.1 Change in the extent of waterrelated ecosystems over time	Marcel van den Bergh, Rijkswaterstaat Diederik van de Molen (Ministry of Infrastructure and Environment - European Water Framework Directive)	marcel.vanden.berg@rws.nl Diederik.vander.Molen@minienm.nl
11.5 Water related	Cees van de Guchte (Deltares), Eva	Cees.vandeGuchte@deltares.nl,

disasters	Baron (Ministry of Infrastructure and Environment)	Eva.Baron@minienm.nl

Annex 5: Background information per indicator from Dutch input

Indicator 6.3.1

Part A: Safely treated wastewater by households



Type of system (JMP definitions)		% of population (P)	Of which Contained (_C)	Of which safely disposed insitu (_S)	Of which Emptied for transport (_E)	Of which Transported & delivered to treatment plants (_D)	Of which Treated at treatment plants (_T)	Safely treated (SM)
Basic sanitation	to piped sewers (PS)	PSP	PS_C			PS_D	PS_T	PSSM
	to septic tanks (ST)	STP	ST_C		ST_E	ST_D	ST_T	STSM
				ST_S				
	to pit latrines with slabs and ventilated improved pit latrines (VIPs) (PL)	PLP	PL_C		PL_E	PL_D	PL_T	PLSM
				PL_S				
	to other systems including composting toilets (OS)	OSP	OS_C		OS_E	OS_D	OS_T	OSSM
				OS_S				
	Total basic sanitation (TBP)	TBP				Total safely treated		SMSS
Shared (SHS)	to shared or public latrines of an otherwise acceptable type (SH)	SHP						
Unimproved (USS)	to pit latrines without slab (e.g. open pits and traditional latrines) (OP)	OPP						
	to elsewhere, hanging latrines and bucket latrines (EW)	EWP						
OD (NSS)	to open defecation (OD)	ODP						
Total non-basic sanitation (NBP)		NBP						
Total basic sanitation + total non-basic sanitation (100%)		TBP + NBP						

Figure 1 Waste water treatment systems

	P	_C	_S	_E	_D	_T	_SM
To piped sewers	PSP 99,4	PS_C 100			PS_D 100	PS_T 100	PSSM 99,4
To sceptic tanks	STP 0,6	ST_C 100	ST_S 100	ST_E 100	ST_D 100	ST_T 100	STSM 0,3
To pit latrines	X X						PLSM
To other systems	X X						OSSM 0,3
	TBP 100				Total safely treated		SMSS 100
Shared, unimproved, elswehere, open	X X X X						
Total non basic sanitation	NBP 0						
Total basic + basic sanitation	TBP + NBP 100						

Figure 2 Parameters in Netherlands Households. See also StatLine: Urban waste water treatment

Feedback on waste water and treatment from Households:

- The data of households are available and updated every 3 year by RIONED. There is a difference between % of households (RIONED) and % of population (proposed framework).
- Waste water of households and human waste are 'mixed up'

Questions:

- How to deal with leakage (damaged/cracked/) of piped sewers and/or septic tanks?
- Water statistics: emissions to water compiled once every 2 or 5 (?) years (time series)

Data availability:

- Water statistics: a) statistics on wastewater treatment (yearly), b) emissions to water compiled yearly but updated for key years only and the last two years. Available time series: 1990-1995-200-2005-2010-2013 and 2014
- Water accounts: emission to water by industry every two years or 4 years (time series)

Part B: Wastewater from economic activities

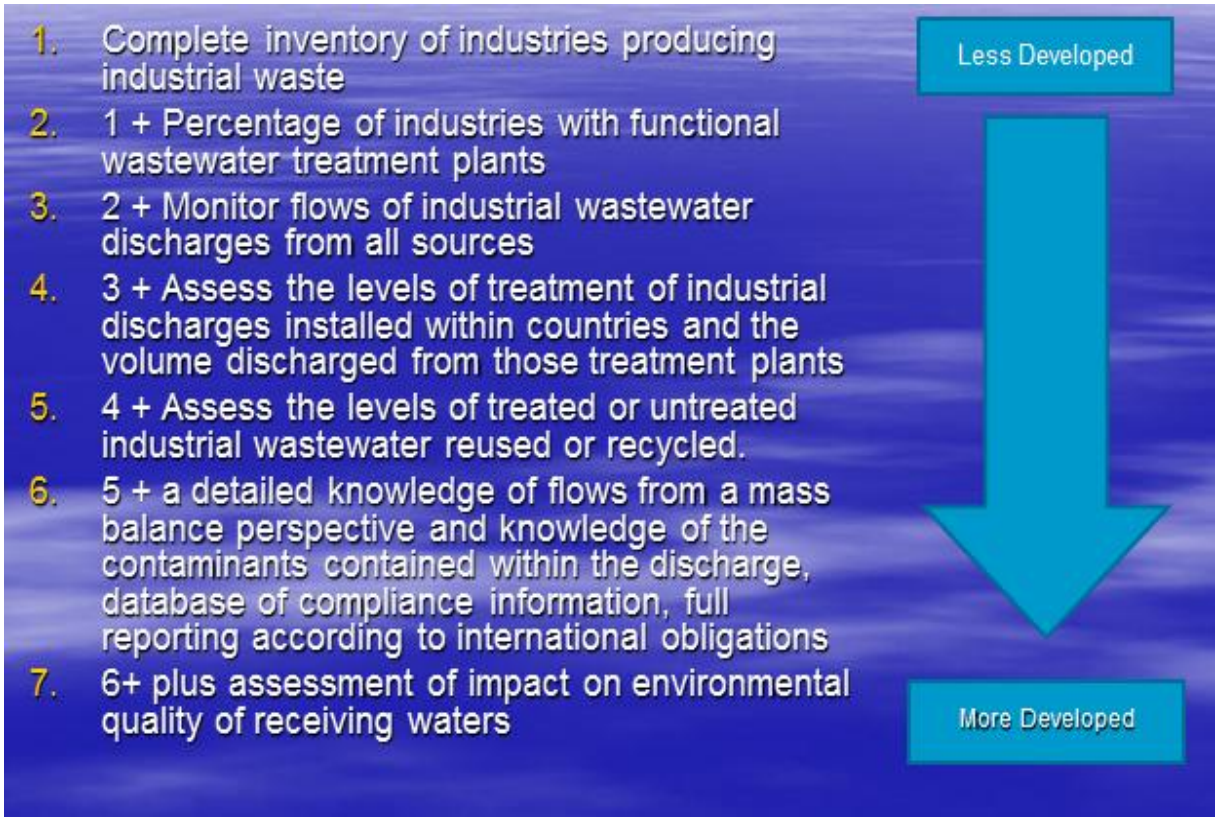


Figure 3 Feedback for industrial activities

Situation Netherlands:

1. Commercial establishments and non-hazardous industries discharge on piped sewers (available, 2012) → 100% treated in WWTP's
2. Industry discharge directly on surface water (available on yearly base, 'emissieregistratie'):
   - Non hazardous substances without treatment
   - Non hazardous substances with treatment
   - Hazardous substances with treatment
   - Hazardous substances without treatment (if any), discharge on:
     - Sea
     - Inland waters

What is the definition/criteria of hazardous?

