ESA/STAT/AC.301
UNCEEA/10/3a

DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION
UNITED NATIONS

Tenth Meeting of the UN Committee of Experts on Environmental-Economic Accounting
New York, 24-26 June 2015

SEEA and Transforming Global and National Statistical Systems for Monitoring SDG Indicators

Revision 1

SEEA and Transforming Global and National Statistical Systems for Monitoring SDG Indicators

1. Introduction

1. The post-2015 development agenda and the adoption of the Sustainable Development Goals (SDGs) and targets to drive that agenda represent a fundamental shift toward integration of a multitude of policy issues into a single policy agenda. This single policy agenda is based on the backdrop of international development strategies and programmes articulated in a sequence of major UN conferences and summits, each addressing specific policy issues. Member states and supporting international agencies will have a key role to play in the integration of the individual development strategies and programmes under the umbrella of sustainable development programmes in countries. In parallel, the statistical community faces similar challenges in developing an integrated and multi-purpose information system in support of policy analysis and decision making for sustainable development. At present, national and global statistical systems are confronted with statistical legacy systems characterised by siloed production processes of data. There is therefore a historic opportunity to transform the national and global statistical systems through the adoption of common statistical frameworks which are systemic in nature, along with a standards-based modernization of statistical production processes. The upshot of this transformation will be improved data quality, coordination, integration and alignment of various monitoring and reporting initiatives.

2. One key aspect of meeting the Sustainable Development Goals is the ability of countries to effectively and sustainably monitor progress towards meeting defined targets through the use of relevant indicators. The Inter-Agency and Expert Group on the Sustainable Development Goals Indicators is tasked with developing a monitoring mechanism for the SDGs which adequately reflects the policy agenda, respects countries' capacity constraints to report on indicators, and strives to facilitate national ownership of country data and globally reported SDG indicators. In addition, an increasingly integrated approach to policy decisions, based on a better understanding of the interactions and trade-offs between different realms of sustainability calls for an improved system of information which integrates social, economic and environmental information.

3. In the context of the abovementioned issues and corresponding policy needs for integrated information, this paper considers the integration of economic and environment related statistics, and the role of the System of Environmental-Economic Accounts as a necessary conceptual framework to this end. It discusses the establishment of integrated economic and environmental statistics at the national level, and corresponding benefits accruing to national and global policy-making and the SDG monitoring process. In conjunction, it lays out a transformative roadmap for aligning SDG monitoring mechanisms with the statistical standard of the SEEA. A more detailed transformative analysis and roadmap will need to be developed for each thematic area relevant to the SEEA methodology, with a preliminary analysis for the case of water provided as an annex to this paper.

2. Global Landscape of Policy, Institutions and Statistics for Sustainable Development

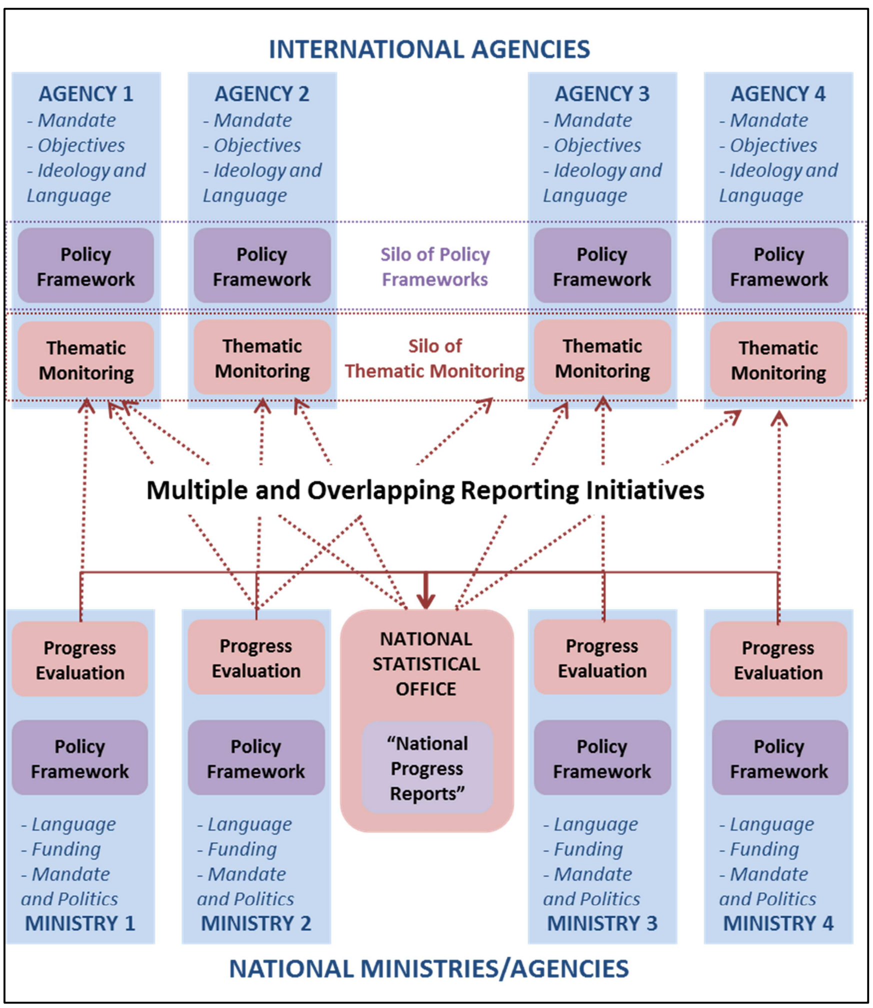
2.1 Policy, Institutions and Statistics: A Silo Structure

4. The evolution of the international development agenda and its community of practice have resulted in a structure of distinct policy frameworks and implementing agencies at the international level. The existing legacy system is a result of specific economic, social and environmental concerns

arising over time, with corresponding policy frameworks being developed and a mandate given to an existing or specially established international organization to implement said framework. The result is a wide array of international agencies each with a specific mandate to pursue a 'unique' set of objectives and priorities. While these organizations all co-exist within the United Nations and broader international development system, initiatives remain relatively isolated within established organisational structures, with stove-piping occurring both across organizations and between different thematic programmes. While some efforts for collaboration have been made greater institutional and thematic integration is needed to maximise progress toward sustainable development in an increasingly complex and globalised world.

5. This silo structure is reflected in the statistical sphere, as different international agencies engage in thematic monitoring to evaluate the progress and effectiveness of relevant programmes. The result is that many international agencies conduct their own, distinct programmes of monitoring in the form of in-country surveys, country assessments and modelling of data for global data sets, as well as specific requests from countries to report progress on programme specific issues. The silo structure of institutions, policy frameworks and statistics in international development as depicted in the top half of diagram 1.

Diagram 1: Silos of Institutions, Policy and Statistics



6. National Governments often experience similar issues associated with the positioning of institutions to address specific issues, and resulting stove-piping of policy and statistics. Ministry mandates typically focus on a specific set of issues, with responding policy frameworks and performance management structures being established within ministries. Each ministry is therefore responsible for the collection of sector specific data using methodologies and structures appropriate to their performance management needs (including the calculation of indicators). As depicted in Diagram 1, the collection of basic data and compilation of indicators is therefore siloed within government agencies.

7. It should be noted that the structure of the National Statistical System varies significantly across countries. More decentralised systems have data collection and reporting on specific thematic issues more concentrated in the responsible ministries. Oppositely, more centralised statistical systems attribute much of the responsibility of data collection, processing and reporting to the National Statistical Office, perhaps with other ministries providing basic data to the NSO. These varying institutional layouts of the National Statistical System will affect the integration and use of statistics in countries.

8. The links between initiatives at the international and national level are deep. Different international organisations have different entry points in countries (in the form of partner ministries and agencies), which are built on an often long history of technical assistance and cooperation based on a common language. The reflection of these links in the statistical sphere is that different national ministries respond to requests for information from different international monitoring initiatives, be it through the reporting of nationally compiled statistics or cooperation with international technical experts to derive modelled data.

2.2 Policy, Institutions and Statistics: Towards Integration

9. Sustainable development by definition requires a balancing of competing policy concerns and consideration of multiple environmental, economic and social factors to ensure a sustainable outcome. Calls for greater policy integration are therefore made to avoid fragmented decision making which risks unexpected and often unwanted consequences. A lack of integration across sectors has long been identified as being a major impediment to sustainable development, as failure of policy design to account for trade-offs and synergies across sectors has resulted in incoherence, adverse impacts on other sectors, and diverging outcomes and trends across broader sustainable development objectives.[1]

10. Integrated policy refers to horizontal integration between different sectors, and vertical integration between different tiers of government and decision making. Integrated policy involves comprehensive inclusion of many different issues, the establishment of a framework in which policy components are consistent and act in agreement, and an agreed set of overarching criterion to evaluate different elements of policy.[2] In this context, the Sustainable Development Goals proposed by an Open Working Group of UN Member States in 2014 represent an effort to develop a policy agenda which is both sustainable and inclusive for all groups over time, and which consistently addresses a wide range of relevant issues.

