UN-Water Task Force on Indicators, Monitoring and Reporting

Final Report

Monitoring progress in the water sector: A selected set of indicators

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Methodological elements are available in a companion document.
The annexes on Indicators in use are available in a separate document and contain illustrations of indicators use, detailed methodology sheets.
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Glossary

The key terms used in the report are defined below on the basis of existing glossaries and the work of synthesis done by the WBCSD and partners. Where appropriate, references for the definitions are provided. Neither the list of terms or references for those terms should be considered exhaustive. Feedbacks and suggestions are encouraged as it would be valuable for the work on a common glossary, and ultimately to those practicing or entering the field of sustainable water management.

Abstraction	removal of water from any source, either permanently or temporarily. Note: abstracted water may not be consumed. See withdrawal.	GH
Agricultural water withdrawal (km3/year)	The annual quantity of water withdrawn for agricultural purposes. This includes water used for irrigation and livestock watering. It includes water drawn from renewable freshwater resources as well as through over-abstraction of renewable groundwater or withdrawal of fossil groundwater, as well as the use of agricultural drainage water, desalinated water and treated wastewater.	Aquastat
Aquifer	permeable water bearing formation capable of yielding exploitable quantities of water	GH, Aquastat
BOD	the biological oxygen demand (BOD) measures the strength of an organic waste by the amount of oxygen consumed in breaking it down. A sewage overlaod in natural waters exhausts the water's dissolved oxygen content. wastewater treatment by constrast reduces BOD.	World Bank
Blue water	the liquid flowing in rivers, lakes and aquifers	SIWI et al. 2005.
Context	Description of the production capacity of a territory (such as water storage facilities)	TFIMR-2009
Data item	An occurrence of a data element – a term used by statisticians to refer to parameters or variables	UNSD
Degradation	a concept related to the lowering of a water body	WBCSD
Depletion	continued withdrawal of water from groundwater or other water body at a greater rate that the rate of replenishment.	GH, Aquastat
Domestic water withdrawals (km3/year)	The annual quantity of water withdrawn for domestic purposes. It includes renewable freshwater resources as well as any over-abstraction of renewable groundwater or withdrawal of fossil groundwater or the use of desalinated water or treated wastewater. It is usually computed as the total water withdrawn by public distribution network. It can include that part of industries that is connected to the network.	Aquastat
economic water scarcity	It results from insufficient human capacity or financial capacity to provide water (lack of infrastructures to store, transport to where water is needed)	CA.2007
ecosystem services	The benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious, and other non-material benefits. The classification of water as a provisioning service rather than a regulating service is debated, but this does not affect its general meaning.	Millenium ecosystem assessment
environmental flow	A concept related to the quality and quantity of water within any surface or subsurface water body that provides water flows sufficient to maintain ecosystem functions and the goods and services dependent on those functions.	Dyson et al. 2003
Exploitable water resources	(Also called manageable water resources or water development potential): The water resources considered to be available for development under specific social, economic and environmental conditions. The computation of exploitable water resources considers factors such as dependability of the flow, extractable groundwater, and minimum flow required for non-consumptive use.	FAO, 2003
Functioning	Physical and economic flows occurring during a period of time on a territory (such as water used by different sectors)	TFIMR-2009
Freshwater	Naturally occuring water having a low concentration of salts, or generally accepted as suitable for abstraction and treatment to produce potable water.	GH, Aquastat

Governance	The web of policies, institutional arrangements and management instruments mobilized by decision-makers who impact the functioning of the production system of a territory	TFIMR-2009
Green water	water in soils and vegetation in the form of soil moisture and evaporation.	SIWI et al.2005
Green water footprint	The volume of rainwater and irrigated water that evaporates during the production process. This is mainly relevant for agricultural products (e.g. crops, trees) where it refers to the total rainwater evapotrasnpiration (from fields and plants)	Gerbens et al. 2008
Groundwater	Subsurface water occupying the saturated zone	UNESCO
Index	A set of aggregated or weighted parameters or indicators that describes a situation	OECD
Hydropower	it is electricity produced by hydroelectric power plants	WB/WDI
Indicator	A parameter or a value derived from parameters, which points to, provides information about, and describes the state of a phenomenon/environment/area, with a significance extending beyond that directly associated with a parameter value.	OECD
Industrial water withdrawals	The annual quantity of water withdrawn for industrial purposes. Usually this refers to the self-supplied industries not connected to any distribution network. It includes renewable freshwater resources as well as any over-abstraction of renewable groundwater or withdrawal of fossil groundwater or the use of desalinated water or treated wastewater. In some situations, industrial water withdrawals are included in the domestic water withdrawal category.	Aquastat
Fossil water	Water infiltrated into an aquifer during an ancient geological period under climatic and morphological conditions different from the present and stored since that time. see. non renewable water.	GH
Reservoir	body of water, either natural or man made, used for storage, regulation and control of water resources.	GH
Renewable water	A concept referring to water quantities that are maintained by the hydrologic cycle and thus renewed on a predictable basis.	GH
Non-renewable water	Groundwater bodies (deep aquifers) that have a negligible rate of recharge on the human time-scale and thus can be considered as non-renewable. While renewable water resources are expressed in flows, non-renewable water resources have to be expressed in quantity (stock). See also fossil water.	Aquastat
Non-point source pollution	Non-point sources are pollutants mobilized by precipitation as it flows over the land and infiltrates the soil.	WWDR3
Parameter	A property that is measured or observed.	OECD
Precipitation	(1) Liquid or solid products of the condensation of water vapor falling from clouds or deposited from air on the ground. (2) Amount of precipitation (as defined under (1)) on a unit of horizontal surface per unit time.	GH
Performance	Judgment of the functioning of a production system related to explicit objectives of the system or recognized norms or standards	TFIMR-2009
performance indicator	Qualitative or quantitative information about results or outcomes associated with and effort that is comparable and demonstrates change over time.	GRI
physical water scarcity	It occurs when the demands outstrips the lands availability to provide the needed water (dry areas are scarce are not necessarily water scarce)	CA,2007
In stream water use	The use of water in situ (e.g. for a dam for hydroelectric power or navigational transport on a river.	Bayart et al. 2008
Off stream water use	the use of water that requires removal from the natural body of water or groundwater aquifer (e.g. pumping or diversion for municipal, agricultural or industrial uses)	Bayart et al. 2008
Point source pollution	Point sources are pollutants from pipeline and other readily identifiable sources.	WWDR3
Pollution	Chemicals or other substances in concentrations greater than would occur under natural conditions.	WWDR3
Sewage treatment	The removal of physical, chemical and biological contaminants from wastewater, both surface drainage and domestic, using physical, chemical and biological processes.	OECD
SMART indicators	Indicators selected as: S Specific; M Measurable; A Achievable; R Relevant; T Time-bound	

Surface water	water that flows over and is stored on the ground surface	UNESCO
Sustainable development	Political compromise between social equity, economic efficiency and environmental sustainability (identified as IWRM for the water sector).	TFIMR-2009
Treated wastewater	Water that has received primary, secondary or advanced treatment to reduce its levels of pollutants or health hazards and is subsequently released back to the environment. It can also be a form of effluent.	OECD
TARWR	Total actual renewable water resources: defined as the sum of internal renewable water resources (IRWR) and external renewable water resources (ERWR), taking into account the quantity of flow reserved for upstream and downstream countries through formal or informal agreements or treaties, and the possible reduction of external flows due to upstream water abstraction. IRWR comprise the average annual flow of rivers and recharge of groundwater (aquifers) generated from endogenous (internal) precipitation. ERWR are the portion of the country's renewable water resources that is not generated within the country, including inflows from upstream countries and a portion of border lakes or rivers. TARWR distinguishes between the natural situation, which corresponds to a situation without human influence(natural renewable resources), and the current or actual situation.	FAO,2003
Total water withdrawals (km3/year)	The annual quantity of water withdrawn for agricultural, industrial and domestic purposes. This is either expressed as a single total (if no desegregation is available by sectors of use) or as the sum of agricultural, domestic and industrial withdrawals. It does not include other categories of water used, such as for cooling of water plants, navigation, recreation, mining, etc, which are sectors that are characterized by a very low net consumption rate.	Aquastat
Variable	Something that varies or is prone to variation. Parameters are also variables.	OECD
Virtual water	The virtual water content of a product (a commodity, good or service) is the volume of freshwater used to produce the product, measured at the place where the products were actually produced (production site definition).	Hoelstra and chapagrain, 2007.
Water availability	A concept expressing the amount of water available at a location.	Wbcsd
Water quality	Water quality refers to the physical, chemical, biological and organoleptic (taste related) properties of water	OECD
Water scarcity *Water shortage* *Water stress*	Terms such as water shortage, scarcity and stress are commonly used interchangeably. they all relate to an excess of demand over available supply. Water scarcity is a relative concept that can occur at any level of supply and demand. It refers to an imbalance of supply and demand under prevailing institutional arrangements and/or prices. It occurs when so much water is withdrawn from lakes, rivers, or groundwater that supplies can no longer adequately satisfy all human and ecosystem requirements. Similarly water shortage is used to describe a state where levels for water supply do not meet the minimum levels necessary for basic needs. And Water stress would be the symptomatic consequence of scarcity.	FAO & WBCSD
Water supply	see water availability.	
Water use	refers to use of water by agriculture, industry, energy production and households, including in stream uses such as fishing, recreation, transportation and waste disposal.	OECD
Water sector	All means and activities devoted to creating net added value from the water resources available in a given territory (Examples of 'net added value' include production of food, maintaining or improving the health status of the population through provision of potable water etc)	TFIMR-2009
Withdrawals (km3/year)	Water withdrawals represents the gross amount of water for a given use, either surface water or groundwater. It includes conveyance losses, consumptive use and return flow. It does not include water reserved for uses with a low consumptive rate or on stream water uses such as navigation, recreation, mining, cooling of power plants etc. see water abstraction.	Aquastat

1. Introduction

Water constitutes a worldwide challenge for the 21st century, both in terms of the management of available water resources and the provision of access to drinking water and sanitation for the world's population. 'Monitoring the advancements in water resources management is essential if this commitment is to be put into practice'.

1.1 A need for monitoring and reporting

This need for monitoring has been widely acknowledged on several occasions. In January 1992, the United Nations (UN) Dublin Conference on Water and the Environment established the main principles of modern water management, which served as the basis of Chapter 18 of the United Nations Conference on Environment and Development (UNCED) Agenda 21 (Rio de Janeiro, June 1992). These principles include the imperative necessity of reliable information for water resources planning and management. This issue has been reemphasized in a series of UN conferences, such as the World Summit on Sustainable Development (WSSD) (Johannesburg, August-September 2002), the 12th and 13th Session of the Commission on Sustainable Development (CSD) (New York, April 2004 and April 2005), as well as other recent international meetings such as the Istanbul World Water Forum (March 2009). The strategy paper of the European Union Water Initiative (EUWI), launched in 2002, calls for a monitoring and reporting mechanism for progress and quality control.

In 2003, UN-Water was endorsed as the new official UN mechanism for follow-up of the water-related decisions reached at the 2002 WSSD and the Millennium Development Goals (MDG). Among its tasks are facilitating interagency information exchange, including sharing of experiences and lessons learned, and serving as a clearing house for policy-relevant information, assessment and advice on status and trends at global and regional levels. UN-Water is also responsible for providing Member States with a collective point of entry to the system's initiatives and responses in areas within its purview. The UN-Water joint reports (WWDR, JMP, GLAAS) are tools to contribute to that objective.

This international commitment translated into common goals and numerous actions aimed at managing water resources, reversing the threats to water and expanding access to water-related services, especially in developing countries. Complex sets of activities, programmes and institutional settings are being conceived and implemented at all levels – from global to local levels. Crucial in this process is mobilizing the required financial resources of donors and financiers, by showing them that the impact of water-related initiatives in poor countries can be reliably assessed.

However, experience shows how difficult it is to monitor and report on the advancements of global commitments (MDGs, WWDR) as well as individual programmes, and to verify that water principles are effectively put into practices. Indeed, the evidence is that the quality and availability of data about both the quantity and quality of water resources has been deteriorating over the past decade. One consequence is that there is no regularly updated stream of data about the availability of water resources that would enable trends to be determined and their consequences to be evaluated on a general – as opposed to a local – basis. This in turn means that it is not possible to provide reliable information about the impact of broader socio-economic and climatic trends that impact upon water resources and their use.

Governments and donors are increasingly called upon to put in place a uniform and consistent system to monitor the impacts of water-related initiatives. This demand was reaffirmed in January 2007 at a meeting gathering UN-Water donors hosted in Stockolm by SIWI.UN-Water endeavours to provide coherent and reliable information on key water-related trends and management issues, based on a sound and reliable set of key indicators and proper monitoring and reporting systems.

A demand for key indicators. Global and regularly updated information on the status and trends of the water sector are requested. Multiple global information systems exist, but they suffer from a lack of integration and coordination. The

Task Force on monitoring proposed in 2006 to move towards a federated information system. A limited set of indicators offers an entry point to target data creation and facilitate mobilization of information flows to generate indicators on a systematic basis. UN-Water will benefit from using a reduced number of indicators selected from an existing larger set of indicators to inform civil society and to support effective communication with decision makers on trends and progress. This will provide only an overview that would need to be complemented with more detailed monitoring activities to track implementation and promote integrated approaches as part of the overall development frameworks, using more detailed sets of sectoral indicators depending on particular local or regional issues in the places where the performance is being assessed.