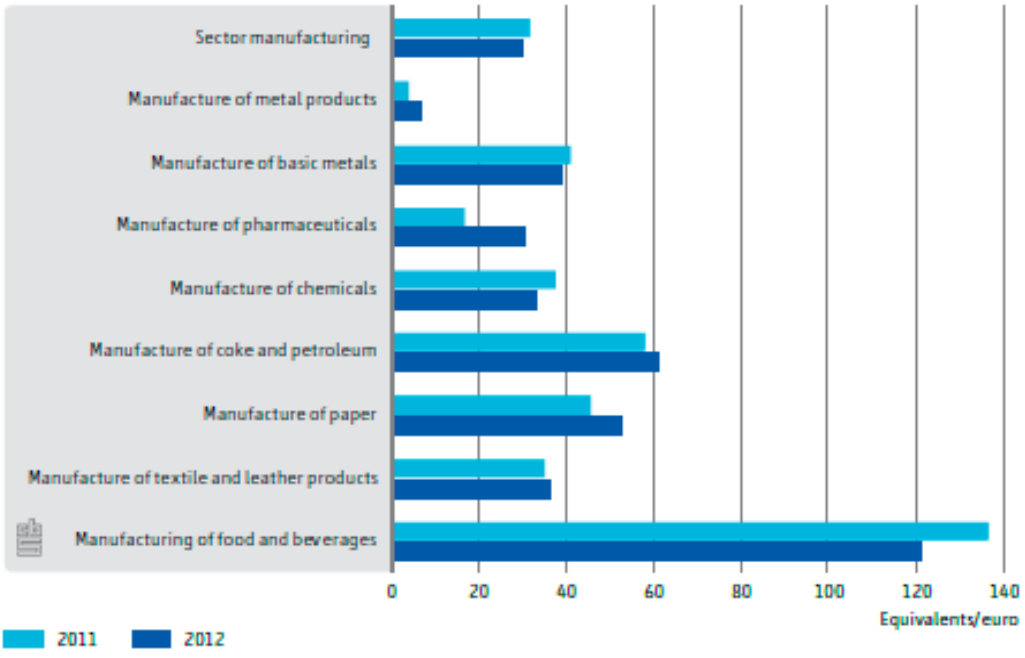
Availability data:

- Data: Statistics *Afvalwaterzuivering bij bedrijven* provides data on waste water treatment within private companies (yearly)
- Emission inventory provides data on volumes of waste water discharged (yearly) and loads of substances: can be used for the 'hazardous' criteria.
- Water accounts: emissions to water can be compiled on regular basis, now every 2 or 4 years
- Combines physical emissions with economic activity by industry (from Statistics Netherlands: National Accounts) for intensity / productivity calculations
- Ready for monitoring development of emission-intensity by Dutch economic activity (National Accounts / water accounts)
- Normally each second year
- Used for policy (I.e. Min. I&M, Rijkswaterstaat, ..)
- Data are not collected on regular base, but on request.

Examples of available data related to emissions to water from particular economic activities in Netherlands

- Emissions to water by origin and by destination (Water accounts)
- Physical supply and use tables per substance.
- Heavy metals and nutrients emissions
- Distinguished per economic sector and households (in water accounts)
- Riverine inflow (loads) from other countries and outflow to Northsea
- Data on absorbed loads / treatment efficiencies
- Data are related / compatible with the economy 'National Accounts'
- See StatLine:
  - 'Afvalwaterzuivering bij bedrijven'
  - 'Emissies naar water'
- Time series
- Emission-intensity: Emissions / economic performance (kg/€) per sector per substance or equivalents

Figure 4 Source: CBS (Water statistics/ water accounts)



Indicator 6.3.2

Input from Rijkswaterstaat (implementation agency of Ministry of Infrastructure and Environment) and the Ministry of Infrastructure and Environment discussing target 6.3.2 on water bodies with good ambient water quality.

All data requested is being delivered in the Netherlands already, and should be fine for the rest of Europe as well. Except for EC/TDS which is not reported in the KRW database. Instead of EC, they can provide chloride concentrations which can be converted.

Remarks on the proposed indicator

- Not all countries in the Global South would be able to deliver E.coli, and perhaps the data is not correct because it is hard to collect. It is a good and important parameter though. This parameter might be better fitting in target 6.1 or 6.2.
- The parameters that are asked for, are inadequate to say something about water quality.
- The word ambient is not well-defined. When is water ambient? In the Netherlands we hold protocols for this.
- So the questions arises, does the country deliver data on all 5 asked parameters?
- Some European countries already cannot make the requests of the EU, so it might be very difficult for the Global South to hold to these parameters.
    - It might give more information to give numbers on treatment plants and the treatment steps used.
    - Or the ecological information; is there a fully grown fish present in this water? This already gives much information. Adding the types of fish for example adds even more. It will provide information and a link to physical interventions (dams, fish migration mitigation) and the production (sustainable consumption).
    - City bonds, water board MoU or university bonds could help to improve conditions/knowledge in the Global South
    - Perhaps better to look at legislations in the country concerning permits on waste water discharges, etc.
    - It would be more interesting to look at the drivers causing the water quality, like for example industry, agriculture, cities, fishery.
    - Or to the response to improve water quality.

Proposition for the ladder approach

In the European Union they use DPSI: Driver, pressure, status, impact. (Example: Agriculture, m3 of discharges, amount N in water, resulting in cyanobacteria)

It says much about sustainability and whether something can be optimized. That would be a good ladder for the SDG as well.

1. Give drivers
2. Give status (the asked parameters)
3. Give impact

Pressure could be included as well, but might be less important.

Indicator 6.4.1

The Netherlands organized a 2-hour workshop with scientists, policy makers and implementation agencies to discuss target 6.4.1 on water use efficiency. Attendees: Deltares, CBS (Statistics Netherlands), eLEAF, University of Twente, Utrecht Univerisity, UNESCO-IHE, NWP (Netherlands Water Partnership), Netherlands IHP-HWRP Committee, Ministry of Foreign Affairs.

The Netherlands should be able to fulfill the request for this data. All parties react positive and would be able to provide sufficient data, although the value is not interesting for the Netherlands. On the contrary, for the Global South it might be difficult to deliver the necessary data.

- Statistics Netherlands (CBS) use say five main flows of data on a yearly (or biennial) basis to capture all sectors / industries.
  They compile UN-SEEA– Water Accounts type of data with supply & use for five types of water: groundwater, surface water (fresh & salt/brackish/marine), soil water, drinking water, industry water. This based upon water statistics data and other sources. And for a wide range of industries (following International Standard Industrial Classification, ISIC) is available. The UN-SEEA – Water Accounts are used in many countries already and further implemented worldwide with help of UNSD and the World Bank.
- Deltares has much information available and is able to model economic parameters.
- UNESCO-IHE/WA+ can provide remote sensing (RS) data on ET and thus only for the agricultural sector. This is a different method then proposed in the indicator, where withdrawals are asked.
- eLEAF provides remote sensing (RS) data to be used for the agricultural sector only. Here the same holds that they provide information on ET, not withdrawals.
- UU works with RS and agrees that the use of ET for agriculture would be better, especially when one wants to model anything with it.
- UT believes we have all the information available on industries.

Improvements that should be included into the indicator

- Not the value but the trend should be looked at. That will give a better understanding of a countries improvements on water efficiency. Looking at the trend will also make comparison between countries possible.
- The way to estimate the indicator should be refined, better defined and methods for calculations should be explained more sharply.
- Combining the three sectors in one value of WE will not give a correct view and has no real use. These sectors cannot be compared in that way. If you want to use the different sectors, multiply all different sectors with the total water use (m3) or with the economical value ($).
- Withdrawal is not the correct parameter. They should use consumptions of water, because you might withdraw more then you use.