---

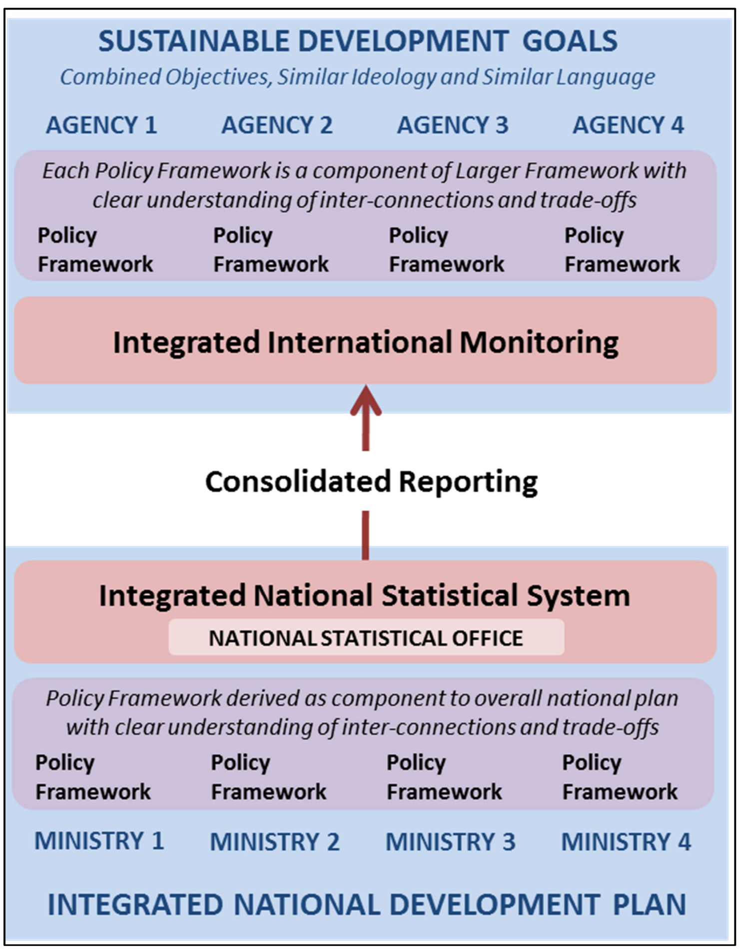
[1] David Le Blanc, 'Towards Integration at Last? The Sustainable Development Goals as a Network of Targets', DESA Working Paper No. 141 ST/ESA/2015/DWP/141, March 2015

[2] Meijers, Evert, and Dominic Stead. "Policy integration: what does it mean and how can it be achieved? A multi-disciplinary review." *Berlin Conference on the Human Dimensions of Global Environmental Change: Greening of Policies-Interlinkages and Policy Integration. Berlin*. 2004.

11. When implementing this integrated policy agenda, significant efforts will need to be made to strengthen links and enhance synergies between international policy frameworks, many of which already address certain elements of the post-2015 development agenda, so as to avoid further overlapping of efforts and conflicting programmes of work. In parallel, there is a need for integration of the statistical mechanisms used to monitor and inform these policy initiatives. A key element of encouraging integration of policy initiatives and programmes across agencies is the development of a common information system and agreement on the overarching criterion and method to evaluate progress to enable shared performance management. This is further elaborated in section 3.1. It should also be acknowledged that existing mandates and agreements will provide the context within which these efforts will take place, and will require careful consideration of how to build on these synergies and maximise the strengths of individual programmes.

12. For illustration purposes an alternative structure is laid out in diagram 2, showing a high degree of integration in which international agencies' policy frameworks are components of an integrated policy architecture for international development based on the SDG agenda. At the national level, ministry-level sectoral policies are part of an integrated national development plan, supported by international agencies. Integration of policy across sectors is further supported by an integrated statistical information system, whereby national statistical systems respond to policy demands for information in a coordinated and efficient manner.

Diagram 2: Integrated Institutions, Policy and Statistics



13. As illustrated in diagrams 1 and 2, integration of statistics for sustainable development is needed along two different lines. Firstly, different types of statistics produced within the national statistical system should be integrated into one common information system. In particular, statistics compiled by different sectoral agencies must be bought together in a way which captures the inter-linkages and trade-offs between relevant sectors. We will term this '*horizontal integration'* based on the need to break down different silos of information production to create one integrated information system. Horizontal integration is depicted in diagram 2 as the creation of an integrated national statistical system.

14. Secondly, monitoring and reporting structures at the global level should be integrated with countries' statistical frameworks used to collect information for national policy purposes. These structures can become more integrated by adopting consistent conceptual frameworks and working to harmonize international monitoring initiatives to minimize reporting burdens placed on countries. We will term this notion '*vertical integration',* based on the need to establish a coherent and efficient 'monitoring and reporting link' between national and global initiatives. *'Vertical integration'* is depicted in diagram 2 as the consolidation of reporting initiatives into one process.

15. These two levels of statistical integration are a significant endeavour at the institutional level, requiring extensive coordination and strengthened institutional agreements for joint programmes of work between relevant actors. In addition, a coherent conceptual framework to integrate these statistics is necessary to provide the frame within which different types of data can be bought together in an integrated way (i.e. capturing linkages and trade-offs between different areas). The System of National Accounts (SNA) serves as this framework for economic statistics, whereby the accounting system enables the use of diverse and often flawed data to produce coherent statistics. Extending the integration of economic statistics to environmental statistics is possible with the System of Environmental Economic Accounting (SEEA), which is an extension of the SNA, and provides the necessary conceptual framework to measure the environment and its relationship with the economy in an integrated manner.

16. The SEEA as a statistical framework represents an important building block in the integration of the statistical system by providing the necessary conceptual and methodological structure to collect environment data and bring it into an integrated system of environmental-economic information (alongside the SNA). In the context of the Sustainable Development Goals and associated monitoring and reporting mechanisms being developed by the Inter-Agency and Expert Group on SDGs, this paper will discuss the potential contribution of the SEEA in promoting an integrated monitoring system for the environmental pillar of the SDGs. While the technical illustrations and examples presented in this paper are based on the case of environmental-economic statistics, it is likely that issues raised in the following sections are universally relevant.

17. Diagram 3 shows the scope of the SEEA as a potential statistical framework to support the SDG indicators. A more in-depth analysis of each goal identified for the SEEA is presented in the annex.

Diagram 3[3]: Relevance of Statistical Frameworks to the SDG Indicators

Sustainable Development Goal	SNA (2008)	SEEA CF (2012)	SEEA EEA
1. Poverty			
2. Sustainable Agriculture			
3. Healthy Lives			
4. Equitable Education			
5. Gender Equality			
6. Water			
7. Energy			
8. Sustainable Growth			
9. Innovation and Infrastructure			
10. Inequality			
11. Sustainable Cities			
12. Sustainable Consumption and Production			
13. Climate Change			
14. Marine and Coastal			
15. Ecosystems			
16. Peace and Governance			
17. Partnership and Implementation			

3. Integrating Environmental-Economic Statistics

3.1 Policy Needs

18. As identified in the previous sections, a lack of well accepted and integrated information concerning the main pillars of sustainable development (i.e. the economy, environment, society and governance) is a significant barrier to formulating integrated sustainable development policy. Given the extent of policies causing environmental externalities or unintended consequences, integration of environmental policy is particularly crucial. An understanding of the interdependencies between the economy and environment, including information concerning the impact the economy has on the long term health of natural systems will support integration of these considerations in policy decisions.

19. Environmental management is characterised by significant inter-linkages between different natural systems which must be properly understood to develop policies which address the system as a whole, internalising previously undetected externalities and taking into account the full impact of potential policy responses (i.e. including potential indirect consequences on other natural systems). For example, despite the fact that these challenges are often addressed in isolation within sectoral boundaries, water, energy and food production have been identified as inextricably linked as described in box 1.. Recognizing these synergies and balancing these trade-offs is central to jointly ensuring water, energy and food security.[4]

[3] Note that blocks shaded as being relevant to the SEEA and SNA does not imply that *all* indicators for the goal can be informed by the SEEA, rather that some of the indicators are relevant and that the SEEA and SNA can provide supportive conceptual frameworks.

[4] World Water Development Report 2014

Box 1: Water-Energy-Food Nexus: Water is an input for producing agricultural goods in the fields and along the entire agro-food supply chain. Energy is required to produce and distribute water and food: to pump water from groundwater or surface water sources, to power tractors and irrigation machinery, and to process and transport agricultural goods. Agriculture is currently the largest user of water at the global level, and food production accounts for about 30% of total global energy consumption. There are many synergies and trade-offs between water use, energy use and food production; 1) using water to irrigate crops might promote food production but it can also reduce river flows and hydropower potential, 2) growing bioenergy crops under irrigated agriculture can increase overall water withdrawals and jeopardize food security, and 3) converting surface irrigation into high efficiency pressurized irrigation may save water but may also result in higher energy use.