1.2 The Task Force on Indicators, Monitoring and Reporting

In 2006, the Task Force on Monitoring finished its study by publishing '***Water Monitoring: Mapping Existing Global Systems and Initiatives***'. In May 2008, the Task Force on IWRM completed its mandate by launching the '***Status Report on Integrated Water Resources Management and Water Efficiency Plans***' at the sixteenth session of the Commission on Sustainable Development. In 2008, UN-Water took the decision to establish the new Task Force on Indicators, Monitoring and Reporting (TF-IMR). TF-IMR built its work on the findings of the previous two Task Forces and concluded its mandate in August 2009 by presenting its final output (a short list of 15 key indicators) at the Stockholm UN-Water meeting.

Objectives

The Task Force's overarching objective is to contribute to public information and informed decision making in the water and related sectors, including the sanitation sector, at global and national levels through improved monitoring and reporting. It aims to support international and national decision-makers and advance the implementation of internationally agreed goals and targets on water and sanitation.

This involves:

- developing a methodology for monitoring water sector progress and performance at regular intervals, including a set of measurable indicators that support both national decision-makers and the international community;
- harmonizing water sector monitoring efforts at the global level to improve reporting of water sector progress and performance;
- identifying priority actions in support of country-level monitoring in terms of how the information should be collected, analysed and reported to be used in global assessments.

Activities

The Task Force focused on the definition of a common framework for monitoring and reporting and the identification of 'key indicators to report on major water domains'.

The Task Force undertook a participatory process involving UN-Water members and partners as well as other stakeholders to select 'policy domains' and 'key indicators'.

All along the process, the Task Force built upon ongoing 'indicators, data items, monitoring' activities of the Task Force members developed in 2009 and relevant to the Task Force objective (e.g. the WWAP Expert Group on Indicator, Monitoring and Databases – EGIMD – for WWDR4; UNDESA/GIRWI; FAO/Aquastat country-level support; the UNESCO Working Group on Groundwater Indicators and the GEF; the UNECE Water and Health protocol monitoring; WHO/UNICEF-JMP; UNSD/SEEAW; CBD 2010 biodiversity indicators; ICID irrigation systems benchmarking; IWA water services benchmarking, WBCSD water footprint network, World Bank development indicators, etc.) as well as other institutions with a recognized expertise in that field (OECD, Eurostat, EEA, Blue Plan). (see Ref.)

The Task Force started in August 2008 by agreeing on its Terms of References and work plan. It also participated in the organization of a seminar on 'Indicators for Action' at World Water Week 2008 in Stockholm, and drafted a tentative list of relevant water indicators for discussion on the basis of tentative proposal by the WWAP. Late 2008 was focused on mapping the Task Force members' indicators activities and the analysis of UN-Water and its 'information users' needs. It enabled a common methodology for assessing the water sector situation and performance to be defined, and this was subsequently used to select the core set of indicators. The relevance of the selected indicators set was discussed with all Task Force members and 'key information users', taking advantage of high level events and meetings in March to June 2009. In addition, some Task Force members made specific proposals on how to move forward in filling data gaps (e.g. the WWAP EG-IMD looked in detail into the 'data items' necessary for calculating the indicators; FAO looked into the legal indicators).

At the end of a year-long consultative process, the Task Force concluded in this report proposing a 'short-list' of key water sector indicators corresponding to main policy domains, with detailed metadata, including computation methods, responsible agencies and details of updating procedures. In addition, it identified areas in which there is a critical lack of data, or lack of quality in the existing data sets, and a need for new approaches.

It proposed a set of follow-up activities that could be implemented collectively or by different partners. A systematic global updating of this limited indicator set is expected to help streamline data collection, monitoring and reporting and enhance coherence and consistency in global information systems.

Members:

Coordinating organization: World Water Assessment Programme (WWAP)

Task Force members: the secretariat, Convention on Biological Diversity · International Commission on Irrigation and Drainage (ICID) · Food and Agriculture Organization of the United Nations (FAO) · Global Water Partnership (GWP) · the International Water Association (IWA) · International Association of Hydrogeologists (IAH) · United Nations Environment Programme (UNEP) · Stockholm International Water Institute (SIWI) · UN-HABITAT · United Nations University (UNU) · United Nations Department of Economic and Social Affairs (UNDESA) · United Nations Office to Support the International Decade for Action 'Water for Life' 2005-2015 (UNO-IDfA) · United Nations Educational Scientific and Cultural Organization International Hydrological Programme (UNESCO -IHP) · United Nations Development Programme (UNDP) · United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) · United Nations Economic Commission for Europe (UNECE) · United Nations Environment Programme (UNEP) · United Nations Statistics Division (UNSD) · United Nations Advisory Board on Water and Sanitation (UNSGAB) · World Business Council for Sustainable Development (WBCSD) · World Health Organization (WHO) · United Nations Children's Fund (UNICEF) · World Water Council (WWC) · World Bank.

1.3 Assessing progress in the water sector

UN-Water's collective purpose for global monitoring is to 'monitor the water sector performance, from the point of view of a sustainable development objective'. It includes a set of more specific objectives related to specific dimensions of water management and related Millennium Development Goals (specifically, Goal 7). It acknowledges in particular the targeted monitoring that enables progress on water supply and sanitation (Goal 7.7 and 7.8 by the Joint Monitoring Programme), the sustainability of water services (Goal 7.3 and 7.4 by FAO/AQUASTAT and Fishstat) to be monitored.

Box 1. Sustainable development of water resources: taking an ecosystem approach

Agenda 21, chapter 18 states that "integrated water resource management is based on the perception of water as an integral part of the ecosystem, a natural resource and a social and economic good, whose quantity and quality determine the nature of its utilisation".

From an environmental perspective e, water resources are a key element of the natural resources context that determine the situation and functioning of the water sector. Water offers multiple ecosystem services such as:

- provisioning services (crop production, timber, fuel wood, fodder for livestock, fish and other species, industry inputs, energy production)

- regulating services (water storage-lowering of peak floods, groundwater recharge, prevention of soil erosion, climate air temperature, watershed conservation, nitrogen fixation, soil fertility improvement

- supporting services (soil conservation, nutrient cycling, soil formation)

- cultural services (religious landscape value)

A main challenge for water resource management is to ensure a sustainable management of the multiple services offered by water systems, avoiding over-exploitation and degradation (MDG-Goal 7).

UN-Water also refers to a series of global agreements and objectives on water management that have come out of the various global conferences since 1972, and more specifically to the global conventions (including Ramsar, UNCCD, Biodiversity).
It acknowledges the need to consider multiple perspectives and concerns of diverse "clients" intervening at different levels but with an interest in seeing the global picture of water and potential "users" of global information.

At global and regional level	**At national or sub-national levels**
Objectives International governance International conventions and agreements (CSD, MDGS) Investments strategies (scoping)	*Objectives* Context of international conventions or agreements (CSD, MDGs…) or international cooperation processes (scientific networks)
UN-agencies(to be specified) Donors, GEF financiers, policy makers	Parliamentarians Policy makers, Government (national, sub-national) in relation to global agreements Ministries sectoral (line ministries; environment, agriculture, health…)
International civil society (NGOs, technical or scientific networks,) Private sector – multinational Consulting companies	Civil society and some local investors. Manager (urban managers; irrigation; industries) in relation to global conventions but interested by more detailed information Consulting companies

This report uses an operational description of the water and development nexus on a given territory presented in detail in a companion document.[1]

[1]UN-water TFIMR, 2009. 'Assessing the water sector', concept paper prepared for UN-Water Task Force IMR, J Rey; referred to as 'concept paper, 2009' in the rest of the report

Box 2. A definition of the water sector (ref. 'UN-Water TFIMR, 2009')

The 'water sector' consists of all means and activities devoted to creating net 'added value' from the water resources available on a given territory. The water sector operates in a complex interplay between water resources and the socio-economic and environmental system in a given country.

It comprises two main segments:

- 'resources activities' that influence the spatio-temporal distribution or the quality of the water resources with a view to manage these resources as an asset.

- 'use activities' that use water in transformation processes for social uses (e.g. water supply), economic uses (e.g. agriculture, industry, energy), and environmental uses (e.g. functioning, restoration and conservation of ecosystem services). These activities in fact benefit from the 'ecosystem services provided by water'.

Such a description involves distinguishing between elements of context, of functioning and of governance

Context sets the scene in terms of the available assets and natural conditions. Functioning informs about the transformation processes occurring in the territory, whereby resources are mobilized and used for producing goods and services. Governance provides the decision-making architecture that explains why actors are pulling the territory along a certain development path. Questions received from users and clients can also be grouped under these three categories.

Box 3. The water sector – linkages between context, governance and functioning

Examples of questions directed to UN-Water about the situation in the water sector:

Context
- How much water is available? How is it changing with population growth?
- What is the impact of climate change on water resources?
- What is the capacity of a given country to adapt to climate change (infrastructure to capture, store, lift, distribute?)

Functioning – water uses
- How much water is used compared to the fixed freshwater resources? Is it sustainable?
- Who is using / polluting water?
- How important are the different sectors of use? consumptive uses? on stream uses of water?
- How important are water footprints for food production (rainfed, irrigation, trade)? Impacts of needs elsewhere – external water footprints?

Functioning – performance
- What are the benefits created from water use? social, economic, environment benefits?
- How many goods/services produced per drops? Is the performance improving?
- How environmental sustainable are human uses? water quality, environmental performance?

Governance/
- Are IWRM objectives integrated in practice?
- How effective is the governance system – at various level- to support sustainable development objective?

Information relating to context, functioning and governance can be expressed in terms of indicators that provide a snapshot of the situation in the territory and its changes. The information on functioning, and related indicators, can become very detailed as we investigate deeper into sub-sectoral activities such as water supply or irrigated agriculture. It remains important to gather the essential bricks of a 'storyline' as a basis for interpreting the role of water in the development of the territory. How is the territory doing considering its given context? Would another governance setup lead to greater value creation? Is the functioning sustainable? All matters related to what is called in the concept paper **performance of the water sector**.

The Task Force report proposes therefore a representation of the water sector, intrinsically linked to the development of a given territory

Based on the representation induced by these choices, the paper provides a way of classifying water indicators as ‘context indicators‘, ‘functioning indicators’ and ‘governance indicators‘. Considered jointly, these three dimensions allow the performance of the water sector to be assessed, leading to the definition of related ‘performance indicators’.

Following this introduction, the present report is organized in three parts. The first part proposes a limited set of indicators (available immediately or in the medium term) selected from existing data sets – as the purpose of this paper is not to reinvent existing indicators or propose drastically new ones. The second part discusses the availability and quality of the necessary data sets. The Third part emphasizes the need for projects of global coverage to improve the availability and quality of basic data sets. Ideas for immediate follow-up activities are indicated and further detailed in Annex 1 and partners’ reports (e.g. the core work of the WWAP EG IMD for WWDR4).

Annexes in a separate document (completed by an excel document) provide examples of what could be a regular snapshot of the ‘water sector situation, context and functioning’ – provided supporting data are improved in terms of coverage and updates, as well as elements on the existence of key governance means at global, regional and national levels. It provides more elements of definitions and detailed methodology sheets for the short term indicator set.. In addition, the excel file provides details on the available statistics at national level, as well as a summary of existing global initiatives concerning monitoring, reporting and the development of indicators;

2. A set of key water sector indicators serving UN-Water communication

Indicators are essentials tools for tracking water sector progress, supporting policy evaluation and informing the public. UN-Water members and partners, regional organizations and individual countries have developed expertise concerning a number of indicator sets related to the water sector. The OECD in particular pioneered the development of international environmental indicators within its Member States in the early 1990s and has since inspired other regional efforts; such as the Blue Plan/MAP/UNEP efforts to monitor the status of the Mediterranean region environment and the implementation of the Mediterranean sustainable development strategy. At the global level, thematic communities are working on developing and selecting relevant sets of indicators for their needs, such as the 2010 biodiversity indicators partnership, the water footprint network, IWA water service benchmarking, and ICID irrigation systems benchmarking. These works have led to the development of several sets of indicators, each responding to specific purposes, and development is still ongoing in some cases. (Ref. Indicators)

As part of its commitment to transparency and better information, UN-Water aims to use a **core set of key indicators** to monitor and communicate its knowledge of the status of water resources and progress in the water sector. In particular, these indicators should help to assess conditions and trends in relation to key goals and targets. This builds on the idea that there is no unique set of indicators; whether a given set is appropriate depends on how it can be used. Indicators are only one tool among many that must be interpreted in context.

Box 4. Some definitions (OECD)

Indicator: A parameter, or a value derived from parameters, which points to, provides information about, or describes the state of a phenomenon/environment/area, with a significance extending beyond that directly associated with a parameter value.

Parameter: A property that is measured or observed.

Variable: refers to something that varies or is prone to variation. Parameters are also variables.

Data item: A data item is an occurrence of a data element – This is a terminology used by statisticians to refer to parameters or variables.

Index: A set of aggregated or weighted parameters or indicators that describes a situation.