Remarks

- The indicator does not hold ecological reality and does not show the potential efficiency.
- Sustainable use of water is not really taken into account. Does sustainable withdrawal from fossil water exist?

- Rain fed agriculture is not taken into account? Excluding this means missing much information.
- The same water can be used more times for different withdrawals, which causes double counting in the system.

Proposition

- Use all three types of data (statistics, measurements and models, RS), and combine them in the most optimal way.
- Give the organizations a couple of months to try out different methods to find the best method to compute the water efficiency worldwide.
- Conduct a study to evaluate how the data and the methods that are used to calculate an indicator (models, remote sensing and models, accounting, statistics) influence the value of the indicator. This study combined with a sensitivity analysis of the indicator to the different input terms, can enlighten the need for countries to focus their efforts in getting one or another data set, and using one or another method.

Indicator 6.4.2

The Netherlands organized a 2-hour workshop with scientists, policy makers and implementation agencies to discuss target 6.4.2 on water stress. Attendees: Deltares, Rijkswaterstaat (implementation agency of Ministry of Infrastructure and Environment), PBL (Netherlands Environmental Assessment Agency), CBS (Statistics Netherlands), University of Twente, Netherlands IHP-HWRP Committee, Ministry of Foreign Affairs, Ministry of Environment and Infrastructure.

The overall reaction shows that the chosen indicator can be compiled by the Netherlands. The data is readily available (although not disaggregated on crop level). The advice is to use the proposed indicator, possibly extended with a monthly scale. And then use the ladder approach to include as much detail as possible per country; i.e. the next step should be to include other indicators that can give more information, the moment a country is up for it.

There are a couple of factors that might in improve the indicator and thereby also provide better information for policy makers:

- Time- and spatial scale should be smaller than yearly scale and country scale; in order to truly shed light on where problems are. It would be useful to know in which catchment areas during what months water shortage is experienced, and which are the biggest water users during that time. Time series of this indicator will enable to show progress
- Water quantity and –quality is separated in the indicators. However, water quality influences whether water will be used or not. They should hence be better viewed and measured in relation to each other. Quantity available is also good enough for use.
- It would be good to make clear distinctions between groundwater and surface water.
- More practical guidance on how the input terms (abstractions, recharge, environmental flows, etc) for the indicator water stress should be calculated or measured will help countries to do so, as several methods to calculate the input terms can give very different results for the indicator. Depending on the data available, a method will be better than another.
- There is a need to evaluate the current water stress threshold of 40%, maybe a range would be better due to the uncertainty related to the input terms that form the indicator.

- The actual goal is to decrease suffering caused by water stress. When is suffering reached? The indicator should include a component to show whether suffering is indeed decreased.
- For this, it might also be wise to include (qualitative) indicator for policy measures aimed at coping / reducing people suffering.

It is thus clear that there are some remarks regarding the indicator and its role to inform politicians and policy makers. Water stress can be caused by natural causes and/or by human actions. Policies to counter this could improve conditions and decrease water stress. This would be an extra qualitative indicator next to the already existing quantitative indicator. It will give action perspective to countries.

The indicator could be a fine starting point to get on overview of water stress on the global level. It could be the first step in a ladder approach, because it will indicate whether there is generally speaking water stress. However, disaggregation of information to months and catchment area will enable politicians and policy makers much better to adapt their policies towards reduction of people suffering from water stress. This would hence be a next step in de ladder approach.

Some remarks:

- There is (except for the word *renewable*) no inclusion of sustainability in the indicator.
- Transboundary waters are important for water availability and water stress..
- Virtual water and the water footprint are important ways to define water use from water stressed countries in a country that is not under water stress itself.
- Disaggregation on sector level will give more information to improve conditions.
- An option for countries that have less data is to model the situation.
- Remote sensing has many opportunities for the agricultural sector.
- It might be much more informative to count the amount of wells that have fallen dry that year, or the amount of pumps that could not be used any more.

Indicator 6.5.1

This methodology and indicator was reviewed by Jentse Hoekstra (Ministry of Infrastructure and the Environment), Maarten Hofstra (former UNESCO-IHE, former Rijkswaterstaat), Herman Havekes (Union of Waterboards), Bart Teeuwen (legal expert).

Overall feedback:

- The questions can be answered relatively quickly. They are straightforward.
- To ensure that the information is indeed correct is challenging. Is it feasible to think of control questions?
- It should be clear that countries can provide additional information to questions – qualitative information might be more useful than numbers.
- Public participation should be included more (based on Dublin principles), as well as culture and communication
- The four components (Enabling Environment, institutions, management instruments, financing)) used in the method are part of IWRM, but can cause confusion. It was proposed to use the Three Layer Model (content layer, an institutional layer and a relational layer), or likewise frameworks to define the components of the methodology. You can find more information and a proposal on how to use it in Annex 1.

Specific feedback:

- Enabling Environment 'It includes the most typical policy, legal and strategic planning tools for IWRM.' -> policy also includes strategic planning. This is not included in the methodology yet.
- It is advised to reflect on whether to focus on laws (and regulations?) or plans, and how this affects the information you receive.
- Focus on different levels (international, national, regional) is not clear. We see a focus now on transboundary, national and federal.
- Q1.1B: can a date be entered in this question related to when when a law is developed, approved, applied?
- Q1.2 A: It is advised to include regional water resources law(s) as well (also non federal), based on IWRM
- Q1.2 B: It is advised to change objectives into measurements (in the sub questions)
- Q1.2.C: does this only refer to international basins?
- Q2: we advise to include a the development of IWRM plans as well in this question (or add another question focusing on institutions leading the development of IWRM plans)
- Q2C: great question, but fits better in another sector (see also three layer model)
- Q2D: In the Netherlands, we score 0 on this question, but we do not see this as a bad thing. There are many assumptions behind this question- (much ppp is good, which is old fashioned and a market oriented approach). We propose to omit this question.
- Q2.2B: Great questions
- Q3: there might be a bit of
- Q3.1A: It's a great question, but does not focus on an instrument. Maybe place it elsewhere
- Q3.1B: Great questions
- Q3.1C: A more elaborate explanation would be good here, as it remains a vague question where many interpretations are possible.
- Q3.1E: This is broadly defined. Are incentives part of this questions? Are instruments included in the questions as well? Is the focus on empowerment or capacity building? Empowerment is mentioned often.
- Q4 – finances is the basis of good water management – great and very important to include.
- Q4.1.A: We advise to ask for quantity, for instance: =Which % GDP (from national and other levels – as our national government is not the one spending money on water, it is the regional governments) is spent on water management including WASH 0 - 1 % or more 0,2%, 0, 3% etc.
- Q4.2C: What does this indicate? Our contribution to the Rhine Committee is 20 fte total, around 2 million. Implementing measures costs much more. We see no added value for this question as you measure how international cooperation is paid. We suggest to omit. Measurements are interesting to gather: are upstream countries paying for downstream problems.