20. Understanding these linkages and building them into sectoral policy analysis and design is often made difficult by the fact that the information on water, energy and food production is produced within sectoral silos. The result is that each agency collects the data specific to their policy agenda, and this information remains contained within sector silos. Other related sectors are both unable to access said information, or properly understand the methodology used to collect it. For example, decisions on the payment of subsidies for water intensive energy crops paid by a Ministry of Agriculture should consider the impact this will have on water resources used for other purposes including the production of energy from other sources (e.g. hydropower from river flows) and production of food. This information may not be available or readily understandable to the Ministry of Agriculture, as it remains dispersed across water and energy agencies, and perhaps even contained within scientific bodies and universities.

21. Even if this data were available, other agencies are at risk of mis-interpreting it resulting in policy mistakes due to the fragmentation of methodologies used in the compilation of environmental-economic statistics across agencies. This also makes it difficult to use other sectoral information in modelling for policy analysis, as the data are compiled based on different concepts, assumptions and definitions making reconciliation difficult. For sectoral policy decisions to be made in an integrated way, which when combined result in effective integrated policy for environmental management, a mutually reinforcing interpretation of the available data by different sectoral decision makers is necessary. This allows decision makers to focus on formulation of the appropriate policy rather than determining the state of the related natural systems and how they are inter-connected. The production of integrated information on the environment and its relationship with the economy and society can therefore support decision making within one integrated framework.

22. In addition, international organizations typically collect their own data using individual methodologies, thereby basing the design and evaluation of their policy frameworks on separate information sets. Moves towards breaking down international organization silos require policy frameworks to be designed in an integrated way. One element of this is that the evaluation of performance to ensure that the implementation of policies is synergistic should build a common evaluation system based on combined results. This requires the establishment of a common and integrated information system which picks up the interlinkages between policy frameworks.

23. In sum, integrating environmental-economic data into one information system based on a coherent conceptual framework and methodology can support policy makers operating within sectoral boundaries to fully understand the environment-economic nexuses within which they are operating. This allows them to design policy based on one set of agreed information which adequately captures the impacts potential policies have on the environment system as a whole, rather than sectors in

isolation. Integrated information on the environment is therefore an important input to the successful integration of environmental policy. The following sections will discuss the necessary elements needed to integrate environment statistics going forward, particularly to respond to policy needs for the post-2015 development agenda.

3.2 Integrating Environmental Economic Statistics in National Statistical Systems

24. Progressively, an integrated information system for the economy has been established at national and global level based on the System of National Accounts, which serves as a common statistical framework to depict a consistent and coherent picture of economic activity for public and private policy, decision making and other analytical uses. *Environmental*-economic statistics however, has long been lacking an established and common set of information relating humanity and the economy to the environment and its condition. Environmental information tends to consist of disparate datasets. A common and integrated understanding of the the environment and its interrelations with human and economic activity is still under developed. While we have much scientifically based data, it is often discipline specific; based on observations in specific areas; not scalable to national or global level; measured using different methods and definitions; and most often, not presented in reference to economic or human activity.

25. In this regard, the integration of environmental-economic statistics (i.e. *'horizontal integration'* as coined in section 2.2) requires the use of common concepts, definitions, estimation methods and data sources to enable statistical reconciliation across different types of environmental-economic data (e.g. water, energy and land-use statistics). Integration of these disparate statistics requires an overarching conceptual framework, to ensure; a) consistency in the application of concepts, definitions and classifications to different but related fields of statistics, and b) data drawn from different sources can be combined in a numerically consistent way. The System of Environmental Economic Accounts (SEEA) was developed to respond to this need and represents the integrated statistical framework to measure the environment and its relationship with the economy and society.

26. In addition to the adoption of a common conceptual framework, a system-wide approach to the integration of environment statistics is needed to reconcile the statistical production process for different sectoral statistics. Furthermore, institutional arrangements must be developed and aligned to facilitate the production of integrated information sets. These institutional and technical considerations are central to facilitating the development of an integrated information system based on the SEEA conceptual framework.

3.2.1 SEEA: A Conceptual Framework for Integration

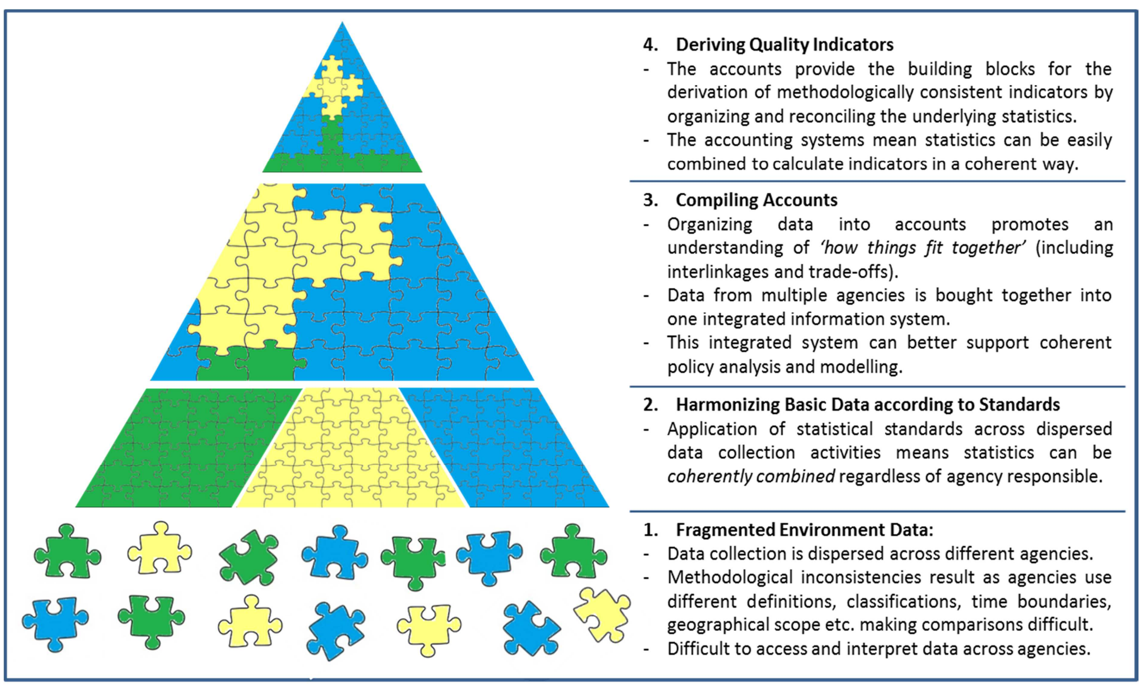
27. The SEEA is an international standard to measure the environment using an accounting framework based on the accounting concepts, structures, rules and principles of the System of National Accounts. It is a systems approach to environmental-economic statistics, providing the structure to measure both the state of the environment and its relationship with the economy (including flows of natural inputs from the environment to the economy and flows of residuals from the economy to the environment). The SEEA as a *system* provides a common statistical framework for many facets of the environment-economy relationship, including but not limited to water, energy, material flows, emissions, land, forests and ecosystems. By bringing these different sectoral statistics together under the SEEA conceptual framework, improved information on the inter-linkages and trade-offs between different variables and/or sectors is developed. Diagram 4 illustrates how the

SEEA serves as the conceptual framework to both harmonise and organise environmental data into one integrated information system.

28. As illustrated in level 1 of diagram 4, methodological inconsistencies tend to result when bringing environment and economic data together as data items are collected and compiled by different agencies, which often use divergent methodologies. As a result, data items often exhibit inconsistencies in definitions, classifications, time boundaries and geographical scope, which makes it difficult to compare data (e.g. across sectors, product items, sub-national boundaries, countries etc.) or combine it within one framework. The first step in developing a coherent and integrated picture of the environment is to harmonise this basic environmental data (as depicted by level 2 in Diagram 4) so it can be integrated into the accounting structure. While it may be preferable that environment statistics are collected according to SEEA methodology from the outset, adjustments can be made to existing data such that it can be integrated with other data at the level of the Accounts. Implementation of the SEEA does not therefore imply overriding existing data, as bridging tables can be constructed to allow for integration.

29. As depicted in level 3 of diagram 4, once basic environment and economic data is harmonised, its integration into the accounting structure allows for a more systemic understanding of key natural systems, their interlinkages and how they relate to the economy (e.g. the hydrological cycle, agricultural and energy production processes). This is facilitated by the accounting structure itself. For example, environmental asset accounts bring together information on the state of key environmental assets (e.g. water resources, mineral and energy resources, land cover types) and how those assets change over time due to economic and natural processes. The SEEA Supply and Use tables organise information on environmental flows between the environment and the economy, both in terms of the source and destination of those flows and the responsible economic activity. These two sets of accounts are closely linked, and by bringing all of this this information together under the SEEA, a more integrated information system is developed.