Major functions of indicators:
• to assess conditions and trends over time,
• to compare places and situations,
• to make informed decisions
• to assess conditions and trends in relation to goals and targets,
• to provide early warning information,
• to anticipate future conditions and trends.

Selection criteria: The following set of 'key indicators'has been selected from larger sets to report on water-related issues (water resources; how water is used in agriculture, industry and energy production; urban water use; water and the environment) using SMART[2] criteria. In particular, the minimum set selection took into account the following three requirements: *policy relevance* with respect to major water challenges for the 21st century, including concern for increased water scarcity and degradation, and lack of access; *analytical soundness* of the data; and *measurability* – is the indicator available now, in the short term, or in the medium term (one to three years).

Why: The 'key indicators set' aims to inform civil society and to support broader communication with the public. It also should provide a snapshot of world water issues. It is clear that such a minimum set can only suggest an overall picture of the water sector and does not allow in-depth analysis leading to intervention.

A dynamic process: The list of indicators is neither final, nor exhaustive; it will evolve as knowledge and data availability improves. Ultimately, the list is expected to include key indicators relevant to issues such as water quality, and also indicators that can pinpoint the effectiveness of the water use practices of important sub-units (relevant sample of irrigated schemes, cities, and industries).

Interpretation: The indicators correspond to varying degrees of policy relevance and policy priorities for different countries. They can only be interpreted in context and must be complemented with country-specific information to acquire their full meaning.

Use for global reporting: The collective purpose of UN-Water is to monitor the performance of the water sector from the perspective of a sustainable development objective. UN-Water also follows a set of more specific objectives related to specific dimensions of water management and related Millennium Development Goals (particularly Goal 7) that also require performance assessments.

Presentation: Four categories of indicators to understand the water sector (ref. 'concept paper, 2009')

Context	Some indicators relate to the natural context (e.g. water availability, rainfall), to infrastructure (such as water treatment capacity, or storage), or to human and economic capitals. 'Context indicators' are required to act as benchmarks when assessing the achievements of another territory with a comparable context.
Functioning	Functioning relates to inputs, outputs and outcomes (e.g. water use intensity). A number of indicators relate to describing the dynamic functioning of the water sector at the national level (e.g. water withdrawals, water depletion or wastewater actually treated).
Governance	A set of governance indicators is required to track the possible explanations behind the different levels of performance achieved between the given territory and different benchmark territories. The breadth of governance indicators must embrace territorial water resources and water uses management to provide an insightful diagnosis of possible weak spots in need of further investigation and possible improvement or reforms.
Performance	Performance adds an element of evaluation. Performance assessment relates to considering the functioning of the sector in relation to its objectives and within a given context. Issues of efficiency/productivity, effectiveness and impact can be considered (e.g. access to water supply and sanitation or value added in agriculture or industry).

Level: The implicit geographical scale adopted by UN-Water is the national level, although some indicators could be monitored at other levels as well. Indeed, other levels are necessary for more detailed assessments (regional, basins, local) or benchmarking objectives (cities, irrigations schemes, industries).

Periodicity: The indicators should be updated regularly (1 to 5 years according to the data set).

Data: These indicators build on the databases of UN-Water members and partners, updated with information provided by authorities from Member States or from internal UN and other international or regional sources (e.g. OECD, Eurostat, European Environmental Agency, Blue Plan/MAP/UNEP).

Measurement and harmonization: Data are measured or estimated at the national level, then collected and compiled at the global level by different international programmes. The data sets are often unsatisfactory: they are incomplete at the global level (e.g. discontinuous time series, gaps in spatial coverage); of unequal quality (e.g. TARWR estimates

[2] SMART criteria: S Specific; M Measurable; A Achievable; R Relevant; T Time-bound

not systematically reviewed; withdrawals often estimated on the basis of efficiency assumptions); use varying terminology; or are missing (more in 3.). Indicators should be interpreted with caution. Representativity would be improved by working to reconcile, standardize and harmonize them at the global and national levels.

Dissemination: The data sets will be made available on the web, completed by additional indicator sets and commented in detail in UN-Water joint reports (WWDR, JMP, GLAAS,).

2.1 The water sector: context and functioning

The list of possible indicators is extensive (Ref. 'UN-Water TF IMR concept paper, 2009') and may be adapted depending on the geographical scale of the system chosen. Other subsets of indicators could be identified for specific purposes.

The selection below offers a limited but useful set for comparing situations and following trends, providing that the global monitoring systems allow regular updates. It presents the conclusion of a lengthy selection process involving all the Task Force members. However, debates continue to surround some of the indicators proposed; in particular concerning the need to break down TARWR into its sub-components of surface and groundwater, or consider only the internal renewable water resource component (more reliable), or breakdown water demand by water source type (surface water, groundwater, non-conventional sources). When data are available, such breakdowns can be done and used to support the interpretation of the related key indicator. There are also diverging views on the relevance of sectoral water productivity indicators; as some would favour "water efficiency indicators" and an evaluation of "corporate water footprints" particularly for the industry and agriculture sector. However, these require methodological work and data collection and are not available in a short term. In addition, there are issues where data are lacking and where efforts should be put in data collection.

This is why a step wise approach is proposed –start with a tentative set now, learn by using it, and improve or develop better indicators when necessary. The table distinguishes between what can be done today (the short term) and what could be done in the medium term:

- **Short term**: Indicators for which data are available for a majority of countries, and for which global information systems exist and could support updating them. In Annex 1, some of these indicators are used to illustrate global water issues. Only the current situation (latest data) is presented as data to follow trends are not available yet for a sufficient number of countries. In Annex 3, a statistical annex provides the detailed values of the indicators.
- **Medium term**: It is expected that the key indicators set will be improved as standardization, harmonization, and data availability at the global level improves. Some new indicators are also suggested in that column to illustrate important water issues where we lack global data sets, but may have selected examples of particular points/areas/units, or regional examples. It is hoped that UN-Water will stimulate a major effort towards improving data collection and production at the global level to fill these data gaps and enable the computing of a best 'UN-Water indicator set' that will show trends.

Table 1. UN-Water set of key water sector indicators feasible now or in the medium term

	Issues	SHORT TERM (now)	MEDIUM TERM (within 3 years)
Water availability or situation of scarcity?			
CONTEXT	Context finite resources and population	1-Total actual water renewable resources per capita or water crowding indicator (people/m^3)	Same, plus sub-national breakdown (at basin level); (+ look at 'exploitable' resources[3] per capita)
	Climate change impact on water resources and adaptation capacity	2. Storage capacity compared to potential (or per capita) (+ irrigated areas / irrigation potential)	same, plus sub-national breakdown (at basin level); + new set on 'moving long term averages of inter-annual rainfall; inter-annual runoffs & snow coverage.
	Ability to invest for sustainable management	3. Importance of national expenditure for water supply and sanitation as a % of total budget	Total public expenditures for the water sector (e.g. water resources management, demand mgt, water supply and sanitation) as a % of total budget (breakdown between country expenditures and ODA)
How intense are our water use? Is it sustainable?			
FUNCTION	Intensity of human uses of renewable but finite resources	4-intensity of use of water resources: Total water withdrawals over total actual renewable water resources (TARWR) (+ intensity of groundwater use compared to recharge)	Same, plus sub-national breakdown (at basin level), and breakdown per water sources (surface, groundwater); + Intensity of use of 'exploitable' resources, to assess 'unsustainable water use' (over-exploitation, depletion...).
	Importance of different consumptive uses	5-Use by abstraction by main sector as a % of total withdrawals	same, plus sub-national breakdown (at basin level); (+ breakdown per water sources – surface water, groundwater, non conventional)
	Importance of on-stream direct use of freshwater services: fishery	6- Comparison of evolution of inland Fish catch (capture) and production (aquaculture) since 1960s	same, plus sub-national breakdown (at basin level) + sustainability compare to 'resources': Intensity of use of inland fish resources (catch / fish stocks)
	Trade and water use	7. Share of blue, green, virtual water used to produce food in a country	same, plus external (quantitative & qualitative) water footprint over total water footprint for the whole economy and breakdown per major sector (food, manufacture, energy)
How effective are our uses?			
Social performance: Are we reaching the MDG target?			
PE	Access to improved water supply	8. % population with access to improved water sources	same, plus sub-national breakdown (at basin level); and breakdown between improved and non improved supply systems.
	Access to sanitation	9- % population with access to improved sanitation (JMP)	Same, plus sub-national breakdown (at basin level); and % sanitation ladder
RF	Access to water for improved livelihood		*Urban context*- Affordability indicator (% of household income spent on water) *Rural context*- Access to water for improved livelihood (e.g. multiple use of non improved water sources – such as irrigation water) → towards a 'rural Water livelihood index'? *Gender indicator:* hour/day devoted to fetching water by women & children
Economic performance: are we producing enough value per m^3 distributed, used or stored?			
	Effectiveness of use		Water efficiency index (all sectors); and breakdown per sector (food-inc. aquaculture,

[3] exploitable resources are the resources really available according to a set of national criteria –technical, economical, environmental-

	Issues	SHORT TERM (now)	MEDIUM TERM (within 3 years)
			manufacture, energy cooling, drinking water supply...)at national, sub-national and local levels (e.g. irrigation scheme or industry) *Urban level*: efficiency of water services at city level
PERF	Food production	10- change in water productivity in irrigated agriculture[4]	Same, plus breakdown at sub-national level (basin level, and irrigation schemes) + see 7- water footprint
	Industrial production	11- water productivity in industrial sector[5]	Same, plus sub-national breakdown and per industrial sectors + see 7- Corporate 'water footprint' (in quantity & quality) per industrial sectors[6]
	Energy production	12-Change in Hydropower productivity (production/ potential)	Same, plus sub-national breakdown (at basin level) + see 7- water footprint.
Environment performance: How environmentally sustainable are human uses?			
PERF	Degradation of key renewable water resources in quality	13. Change of quality of freshwater systems (% of samples compared to standards/limits)[7]: - concentrations of nutrients in freshwater, - concentrations of salt in aquifers	General water quality index (BOD, nitrates, phosphates, salt...) for main water resources system (aquifers, basin, local) + Pollution loads to water bodies compared to limit
	Mitigation efforts to reduce pollution	14. Urban wastewater treatment connection rates	Same, plus sub-national breakdown (at basin level); + individual pollution mitigation efforts of industries such as manufacturing industries with clean production programmes, and individual treatment plants (% of total industry of the sector)
	Risks of biodiversity loss	15.Threatened freshwater species	- Change in wetlands health status (% Ramsar sites degraded, or lost)

[4] proxy- value added of agriculture in country where irrigated agriculture is the major farming system as FAO statistics cannot distinguish between irrigated and rainfed production..

[5] Relevant in countries with industrial production using significant amount of water (e.g. paper, sugar, steel, petrol, soap, beer). In many cases, industrial water use is underestimated and makes this indicator difficult to interpret.

[6] This concept is considered important but is still in the process of being defined. There is not yet an agreement on what it entails.

[7] It is important to reflect water quality issues in the short term minimum set. However quality data are relevant at local level and are not available except for some European countries where the Water directive create obligations to monitor the quality status of the resources. It is suggested to start with a "sampling approach" to follow trends in quality in a limited number of sites located where pollution hotspots exists and building on ongoing initiatives (GEMS-water, UNIDO, UNEP-clean production network…)

2.2 Governance indicators

Governance can be defined as the web of policies, institutional arrangement and management instruments mobilized by the actors making decisions impacting the functioning of the production system on a territory. (ref. 'UN-Water TF IMR concept paper 2009')

A set of *governance indicators* is required to track down possible explanations for the different levels of performance achieved by the given territory and selected benchmark territories. The breadth of governance indicators should embrace territorial water resources and water uses management if one wants to provide an insightful diagnosis on the possible 'weak spots' needing investigation and possibly improvement or reform.

Collection of governance data is obtained through **auditing the governance system** of the selected territory, using an Integrated Water Resources Management (IWRM) referential. The data collection methodology involves interactions with actors in the selected territory and expert knowledge. This domain is fundamentally different from the 'water resources and water use' and 'functioning – performance' block of information included in Table 1. If defined, indicators can be derived from a survey of **'water governance means'.**

Box 5: Instruments of water governance (ODI, rethinking governance in water services, working paper 284, 2007) / Policy instruments

Technical: Measures used in resource assessment and design of structures used to control, store and supply water for different purposes.

Economic: Measures used to encourage efficient and responsible allocation and use of water resources including pricing, charges, subsidies and penalties.

Administrative: Information systems, maps/models, plans, guidelines and other decision support and management tools.

Legal: Measures which prescribe restrict or prohibit different water uses including abstraction/discharge permits, codes of conduct and minimum standards.

Institutional: Regulatory bodies, management arrangements, planning procedures, coordination and partnership mechanisms

Social/Participatory: Measures to increase awareness of water issues and mobilise users to participate in planning, management and financing of water resource development.