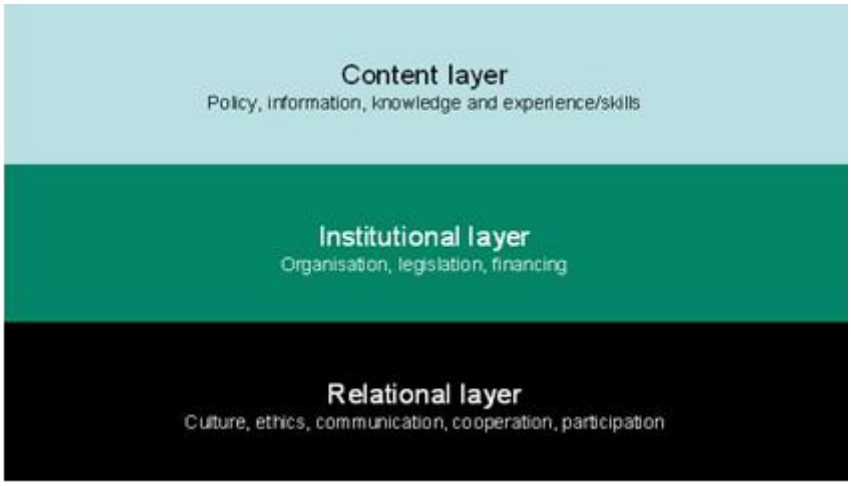
<u>Notes by Maarten Hofstra linked to the Draft indicator list van de Global Expanded Monitoring Initiative for monitoring and reporting the SDG target "IWRM implemented by 2030"</u>

In the Integrated Monitoring Guide the following division is applied

- Enabling environment
- Institutions
- Management instruments
- Financing

It is important to remark : each classification is arbitrary and justifiable. The division chosen is therefore not wrong. However, especially the notion “Enabling environment” is used often and different organisations will give a different interpretation. In addition, the other three components overlap: Financing is an instrument, instruments are Institutions, etc.

There is a more systematic classification due to go out of the three layer approach that we used in the Water Governance Centre. See "Chapter 1 of the book Building Blocks for Good Water Governance". See also the brief description in the annex.



The three-layer approach makes a distinction between a content layer, an institutional layer and a relational layer.
Inside those layers are again a number of distinct components

Content layer	Strategy/Policy
	Planning*
	Information
	Knowledge/skills (capacity)

* Planning here refers to content. Of course, it is also an instrument and part of the institutional layer.

Institutional layer	Organization
	Legislation
	Financing

Relational layer	Culture and ethics
	Communication
	Cooperation
	Participation

Indicator 6.5.2

Monitoring concept and definitions

The proposed monitoring has as basis the spatial coverage of transboundary basins shared by each country, and focuses on monitoring whether these are covered by cooperation arrangements that are operational. The criteria needing to be met for the cooperation on a specific basin being considered "operational" seeks to capture whether the arrangement(s) indeed provide an adequate basis for cooperation in water management.

Transboundary basins are basins of transboundary waters, that is, of any surface waters (notably rivers, lakes) or groundwaters which mark, cross or are located on boundaries between by two or more states. For the purpose of the calculation of this indicator, for surface waters, the basin is the extent of the catchment area; for groundwater, the area considered is the extent of the aquifer.

Arrangement for water cooperation: a bilateral or multilateral treaty, convention, agreement or other formal arrangement, such as memorandum of understanding) between riparian countries that provides a framework for cooperation on transboundary water management. Agreements or other kind of formal arrangements may be interstate, intergovernmental, interministerial, interagency or between regional authorities.

Operational: For an agreement or other kind of formal arrangement (e.g. a memorandum of understanding) for cooperation between the riparian countries to be considered operational, all the following criteria needs to be fulfilled:

- There is a joint body, joint mechanism or commission (e.g. a river basin organization) for transboundary cooperation
- There are regular formal communications between riparian countries in form of meetings
- There is a joint or coordinated water management plan(s), or joint objectives have been set
- There is a regular exchange of data and information.

Progress by a particular country towards the cooperation aspect of the target, reflected by the indicator value, can be achieved either by establishing new operational cooperation arrangements with co-riparian countries, or making existing arrangements operational by developing and regularizing activities, or expanding the coverage of cooperation arrangements with the ultimate objective to cover all surface waters and groundwaters.

Arrangements for water cooperation in The Netherlands

The Netherlands has four river basin districts. These are all parts of international river basin districts. The sharing countries are EU member states, as well as Switzerland, and Liechtenstein. The EU countries have to comply to the EU Water Framework Directive and the EU Flood Directive, that can be considered overarching cooperation frameworks. Next to that, each international river basin districts has a commission on that specific river basin. These cooperation frameworks will be shortly discussed below.

European Union Directives

The River Basin Districts in the EU that are coordinated through international river commissions have in most cases also developed international River Basin Management Plans (RBMPs) according to the

EU Water Framework Directive (WFD) and the Flood Directive (FD). Many other river basins are less advanced regarding adoption of RBMPs but may still cooperate via international coordination mechanisms and coordinating bodies. Some basins have not yet established any cooperation framework at all. From this, four categories have been pre-identified:

- Category 1: International river basins with an international agreement/convention & a River Basin Organization & international River Basin Management Plan
- Category 2: International river basins with an international agreement & coordination body & no international River Basin Management Plan
- Category 3: International river basins with an international agreement & no coordination body & no international River Basin Management Plan
- Category 4: International river basins with no international agreement/convention & no coordination body & no international River Basin Management Plan

These categories are part of the reporting in the international River Basin Management Plans. The categories show some overlap with the criteria for operational cooperation as defined for this indicator (see Section 1.2). The coordination in the four river basin districts (RBD) in The Netherlands all fall under category 1 as for all of the RBDs, an international agreement exists, a River Basin Organisation exists, and an International River Basin Management Plan (RBMP) has been drafted in coordination with the neighbouring countries. The International RBMPs of Scheldt, Rhine, Meuse and Ems specifically mention measures related to groundwater, but these are not described in detail[2].

International Commission for the Protection of the Rhine (ICPR)

On 11 July 1950, Germany, France, Luxemburg, the Netherlands and Switzerland founded the ICPR in order to analyse the pollution of the Rhine, to recommend water protection measures, to harmonize monitoring and analysis methods and to exchange monitoring data. Today, international cooperation in environment and water protection is considered to be obvious[3]. Currently, all countries that share the river basin coordinate and develop a common RBMP. Also, a common Flood Risk Management Plan is developed.

International Meuse Commission (IMC)

In 1994, the governments of the French Republic, the Walloon Region, the Flemish Region, the Brussels Capital Region and the Kingdom of the Netherlands signed the Treaty on the protection of the Meuse in Charleville-Mézières and set up an International Commission for the Protection of the Meuse (ICPM). The International Meuse Commission (IMC) was established in 2002 with the signing of the Meuse Treaty (Treaty of Ghent). The aim of the Treaty is to achieve sustainable and integrated water management of the international river basin district of the Meuse[4].

International Scheldt Commission (ISC)

The International Scheldt Commission (ISC) is an intergovernmental body for sustainable management of the Scheldt river basin district. In 1994, the governments of the French Republic, the

[2] http://ec.europa.eu/environment/water/water-framework/pdf/3rd_report/CWD-2012-379_EN-Vol3_NL.pdf
[3] http://www.iksr.org/en/international-cooperation/about-us/history/index.html
[4] http://www.meuse-maas.be/Accueil.aspx

Walloon Region, the Flemish Region, the Brussels Capital Region and the Kingdom of the Netherlands signed the Treaty on the protection of the Scheldt in Charleville-Mézières and set up an International Commission for the Protection of the Scheldt (ICPS). The 2001 Ministerial Declaration of Liège and the 2002 Treaty of Ghent marked the setting up of the International Scheldt Commission[5].