Diagram 4: The SEEA to Integrate Environment Information



30. It is important to note that because the SEEA uses the same accounting conventions as the SNA, flows of natural inputs and residuals between the environment and economy can be attributed to economic activities and classified by product type based on classifications common to both statistical standards (e.g.. the Standard Industrial Classification of All Economic Activities). This allows for the integration of environment statistics (which are often measured in physical terms) with economic statistics (measured in monetary terms) within one single framework. The accounts can therefore support the derivation of key environmental aggregates disaggregated by economic sector, as well as important ratio indicators linking environmental and economic aggregates.

31. Furthermore, as illustrated in the paper prepared by UNSD on 'The SEEA as a Statistical Framework to meet Data Quality Criteria for SDG Indicators ', indicators derived from integrated statistical frameworks are likely to be of higher quality, as the basic statistics used to derive them originate from one consistent methodological framework. This avoids, for example, inconsistencies in terminology (i.e. definitions of data items) and classifications. In particular, it is often the case that for ratio indicators, the calculation of the numerator and denominator are not derived in a fully consistent way. They may use different definitions, classifications, time and space boundaries or scientific methodologies. When combined, this can result in inaccurate and often meaningless indicators. An elaboration of this is provided in Box 3.

3.2.2 SEEA: Institutional Arrangements and Production of Statistics

32. While one step for the integration of environment statistics is the adoption of a solid conceptual framework, favourable institutional settings for statistical integration and alignment of the statistical production process across different sets of environment statistics are also needed. The methodological inconsistencies between environment data identified in the above section are mainly caused by the separate and independent statistical operations used by government departments responsible for producing a specific subset of environmental and economic information.

33. The process of adopting and implementing the SEEA has been found to enable efficiencies in national statistical production processes by creating the scope for consolidation of dispersed data collection, processing and dissemination activities. In order to implement the SEEA, different agencies responsible for collecting the component data must work together. Managing the adoption of a common standard and seeking agreement on statistical production, related data exchange and dissemination processes calls for significant buy-in from multiple agencies. In addition the development of institutional arrangements between the lead statistical agency and other data producing and collecting agencies is needed. Depending on the level of centralisation of the statistical system, the necessary institutional and legal arrangements to facilitate this will vary. However, the development of such institutional mechanisms facilitates consolidation and greater coordination of data activities, thereby leading to more efficient statistical systems.

3.3 Integrating Environment Statistics for the Global Statistical System

34. The following section will discuss the integration of environment and economic statistics from the perspective of the global statistical system (i.e. *vertical integration* as discussed in section 2.2) and the corresponding monitoring and reporting structures which exist between countries and international agencies in the context of the Sustainable Development Agenda. In general, *'vertical integration'* of statistics for SDG monitoring will require three key elements; an architecture of integrated indicators set for different levels of monitoring, national ownership of data used in international reporting, and the development of a consolidated system for reporting on SDGs.

3.3.1 SEEA: Integrated Indicator Architecture for SDGs

35. The global monitoring mechanism for the SDGs is likely to involve reporting at a number of different levels to reflect national reporting constraints and the wide variations in the level of development and policy priorities of countries. This is set out in box 2.

Box 2: Proposed SDG Indicator Architecture

The Architecture for monitoring the SDGs will likely consistent of different 'tiers' of indicators;

I. *Global Core:* Information will be collected on a global level to inform a limited number of universal indicators to serve as a basis to assess SDG progress across countries and regions. These indicators will provide a basis for communication and advocacy for priority areas of sustainable development. The set should therefore be limited in number, particularly in light of existing capacity constraints. . Given the inter-linkages and overlaps between SDG targets, global core indicators should inform multiple targets based on conceptual links and overlaps between targets. This set will be used as the basis to develop complementary lists of regional, national and sub-national indicators;

II. *Regional, National and Sub-National Indicators:* These indicators are expected to serve as an extension of the Global Core Set, capturing those more detailed aspects of the targets, which is required for national policy. Due to countries' different development levels and policy focus, these indicators lists are expected to reflect national sustainable policy initiatives. These complementary lists should be nested within the core list of indicators, such that a coherent methodological link exists between the 'higher-level' indicator in the global core set and the more detailed indicator in the national set.

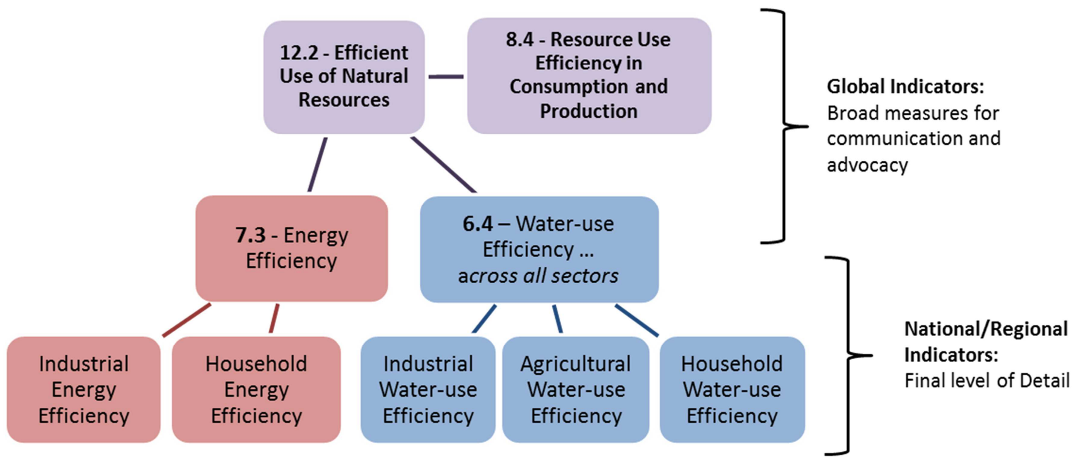
III. *Thematic sets of indicators:* These indicators will be established based on topics for which more detailed information is needed. They will be established at all levels of monitoring to cover certain aspects of a target which may not be covered by global and national indicators, and will address specific thematic sustainable development issues in more detail such as sustainable consumption and production, biodiversity, climate change, etc.

36. It is important that the three tiers of indicators set out in Box 2 are organised within one integrated architecture based on a nesting of indicators. The core global set of indicators will likely consist of higher level indicators, which are more aggregated in nature and capture elements of multiple targets for the purposes of advocacy and communication. It would be beneficial if a comprehensive and methodological link existed between these global indicators and the more specific indicators measured at national level, to ensure that the information conveyed through international reporting is not detached from national monitoring and evaluation activities. The use of a coherent statistical framework, such as the SEEA, would support this integration, both across goals and at different levels of monitoring, by helping to ensure that the same concepts, definitions and classifications are used at all levels of indicators. A concrete example of this is provided in box 3.

Box 3: Example of the SEEA as the methodological basis for 'horizontal' and 'vertical' integration of indicators for SDG monitoring

The figure below presents an example of SDG targets which are linked and could be monitored at different levels of detail. In particular, a number of targets identify efficiency in the use of natural resources, with some targets identifying specific resources such as water and energy. While the global core indicator set may only include one aggregated indicator to measure resource efficiency (i.e. with the aim of capturing improvements in resource efficiency across different resource types within countries in an aggregated way), it is likely that regions and countries may need to calculate resource specific, as well as sector specific, efficiencies for national policy purposes. Comprehensive alignment between global figures and more disaggregated national indicators requires the application of a common methodological approach. If all indicators in the below example were defined according to the SEEA standard, the methodology for each indicator would be consistent allowing countries to comprehensively (dis)aggregate as needed.

Diagram 4: Integrated Indicator Sets for SDGs



In this example, the Physical Supply and Use tables for water capture water abstraction and use by industry according to the International Standard Industrial Classification (ISIC). By using the same accounting conventions for water abstraction and use across sectors (i.e. agricultural, industrial and household sectors), these data items from the SEEA can be combined with economic data from national accounts to calculate efficiency ratios. In addition, compliance with the SEEA means 'water abstraction' and/or 'water-use' is defined in the same way across sectors, and these sectors are defined by the ISIC. Indicators for water efficiency can therefore be (dis)aggregated in a fully coherent way as the classifications and definitions are the same at all levels of detail. If the SEEA were not used, it is likely that different economic sectors (e.g. agricultural versus industrial) would define 'water abstraction or use' in different ways, resulting in inaccuracies when computing "total water abstraction or use". Furthermore, without applying a standard classification of industries to define "economic sectors" some economic activities risk being omitted from calculation of the indicator while others are double counted. By horizontally integrating data, the SEEA facilitates streamlined (dis)aggregation of relevant indicators.

3.3.2 SEEA: National Ownership of Data and Consolidation of International Agency Reporting Silos

37. Use of the SEEA as the underpinning statistical framework for relevant SDG indicators offers significant practical advantages in terms of international monitoring and reporting processes. A wide

range of statistical initiatives are undertaken by various international organizations, oftentimes with multiple organizations operating in one country. While efforts have been made by international organizations to cooperate and share country data for their respective programmes, more can be done to consolidate existing statistical initiatives towards ensuring a common and synergistic approach. Adoption of the SEEA as the underlying statistical framework for international organizations working on environment statistics in countries can guide the harmonization of these approaches. This will help to ensure that, despite operating under different mandates, with different national partners and on different parts of environment statistics, international organizations support countries in developing *one coherent* information system for the environment. It will also encourage facilitate that capacity building efforts undertaken by international organizations become mutually reinforcing, translating to more sustainable national capacity and ownership in environment statistics.