Review of 'Integrated water resources management means'

A preliminary step was taken by the 2007–2008 Task Force on Monitoring IWRM. This was led by UNDP, who presented a review of the level of implementation of IWRM at the CSD-16 (2008). They provided an assessment of the level of implementation of IWRM plans, but were not able to assess the efficiency and sustainability of IWRM management means. One limitation was the use of global surveys on IWRM (UNDESA, AfdB, UNEP/DHI, GWP) that were not based on a common scoreboard, as they had been conceived separately. The Task Force conclusions recommended in future starting with a review of enabling conditions for IWRM, using a preliminary set of indicators (UN-Water and GWP, 2008). In particular, they proposed a new global survey to assess if enabling conditions are in place, change processes have been initiated in accordance, with a politically supported and approved legal framework and with allocation of appropriate financing sources for management functions.[8] A preliminary list of necessary information is listed in the table below.

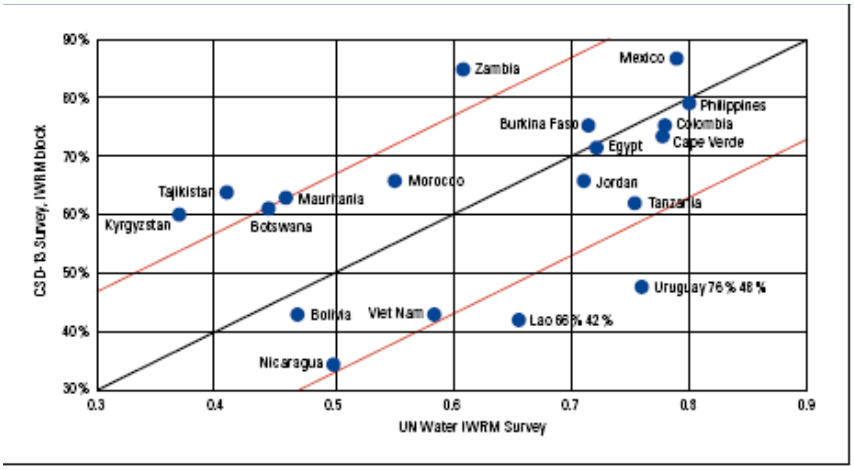
Table 2. Necessary information identified by the UN-Water Task Force in IWRM monitoring

Domains	**Necessary information→ indicators**
Changes in enabling environment	Revision and amendment of policies and laws; Water is mainstreamed into national development policies, strategies, plans Allocation of appropriate and sustainable funding in national budgets.
Changes in	Establishment of cross-sectoral coordination frameworks;

8 from: UN-Water and Global Partnership (GWP) Road mapping for advanced integrated Water resources Management (IWRM) processes, based on the Copenhagen initiative on Water and Development prepared jointly by Un-Water and the Global Water Partnership. Un-water & GWP, 2008. online http://www.unwater.org/downloads/UNW_ROADMAPPING_IWRM.pdf

Domains	Necessary information→ indicators
institutional framework	Change of ministerial and departmental mandates; Formal involvement of stakeholder groups; Launching of awareness and mobilization campaigns; Decentralization and delegation of decision making at the river basin, provincial/local and community levels; Capacity development of government staff and stakeholder groups.
Changes in management instruments	Improvements in information management; Water resources issue assessment; IWRM strategy and plan development Countries produce coherent water resources development and management plans that support the achievement of the MDGs; Demand management of user behaviour and water use efficiency; Social change instruments for public awareness, mobilization and conflict mediation; Regulatory instruments and associated enforcement frameworks; Economic instruments for behavioural change. Regional and Global Evaluation

Figure 1. Comparison of scores of UNDESA- CSD13 survey and UN-Water 2008 IWRM survey



UNDESA/SIWI (2008)[9] completed that approach with a review in 2008of the progress made in implementing decisions on water and sanitation adopted at the thirteenth session of the Commission on Sustainable Development. The decisions were based on two major priorities of the Johannesburg Plan of Implementation: access to water and sanitation services, and the preparation of national integrated water resources management and water efficiency plans. It compared its results with UN-Water, 2008. The two surveys collected information by different methods but the overall results on the level of implementation of IWRM policies are comparable. However it cannot provide elements on the quality of the IWRM means. It also recommend to agree on a common scoreboard of 'well-established, globally accepted indicators for monitoring integrated water resources management'to state with certainty the status of integrated water resources management in each country, and to make comparisons across countries.

Currently UNEP/DHI[10] is using a revised questionnaire to support IWRM plans monitoring of country level (e.g. Zambia, Bangladesh), while UNDP/Capnet supports basin assessment on the basis of a limited set of IWRM indicators in different countries. The Global Water Partnership aims to initiate a programme on IWRM country level review. The CEDEAO in West Africa has developed for its regional need a conceptual approach on IWRM monitoring that was tested in Burkina Faso and will be tested in other West African countries; it aims to complete this exercise on the financial aspects by a Water accounting exercise using the SEEAW methodology developed by UNSD.

Proposed approach to move towards 'water governance indicators or a water governance index

A comprehensive approach to assessing water governance would propose to focus on an assessment of the capacity of the governance system to steer a given territory on a sustainable development path, from a water perspective. (Box 5).

9 UNDESA/SIWI (2008), Review of progress in implementing the decision of the thirteenth session of the Commission on Sustainable Development on water and sanitation.

10 the UNEP collaborative center based in DHI, Denmark is also working with WWAP to develop IWRM monitoring indicators

Box 6. Towards an assessment of water governance performance (Ref. 'UN-Water TF IMR concept paper, 2009')

In order to ensure that the water sector can be steered towards overall objectives, the governance system available at each decision making level needs to fulfil three basic functions as a pre requisite:
- Objectives setting;
- Regulation of functioning according to these objectives;
- Coordination at the interfaces according to these objectives.

The description of the governance system will thus focus on the key management domains relating to these three functions. These three functions are fulfilled through mobilizing management elements of various types (relating to policies, institutions or instruments11).These management elements constitute the elementary bricks of the governance system.
The functional characteristics of the governance system are described against their capacity to foster the overall creation of socio-economic environmental value with the water resources available on the territory ('3E' objectives). Describing the governance system from the point of view of its capacity to steer the water sector towards achieving a set of 3E objectives can thus be translated as describing its constituting management elements from the point of view of their 'IWRM characteristics'.

That approach leads to define a common scoreboard on the governance capacity of the water sector within a given set of overall IWRM objective. Indicators can be derived from a survey of the existence of the 'IWRM management means'. For example, a review of legal aspects would imply to look at the existence, administration, implementation, and enforcement of legislation and then assess the effectiveness of legislations and institutions. For a given governance system, scores could be attributed reflecting the satisfactory existence, efficiency and sustainability of each of these management means and could lead to a 'water governance index'.

This approach and the collection of such governance data require an auditing of the governance system of the selected territory on the basis of a 'common IWRM management means scoreboard' to be established, that would reconcile different IWRM indicators set being tested and would consider whether instruments applied are appropriate to their context..

Such a scoreboard would enable to assess the existence, administration, enforcement, and effectiveness of key IWRM management instruments such as: policies (supporting 3 Es, e.g. CSD-13), legislations (supporting 3Es objectives), financial instruments (enabling implementation of 3Es obj. However, as the question remains of whether diversity of contexts can be addressed by a standard checklist, the Task Force therefore recommends working on peer reviewed assessments in pilot countries, using as much as possible ongoing projects at country level. In addition, a global survey could be done to get a general understanding of the diversity of governance contexts but would not enter in the assessment of the systems in place.

11 Classification promoted by GWP Toolbox

3. Data items to support the limited set of indicators

This section focussed on the key variables used for the indicators computation. It is based on a review of existing data sets available in the main global information systems (UN-Water. 2006) to check the measurability of the proposed set of indicators, completed by the comprehensive work done by the IWG-ENV Subgroup on Water Statistics (UNSD, FAO, OECD, Eurostat, UNECE, UNEP and GEMS-Water), discussion with experts of OECD, Blue Plan, IEA, AQUASTAT, WMO, UNSD among others and the conclusions of the series of workshops organized by the WWAP expert group on Indicators, monitoring database (EG IMD) on filling data gaps for the minimum set to be used in the WWDR4.

3.1 Availability of necessary data sets for computing the indicator set

It is clear from the above that improved hydrological as well as water use data collection and sharing globally directly contributes to the key information needed for sustainable water management. The benefit to cost ratios of hydrological data for various uses (e.g. infrastructure design, water resources planning, flood forecasting) are considered high but there are no studies to measure the socio-economic impacts of reliable information and therefore demonstrate this importance. The willingness to follow trends of the limited set of key indicators gives a new urgency to updating regularly global monitoring systems.

The Table below presents a quick review of what is available to compute most of the short term indicators with the latest years available. The feasibility of following trends is also assessed and reveals that the historic data sets are too variable to enable to follow trends in most cases, except for some regions with a long established environmental statistics collection activity (OECD countries, Europe, Mediterranean/ Blue Plan).

Table 3. Review of availability at country level of the necessary information for computing the indicator set

Availability: LTA- long term average estimates; V: variable latest years ranging from the 1990s to 2006 ; A: available only for few countries, often at a regional level.;

Updating : 1: annual estimates (and regular data collection from countries); 2: update every 2 years ; Y some data sets exist for some countries but irregular updates and year differ ; X no update except when new country data are available ; N: no update – estimated once.:

	Availability	**countries & regions****	**Ability to follow trends?**	**Nb of countries with historic data sets for**		**Main data sources used for this revies**
	latest years available	number	updating	2 or 3 years	4 to 6 years	Global and Regional
CONTEXT						
Population	2008	Most world	1			UN Population Division
GDP	2008	Most world	1			World Bank
Precipitation (e.g. rainfall, snow)	LTA	193	X			Aquastat; WMO
TARWR	LTA	183	X			Aquastat
IRWR	LTA					Aquastat
surface water actual (SW) actual)	LTA	183	X			Aquastat
groundwater recharge (GW) actual:	LTA	183	X			Aquastat; UNESCO-Rep
Total Exploitable resources	VA	34	X			Aquastat; Blue Plan
storage: existing capacity	Va	109	X	10		Aquastat; Blue Plan
irrigation potential	VA		X			Aquastat
area equipped for irrigation	VA	171	Y	88	20	Aquastat
agriculture water management area	VA		Y			Aquastat
hydropower capacity: potential & installed	VA	171	11			Aquastat; IEA
FUNCTIONING						
water abstractions (Total withdrawals)	2002	169	Y	92	18	Aquastat

	Availability	countries & regions**	Ability to follow trends?	Nb of countries with historic data sets for		Main data sources used for this revies
	latest years available	number	updating	2 or 3 years	4 to 6 years	Global and Regional
withdrawal from surface water	2002	37	Y			Aquastat
from renewable groundwater	2002	37	Y	5	1	Aquastat
withdrawals breakdown per SW & GW	2002		Y			Aquastat
from non renewable groundwater	2002		Y			Aquastat
waste water reused: volume	2002	177	Y	104	32	Aquastat
desalination prroduction: volume	2002	177	Y			Aquastat,
green water flows (soil moisture in rainfed)	2002	med	N			Blue Plan
Demands per sector	2002	162	Y			Aquastat
sectors: domestic water supply,	2002	162	Y	116	20	Aquastat
sector: agriculture	2002	162	Y	88	13	Aquastat
sector: industry	2002	162	Y	119	16	Aquastat
sector: energy cooling	A		N			Blue Plan
on stream: reservoirs evaporation	A	18	N			Blue Plan
on stream - hydropower electricity	2005	124	Y		124	International Energy Agency
on stream; navigation		28	N			BVB
on stream: fishery freshwater fish catch	2006	226	Y			FAO/Fishstat
freshwater fish production (aquaculture)	2004	160	Y			FAO/Fishstat
population access to improved drinking water (total, urban, rural)	2006	172	2			JMP
population access to improved sanitation(total, urban, rural)	2006	162	2			JMP
waste water treated: volume	V	70	N			Aquastat
pop. connected to sewerage: number	2001-2004	28	1			OECD
pop. connected to WW treatment	2001-2004	28	1	3	24	OECD
Water quality : nitrates	A		Y			GEMS-Water, OECD
Water quality GW: salinity	A		N			IGRAC, UNESCO.
Industrial pollution load: BOD	2006		1			World Bank development indic.
Freshwater species (status)	2006	World aggregate	2			WWF, UNEP-WMCC
Wetland areas (status)	2006	159 (2500 sites)	N*			Ramsar; Wetland International

* Countries report regularly to the international Ramsar convention but do not provide in a systematic way an evaluation of the change of wetlands areas and status.

** In most cases, data are missing for small islands, even for the population and GDP data sets.

While the amount of information available on the international systems, key information is still missing to get a full coverage of the water sector. Water productivity is not available in a systematic and satisfactory way. Gender related information, for example time spent by women and girls to fetch water in cities and rural areas don't seem to be readily available. Information on water quality and waste water production and treatment is limited to OECD countries. Global monitoring of groundwater drawdown's and quality remains a problem in conceptual and practical terms. Information on changes in status of freshwater systems is also very patchy.

3.2 Quality of existing data sets

Beyond the availability, global data sets needs to be of sufficient quality to allow for analysis and interpretation. The following criteria's are used to assess the quality of statistics : relevance, accuracy, timeliness, accessibility or clarity, comparability, coherence, and cost-efficiency (OECD, EUROSTAT, FAOSTAT, UNSD).