Permanent Dutch-German Ems Commission

The Permanent Dutch-German Ems Commission was established on the basis of article 29 of the 1960 Ems-Dollart Treaty between the Netherlands and Germany. The first meeting of the Ems Commission took place on 30 October 1963 in Emden (Germany). Its purpose is the promotion of cooperation in good neighbourliness to safeguard the navigation towards and from the Dutch and the German harbours and the sea.

For the international co-ordination of the implementation of the European Union Directives in the Ems RBD, the International Steering Committee Ems was established. Especially for the Ems-Dollard area the Dutch-German Ems Commission (subcommission G) is involved as well.

Computation of the indicator

Surface water

Table 1 provides an overview of the four river basin districts in The Netherlands, the surface and the percentage of the Dutch territory that each RBD covers. Each RBD has an operational arrangement for water cooperation in the form of a commission that have formal communications, has coordinated water management plans, and has a regular exchange of data and information. The respective RDBs cover the whole of The Netherlands. It is therefore concluded that the value of the indicator 6.5.2 for surface water in The Netherlands is 100%.

RBD	Name	Size (km^2)	Percentage of NL territory	Percentage of international RBD	Countries sharing RBD
NLRN	Rhine	28,917	69	17.1	AT, BE, CH, DE, FR, IT, LI, LU
NLSC	Scheldt	3,263	8	5.5	BE, FR
NLMS	Meuse	7,474	18	21.8	BE, DE, FR, LU
NLEM	Ems	2,478	6	13	DE

Table 1: *Overview of the Netherlands' River Basin Districts*[6]

Groundwater

Groundwater bodies in The Netherlands are divided over the respective RDBs as shown in Figure 1. International coordination of these groundwater bodies, where relevant, is mandated to the respective international river commissions. Table 2 provides an overview of the sum of the surface area of the groundwater bodies in each RBD. The groundwater bodies extend at different depths and therefore the total area may extend over the surface area of the RBD.

RBD	Name	Size (km^2)
NLEM	Ems	2,313
NLMS	Meuse	10,119
NLSC	Scheldt	3,980

[5] http://www.isc-cie.org/
[6] http://ec.europa.eu/environment/water/water-framework/pdf/3rd_report/CWD-2012-379_EN-Vol3_NL.pdf

NLRN	Rhine	23,517

Table 2: *Overview of the Netherlands' groundwater bodies*[7]

Figure 1: *Netherlands EU-WFD River basin districts and Groundwater bodies RBMP 2015-2021*[8]

Two groundwater bodies are characterised as being transboundary, both located in the Scheldt RBD. The total area of these two ground water bodies is 1,597 km^2. The water cooperation of these two bodies is covered through the International Scheldt Commission. Nevertheless, any necessary coordination on groundwater at the transboundary level, also in the other RBDs, is covered by the respective international river commissions.

As the water cooperation on groundwater is covered through the international river commissions and all groundwater bodies fall under one of these commissions it is concluded that the value of the indicator 6.5.2 for groundwater in The Netherlands is 100%.

Calculation of the indicator

The calculation of the indicator requires the following steps:

- *Identify all transboundary basins (both surface waters and groundwater)*

  Four transboundary basins are identified as well as two groundwater bodies.

- *Calculate the extent in the country of each transboundary basin (and the total area in the country of all transboundary basins = sum of the catchment areas of all transboundary surface waters + sum of the extent of all transboundary aquifers)*

  The sum of the total area of all transboundary waters equal the total of the country (Table 1).

[7] Water quality portal of the 'Informatiehuis Water'
http://www.informatiehuiswater.nl/pagina/producten/waterkwaliteitsportaal.html
[8] Water quality portal of the 'Informatiehuis Water'
http://www.informatiehuiswater.nl/pagina/producten/waterkwaliteitsportaal.html

- *For each transboundary basin (both surface waters and groundwater) determine whether there is an operational arrangement for transboundary cooperation*

  For each transboundary basin an operational arrangement for transboundary cooperation is present.

- *Calculate the ratio: sum of the areas in the country of transboundary basins covered by an operational arrangement for transboundary cooperation over total area in the country of all transboundary basins*

  All transboundary basins are covered by an operational arrangement for transboundary cooperation. The overall value of the indicator consequently is 100%.

Some considerations on the proposed indicator

Concerning data collection and ease of application of the indicator

Data collection for surface water in general should not be problematic as usually numbers are available, either at national or international level. And as it is not the exact surface area data that are used for the indicator but their percentages, the order of magnitude is much more important than the exact figure. For groundwater, this information may not always be available.

The accuracy of the data may be variable, as data are collected for different purposes and mismatches may occur. In the case of The Netherlands, various numbers of the total catchment area are available that are not exactly the same. For instance, adding up the surface areas of drainage areas that are inventoried for surface water emission registration purposes (Figure 2) lead to a total surface area per RBD that are higher than the numbers as reported in the national River Basin Management Plan, among others because the coastal area is included as drainage area. The differences are however small and will not lead to substantially different outcomes of the indicator. However, such differences will appear and it is therefore important for comparability that the surface areas of different transboundary basins as used for the calculation of this indicator come from the same data source.

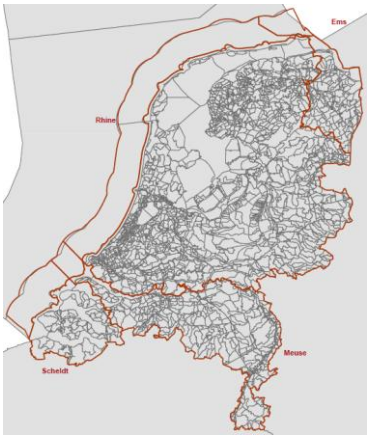


Figure 2: *Drainage areas for emission registration and River Basin Districts*[9]

Determination whether there is an operational arrangement for transboundary cooperation according to the criteria as mentioned can be subjective to some extent. Overall, the criteria help to determine whether the arrangement is operational.

The calculation of the indicator after data collection is quite straightforward and should not lead to difficulties.

Concerning the relevance of the indicator

The indicator provides information on the level of transboundary cooperation where this is wanted. As already indicated, the indicator does not show if the whole of a transboundary basin or just a part of the basin is covered through an operational arrangement.

Next to this, the area covered by transboundary basins relative to the overall surface area of the country is important information. For countries where the total surface area is covered by transboundary basins, like The Netherlands, transboundary cooperation is of high importance. On the other hand, for countries that have a transboundary basins covering only a minor part of the total surface area of the country transboundary cooperation may not be essential, especially when the transboundary basin lies in a part of the country where there are virtually no activities related to water management. Possibly, reporting on the indicators should be done in classes (e.g. < 5%; 5-30%; 30-60%; >60% (percentage transboundary basin area relative to the countries' total surface area)). A first global assessment should analyse such outcomes to determine if the indicator should compensate for the relative importance of transboundary cooperation in a country in relation to the overall surface area of the country.

Another issue that can be raised is if the indicator provides sufficient incentives for improving cooperation. The criteria for determining if an operational arrangement exists lead to a yes/no answer. A country that has just started implementing an arrangement will not gain a positive score until the arrangement is fully operational according to the criteria. An alternative could be to use the criteria as steps in a process. Meeting only one criterion should lead to gaining some points, meeting more criteria to more points and in the end meeting all criteria to the maximum points. In this way, progress in transboundary cooperation can be shown through the indicator in more detail.

Table 3 shows an example of how the value of the indicator develops over time for The Netherlands for the proposed indicator and if the criteria are used as steps in the process.