38. Furthermore, alignment of the methodologies used for international reporting will reduce the reporting burden for national statistical offices and other national agencies. In particular, if requests for environment statistics from international agencies are based on *one* integrated statistical framework (i.e. the SEEA) countries avoid having to make arduous data adjustments to adhere to the different and fragmented approaches taken by international organizations. Even if all agencies' reporting systems for all environmental issues for the SDGs are independently sound, if they are not integrated under one statistical framework a common quality assurance framework cannot be established, and undue burden is placed on countries.

39. For countries which currently have low statistical capacity to report nationally measured data for SDG indicators, the consistent use of statistical standards at different levels of monitoring will facilitate a smoother and more efficient transition towards eventual national ownership of SDG indicators over time. Calls for data used in global monitoring to come from national statistical systems rather than internationally derived global datasets will need to be met through a process of transition involving significant capacity building at national level. The right hand side of diagram 5 depicts a likely transition process with various threshold steps, through which initial steps include increased collaboration with and involvement of national statistical offices in the derivation of modelled estimates to meet data needs. Eventually countries should be in a position to measure SEEA-based indicators at the national level through capacity building by the international statistical community. Using the same definitions, classifications and methodologies for environmental data in all phases of the process depicted in Diagram 5 will significantly reduce the hurdles previously encountered when reconciling and communicating nationally compiled statistics with figures estimated at the global level. It will also facilitate improved trust, communication and consistency between national and international statisticians.

4. TOWARDS ADOPTING AN SEEA APPROACH

40. The SEEA Central Framework was adopted as a statistical standard in 2012 and many countries have started implementation. In addition, the SEEA Experimental Ecosystem Accounts are being developed, with a number of pilot countries currently in the testing phase to advance the research agenda. The Global Assessment on Environmental Economic Accounting conducted in 2014 indicated that of the 84 countries which responded, 54 had programmes on environmental economic accounts while 15 intend to begin the compilation of accounts in the future. In addition, the OECD and Eurostat have begun data collection on a number of key SEEA accounts (with reporting mandatory in the European Union). In parallel, the joint OECD/Eurostat Questionnaire on the State of the Environment and the joint UNSD/UNEP Questionnaire on Environment Statistics collect data from countries on the environment, which could be further reviewed for its conceptual alignment with

the SEEA. Despite recent progress, the SEEA implementation is not adequately advanced for the purposes of SDG monitoring, which is expected to begin in 2016. Recognition of this was reflected by the request from the UN Statistical Commission at its 46th session that the Committee of Experts on Environmental Accounting consider ways to scale up the SEEA Implementation programme. While this paper argues for a SEEA-based approach to monitoring SDG indicators in the long run, the lack of immediate SEEA-based data for the 2016 baseline implies the need for a gradual transition to SEEA alignment over time. A short term and long term strategy should be adopted; in the short term, indicators should be derived based on the best available data and where possible aligned with the SEEA, while in the longer term, capacity to report on SEEA-based accounts can be developed for reporting purposes. The following section will discuss the requirements needed to this end, both within the international statistical community, international development agencies and national statistical systems.

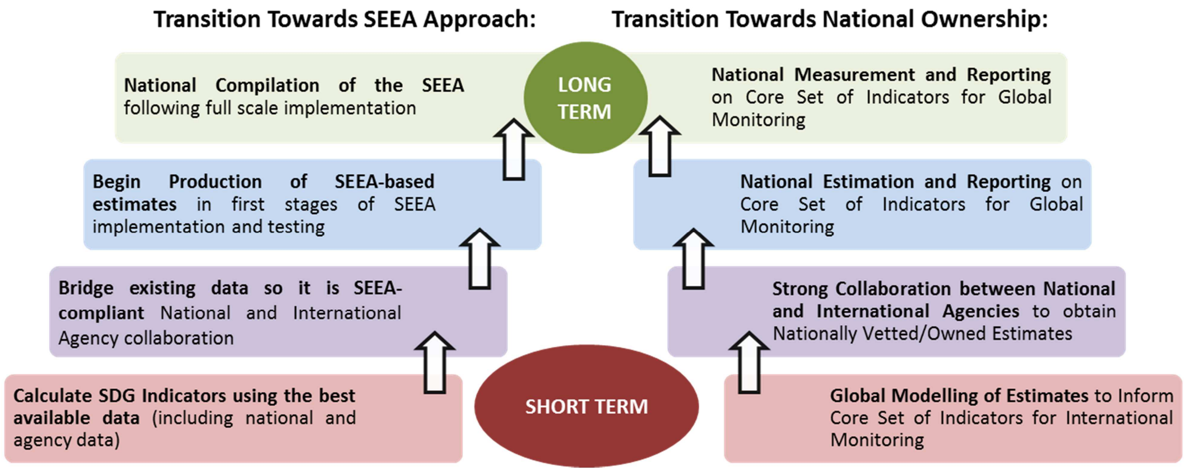
4.1 Adopting a SEEA approach: International Statistical Community and SDG process

41. At its 45th Session in 2014, the Statistical Commission recognized the SEEA as an important statistical framework for the post- 2015 development agenda and the SDG indicators. Furthermore, it requested at its 46th session in 2015 that the UN Committee of Experts on Environmental Economic Accounting closely collaborate with relevant groups to promote and advocate that SEEA be properly reflected in the formulation of the sustainable development goal indicators. In this regard and as a first step, the relevant SDG indicators developed by the Inter-Agency and Expert Group on SDG Indicators should be defined according to SEEA methodology. This will help to define the parameters for a coordinated transition towards a standards based approach over time. If SDG indicators are not defined in alignment with statistical standards from the outset, it is more likely that international initiatives and national capacity building efforts for SDG reporting will fail to converge to the statistical standard as the incentive to do so is significantly weaker.

42. It is generally not expected that in the short term the data sources available to inform the SDG indicators will be compliant with the SEEA. A process of transition will be needed along the lines suggested in the left hand side of Diagram 5. This process will involve a period of adjusting existing data sources so that they are SEEA compliant; either through the bridging of existing global data-sets, or through adaptation of country-based questionnaires and collaboration with national experts to make necessary adjustments. This will require the development of bridging tables by relevant international agencies which currently compile global datasets on SEEA-relevant data. A series of Technical Notes and Core Tables have been developed which aim to present the key SEEA accounts and information needed to inform the SDG indicators. The expectation is that these tables will form the basis of international data dissemination for the SEEA. These efforts will build on those of existing SEEA data collection initiatives, such as those of OECD and Eurostat, which already collaborate, including through data sharing, to minimise country response burdens.

43. As indicated in Diagram 5, the process of SEEA implementation (particularly in developing countries) will take place in tandem with significant efforts to increase national statistical capacity to secure national ownership of SDG monitoring. The following sections discuss important factors at both the national and international level which will help to ensure these processes take place in a synergistic way.

Diagram 5: Tiered transition towards SEEA-based reporting on nationally-owned SDGs



4.2 Adopting an SEEA Approach: National Reporting

44. Significant investment and capacity building will be needed by national statistical systems to develop an integrated information system for sustainable development. The Implementation Strategy for the SEEA Central Framework, endorsed by the UN Statistical Commission in 2013, provides initial guidance on the implementation of the SEEA as a first step in this process. The objective of the implementation strategy is to assist countries in the adoption of the SEEA Central Framework as the conceptual framework for integrating environment statistics, and to incrementally establish the technical capacity for regular reporting on a minimum set of accounts.

45. In this regard and for the purposes of responding to information needs for SDG reporting, a first step for countries looking to establish an integrated information system is to define the scope of integration. The process of developing an integrated information system will likely be a staged process, starting with a smaller set of priority statistical domains to address the most pressing user demands. Given the wide variation of policy concerns across countries, the SEEA takes a flexible and modular approach to implementation, allowing countries to prioritise compilation of accounts specific to their policy needs. Countries should therefore make the strategic decision on the scope of integration based on national policy demands and priorities.

46. A key aspect of establishing an integrated information system on the environment is to establish a national institutional mechanism to drive integration. As discussed in previous sections, data collection is fragmented across different national agencies, and harmonisation of that data to the SEEA standard requires sustained commitment from source agencies. Depending on the scope of integration, existing institutional collaborative arrangements should be reviewed and where necessary strengthened with key ministries and agencies leading national steering arrangements, and organised by thematic issues and/or accounts at the level of technical working groups. A flexible structure should be adopted that can be expanded as the domains of integration expand. That said, integration should be consciously introduced in the quality management culture of the national statistical system, to guide the institutional arrangements being made throughout the process. Furthermore, the approach to integration and corresponding characteristics of the institutional mechanism can be described generically but will depend on the specific structure of the national statistical system.