Country-level data is mostly drawn from national sources and the main role of the different UN agencies is to compile them and provide global estimate relevant to their respective mandate. Most of the global water data bases and monitoring systems currently maintained by the various UN agencies and programs contain only secondary data or even tertiary data (UN-water, 2006). In other word the organisation concerned do not collect the data themselves, but compile and disseminate data retrieve from sources that directly collect data (primary data bases) or even from other international sources (tertiary data sets). Several major monitoring programmes suffer from irregular updating which affect their timely and regular reporting capacity. The discrepancy increases with the diversity of updating strategies or periodicity used with global information systems (from 1 to 10 years) or the multiplicity of information or monitoring systems at the national level, again, these are not always complete nor are they regularly updated. In addition, international, regional and even national systems often lack elements to assess the quality of the data items series as do not have details on the production process. Box 7 and 8 summarises how little we can say about some of the most important data items for the indicators computation: TARWR, and water withdrawals.

WWAP (2009) indicates that there are many evidences that the quality and availability of data about both the quantity and the quality of water –resources and uses- is unsatisfactory and has been deteriorating over the past decades. Information for developing countries is not always available, but experiences suggest that the overall status of hydrological and meteorological data collection can be characterized as poor or deteriorating (WWAP-EG IMD.2009).

The story of the hydro meteorological networks is a case in point where we can see that despite the understanding of the importance of hydrological information for planning and continuing efforts to improve data collection and sharing, the issues of data shortage prevail and observation network continue to decline. There are reports of closure of some 2200 flow stations in the USA between 1980 and 2005, many of which had + 30 years of record, most of them needed to understand flood and low flow particularly in the context of climate change (Lins, 2008).

The World Meteorological Organisation is at the fore front of promoting exchange of hydrometeorological data globally supported by various global commitments[12] recognizing the importance of integrated international system of observation, collection, processing and dissemination of hydrometeorological data. WHO is in fact behind the few existing global information systems that do collect primary data sets (e.g. Global Climate Observing system, global terrestrial observing system) but also regret there incompleteness and deteriorating quality. Attempts to improve data collection systems by introducing first world technology such as HYCOS – regional Hydrological Cycle Observing systems (WMO 1998), or FRIEND and HELP programs (UNESCO-IHP) have so far enjoyed slow progress. Smathkhins (2009) indicates that in South Africa, out of the 48 data collection points installed in 1998-2001 for the HYCOS project in 10 countries of the region only 7 platforms were still operational in 2006 due to Vandalism, faults ususal lack of resources for general maintenance. Only 20 out of 170 WMO members presented their basic information (not the data themselves) on the number and types of observation stations on any meteorological variables using the WMO INFOHYDRO online system facility (www.wmo.ch/pages/prog/hwrp/INFOHYDRO/infohydro_index.html).

The Global Runoff Data center (GRDC, Koblenz, Germany) operating under the auspices of the WMO hosts the time series data sets from some 7300 stations (http://grdc.bafg.de), out of which 4800 with daily data. It is the best centralized source of virtually free flow data, however, it hosts only a very limited part of the daily and monthly flow datasets. For comparison, USGS in the USA manages an estimates of 7500 flow stations (http://waterdata.usgs.gov/nwis/sw). Similar conclusions can be drawn from a closer look of the Global ground water information system managed by IGRAC , the Global Terrestrial Network for River Discharge project (GTN-R of GCOS), or the GEMS-Water water quality data base (for which most of the stations being located in the developing world).

[12] the 1997 UN convention on non navigational water uses urges ' watercourse states' to exchange readily available data. The requirements for full, open, and prompt exchange of hydrological data and products has been recognized by other international conventions such as the Convention on biological Diversity, the UNFCCC and UNCCD.

Smakhtin (2009) indicates that while there is a slow but raising awareness of the usefulness of global hydrological data archives, the existing initiatives, despite their usefulness are unlikely to significantly improve data availability and their quality internationally soon. Improvement of data collection and sharing require a further development of national and international networks with informal and semi-formal sharing agreements and maybe an international convention on hydrometeorological data sharing.

UN-Water (2006) concluded that data quality is and remains a major issue in assessing the reliability of monitoring systems. While heterogeneity in the quality of the data is intrinsically related to the nature of the data collection process, which relies in most cases on countries capacity to collect and handle information, the development of metadata, careful cross-checking of information and systematic description of some standard assessment of quality level can greatly increase understanding about the reliability of the information. The UN-statistics group is developing quality control and reporting procedures appropriate to country compilations which should be systematically used for water related data. The newly developed water accounts (SEEAW) represents a good tool to build capacity at country level.

Box 7. Total actual renewable water resources

TARWR is a very important data item for the UN-Water key indicator set, in particular, as:

- a denominator for many proposed indicators, where long term average estimates are commonly used,

- a key element to monitor in the face of growing uncertainty over the availability of water resources linked to climate change impacts (annual and seasonal values of total water resources would be of interest for that objective).

These two objectives highlight the importance of having an appropriate methodology for measuring, aggregating and computing those totals.

Compilation: Little information exists on water resources on a regional basis at country level. Before the FAO/AQUASTAT world compilation of water resources data (FAO, 2003) exercise, the only study that produced country figures systematically had been conducted in the 1970s. It led to a publication entitled *World Water Resources and their Future* (L'vovitch, 1974), which remains in use as a reference work in this field. Based on a water balance approach and drawing on a large amount of information on stream flow gathered from around the world, it proposed a table of water resources by country, including water resources generated in the country and flows from neighbouring countries. Also based on a water balance approach and following the work of Korzun et al. (1974), the publications by Shiklomanov (1997, 1998 and 2000) are the most frequently cited and most up-to-date sources of information on water resources at regional and continental level. Shiklomanov (1998) provides country data for 51 countries on available water resources.

The FAO compilation is limited to the long-term average TARWR based on multiple country sources and has been validated with country representatives. It is the most complete available today and is updated ideally every five years, but in fact up to ten years depending on the resources available. It uses a generic water resource balance sheet that was established on the basis of available information in 2003 at country level for the world. Since then, the country water balance sheet is sent to each country together with the AQUASTAT questionnaire. Countries are requested to verify the information and correct it if data have changed. For Europe and OECD countries, the OECD/EUROSTAT data sets are used by AQUASTAT, as well as the Blue Plan/MAP data sets for the Mediterranean.

Some water resources data items are also collected by the joint UNSD/UNEP water questionnaire that is sent every two years (with on average 60 responses).

Other useful compilations are by Gleick (Pacific Institute), UNEP (Geo data portal & vital statistics), and the World Resources Institute (Earth trends database). The latter provides regular and systematic information about water resources at country level. Most of these sources compile information from the FAO/Aquastat database.

Data quality
These global data sources often do not indicate the method used to compile and produce these figures. This is frequently because this type of information is not available in the national documents. This is a concern for AQUASTAT which started a pilot project to assess the data production methodologies (meta data) in order to be able to assess the quality (relevance, accuracy, timeliness, accessibility, comparability, coherence) of its data sets.

Box 8. Withdrawals or abstractions

Compilation: The most complete compilation on water withdrawals (total, agriculture, domestic, industry) is provided by FAO (AQUASTAT). It is updated ideally every 5 years, but in fact up to 10 years depending on the resources available. It uses a generic questionnaire with detailed definition. That compilation is based on multiple country sources and is validated with country representatives.

Other useful compilations are by Gleick (Pacific Institute), UNEP (Geo data portal & vital statistics), and the World Resources Institute (Earth trends database). The latter publish regular and systematic information about water withdrawals at country level. All these sources are compiling information from FAO/Aquastat database. Some water withdrawals/abstractions data items are also collected by the joint UNSD/UNEP water questionnaire that is sent every 2 years (and get in average 60 responses).

Data quality: Withdrawals or abstraction data quality are poor, perhaps poorer that the knowledge on water resources. Information is largely incomplete – particularly for agriculture, the largest user – and is lacking altogether for some countries.

Only limited disaggregated information exists, and even this shows deficiencies of validity and homogeneity and provides extremely poor information on trends. The quality of information systems varies with each country, but there are common difficulties:

- Magnitude of demand and withdrawal are often estimated rather than based on data that are measured or collected from censuses. The level of uncertainty varies, but is particularly high for agriculture.

- Sectors of use are not defined homogeneously and are not well disaggregated.

- Adequate historical datasets are rare, and the dates of available statistics are not always explicit.

- Lack of agreed terminology leads to discrepancies in data compilation and analyses.

Data on water withdrawals have to be used with care particularly to do inter-comparison between countries as data can be measured, estimated, modelled – using different assumptions or derived from other data. Data found at national level rarely provides details on these specific aspects and often use different definitions. The Joint Monitoring programme already started working on the reconciliation of definition between the international and the national level on the water supply and sanitation issues and it involves extensive work both at regional and national levels.

3.3 Towards better quality of global data sets

As concluded by UN-Water in 2006, there are problems but also a tremendous scope for improving information quality by better structuring the information among the different systems. This was reaffirmed by the individual Task Force members and water experts who met in the context of the WWAP-Expert group on Indicator, Monitoring and Data bases with data users and data providers in 2009. They explored data needs, problems with existing key data sets and ways to overcome problems and data gaps if aiming to produce the key indicator set and report progress in the next World Water Development Report (2012).

There are ways forward to improve the monitoring situation and report effectively on a limited set of indicators. Future works should strengthen the various efforts underway.

To **improve the coherence and comparability across countries and international data sets**, an effort of **harmonization of definitions and methods** was initiated by the IWG-ENV Subgroup on Water Statistics functioning from 2005 to 2007. It was mandated to foster a close collaboration between the parties involved in the collection and compilation of statistics on the quantitative and qualitative aspects of freshwater resources and their use, with the aim of assuring complementarity in international data collection, removing redundancies, and sharing data and country information between all parties, and to support country efforts in developing water statistics (including data collection, data treatment, quality assurance, publication and dissemination), through appropriate sharing of experiences, promoting of best practices, and capacity building. This work is still to be finalised and should be revived. WBCSD with IUCN and NCASI have also started to work on a common glossary for the water sector (annex 1 and glossary).

To **improve the timeliness and accuracy**, the Joint Monitoring Programme (WHO/UNICEF) has demonstrated the usefulness of using the statistical systems in place in the countries and has been working closely with individual countries to use existing national household or health surveys to collect relevant data sets. It negotiated the addition of few questions to allow for regular reporting on the level of implementation for the MDG on water supply and sanitation. AQUASTAT (FAO) is following a similar path and has proposed new questions to be added to the global agricultural census about to be launched in order top improve the data collection on irrigated areas. The WWAP-EG IMD concludes similarly on the importance to collect water use data items in particular in a manner compatible with structures used in national accounts and other statistics.

When data sets are incomplete or not available, it is suggested to rethink global monitoring systems and methods used and explore new opportunities presented by modern technologies (e,g. global spatial information). While data quality remains an issue for several of these data sets, the development of common open-sources platforms, like Geonetwork, are an excellent example of successful inter-agency cooperation. The WWAP expert group on Indicator, monitoring and databases (EG IMD) proposes to test the feasibility of utilizing operational Earth system science (combination of remote sensing, modelling and field measurements) to overcome major data gaps and get global data coverage. In particular, he proposes to work on several of the critical data items identified above and in particular on TARWR, wetlands status, water quality (chlorophyll) (WWAP-EGIMD, 2009).

To solve data gaps, the Work Bank has shown how missing data can be created by using estimations methodologies based on field experimentations and regular statistical surveys as done for industrial emissions of BOD using UNIDO industrial surveys. In India, a non governmental Organisation has created a water portal where information is posted and exchanged and household surveys are carried out.

To enhance accessibility, cost-efficiency and clarity, innovative cost-effective IT modeling, communication and dissemination solution should be used at global level. A federated water monitoring system (FWMS), a web services based UN-Water corporate information system already proposed in UN-Water 2006 would help to streamline and improve access to key data sets.