Year	Basin name	Size (km^2)	Percentage	Number of criteria met	Indicator value as proposed	Indicator value alternative
1990	Rhine	28,917	69	4		69(4*0,25)+8(0*0,25)+
	Scheldt	3,263	8	0	69*1+8*0+18*0+6*1=	18(0*0,25)+6(4*0,25)=
	Meuse	7,474	18	0		
	Ems	2,478	6	4	**75%**	**75%**

[9] Water quality portal of the 'Informatiehuis Water'
http://www.informatiehuiswater.nl/pagina/producten/waterkwaliteitsportaal.html

2000	Rhine	28,917	69	4		69(4*0,25)+8(2*0,25)+
	Scheldt	3,263	8	2	69*1+8*0+18*0+6*1=	18(2*0,25)+6(4*0,25)=
	Meuse	7,474	18	2		
	Ems	2,478	6	4	**75%**	**88%**
2016	Rhine	28,917	69	4		69(4*0,25)+8(4*0,25)+
	Scheldt	3,263	8	4	69*1+8*1+18*1+6*1=	18(4*0,25)+6(4*0,25)=
	Meuse	7,474	18	4		
	Ems	2,478	6	4	**100%**	**100%**

Table 3: *Example of how the indicator value develops for the proposed indicator and if the indicator uses the criteria as steps in a process*[10]*.*

The downside of this approach is that the 'operationality' of the arrangement becomes more subjective and disputable.

Target 11.5

Input from Deltares, CBS (Statistics Netherlands), and the Ministry of Infrastructure and Environment discussing target 11.5 on water related disasters.

This indicator is mostly discussed in relation to the Sendai Framework for Disaster Risk Reduction (DRR). The Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted at the Third UN World Conference in Sendai, Japan, on March 18, 2015. It is the outcome of stakeholder consultations initiated in March 2012 and inter-governmental negotiations from July 2014 to March 2015, supported by the United Nations Office for Disaster Risk Reduction at the request of the UN General Assembly.

At the moment the Sendai Framework is looking for a good way to report the monitoring procedures and data, which will strive for improvement.

- At the moment they mainly focus on the questions how and what. May next year they will analyse how to improve the chosen methods.
- The Sendai Framework is interested in the information available in the Netherlands, and whether or not this information will be sufficient to provide enough data to monitor the indicator.
- There has been added that prevention and investments in DRR should be followed and used as indicators. There are some difficulties in interpretations between countries about the definition of prevention. Furthermore the question arises whether this should be reported qualitatively or quantitatively. Many countries in the Global South already need to deliver qualitative reports to disaster funds.
    - CBS has information and data on investments of the ministry to destinations like dikes and the building and maintenance of dikes. However, this information is used for other purposes and is thus not yet analyzed to be used in this way.

[10] The example assumes that in 1990, the agreement for the Ems and Rhine met the four criteria while there was virtually no cooperation on the Meuse and Scheldt. In 2000, there was a joint body and formal communication for Meuse and Scheldt, but no coordinated plan and no formalised regular exchange of data and information. The calculation of the indicator is done by multiplying the number of criteria that are met by 0,25.

- Insurances might be able to provide much information on disasters and investments for prevention as well.
    - CBS might have information on and/or contact with insurances.
- The deadline to find if the Netherlands would be able to provide information on investments is in November. Preferably the information would be available in September already.
- The Sendai Framework indicators cannot be decided upon before October (IAEG meeting).
- They also search for information on damage to critical infrastructure (schools, hospitals, roads and perhaps electricity, drinking water and water transport facilities)
    - CBS has information on hospitals and roads.
    - Electricity infrastructure information can be found with Tenet.
    - Drinking water infrastructure information can be found with Vewin.
    - Water transport infrastructure information can be found with Rijskwaterstaat.
    - Security regions (veiligheidsregio's) also keep track of this after a disaster.
- There is not yet a framework in the Netherlands to keep track of disasters and their effects. We are lucky in this region and have had no need for this until now.
- CBS has coupled economic data with flood models of Deltares around 7 years ago. This could be performed more often, although a yearly repetition seems overdone since economic data and flooding risks do not change that fast.

Can the Netherlands provide the necessary data?

Looking at the existing publications and information contained in those publications, this does not seem to be a problem.

Is this a fitting indicator

The goal of the target is to reduce the amount of victims and damage. The question is whether the reduction is sufficiently mapped with the chosen indicator (amount of deaths per 100.000 inhabitants and damage over BNP). Especially for a country as the Netherlands.

- With the chosen indicator there will only be data if there has been a disaster. In the Netherlands it has not occurred anymore for 53 years. Due to our high level of prevention this indicator thus only show that there are no victims, assuming a regular measurement (once or every two years). What you will not see is all the efforts that are made to become more safe.
- This indicator and number is strongly influenced by the weather, which can be very changeable and will most likely differ for every area and year.
- It is unsure however whether an indicator can include prevention or risk reduction to give insight in such measures, and if it can be reached by other countries.
- Perhaps these extra indicators can be included into the ladder approach; if countries are able to fulfill it, they should.
    - It might be interesting to then include flood risk maps for example.
    - Or perhaps countries have flood risk management plans available that could function as indicator.

Other available data or indicators

- At the International Committee for Protection of the Rhine (ICBR), which has an international flood risk management plan for the complete transboundary catchment, they look at the risk and as step in between they include damage/victims/affected people. By including risk you can also get an image of the events that are not often occurring, which will ensure that we also include the new norms of the LIR (individual risks for passing).
- At the ICBR Expert group they do not take the amount of victims as indicator, but they use a couple of indicators that influence the potential amount of victims. These are availability of run-off expectations, the quality of those, communication channels, and crisis management. Eventually this results via calculations into an estimation of an evacuation fraction.
- For the Netherlands we can produce a number for the potential victims based on the evacuation percentage. However, this probably deviates strongly from what other countries can deliver. Furthermore we can determine "persons affected", though they need to define better what is exactly meant with that term. If the total amount of people in the flooded area is meant, than the above mentioned number will increase over the years. The effect of measures cannot be seen then, except if we all start living in the Veluwe. It might be that the indicator will not show the improvements that we in the Netherlands are striving for.

Annex 6: Additional information

Overview of CBS analysis of data gathered

The information below is gathered by the CBS for the IHP-HWRP workshop. It is clear that 6.3.1, 6.3.2 can already be measured. 6.4.1. and 6.4.2 can be calculated by the CBS. The expectation is that for 6.5.1, 6.5.2, and 6.6.1 data still needs to be gathered.

Indicator used by CBS	**Updated indicator**	**Data available**
6.3	"By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and increasing recycling and safe reuse by [x] per cent globally"	
6.3.1 Percentage of waste water safely treated	6.3.1 Proportion of wastewater safely treated	All sewage is treated in a wastewater treatment plant (WWTP). Over the country a number of 339 WWTPs are recorded (situation 2014). Statistics Netherlands (CBS) collects and processes the data from all these WWTPs, with respect to the design of these installations, the annual influent and discharge of wastewater and the substances it contains, the treatment efficiency, the resulting sludge and related energy use. The volume of wastewater collected by the sewer system (pipes) is completely processed at the Waste water treatment plants. CBS record and produces figures for the full population of WWTPs in the country. See also: http://statline.cbs.nl/Statweb/ , search by keyword 'stedelijk afvalwater' ('urban waste water'). CBS also collects data and generates information on the treatment of industrial waste water produced by companies, search in StatLine for the term 'afvalwaterzuivering' ('waste water treatment').