47. While it is noted that the integration of environment and economic statistics based on the SEEA conceptual framework is a complicated process, which will require significant investment, a number of benefits can be expected in the longer run in the form of more efficient statistical systems, more integrated information to inform integrated policy (as laid out in section 3.1 and 3.2), and an improved capacity to respond to international reporting demands with nationally compiled information (as suggested in section 3.3). This process of implementation should be supported by technical assistance and training from international agencies, as well as north-south and south-south cooperation through the establishment of communities of practice.

4.3 Adopting an SEEA Approach: International Agencies

48. International agencies have a key role to play in supporting the implementation of the SEEA. Buy-in at the highest national and global policy level is required as a first step, to provide the necessary mandate to align statistical frameworks used by agencies with the SEEA standard. A number of policy initiatives have already adopted the SEEA as their underlying statistical framework, including the OECD's Green Growth Strategy, the European Union's Beyond GDP Framework, the World Bank's WAVES initiative and the Convention on Biological Diversity's Aichi Targets. Similarly positive signals have been received from major international policy initiatives such as Sustainable Consumption and Production (SCP) under the 10YFP, monitoring of water related SDG indicators under inter-agency Global Expanded Monitoring Initiatives (GEMI), and the three Rio Conventions on biodiversity, climate change and desertification The annex to this paper lays out how this process of adapting international reporting initiatives to the SEEA Standard can be facilitated for Sustainable Development Goal 6, taking into account the existing data collection mechanisms and the necessary adjustments needed to align to the Standard. Similar efforts will be undertaken for other relevant goals.

49. As mentioned in section 2, the fact that different international agencies have different entry points in countries means that they have a key role to play in promoting implementation of the SEEA, which requires buy-in and collaboration among a number of different national agencies. Rather than supporting statistical capacity development in countries to respond to individual and time-bound policy frameworks, international agencies should support the combined development of standards based and integrated statistical systems which equip countries with the necessary capacity to respond to information needs as they emerge in a sustainable and flexible manner. In order to achieve this, international agencies should take a coordinated and consistent methodological approach across all technical assistance provided. A first step and key aspect of this is communication, through which agencies use their different entry points in countries to encourage and support national counterparts to support implementation of the SEEA.

50. Given that the SEEA is a relatively new standard, significant capacity building is needed within agencies to align their work with the SEEA. A training-of-trainers for international agencies on specific SEEA-modules relating to their work is therefore required.

5. Concluding Remarks

51. The SDGs are a step towards closer integration of policy frameworks and programmes, requiring more integrated information on the inter-linkages between the economy, the environment and society. The statistical community has an opportunity to respond to these demands by taking a standards based approach to integrating information systems at the national level, supported by a global monitoring mechanism based on the same standards and conceptual frameworks. The systems

of national accounting (i.e. the SNA and SEEA) are important statistical frameworks to support this, as their systems approach helps to ensure methodological consistency across sectors and at multiple layers of monitoring. This will help to ensure that the global monitoring architecture for the Sustainable Development Agenda is both comprehensive and builds the necessary monitoring links to reflect the integrated nature of the SDG agenda. The use of a systems approach based on the SEEA and SNA can also significantly streamline the statistical system for global reporting and reduce national response burdens.

52. This paper has presented a roadmap for aligning the Sustainable Development Goals indicators with the SEEA standard, where feasible and relevant, taking into consideration national capacity constraints and the need to use and build on existing global reporting efforts. An in depth analysis must now be undertaken for each thematic[5] area to: 1) assess the potential to align global indicators with the SEEA standard; 2) assess current data availability and monitoring mechanisms at the global level, with a view to developing a standards based monitoring framework which enhances the complementarity of initiatives; and 3) develop national capacity to implement the SEEA and further integrate and modernise statistical production processes.

[5] For a preliminary example of such work please refer to Annex 1: "Towards Standards-based Global Monitoring for Water"

Annex 1: Towards Standards Based Global Monitoring – The Case of Water

The intention is that this annex will eventually analyse for each relevant thematic area the extent and way in which SDG monitoring and reporting mechanisms can be aligned with the SEEA standard. This will involve: 1) an analysis of the global indicators proposed by international organizations to the Inter-Agency and Expert Group on SDGs for each thematic area, and alignment of the definitions and classifications used with the SEEA standard; 2) an assessment of existing global datasets and the extent to which they are aligned and/or can be aligned with the SEEA standard, and; 3) an assessment of the extent to which data sources exist at the national level for the population of the core/minimum set of SEEA accounts needed to inform these indicators

The SEEA-Water was already recognised as an interim standard in 2007, and a large number of countries are already well-advanced with the implementation of SEEA water accounts. The Global Assessment on Environmental-Economic Accounts conducted in 2014 indicated that of the 85 countries which responded, 23 already compile water accounts while a further 28 plan to begin compilation in the near future. For these reasons, water has been chosen as the first thematic area for which this analysis should take place. In addition, efforts are underway to make Sustainable Consumption and Production indicators SEEA compliant, and consultants are engaged to address the abovementioned issues and develop an implementation strategy. A draft Terms of Reference for these SCP consultants is provided on the website of the 10th meeting of the UNCEEA.

With this eventual goal in mind, this annex will start by exploring the importance of developing an integrated information system for water which is based on statistical standards, and as a first step, present preliminary efforts to align SDG indicator proposals with the SEEA standard.

A1. Overview

This paper has argued that basing the SDG indicator framework on statistical standards such as the SEEA and SNA is crucial to ensuring the production of high quality indicators which are internationally comparable and based on international best practice. In addition, by defining the SDG indicator architecture according to standards, methodological consistency is ensured across and between different levels of monitoring. A standards-based approach will also consolidate the system for global reporting and reduce national response burdens. Basing international agencies' reporting initiatives on statistical standards aligns the methodology used by each reporting framework, thereby facilitating more direct transmission of information from National Statistical Systems through a common interface to various international reporting initiatives. As each request for information is based on consistent definitions, classifications and spatial units, the burden on countries to make methodological adjustments is reduced in the long term.

The compilation of statistics and international reporting on water-related issues is a crucial area in which alignment to statistical standards must take place. The structure of the statistical system for water reflects the diversity of issues relating to water both at the national and international level. At the national level, water statistics are dispersed in reflection of the multitude of sectors for which water is a key concern, resulting in a siloed production of data which is difficult to combine to obtain complete and integrated understanding of the hydrological system and its relationship with the economy and societal wellbeing. Similarly, a large number of international organizations operate within the water sector, each with specific thematic concerns and targeted policy frameworks. This has resulted in a number of well-established global reporting mechanisms to address specific policy concerns, each based on individual methodologies and compiling data on a variety of water related issues.

Attempts to integrate water policy have been widespread at the national level, in particular through the adoption of an integrated water resources management approach and close cooperation between different ministries and groups to ensure coordinated development and management of water, land and related resources, with the goal of maximizing economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. At the international level, a wide range of international organizations work to improve water related issues within specific thematic areas, coordinated under the umbrella of UN-Water which works to strengthens cooperation among all UN agencies working on all aspects of freshwater and sanitation, including surface and groundwater resources, the interface between freshwater and seawater and water-related disasters.

Improvements in the monitoring mechanisms for water are now needed to support these efforts. In this regard, the System of Environmental Economic Accounts for Water presents a statistical framework to harmonize and organise water statistics within an accounting structure. It represents an important tool for countries to build an information system to inform water policy which adequately captures the inter-linkages between sectors competing for water, the societal and economic impacts of competing demands for water, and the impact of the economy on water resources and their quality in the longer term. Furthermore, adoption of the SEEA-Water as the statistical framework for global reporting mechanisms for water in the context of the SDGs would promote methodological consistency across all levels of reporting and between currently incompatible global datasets. Harmonization of the global reporting mechanisms for water in alignment with the SEEA, in combination with national capacity building to compile SEEA accounts for water, would significantly improve the ability of countries to meet monitoring needs for SDG 6.

As mentioned, the SEEA-Water can support a standards-based monitoring framework for water, from which global indicators can be derived from SEEA aligned global reporting mechanisms while at the same time providing methodological scope for countries to compile more detailed and disaggregated indicators depending on policy needs. Achieving this will require a process of transition, based on the following important steps:

A. *Develop a SDG indicator architecture for water which is aligned with the SEEA*

B. *Assess existing global data sources and their associated methodologies, and the extent to which these can be used to compile 2016 baselines for indicators defined according to SEEA standards*

C. *Develop a programme of work to create a global reporting framework for SDG 6 which is aligned with the SEEA*

   I. *Where reporting mechanisms are in place:*

      - *In the short term, where global datasets are established but not aligned with standards, develop methods to bridge/adapt existing data to calculate baselines in alignment with the SEEA*

      - *In the longer term, develop a joint programme of work with relevant organizations to align established reporting mechanisms with the SEEA standard*

   II. *When monitoring mechanisms do not exist (and data is not available): develop these mechanisms in line with SEEA standards*

D. *Develop a joint programme of work among international organisations to support national capacity to compile water-related information in a sustainable way and in full alignment with the SEEA standard*

Significant efforts have already been made by UNSD to complete step A and align the global indicators proposed by UN-Water and other international organizations to the International-Agency and Expert Group on SDGs (IAEG-SDGs) with the SEEA standard. This work is presented in section A3, with the expectation that future work will review and build on this. For the purposes of illustration, the remainder of this annex will provide an overview of the SEEA-Water and the scope of alignment which can take place. It will present a brief explanation of the value of implementing SEEA-Water in countries to support national statistical systems in the development of integrated information on water. It will then present the work done on aligning the global indicators being proposed to the IAEG-SDGs for Goal 6, and provide an overview of the potential of SEEA-Water methodology to disaggregate global indicators at the national level, as well as use the SEEA accounts to derive supplementary national information to monitor and inform specific targets.