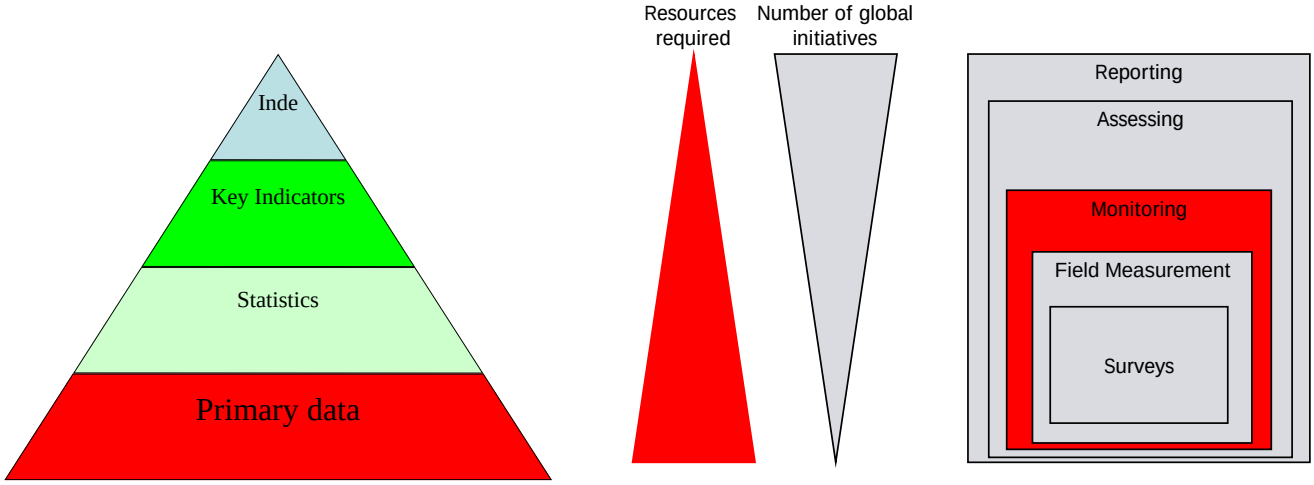
Table 4. Rethinking data production for the key data is necessary and possible

+ indicates potential for data improvements	Definition collection methods	using statistical surveys and systems	Targeted Direct measurement	Using Remote sensing/ modelling
Precipitation (e.g. rainfall, snow)			++(daily)	++
TARWR, IRWR	+		++	++
surface water actual (SW) actual)	+	Check coherence	++(daily)	++
groundwater recharge (GW) actual:	+	Check coherence	++(daily)	++
Total Exploitable resources	++ +		+	+
storage: existing capacity	++	+	+	+
area equipped for irrigation & agriculture water management area	+	++	+	++
hydropower capacity: installed	+	++	+	
water abstractions (Total withdrawals)	+	++	+	
withdrawal from surface water	+	+	+	
from renewable groundwater	+	+	+	+
withdrawals breakdown per SW & GW	+	+	+	
from non renewable groundwater	+	+	+	+
waste water reused: volume	+	++	+	+
desalination production: volume	+	++	+	+
green water flows (soil moisture)	+			+
sectors: domestic water supply, agriculture, industry	+	++	+	+
sector: energy cooling	+	+	+	+
on stream: reservoirs evaporation	+	+		++
on stream - hydropower electricity, navigation	+	++	+	+
on stream: freshwater fish catch, aquaculture	+	++	+	++
population access to improved drinking water & sanitation(total, urban, rural)	++	++		
waste water treated: volume	+	++		++
pop. connected to sewerage and WW treatment	+	++		
Water quality : nitrates & P (chlorophyll)	+	+	++	++
Water quality GW: salinity	+	+	++	++
Industrial pollution load: BOD	+	++	+	+
Freshwater species and wetlands (status)	+	+	++	++

4. Conclusions to produce a regularly updated indicator set

The limits of the proposed key set of indicators have already been acknowledged. They represent only the visible part of the complex information "iceberg". In order to report regularly and effectively on even such a limited set, a major effort should be put in place towards improving the global coverage and quality of the critical data items necessary to calculate the indicators (water resources, withdrawals, water quality, wetlands health, governance). It implies to work in a consistent and comprehensive way on how we monitor and in particular strengthen existing surveys, field measurements and other innovative approach to monitoring. Reporting should be done on a more reliable and regularly updated data set and the ability to follow trends of the key indicator set will reveal defaults.

Figure 2. to support the key indicators, a need to strengthen the primary data production (UN-Water, 2006).



There are innovative opportunities to be explored (using regular country surveys as done with success by the JMP using household surveys, or working at country level as done by AQUASTAT and UNDESA, or involving the business and practitioners community in monitoring representative samples at local level, using modern technologies when data gaps cannot be filled at country level). To succeed, there is overall a need for coordinated action that UN-Water can foster and based on this report, to agree on the basics of a **common approach to assess the performance** of the water sector in all its dimensions,

The Task Force recommends initiating a major collective effort to improve and increase data production so as to improve our ability to follow trends and produce valuable indicators in the short and medium term.
However, it is suggested to distinguish between the following two types of information to strengthen monitoring and reporting: 1. **Quantitative information** - context, functioning of the water sector - ; 2. **Governance information** - qualitative in nature -. These require different approaches and would benefit from having different working groups (Box 9 and 10). However when pilot projects are proposed at the national level, data collection for both quantitative and qualitative aspects can be undertaken within the same project via a multidisciplinary team. This would fit in the One UN and monitoring could be one of the issues of the next phase of the Country level coherence Task Force.

The following three main areas of work are recommended by the Task Force. They are centred on improving the global information base needed for regular reporting of changes in the key indicators set, and in particular structuring a monitoring strategy, and developing a federated information system where the necessary data sets would be accessible. Such outcomes could go beyond informing the indicators as they imply improving the monitoring systems supporting the production of key data items and would therefore be a tool for the UN-Water joint reporting.

Three main working areas are proposed for UN-Water:

I- at the global level improving coordination, consistency and complementarities in international data collection practices with the objective of sharing quantitative data and country information among all parties, and in priority feeding the key indicators set.
The aim of the set of activities under that working area would be to remove redundancies, clarify differences, harmonize and standardize data collection in a common strategy. Such a monitoring strategy would define the "what, how and who" for supporting the regular production of the key indicator set based on existing data collection systems at global level (e.g. WMO, AQUASTAT, JMP, UNSD, IGRAC…) and regional level (OECD/Eurostat, Blue Plan …). It would also integrate new initiatives to develop innovative ways to produce global data sets. It would also use the key indicators set to provide a snapshot of the water sector situation –latest situation and trends-. Annex A provides an illustration of the use of some of the key indicators and Annex B completes it by describing the institutional context in which the water sector fits at global, regional and national level.

II- at an operational level, improving monitoring approaches working with countries and with sectors in order to improve the quality of necessary global data sets for the key indicators:
The focus is first on reconciling global, national and sub- national information, clarifying differences, harmonizing and standardizing data sets towards improving the sharing of data, country and representative sample information through pilot projects. The following areas should be explored: definitions difference between global and national level; surveys on water sectoral use, economic indicators, and country reviews of water governance (policies; regulatory framework; budget). It is secondly to propose improvement or new ways to compile or produce the key data items. The following areas of work are proposed: Long term average of water resources and variability, water uses estimations, water quality, and freshwater systems quality. The WWAP (Expert Group on Indicator, Monitoring and Data bases) working with UN-Water members and partners has developed a set of proposals in this regard (WWAP, 2009b). These may represent different sub-project to be implemented by different agencies –even if same objective-, however it would be important to seek synergies among them (one UN approach), follow agreed methodology (if this exists), exchange on problems and lessons learnt and contribute to the country's development (if this is identified as a need).

III- at the national and sectoral level, supporting country and sectors efforts to develop needed water statistics and governance review (including data collection, data treatment, quality assurance, publication and dissemination). It means to develop a strategy to review and strengthen the collection of primary data and improve information capacities at the national level. This would include training, capacity building and the provision of financial support towards regular and targeted (e.g. water balance) assessments and surveys (e.g. global surveys every five years of households, or of industrial, agricultural or energy sectors). Together with improving computation methods, this would enable countries and global organizations to improve their knowledge base on at least the limited set of main indicators, and potentially more.
In a preliminary stage, a participatory review of the existing national monitoring, data collection and statistical compilation would be necessary. In that context, the water accounts methodology (SEEAW led by UNSD) offers a framework for checking at national level coherence between water resources and use data sets and identifying differences in terminology, computation methods, metadata, as well as critical data gaps. At local level, the ISO standards on water service benchmarking, and the ICID irrigation system benchmarking indicators represent useful tools if there is a willingness to get closer to assessing the performance of responses.
Ongoing activities by UN-Water members at country level (UNDESA, AQUASTAT, GWP, UNDP, Capnet…) and willingness to strengthen country level coherence on monitoring (link with Task Force on country level coherence) could be useful starting point.

The following boxes provides more details on directions for improvement on quantitative information (Box 9) and governance information (Box 10).The Annex 1 proposes a practical follow up to the recommendation of Task Force on Indicator Monitoring and Reporting and list a series of activities that could fall under a common Un-Water strategy, and could be developed in parallel but in a coordinated manner in the next years. It provides more insides on a first activity under I (harmonization of terminology) and under II (approach to regulatory framework performance assessment).

Box 9 Improving quantitative monitoring of the water sector at global level

The availability of data has been a factor in the choice of the limited set of key indicators. Their completeness, reliability and capacity to show trends have determined their choice for the short term. If action is taken now, we can move to improved indicators (medium term). UN-Water is the right forum to stimulate new approach to data collection to ensure regular updating. The following ideas have been brought forward to improve our ability to report on the water sector:

1-Launch **in 2010 a global survey of water statistics** to support the development of a regularly updated key set of indicators (context and functioning). Such a survey would be based on agreed standards and methodology and would be linked to existing data collection processes at global level (in particular JMP; AQUASTAT ; UNSD/UNEP;) and regional level (OECD/EUROSTAT; EUROSTAT/MEDSTAT) and will use global census (agriculture), surveys (industry, energy, cities), thematic reporting (global conventions), individual reporting (Global reporting initiative for businesses, IWA, ICID benchmarking...) to ensure complementarities, regularity and focus on gap filling. It is proposed to launch the first survey in August 2010 and with a 5 years frequency.

2- Use **operational Earth system science** data sets to monitor key elements of the global water resource base (combination of remote sensing, modelling and field measurements) to overcome major data gaps and get global data coverage. Various issues could be explored: TARWR components, water quality (including eutrophication), wetlands status (see specific proposals by the WWAP, expert group on IMD in Ref. WWAP.2009b).

3- **Strengthen existing sectoral surveys** and increase their periodicity, comparability and exchange across sectors. Specialised data collection are carried out with very different time frame: every year (GLAAS survey), every two years (JMP survey), every 5 and 10 years (AQUASTAT), 10 years (agricultural census). UNSD and UNEP, OECD and EUROSTAT have biannual environmental surveys. All report problems in reconciling between global and national terminology or data collection methodology. The JMP have initiated activities at regional and country level to understand better the reasons behind the differences between national data sets and global data sets. AQUASTAT has initiated country level projects to identify opportunities for improved data collection in quality and regularity-. The Business sector (WBCSD) is also interested in assessing corporate water footprint and water management progress in different industrial sectors. UN-Habitat wishes to strengthen its city level monitoring. IWA and ICID support local level performance benchmarking of water services respectively in urban or rural context. It is important to strengthen such initiatives through targeted sector project but with an harmonized approach and creating opportunity to exchange and document results and lessons learnt across sectors, and levels.

4- A subgroup on 'economic aspects and **valuation' should be created to propose an approach to measure economic aspects and economic performance of water use and services**. In particular, it would investigate ways to monitor and report on " financial accounts of water expenditures" and measures of economic productivity of water use. Such a group would involve people interested in financial accounts (UNSD, and interested statistical institutes), and would link up with ongoing regional initiatives such as the Economic Commission of West African States (ECOWAS), the Blue Plan/Mediterranean Action Plan (UNEP). For the specific aspects of water productivity, it would involve among others the World Bank, FAO (agriculture), UNIDO (industry), WBCSD (businesses), IEA (energy).

1 to 4_ Pilot test at country level in a number of countries will be needed to test the relevance, and feasibility at national level of each of the above improved data collection methodologies. Projects at country level could start with a capacity building on water monitoring and use the "water accounts" framework (SEEAW led by UNSD) as a tool to check existence of the necessary data sets, coherence between water resources and use data sets and identifying differences in terminology, computation methods, metadata, as well as critical data gaps.

The SEEAW is currently applied in 44 pilot countries. Pilot countries have offered comments and propositions to adapt and revise the proposed framework. It is recognized as a useful tool to stimulate a dialogue between statisticians and technical ministries, increase understanding of the quality of water statistics, and identify major gaps at national level.

Box 10. Towards a global assessment of water governance performance supported by country level reviews/audits

A sub-group on water governance is to be set in order to exchange on ongoing global, regional and country level water governance reviews, and work on a common approach to measure governance performance at all three levels. Several activities are proposed:

1- It would investigate the **feasibility of a common approach for future "water governance reviews/audits"** that would facilitate synthesis across countries and regions. The following UN-Water members and partners could be involved : UNDP-governance facility, DHI/UNEP-UCC, GWP, UNESCO-PCCP, and regional organisations should also be involved.. There are global-level experiences (UN-Water 2008, UNDESA 2008, GWP) and regional (ECOWAS, 2008) and country-level (DHI, Capnet) approaches available that could be built on to define a common methodology for country-level audits. There is a need to define and break down precisely the different governance elements to be captured, in particular the distinction between policies and regulatory framework. *A first output* of such a group would be a '**methodology to assess water sector governance performance' at global, regional and national level. It would propose a specific approach to carry "** water sector governance review/auditing at country level' (Indicative elements are proposed in the companion document of that report ref. UN-Water TFIMR, 2009).

2-A **2010 global governance survey** to assess the level of existence and implementation of governance means supporting IWRM objective could be launched to initiate a monitoring of water governance progress. It should rely on existing data bases (FAOLEX, WATERLEX...), and past surveys (UN-Water 2008 on IWRM, UNDESA 2008 on CSD_13) and revised methodologies (e.g. ECOWAS work in West Africa) and would involve accordingly all interested partners at global and regional levels. Among the governance means, the survey would assess the reality of monitoring and reporting infrastructure at country level to understand the problems to overcome for the regular updating of the key set of indicators (for example, existence and functioning of network, measurement stations on basins, aquifers, statistical surveys with water related questions etc).