		There are several other organizations in the country with information on emissions to water, the most important is the National Emission Inventory database, called the Pollutant Release and Transfer Register (PRTR). See; www.prtr.nl. It is managed by RIVM and the figures are supplied for this database by organizations like TNO, RIVM, Alterra, CBS, Ministry of Infrastructure & Environment (Rijkswaterstaat), Rijksdienst voor ondernemend Nederland (Netherlands Enterprise Agency, RVO.nl) and Deltares. For more information, backgrounds and figures see: www.emissieregistratie.nl or http://www.emissieregistratie.nl/erpubliek/bumper.en.aspx.
6.3.2 Percentage of receiving water bodies with ambient water quality not presenting risk to the environment or human health	6.3.2 Proportion of bodies of water with good ambient water quality	All sewage is treated in a wastewater treatment plant (WWTP). Over the country a number of 339 WWTPs are recorded (situation 2014). Statistics Netherlands (CBS) collects and processes the data from all these WWTPs, with respect to the design of these installations, the annual influent and discharge of wastewater and the substances it contains, the treatment efficiency, the resulting sludge and related energy use. The volume of wastewater collected by the sewer system (pipes) is completely processed at the Waste water treatment plants. CBS record and produces figures for the full population of WWTPs in the country. See also: http://statline.cbs.nl/Statweb/ , search by keyword ‘stedelijk afvalwater’ (‘urban waste water’). CBS also collects data and generates information on the treatment of industrial waste water produced by companies, search in StatLine for the term ‘afvalwaterzuivering’ ('waste water treatment'). There are several other organizations in the country with information on emissions to water, the most important is the National Emission Inventory database, called the Pollutant Release and Transfer Register (PRTR). See; www.prtr.nl. It is managed by RIVM and the figures are supplied for this database by organizations like TNO, RIVM, Alterra, CBS, Ministry of Infrastructure & Environment (Rijkswaterstaat), Rijksdienst voor ondernemend Nederland (Netherlands Enterprise Agency, RVO.nl) and Deltares. For more information, backgrounds and figures see: www.emissieregistratie.nl or http://www.emissieregistratie.nl/erpubliek/bumper.en.aspx.
6.4	“By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity”	
6.4.1 Water Stress	6.4.1 Change in water-use efficiency over time	CBS produces on an annual basis the water statistics and physical water flow accounts. This data represent the relevant part of the physical supply and use tables. We have also data on fresh water balance or in other terms the Physical water asset accounts for

		the country, these represent the fresh water flows that enter the country via rivers from neighbouring countries and via precipitation at the Dutch territory and the water that leaves the country via Evapotranspiration and discharge to the North Sea. Together this data allows to calculate the indicator that shows the water stress situation for the country, via the indicator 6.4.1 Water Stress.
6.4.2 Water Productivity	6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	With the data compiled on an annual (or eventually biennial basis), on physical flows, this allows for comparison with the economic data annually produced at the macro and meso-level (industry-level). Together this indicator 6.4.2 Water Productivity can be calculated or derived both at the macro and meso-level.
6.5	"By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate"	
6.5.1 Status of IWRM Implementation	6.5.1 Degree of integrated water resources management implementation (0- 100)	We wonder how both indicators are measured? Is at the level of the total national territory or at the level of the 7 (sub-) river-basin, or as percentage of the number of water bodies or else? For these two indicators CBS has no data. Probably can be found with the Ministry of Infrastructure & Environment (I&M), The Union of Dutch water Boards, Association of Water and Public Works (Rijkswaterstaat). To our knowledge, the impression is that IWRM is already largely implemented throughout the country. There is plenty of cross-border cooperation through the international river basin commissions, Moreover, the water supply companies also has cross-border cooperation, for instance RIWA.
6.5.2 Availability of operational arrangements for trans boundary basin management	6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation	
6.6	"By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies"	
6.6.1 Change in wetlands extent over time (% change over time)	6.6.1 Change in the extent of waterrelated ecosystems over time	No CBS data yet. But in 2016 CBS with partner organisations and Wageningen University, will compile Ecosystem Accounts for the Netherlands, with detailed land mapping. This will allow to monitor this indicator. For the indicator 6.6.1 specific: it might for the time-being, for this purpose, that use can be made of the existing land cover and land use maps and data available with and reported by CBS. Specific 6.6.1: this might be discerned with a land cover map.
11.5	"By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations"	

11.5.1 Number of people killed, injured, displaced, evacuated, relocated or otherwise affected by disasters	11.5.1 Number of deaths, missing persons and persons affected by disaster per 100,000 people	This is not entirely applicable for the recent history, luckily the Netherlands have not experienced major disasters. The most recent and large-scale flood in the river Delta of the North Sea disaster occurred in February 1953. More recent there was high-tide in 1995, more inland with potential danger from the large rivers that enter the country with large-scale evacuations. But for the latter but no people or buildings seriously hit by floods or something similar. In 2009 with the environment accounts we analysed the area in the Netherlands that are prone to flooding (together with Deltares). We then actually looked at the percentage below sea level, but also to the areas which are potentially at risk for flooding. We analysed the share of the GDP that is generated in these areas, as well to the value of the assets (houses, buildings, constructions), that are situated in these areas. Although some time ago, one may well expect that these figures will not change severely over time. See: http://www.cbs.nl/nl-NL/menu/themas/macro-economie/publicaties/artikelen/archief/2009/2009-2935-wm.htm, and/or: http://www.cbs.nl/nl-NL/menu/themas/macro-economie/publicaties/publicaties/archief/2009/2008-c167-pub.htm
11.5.2 Number of housing units damaged and destroyed	11.5.2 Direct disaster economic loss in relation to global GDP, including disaster damage to critical infrastructure and disruption of basic services	

Indicator 6.3.2: A memo from Deltares

Introduction: Fish as water quality indicators

Fish needs oxygen to breathe, needs food, and needs to reproduce, and fish are relatively long living aquatic organisms. Therefore fish are potentially excellent indicators for the water quality representative for a longer time scale. A number of WISER-documents (EU project) provide an overview of fish-based indicators developed in Europe and North America (Pedron et al. 2013; Perez-Dominguez et al. 2012). The use of such indicators is simply justified like this: “The presence of any fish species indicates that the basic ecological requirements (food, shelter, reproduction) and a minimum of water quality or habitat availability are being met. Likewise, finding species with stricter habitat requirements indicates better conservation and of key species indicates better conservation status and hence less disturbed conditions for that area”. This basic principle has been used to define habitat integrity in monitoring programs. Many metrics have been developed to indicate status as influenced by a variety of anthropogenic pressures:

- Hydromorphological pressures
  - Channeling and dredging (main river channel)
  - Land reclamation (flood plains, estuaries)
  - Flow manipulations (dams etc.)
- Chemical and physical pressures
  - Chemical pollution
  - Eutrophication

    - Increasing water temperature
- Biological pressures
    - Overfishing
    - Invasive species

Most indices reviewed are multi-metric, combining several metrics in a number of categories:

- Species composition
    - Tolerant / intolerant species
    - Ecological niches (e.g. phytophilic species)
    - Trophic composition (omnivores, piscivores etc.)
    - Migrating species
- Abundance (numbers / biomass dominant, native, etc.)
- Diversity (indices; Shannon-Weaver etc.)
- Condition/reproduction
    - Health (% with disease, anomalies)
    - Length distribution (fry, year-classes)

Different metrics may be related to different pressures and specific indices may be selected to target specific pressures. A metric like the share of migratory species may indicate hydromorphological pressures, metrics like total abundance, share of phytophilic or tolerant species may indicate chemical or physical pressures, length distribution may indicate biological pressures. Pedron et al. (2013) summarize and compare a number of multi-metric indices developed for North American (incl. Mexican) and European waters, with a lot of emphasis on identification of and comparison with reference conditions and based on intensive, standardized sampling. Many states, thus, have developed indicators based on fish which may be used for estimation of 'ambient water quality'.