A2. Mainstreaming Water in the Integrated Statistical System

Water is an integral component of sustainable development and is critical for socio-economic development, healthy ecosystems, human survival and health. It has been reflected as such in the Sustainable Development Goals, both as a stand-alone goal and an enabler for achieving a number of other Goals. The extent to which water is linked with the sustainable production of energy, food and adaptation to climate change requires an integrated approach to policy decisions based on a full understanding of the hydrological cycle and its relationship with the economy, social well-being and other natural systems. Given the diversity of issues to which water is a primary concern, a siloed approach to water policy often results, in which different sectors compete for scarce water resources and exert negative externalities on other sectors and groups through their use of and impact on the hydrological system.

In reflection, national statistics on water are typically dispersed across multiple responsible ministries and agencies. In particular, agricultural ministries often collect information on water use and emissions of water residuals by the agricultural sector. Water agencies responsible for municipal water supply collect information on the supply of water to households and industries connected to the water grid, both in cities and rural areas, as well as the generation and treatment of sewerage. Information on water use by mining and energy sectors, as well as heavy manufacturing is again likely collected by different ministries. Furthermore, the health of water-related ecosystems and their capacity to provide ecosystem services are typically the domain of environment ministries, and the capacity of water-related ecosystems to provide protection against natural disasters may be monitored by city planning, defence and/or many other national agencies.

To support the development of integrated water policies, this information should to be brought together into one system to understand, among other things, patterns of water use and re-use across sectors, flows of water between sectors, how the hydrological system impacts different sectors of the economy, and the extent to which different sectors affect the availability of water resources and the quality of these resources in the short and longer term. In this regard, this section will briefly present the key sets of information needs which are likely to arise in national water policy considerations, based on a brief analysis of what may be considered the four main quadrants of water policy. It will then describe the SEEA-Water accounts and how they can inform these quadrants.

In general, water policy can be grouped into four main quadrants as illustrated in figure 1. These are reflected in the Sustainable Development Goals on Water, which cover a range of targets to address specific components of this broader framework. In view of the information needs identified in figure 1, the SEEA-Water provides a strong conceptual framework to harmonize and bring together the necessary economic and hydrological information relevant to these broad policy areas, based on a number of tables and accounts. In general there are five main accounts which capture various aspects of this system and are described briefly in figure 2.

Figure 1: Policy Quadrants, SDG targets and Corresponding Information Needs

I. IMPROVING WATER SUPPLY AND SANITATION SERVICES

POLICY PRIORITIES: Aim to ensure the population has access to safe water as well as to means of disposing wastewater

SDG TARGETS: 6.1 and 6.2

INFORMATION: WATER AND PEOPLE

1. Quality and affordability of services being offered to the population, and progress being made towards expanding service coverage
2. Costs associated with providing the services in a sustainable way (both current and capital costs) and sources of financing
3. Efficient operation of the water utilities – capacity to provide a reliable service to the population, recover the costs of providing the services, and reduce losses

II. MANAGING WATER SUPPLY AND DEMAND

POLICY PRIORITIES: Aim to improve water allocation to satisfy societal needs without compromising the needs of future generations or the environment

SDG Targets: 6.3 (partial), 6.4 and 6.5

INFORMATION : WATER AND THE ECONOMY

1. The amounts of water that are being allocated for different uses (including water allocated for environmental needs) and the losses during abstraction and distribution
2. Trade-offs in allocation of water as that water is a scarce resource and should be used sustainably
3. Productivity of water in deciding water allocation
4. Financial resources to maintain or increase the capacity to supply water through investments in storage, conveying and reclamation systems

WATER SECURITY

III. IMPROVING THE STATE OF THE ENVIRONMENT AND WATER RESOURCES

POLICY PRIORITIES: Preserve or improve the quality of water resources and aquatic ecosystems

SDG TARGETS: 6.3 and 6.6

INFORMATION: WATER AND THE ENVIRONMENT

1. The emissions discharged into water resources by different users
2. The capacity of wastewater treatment facilities to remove them, and the carrying capacity of the different water bodies
3. Investments in sanitation infrastructure and its financing to strengthen and enhance the mechanism to reduce waterborne emissions

IV. ADAPTING TO EXTREME HYDRO- METEOROLOGICAL EVENTS

POLICY PRIORITIES: Aim to reduce the socioeconomic impact of water related disasters

SDG TARGETS: 11.5, 6.5 and 6.6

INFORMATION: WATER AND RISKS

1. Identify the variability in water availability that gives rise to droughts and floods
2. Monitor the state of natural systems (e.g. floodplains, marshlands) or manmade structures (e.g. levees, dams) that will assist in regulating seasonal and inter-seasonal variations

Figure 2: Overview of SEEA-Water Accounts

PHYSICAL SUPPLY AND USE TABLES (PSUT) for water bring together hydrological data on the volume of water used and discharged back into the environment by the economy. They provide information on the volumes of water exchanged between the environment and economy (abstractions and returns) and also within the economy (supply and use within the economy[6]). The physical supply and use tables for water describe three types of flow; a) environment to economy, b) within economy and c) economy to environment. Bringing this information together under the common framework of the SEEA means the information is presented using definitions and classifications of the standard economic accounts of the SNA. **This information is particularly relevant to Policy Quadrants I and II.**

EMISSION ACCOUNTS describe the pressure that the economy puts on the environment in terms of emissions into water. They bring together information on the quantity of pollutants that is added to

[6] This includes re-used water and waste-water to sewerage

wastewater, as well as the quantity removed as part of treatment by the sewerage industry. **This information is particularly relevant to Policy Quadrants II and III.**
ASSET ACCOUNTS measure stocks of water resource assets in physical terms at the beginning and end of an accounting period, describing all changes in the stock due to both natural and human activities. These accounts help to link water abstraction and returns to water availability in the environment, thereby providing information on economic pressures being exerted on water resources. **This information is particularly relevant to Policy Quadrant II.**
COMBINED PRESENTATIONS[7] link physical information in the PSUT with emissions information and monetary information on the production (supply) and consumption (use) of water related products. The monetary part of the tables identifies two water-related products; natural water exchanged between economic units and sewerage services[8]. Depending on the issue of interest, combined presentations can provide information on; 1) the costs associated with the production of water-related products; 2) the income generated by their production and 3) the investment in water related infrastructure and costs to maintain that infrastructure. Combining physical and monetary data in a coherent way makes the analysis of trade-offs in alternative water policies and economic strategies possible, and allows for the calculation of important indicators such as water efficiency. **This information is particularly relevant to Quadrants I and II.**
ECONOMIC ACCOUNTS for activities and products related to water include a range of accounts on the costs of water use and supply as well as its financing. The combined presentations described above can be expanded to provide information on the intermediate costs and outputs of water related activities carried out for own-use by households and industries (to fully reflect the contribution of water-related activities to the economy). They can also be expanded to government expenditures for water services such as administration of policy and enforcing standards. Specific economic accounts can also provide information on government instruments used to regulate water in the economy. In addition, national expenditure accounts for water related activities provide information on the expenditure by different economic units within a country on environmental protection and resource management activities related to water. Financing accounts provide information on the financing of this national expenditure by identifying the financing sector and its beneficiaries for these activities. These accounts are useful tool for informing cost-recovery policies and water allocation policies, **making this information relevant to all Policy Quadrants.**
EXPERIMENTAL ECOSYSTEM ACCOUNTS[9] can provide information on a number of issues relating to water in four contexts; 1) water as an ecosystem asset, 2) water as a characteristic of ecosystem asset condition; 3) the provision of water as an ecosystem service, and 4) water related ecosystem services. These accounts provide much of the biophysical information necessary for tracking changes in extent and condition of water-related ecosystems, as well as for measuring the ecosystem services provided (such as water filtration, regulation or retention). They can be used to identify water-related ecosystems declining in quality, and the economic and other uses dependent on them, and hence allow for the targeting of investment in remediation to achieve the greatest overall benefit. **This information is particularly relevant to policy quadrant III and IV.**

To illustrate how the SEEA-Water accounts can strengthen the global monitoring framework for SDG 6, the following section provides a preliminary illustration of how information in the accounts can be used inform relevant indicators at all levels within one methodologically coherent indicator framework for water.