3-A pilot test of **such a water sector governance audit** would be done in a number of interested countries (5, 10 or preferably more provided funding is available) to assess the enforcement and effectiveness of the governance means supporting IWRM objectives. It would involve those UN-Water members and partners already involved in similar activities and active in those countries. It would provide a good opportunity to clarify differences at an early stage, streamline methodologies used and adapt accordingly the common UN-Water methodology.

4- It is suggested to have also **sub-group focused more specifically on the assessment of the performance of the legal/ regulatory system** as it requires specific expertise and would take a pilot approach to investigate the level of implementation, enforcement and effectiveness. The FAOLEX and WATERLEX data bases managed at FAO provide preliminary instruments that should be completed by "national water regulatory framework review" in pilot countries interested involving national legal experts and a network of international legal experts. .

5. Annexe on the Way forward – Ideas

5.1 Elements for a UN-Water monitoring strategy to produce the key indicator set

Table 5. Elements for a UN-Water monitoring and reporting plan to report regularly on the key indicator set

The various activities proposed in the table will be implemented by a sub-group of interested UN-Water members or partners with a lead agency, and should involve regional or local partners if possible.Each line would need to be developed further into a full proposal after the UN-water Stockolm meeting (O8/09).

Objective	Activity	Outcomes	When	Who and relevant initiatives
I. Improve coordination and consistency of monitoring of water sector at global level			2009-2012	
Assess data quality of existing key quantitative water data and ways to improve existing systems	Detailed assessment of data quality of key data items (Water resources, water uses, freshwater)	A report of data quality and metadata for each of the critical data	2009-2010	Each monitoring systems managing a global data base
	Harmonization and standardization of definition, monitoring methods and system for quality control to strengthen existing data collection processes. (see below)	Common glossary and agreed monitoring performance approach, methods/standards for data of key data items at the global level	2009-2010	Build on IWG-ENV Subgroup on Water Statistics & partners with data collection activities (e.g. JMP) & glossary initiatives (WBCSD et al)
	Design a common monitoring and reporting strategy (will contain II and III)	UN-Water coordinated monitoring strategy targeted to joint reporting (key indicators, WWDR…), including a pilot testing proposal at country level	2009-2010	Build on IWG-ENV Subgroup on Water Statistics, and others with data collection activities (e,g, Aquastat, JMP) And the assessment of ways to improve existing systems.
Improve data sharing, and exchange	Develop a federated information system to support reporting needs and define functioning	An operational federated systems linked the existing data bases and presenting results (key indicators)	2009-2010	WWAP? and all having a monitoring and reporting activity
	Produce an annual snapshot of the water sector using the key set of indicators (illustrated report and statistical annex available online and as a UN-Water short document).	A regular UN-Water document presenting the situation of the water sector in brief.	2009-2015	Annex A and B provide draft elements of such a report/.
II. Improving monitoring approaches with countries and sectors for global data sets				

Objective	Activity	Outcomes	When	Who and relevant initiatives
Explore innovative approach to improve fill data gaps, improve data coverage, periodicity and quality	Test the feasibility of utilizing Operational Earth system science[13] data sets to monitor key elements of the global water resource base.	Improved global data sets on: TARWR, variability indicator, Water use, Water quality…	2009-2012	WWAP-EG IMD proposals WWAP.2009b with interested partners.
	Refine the assessment of economic aspects of the water sector performance framework	A shared methodology to value costs, benefits and productivity in the different sectors (e.g. water productivity, services valuation)	2009-2010	Build on UN-Water TFIMR Concept note and ongoing initiatives at regional level (e.g. ECOWAS, Blue Plan) and interested members (e.g. World Bank, UNIDO, FAO)
	Explore ways to strengthen data quality and periodicity of water use and pollution data for the various sectors: agriculture, industry, domestic/urban, other sectors	Proposals on strategies to strengthen data production of existing important water related surveys (e.g. Aquastat) or use sectoral surveys (adding questions) at global, regional and local levels	2009-2010	Work with global surveys: AQUASTAT, UN-Habitat, and existing statistical collection (agricultural census, UNIDO industrial surveys, household surveys…), as well as reporting mecanisms (Global reporting initiative for industries, ISO, conventions…) Regional : OECD, EUROSTAT, Blue Plan, ESCAP… Sub-national levels (IWA, WB-IBNET)
	Design a common approach to assess water governance performance and define strategies to implement it	An agreed methodology to assess water governance at different levels and a pilot testing proposal to do country water governance review	2009-2010	Build on UN-Water TF IMR concept note and interested partners (UNDESA, GWP, UNDP, Capnet, regions west Africa…)
	Focus on the regulatory framework performance for IWRM objectives	A pilot testing proposal to review the performance of the regulatory framework at national level	2009-2010	Build on UN-Water TF IMR concept note and interested partners (FAO-legal department, WWAP Expert group on legal aspects…)
Collect data and governance information every 5 years (periodicity to be confirmed) for the key indicators	Design & implement global survey on key water data to support the regular updating of the key indicators set (periodicity to be defined)	20100 first global survey[14] (include sampling approach for local issues –cities, irrigation schemes, industries) and link to country level pilot projects.	2009-2011	build on existing global surveys of AQUASTAT and JMP, GLAAS and interested partners
	Design and implement a global survey of Key water governance means at global, regional, and national levels	2010 assessment of key water governance means launches, at global, regional and national level (global survey and link to country level reviews).	2009-2011	Build on international conventions reporting procedures, as well as existing data bases (faolex, water lex), and interested partners
III. Support country and sectors to develop needed water statistics			2009-2015	

13 combination of remote sensing, modeling and field measurements

14 Such a survey would be based on agreed standards and methodology and would be linked to existing data collection processes at global level (in particular JMP; AQUASTAT ; UNSD/UNEP;) and regional level (OECD/EUROSTAT; EUROSTAT/MEDSTAT) and will use global census (agriculture), surveys (industry, energy, cities), thematic reporting (global conventions), individual reporting (Global reporting initiative for businesses, IWA, ICID benchmarking...) to ensure complementarities, regularity and focus on gap filling. It is proposed to launch the first survey in August 2010 and with a 5 years frequency.

Objective	Activity	Outcomes	When	Who and relevant initiatives
Regional and national levels	Capacity building and exchange on monitoring water sector performance and reporting at country level, regional and global levels, including issues of terminology, data collection, data treatment, indicators computation	Generic training module on monitoring and reporting on the water sector on quantitative and governance (would reflect the findings and choices of I and II) Country and regional experiences documented	**2009-2015**	Build on existing capacity building at regional level on data (e.g. JMP, UNSD, Aquastat) and link up with existing regional facilities as well as UN-Water capacity building office.
Pilot countries & regional if possible)	country level review of existing and potential monitoring capacity using in particular the water accounts framework (SEEAW) as a tool,	A series of country level assessment of existing monitoring and statistical systems for producing water statistics and potential improvement & first elements of comparative analysis at regional level	**2009-2015**	Build on ongoing partners activities on water information systems, audits or reviews (e.g. FAO, UNDESA, UNSD…) and regional experiences (MEDSTAT, West Africa…)
Pilot countries & regional (if possible)	Country level review of water governance means performance based on methodology defined in II	A series of country level assessment of existing water governance performance & first elements of comparative analysis at regional level	**2009-2015**	Build on ongoing partners activities on IWRM monitoring (UNDP, GWP, DHI) and on CSD-13 policies (UNDESA).
Pilot countries & regional (if possible)	Country level review of regulatory framework implementation, enforcement and effectiveness based on methology defined in II	A series of country level assessment of existing regulatory framework relevant to IWRM objectives & first elements of comparative analysis at regional level	**2009-2015**	Build on existing data bases and expertise at FAO (legal division) and expert group on legal aspects of the WWAP.
Exchange of experience and lessons learnt	Provide opportunity for regular exchange of experience with countries, at regional or global level about monitoring strategies and progress ; document innovative experiences at local and national levels	Annual gathering on data and statistics with countries and partners at the World Water forum (every 3 years) at the World Water week (every other year)	2009-20015	Develop an informal network around water information using webbased tools such as the water wiki, but more national or local portals (e.g. In India, the water portal).

5.2 The need for standardization and harmonization of terminology: past initiatives and new ones

In as much as water resources management is not new but it is evolving as knowledge progress and the boundary between disciplines become blurry. Water is not anymore the field of only the hydrologists; it concerns the agronomists, environmentalists, the health sector, urban planners, businesses, land use planners, watershed managers, policy makers deciding on development strategies and multiple water users etc. As water becomes more everyone business, concepts evolve in a multidisciplinary fashion and the water sector (the resources and uses aspects) becomes more complex to describe.
Terminology used to describe multiple aspects of the water reality is not always commonly understood or consistently used. The lack of a common and accessible language with which to discuss and measure water sustainability and to consider the impacts of human water use on ecosystems and resources has been identified as an obstacle to progress toward sustainable water management.

A follow up project on harmonization of definitions

Objective: The Task Force on Indicator, Monitoring and reporting recommends setting a UN-Water working group to reconcile differences in terminology and computation methods used at global level.

Outcome: Develop a common glossary on water that would be used by all members.

Implementation: A working group on terminology would build on the ongoing initiatives of Members of the Task Force active on this, in particular:

- The IWG-ENV Subgroup on Water Statistics (UNSD, FAO, OECD, Eurostat, UNECE, UNEP and GEMS-Water) functioned from 2005 to 2007. Its mandate was to foster a close collaboration between the parties involved in the collection and compilation of statistics on the quantitative and qualitative aspects of freshwater resources and their use. Discussion on differences and complementarities of data collections and definitions were initiated but unfortunately interrupted. Examples of the issues discussed are provided in that section. (Contact:
- The UNSD water accounts initiative (SEEAW) proposes a common glossary that covers many of the important terminology to describe statistically the water resources and uses. It has been discussed with a large community but debates remains with the water technical community. (Contact:
- The WBCSD Secretariat together with IUCN and technical input from NCASI has taken the initiative to begin development of a glossary of terms and definitions related to sustainable water management. It aims to make it valuable to those practicing or entering the field of sustainable water management. (Contact: water@wbcsd.org).

Process: These initiatives, as well as existing glossaries provide the base on which to build a technical working group that would come out in a short time with a common glossary that would gather terms commonly used in the water sustainability dialogue. Such a glossary would denote their specific or general meanings. Such a glossary could be available online on the UN-Water website and on one of its members/partners ones. Such a glossary should be a "living" product that will be updated periodically as water sustainability terms evolve and/or become more consistent in their usage. →The organisation hosting the glossary on its website would update it regularly.

Key references available to build a common glossary

Within the UN-Water group, various valuable glossary exist, some of which are noted thereafter and have been used for the short glossary of the document.

Aquastat: FAO's Information System on Water and Agriculture	http://www.fao.org/nr/water/aquastat/glossary/index.jsp
Glossary of Hydrology, UNESCO-IHP and World Water Assessment Program	http://www.cig.ensmp.fr/~hubert/glu/HINDEN.HTM
UNSD - System of Environmental-Economic Accounting for Water (SEEAW)	http://unstats.un.org/unsd/envaccounting/seeaw.asp
OECD Glossary of Statistical Terms	http://stats.oecd.org/glossary/index.htm
ISO/FDIS 24510:2007(E)- ISO/FDIS 24511:2007(E)- ISO/FDIS 24512:2007(E)-	Three ISO manual on "Activities relating to drinking water and wastewater services Guidelines for the assessment and for the improvement of the service to users." that define precisely all the terminology related to those services.
The Water Footprint Network Online Glossary	http://www.waterfootprint.org/?page=files/Glossary
UNDP Water Wiki	http://waterwiki.net/index.php/Concepts_/_Definitions_/_Glossary
World Meteorological Organization, Meteo term, Terminology Management Tool	http://meteoterm.wmo.int/meteoterm

However, in some cases definitions of important data items defer and reconciliation of these differences would enhance their usefulness for non specialists. WBCSD proposes to group the water terms in the following categories and aims to establish categories 2 to 4:
(1) Terms commonly used in water hydrology science. These terms are established.
(2) Terms and concepts with definitions associated uniquely to particular water initiatives (e.g. water footprint). Such terms would evolve as science progress.

(3) Terms commonly used in the larger water community, where definitions have been proposed and adopted by part of the water sector but where exist other definitions (e.g. Total actual renewable water resources)
(4) Concepts or states of condition in water resource management, such as water consumption that are often used by different communities with different definition in mind or in some case no specific definition in mind. It affects the reliability of available statistics as a similar concept may describe a different reality.

The following table aims to group the key indicators and the necessary data items according to these referenced categories.

1 established	**2 specific**	**3 common use but difference**	**4 different use and interpretation**
Precipitation	Water footprint	Sustainable development	Water sector
Groundwater	Green water	Context	Withdrawals Astraction
Surface water	Blue water	Functioning	Total water withdrawals
Water quality	Green water footprint	Governance	Agricultural water withdrawal
Pollution		TARWR	Domestic water withdrawals
Point source pollution		Improved water supply	Industrial water withdrawals
Non-point source pollution		Improved sanitation facilities	Exploitable water resources
Sewage treatment		Performance	Water scarcity Water shortage Water stress

The need to reconcile definitions at global level to improve data collection, treatment and quality is illustrated with the two key data items for the UN-Water indicator set (TARWR, Withdrawals).