While these indices are probably too elaborate at this time for status assessment of wetlands in many other countries (e.g. in the southern hemisphere countries), separate metrics may be used in combination with data of hydromophological, chemical and physical parameters to help assess water quality of wetlands in the southern hemisphere or countries without fish index:

Hydromorphological pressures

Proposed indicator: presence (number of species) or share of migratory fish species or changes in these parameters.

Migratory fish species in the fish community of a riverbasin may be lost because of the loss of spawning grounds (reclamation, deforestation and cultivation of floodplains), disconnection of floodplain waters from the main channel (channeling, dredging) or construction of dams etc. on the migration route.

Freshwater fish are ten times more likely to become extinct than marine fish (Carolsfeld et al. 2003). And among freshwater fish, migratory species are most at risk, particularly the species that feed at the lower trophic levels, are large, grow slowly and mature late.

Both in the northern hemisphere and, increasingly, in the southern hemisphere, there are many examples of negative effects of these pressures on populations of migratory species, including

disappearance of species from particular basins. Some of these species are (were) of significant commercial importance. In Carolsfeld et al. (2003) changes of migratory fish populations in South America are described, but a summary of examples of changes in North America, Europe, Africa and Asia is also given. Several species have disappeared from reservoirs or river basins because migration routes have been blocked by dams. Examples given are of decrease and disappearance of stocks of species of salmon, shad, sturgeon and lamprey etc. in North America and Europe, giant catfish (Mekong) and species of shad and carp in Asia and several species of migratory fish in basins of South American rivers like the Parana. In Africa, relatively few dams have been built so far, but the risks are considerable as for example in the Niger River basin there are as many as 130 species with some form of seasonal migration. Several populations have already decreased in size because of disruption of migration. *Clarias gariepinus*, a predatory catfish, is one of the commercially important species that are vulnerable because of their dependency on vegetation in flooded areas during the rainy season for spawning.

Chemical and physical pressures

Proposed indicator: presence and abundance of live fish, age and maximum size, occurrence of events of mass mortality, diversity, share of phytophilic species, changes in these parameters

Many fish-based indicators in the northern hemisphere focus on pressures on water quality, particularly eutrophication or acidification. Eutrophication is a world-wide problem, which may result in algal blooms and loss of light and aquatic vegetation. More severe cases of eutrophication may result in production of cyanobacterial toxins and in oxygen depletion. Eutrophication can be monitored directly by recording concentrations of nutrients and related parameters, but such data are not always easily available on tropical wetlands.

Baseline water quality monitoring as proposed under GEMI indicator 6.3 includes monitoring of N, P, oxygen, conductivity and E. coli. In southern hemisphere countries, information on each of these five parameters may not be easily available for all selected or representative waters.

- N/P concentrations: cost of analysis may be a problem, if available often either only P or only N
- E. coli: cost of analysis, sampling problems (contamination of samples)
- Conductivity: availability of equipment
- Oxygen: availability of equipment, seasonal and daily patterns (low concentrations at night or in dry season), vertical patterns (stratification) often missed

Also, these are just five aspects of a multitude of parameters affecting wetland status. Information on the impact of pressures regarding water quality may be derived from indicator 6.6 on wetland ecology. But where standardized monitoring data is not available, this combination of indicators may be supplemented by more basic ecological information.

Eutrophication is often reflected in increased fish biomass, dominance of eurytopic (indifferent) species and decrease of species diversity. Production of cyanobacterial toxins and oxygen depletion may be reflected in events of mass mortality of fish. Metrics involving species composition are likely to be less indicative in tropical lakes than in temperate waters, because while the number of species in the tropics is relatively high, the trophic and ecological guilds are less clearly separated (Lazaro et

al. 2003). There is generally competition between small fish and zooplankton for sestonic food, resulting in lack of larger zooplankton. Communities are dominated by omnivores, with a less prominent role for large piscivores (number of species, biomass). Jeppesen et al. argue that this also restricts the possibilities for restoration: “A significant difference in biological interactions in temperate versus subtropical-tropical lakes renders it difficult directly to apply the biological restoration methods. These include often higher dominance and abundance of small fish, higher aggregation of fish in vegetation, higher number of fish cohorts per year, higher degree of omnivorous feeding by fish and less piscivory in subtropical and tropical lakes than in temperate lakes.”

The value of metrics using trophic composition or ecological niches depends on the possibility of defining distinct clusters of species with a strong indication of wetland characteristics like the presence of submerged vegetation. This will have to be assessed per basin or zoogeographical region, perhaps linked to wetland typology. A metric involving age is also harder to develop than in temperate waters because in tropical waters fish keep growing all year and there are often several cohorts of fry each year. As consequently there is no clear distinction between year-classes. The only indication of age is size itself, and data on the relationship between the two parameters may not be available for all species.

Simple, possibly questionnaire-like metrics however, should be able to give a first impression of the presence of pressures with a strong impact. The most basic metrics in this respect are registration of the presence of live fish with a simple indication of species composition, and registration of events of mass mortality. The percentage of fish with diseases, tumors or other anomalies may be another useful metric.

Fish in GEMI indicator 6.6

Once this provides increasing insight, metrics may be upgraded, possibly as part of a biological monitoring network under GEMI Indicator 6.6.1: Change in the extent of water-related ecosystems over time. Under this indicator a step-wise increase of monitoring coverage is suggested:

- Change in spatial extent of water-related ecosystems
- Change in quantity of water contained within these ecosystems
- Change of state of ecosystem health

A methodology guide is being finalized to be used in PoC countries from 2017, but the assessment of “ecosystem health” has not been addressed in detail yet.

Biological pressures

The impact of fishery can be monitored by recording trends in catches and in length distribution. Overfishing may result in reduction of catches and the size of the fish caught, and finally in depletion of stocks.

Invasive species are a pressure in itself, often with a larger impact if it acts in combination with other pressures. This pressure can be monitored by recording the abundance of non-indigenous species and information on deliberate stockings.

Summary of potential metrics

- Abundance
- Presence of live fish
- Registration of mass mortality events
- Number of indigenous species
- Number of non-indigenous species
- Species composition
- Presence / share of indicative species (intolerant species, phytophilic species)
- Presence / species of migratory species
- Condition / reproduction
- Share of fish with diseases, anomalies
- Length distribution of selected species

Monitoring and data collection

In states where indicators based on fish are in use, monitoring programs including their (international) protocols are in force. But when this is not the case, simple indicators – like proposed here – require only simple data collection. For example, part of the information suggested may be collected from fish markets, in case the origin of the fish in the market is clear. A starting point may be the network used by the FAO (2016, in series) to produce its yearly status report on world fisheries. Details on species composition and length distribution may be recorded at fish markets linked to particular wetlands. Information on mortality events should be collected from local fishermen. Those fishermen may also be approached with questionnaires on other historic developments, or they can be approached for basic registration of catches in return for a small fee.

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