Total actual renewable water resources (TARWR)

Definition and computation of TARWR (FAO, 2003).
Actual renewable water resources are defined as the sum of internal renewable resources (IRWR) and external renewable resources (ERWR), taking into account the quantity of flow reserved to upstream and downstream countries through formal or informal agreements or treaties and possible reduction of external flows due to upstream water abstraction.

- IRWR are composed of the average annual flow of rivers and recharge of groundwater (aquifers) generated from endogenous (internal) precipitation.
- ERWR are the portion of the country's renewable water resources that is not generated within the country, including inflows from upstream countries and a portion of border lakes or rivers. It distinguishes between the natural situation (natural renewable resources), which corresponds to a situation without human influence, and the current or actual situation.

There are differences in the way individual elements of the water balance are described by different international agencies. This is illustrated in Table 7, below, prepared in the framework of the IWG-ENV Subgroup on Water Statistics.

The variables shared between the UNSD water questionnaire and FAO's country water balance sheets may use different terms, but they appear to be equivalent.

Table 6. Long-term annual average data collected on freshwater resources by the UNSD water questionnaire and FAO country balance sheets[15]. (IWG-ENV Subgroup on Water Statistics)

Variable	UNSD	FAO
Precipitation*	Precipitation* Total volume of atmospheric wet precipitation (rain, snow, hail, dew, etc.) falling on the territory of the country over one year, in millions of cubic metres (mio m^3).	Average precipitation* Long-term double average over space and time of the precipitation falling on the country in a year, expressed in depth (mm/year) or in volume (km^3/year or $10^9 m^3$/year).
Internal flow*	Internal flow* Total volume of river run-off and groundwater generated over a year, in natural conditions, exclusively by precipitation into a territory. Internal flow is equal to precipitation less evapotranspiration and can be calculated or measured. If river run-off and groundwater generation are measured separately, transfers between surface and groundwater should be netted out to avoid double counting.	Total internal renewable water resources* Long-term average annual flow of rivers and recharge of aquifers generated from endogenous precipitation. Double counting of surface water and groundwater resources is avoided by deducting the overlap from the sum of the surface water and groundwater resources.
Inflow of surface and groundwater* comment: According the FAO's definition incoming is not really the same as external**.**	Inflow of surface and groundwater* Total volume of actual external inflow of rivers and groundwater, coming from neighbouring countries. Boundary waters should be divided 50/50 between the two riparian countries, unless other water sharing agreements exist.	Total actual external renewable water resources* That part of the country's annual renewable water resources which is not generated in the country. It includes inflows from upstream countries (groundwater and surface water) and part of the water of border lakes or rivers. Contrary to natural external renewable water resources (i.e. no human influence), ERWRactual takes into account the quantity of flow reserved by upstream (incoming flow) and/or downstream (outflow) countries through formal or informal agreements or treaties, and possible water abstraction occurring in the upstream countries. Therefore, it may vary with time.
Total renewable freshwater resources* comment: depends on previous comment whether it is the same or not	Total renewable freshwater resources* = Internal flow + Inflow of surface and groundwater	Total actual renewable water resources* The sum of internal renewable water resources (IRWR) and external actual renewable water resources ($ERWR_{actual}$), which take into consideration the quantity of flow reserved to upstream and downstream countries through formal or informal agreements or treaties and possible reduction of external flow due to upstream water abstraction. It corresponds to the maximum theoretical yearly amount of water actually available for a country at a given moment. While natural resources are considered stable over time, actual resources may vary with time and refer to a given period.

* Long term annual average: Arithmetic average over at least 20 consecutive years.

Future – proposed improvement

The Expert group on Indicator, Monitoring and databases of the WWAP recommends a new calculation of the TARWR to account for human impacts and climate variations (new long term average) and to look at a 30 year moving average; replacing fixed 1960-1990 data) (using remote sensing + synthesised). (Ref. WWAP – EG IMD, 2009b).

Withdrawals or abstractions

Compilation: The most complete compilation on water withdrawals (total, agriculture, domestic, industry) is provided by FAO (AQUASTAT). It is updated ideally every 5 years, but in fact up to 10 years depending on the resources available. It uses a generic questionnaire with detailed definition. That compilation is based on multiple country sources and is validated with country representatives.

[15] UNDSD and FAO water data collections executive summary provided by Karen Frenken (FAO) prepared in the context of the International water statistics working group that was active between 2004 and 2006.

Other useful compilations are by Gleick (Pacific Institute), UNEP (Geo data portal & vital statistics), and the World Resources Institute (Earth trends database). The latter publish regular and systematic information about water withdrawals at country level. All these sources are compiling information from FAO/Aquastat database. Some water withdrawals/abstractions data items are also collected by the joint UNSD/UNEP water questionnaire that is sent every 2 years (and get in average 60 responses).

Definition: the FAO provides data on water withdrawal by sector (which includes surface water, groundwater, reused treated wastewater and desalinated water) and by source (which includes surface water and groundwater). All AQUASTAT terms are defined in the online glossary. As illustrated in Table 7, created by the water statistics working group (FAO, UNSD, OECD), there are some differences that can be reconciled:

- Aquastat speaks about withdrawals where UNSD or OECD speaks about abstractions.
- There are differences in the terms and definitions used for describing economic activities that may lead to differences in values (examples are given thereafter).

Table 7. Data on abstraction collected by the UNSD water questionnaire and the FAO AQUASTAT questionnaires. (IWG-ENV Subgroup on Water Statistics)

Variable	UNSD questionnaire	FAO – Aquastat questionnaire
Gross freshwater abstracted	Gross freshwater abstracted Water removed from any source, either permanently or temporarily. Includes abstraction by the water supply industry (ISIC 41) and direct abstraction by other activities, and water abstracted but returned without use, such as mine water and drainage water.	Total water withdrawal It is the sum of the withdrawal from surface water and groundwater, which are also called conventional water sources.
Gross fresh surface water abstracted	Fresh surface water Freshwater which flows over, or rests on, the surface of a land mass; natural watercourses such as rivers, streams, brooks, lakes, etc., as well as artificial watercourses such as irrigation, industrial and navigation canals, drainage systems and artificial reservoirs. For purposes of this questionnaire, water obtained through bank filtration is included under (fresh) surface water. Sea-water, and transitional waters, such as brackish swamps, lagoons and estuarine areas are not considered fresh surface water. Gross freshwater abstracted Water removed from any source, either permanently or temporarily. Includes abstraction by the water supply industry (ISIC 41) and direct abstraction by other activities, and water abstracted but returned without use, such as mine water and drainage water.	Surface water withdrawal Gross amount of water, which is extracted from all surface water sources for a given use. It includes conveyance losses, consumptive use and return flow.
Gross fresh groundwater abstracted	Gross fresh groundwater abstracted Fresh groundwater removed from the ground, either permanently or temporarily. Includes abstraction by the water supply industry (ISIC 41) and direct abstraction by other activities, and water abstracted but returned without use, such as mine water and drainage water. Note artificial recharge is not deducted from this figure.	Groundwater withdrawal Gross amount of water, which is extracted from all aquifers for a given use. It includes conveyance losses, consumptive use and return flow. Preferably indicate separately the quantity of water extracted from deep fossil aquifers (non-renewable water).
Abstraction [by] agriculture	Gross freshwater abstracted [by] Agriculture, fishing and forestry Gross freshwater abstracted: Water removed from any source, either permanently or temporarily. Includes… …direct abstraction… …and water abstracted but returned without use, such as mine water and drainage water. Agriculture, fishing and forestry, agriculture, hunting and forestry covers the exploitation of vegetal and animal natural resources. The section comprises the activities of growing crops, raising animals, harvesting timber, and harvesting other plants and animals from a farm or their natural habitats. Fishing, aquaculture and service activities incidental to fishing. Fishing is defined as the use of fishery resources from marine or freshwater environments, with the goal of capturing or gathering fish, crustaceans, molluscs and other marine products (e.g. pearls, sponges etc).	Agricultural water withdrawal Annual quantity of water withdrawn for agricultural purposes. It includes irrigation and livestock watering. If the breakdown is available, put the figures in the comments (if livestock water withdrawal is accounted for in domestic water withdrawal, as is sometimes done, indicate it in the comments). Methods for computing agricultural water withdrawal vary from country to country. The figure could be reviewed for each country on the basis of crop water requirements and irrigated areas, and comments should be added in the country profiles to explain the figure when necessary. In some cases, rural water supply is included in this category, in which case it should be mentioned in the comments. If a separate figure is available for rural water supply, it should be added to urban water supply and reported in the related line (domestic water withdrawal).
Abstraction [by] water supply industry (ISIC41)	Gross freshwater abstracted [by] water supply industry (ISIC 41) Gross freshwater abstracted: Water removed from any source, either permanently or temporarily [by ISIC 41]. Water supply industry (ISIC 41): Collection, purification and distribution of water. Providing water supply through a permanent infrastructure (network) of lines mains and pipes. It also includes: - purification of water for water supply purposes - desalting of sea water to produce water as the principal product of interest	Domestic water withdrawal Annual quantity of water withdrawn for domestic purpose. It is usually computed as the total water withdrawn by public distribution network. It can include that part of the industries, which is connected to the network, in which case it should be mentioned in the comments.

	And excludes: - irrigation system operation for agricultural purposes - (long-distance) transport of water via pipelines - treatment of wastewater in order to prevent pollution (Remark: In earlier versions of the questionnaire, the term Public Water Supply was used instead of Water Supply Industry)	

For example, UNSD asks for data on gross freshwater abstracted by 'Agriculture, fishing and forestry' while FAO only ask for abstraction by agriculture, which may include some forestry where trees are irrigated. For example there may be abstractions used for irrigating commercial tree growing operations, in which case FAO includes these withdrawals with agriculture since FAO includes all that is irrigated.
In theory this means that UNSD figures should be higher than FAO figures and should include all water abstracted by fishing and forestry in addition to agriculture and irrigated forestry. It is thought many countries will lack data on abstraction by fishing and forestry. Even if these figures are available, they are likely to only be a small fraction of the total, as agriculture is typically a very large water abstractor. In practice the difference between the UNSD and FAO figures should normally be very small, assuming the figures UNSD and FAO receive are accurate.

Gross freshwater abstracted by the 'Water supply industry' is equivalent, in practice, to FAO's 'Domestic water withdrawal' because the manual supporting the FAO AQUASTAT questionnaire states that the figure for domestic water withdrawals 'is usually computed as the total water withdrawn by public distribution network'.

Table 8. FAO terms in relation to ISIC Rev 4. (IWG-ENV Subgroup on Water Statistics)

FAO terminology	**Terminology using ISIC Rev 4 as a reference**
Agricultural withdrawals	Abstraction by ISIC 01 – Agriculture
Industrial withdrawals	Abstraction by ISIC 02 – ISIC 99, excluding ISIC 36
Domestics withdrawals	Abstraction by ISIC 36 – Water collection, treatment and supply*
ISIC Rev4: International Standard Industry Classification, http://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=27&Lg=1 *ISIC 36 from revision 4 of ISIC is the same as what used to be ISIC 41 in Revision 3 of ISIC.	

Future : A similar work is needed on all the data items related to withdrawals/abstractions. → get proposal to improve withdrawals data sets from AQUASTAT with involvement from JMP, UN-Habitat, UNIDO and UNSD.

5.3 Steps for assessing the performance of the regulatory framework

Stefano Burchi (FAO) proposes to UN-Water the following process for developing indicators of legal/regulatory system performance (governance).
It suggested to focus on the assessment of **Existence of effective IWRM legislation and institutions** and for this, it is recommended to distinguish between: existence, administration and implementation, enforcement and finally effectiveness (the most subjective and difficult but the most important). The first level (existence) was tested for few countries and results are presented in the separate excel file (prepared by Christopher List for Un-Water).

Table 9. Steps to assess the existence of effective IWRM legislation and institutions

Name	**Methodology**	**Reference to be used and tools**
1.Existence of legislation meeting essential IWRM parameters	1.Define key parameters 2.Apply key parameters by reference to selected countries' legislation	1.Caponera, Burchi 2.FAOLEX, WATERLEX (FAO)
2.Administration and implementation of legislation	1.Mapping out the organization & structure of the government water administration and the relevant distribution of functions 2.Survey of manuals and instructions for the use of governments administrators in the performance of their functions 3.Survey of administrative actions taken on abstraction licences and wastewater discharge permits (initial grant, subsequent periodic review, variation, suspension, cancellation/revocation)	1. Legislation (FAOLEX, WATERLEX) 2. Available literature 3. Questionnaires 3. Manuals and instructions 4. Interviews with users thereof (government administrators and regulated water users' population) 5.Official records of government Water Authority (water rights registry) 6.Questionnaires 7.Interviews with Water Authority officials 8.Interviews with licence and permit holders (customer satisfaction)
3.Enforcement of legislation	Survey of prosecutions (for breach of statutory provisions carrying criminal or administrative sanctions)	1.Official records of court proceedings (criminal, administrative) 2.Questionnaires 3.Interviews with law enforcement officers 4.Interviews with members of the judiciary
4. Effectiveness of legislation and institutions	To be developed based on returns of 6.1, 6.2 and 6.3	1.Questionnaires 2.Interviews with government officials and stakeholders 3.Others?

6. Annexe – Indicators in use and indicators methodology sheets (in separate document)

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