A3. Developing a Standards-based Indicator Architecture for SDG 6

[7] Also referred to as Hybrid Accounts
[8] Including sewerage treatment and septic tank cleaning services
[9] Experimental Ecosystem Accounts are an extension to the SEEA Central Framework and are still experimental.

As described in box 2, the Indicators Architecture for the SDGs will consist of a number of global indicators for reporting at the international level, complemented by a range of national and thematic indicators which countries may compile based on capacity and depending on their policy priorities. A list of global indicators to monitor SDG 6 on water has been compiled and submitted to the Inter-Agency and Expert Group on SDG Indicators, based on input from multiple agencies and coordinated by UN-Water. Many of these indicators can be directly measured using SEEA-Water methodology, and it is therefore important to ensure that efforts are made to align these indicators to the SEEA standard in the short term.

This section will therefore consider each Global Indicator in turn and provide initial guidance on how this can be defined in alignment with SEEA methodology. To complement this, an illustration of how these global indicators can be disaggregated for national purposes and what types of additional contextual information can be obtained from the SEEA-Water accounts to complement the Global Indicators is described.

Target 6.1 - By 2030, achieve universal and equitable access to safe and affordable drinking water for all

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

Global Indicators proposed by UN-Water

6.1.1 Percentage of population using safely managed drinking water services
6.2.1 Percentage of population using safely managed sanitation services
6.2.2 Population with a hand washing facility with soap and water in the household

Alignment to SEEA: Much of the information required to calculate the proposed indicators goes beyond the scope of the SEEA-Water and requires more detailed household information based on censuses, administrative sources and surveys. While the SEEA-Water accounts do not directly inform these indicators, efforts should be made where relevant and necessary to align definitions and methodologies with the SEEA standard.

Related Information for National Policy: The SEEA-Water accounts can however assist national policy makers to understand the role and contribution of the household sector in the hydrological system, as well as economic information which will impact policy design. Particularly relevant information contained in the accounts includes:

- *Contextual Information in Physical Terms* regarding the amount of water supplied to households and the amount of wastewater generated by them, as well as the relative importance (in physical terms) of households in total consumption of drinking water and generation of sewerage products within the economy. This is provided in the PSUT for water, which also includes relevant information on the efficient operation of the water system, such as losses in distribution, which can significantly affect the capacity of utilities to provide a reliable service to the population.

- *Contextual Information in Monetary Terms* is provided in the combined presentations which present information on the cost and expenditure structure for water and sanitation, including the significance of water related products in industries' output and expenditure on (intermediate and final) consumption of water related products by economic units, particularly households. The combined presentations record actual final consumption of water related products (both for households and governments), which allows for comparison of expenditures on household consumption of water related products over time, independent of the mechanisms in place to fund that consumption.

- *Information on Fixed Capital Formation* for water supply and sanitation services is included in the combined presentations, to inform policy makers on investments being made to maintain and/or improve infrastructure for water supply and sanitation.
- *Information on national expenditures on water related activities* provides information on expenditure by different economic units (including but not limited to government) on environmental protection activities, available in the Economic Accounts for water.

Furthermore, the UN-Water GLAAS TrackFin initiative is developing a methodology to track finance to the water, sanitation and hygiene sector (WASH) in a coherent and consistent manner so as to inform policy and promote effective financing in meeting development goals in this area. Efforts are being made to make the methodology consistent with the SNA, the SEEA and the SEEA-Water.

Target 6.3 - by 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and increasing recycling and safe reuse by x% globally

Global Indicator proposed by UN-Water:

6.3.1 Percentage of wastewater safely treated (a composite indicator based on treatment ladders for domestic and industrial waste water)

SEEA-Aligned Global Indicator: The indicator proposed by UN-Water can be made compliant with the SEEA standard and informed by the SEEA accounts.

- *6.3.1 SEEA-Aligned Definition:* Percentage of wastewater that undergoes [Primary/ Secondary/ Tertiary] treatment

The information to inform this indicator can be derived from the Physical Supply and Use Tables (PSUT). This alignment, including detailed definitions and data items, is illustrated in more detail in figure 3 at the back of this annex

National SEEA Indicators on Wastewater: More detailed indicators for national monitoring purposes can also be calculated based on the PSUT, including for example disaggregation of the global indicator by economic activity and for the separate calculation of wastewater treatment rates for households. This is because the PSUT essentially break down flows of water to and from economic units by economic activities[10], with ISIC divisions 36 (water collection, treatment and supply) and 37 (sewerage) identified separately. These are the key industries for the distribution and treatment of water and wastewater.

- Once water is used by an economic unit and is of no further value to it, then it becomes wastewater. It can then be discharged directly into the environment (recorded as a return flow), supplied to a treatment facility (ISIC 37) and recorded as waste water to sewerage or supplied to another industry for further use and recorded as re-used water. As a result, aggregate indicators

[10] Using the International Standard Industrial Classification (ISIC)

for re-use of wastewater can also be derived from the accounts as well as disaggregation by economic activity to identify the key sectors and industries driving these averages.

- Incorporation of this physical data into combined presentations means the information can also be linked with corresponding expenditure and investment in the provision of services related to wastewater.

National SEEA Indicators on Emissions: the Water Emissions Accounts can also be used at national level to inform the part of the target relating to release of pollutants and water quality. Emissions accounts describe the flow of pollutants added to wastewater as a result of production and consumption, and emissions flowing into water resources directly or indirectly through the sewerage network;

- The Emissions Accounts report the total amount of a pollutant added to water by an economic unit measured at the point of discharge, disaggregated into the quantity of the pollutant released directly to the environment and the quantity of pollutant released into the sewer system with wastewater.
- Emissions to the sewerage system are then treated, and the remaining emissions from the sewerage industry into the environment are re-allocated to the contributing industry/sector.

The emissions accounts can therefore provide information on the attribution of emissions to different industries/sectors, as well as the structure of those flows (i.e. direct or via sewerage facilities).

Target 6.4 - by 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity, and substantially reduce the number of people suffering from water scarcity.

Global Indicators Proposed by UN-Water:

6.4.1 Percentage of change in water use efficiency over time

Sectoral efficiencies, including agriculture, industry, energy, municipal, are aggregated in a single indicator through the use of weighting coefficients proportional to each sector's share of total water withdrawal/ consumption. The unit for efficiency can vary between the sectors, e.g. revenue in dollars for industry, energy production in kWh for energy or in kcal for agriculture.

6.4.2 Percentage of total available water resources used, taking environmental water requirements into account (Level of Water Stress)

Defined as the ratio between total water withdrawals (use) by all sectors and available water resources, taking environmental water requirements (EWR) into account.

SEEA-Aligned Global Indicators: The indicators proposed by UN-Water can be made compliant with the SEEA standard and informed by the SEEA accounts.

- *6.4.1 SEEA-aligned definition:* Water Productivity[11] (defined as GDP / Total Water Use)
- *6.4.2 SEEA-aligned definition:* Water Stress (defined as Total Water Abstraction / Total Actual Renewable Water Resources)

[11] Note: Can also calculate as percentage change

The information to inform this indicator can be derived from the physical supply and use tables and the asset accounts of the SEEA-Water. This alignment, including detailed definitions and data items, is illustrated in more detail in figures 4 and 5 at the back of this annex

National SEEA Indicators: While global indicators may be calculated at the aggregate level, countries can use the accounts for further disaggregation by economic activity as the structure of the physical supply and use tables provide detailed information on water abstraction and use by ISIC category and for households. This information can be easily combined with information on value added from the SNA, as it is based on the same classifications. In particular:

- *Water Productivity can be disaggregated by economic activity according to ISIC, calculated as*: Value added by ISIC (from the SNA) / Total water use by ISIC
- *Water-use Efficiency can also be calculated for households as*: Total water use by households / Total population

Furthermore, detailed information on the sustainability of withdrawals can be derived from the asset accounts which may be useful for national policy decisions beyond the information provided by the global indicator. The asset accounts for water illustrate changes in stocks of inland water resources over an accounting period, attributing these either to human or environmental flows;

- The use of asset accounts over time will provide policy makers with key information on water levels, and the extent to which different types of water stock (i.e. surface water, groundwater and soil water) are being depleted over time.
- The evolution of the changes in stocks, and in particular the extent to which human pressures (in the form of abstractions) are causing reductions in stocks of water can also be monitored using the asset accounts.
- Spatial disaggregation is possible at the basin or regional level using SEEA accounts.

Target 6.5 - By 2030, implement integrated water resources management at all levels, including through trans-boundary cooperation as appropriate

Global Indicator Proposed by UN-Water:

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

The SEEA-Water cannot inform this indicator which will be based on a questionnaire. For this target, SEEA-Water should be considered as a tool that functions in support of IWRM by providing the information system to inform this integrated decision making approach.

Target 6.6: by 2020 protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

Global Indicator Proposed by UN-Water:

6.6.1 Change in wetlands extent over time

I.e. % change over time using an existing methodology for data collection and analysis to calculate a global average of change in wetland extent and can be disaggregated geographically and by wetland type - the Ramsar broad definition of "wetland" is used

This indicator cannot be informed by the SEEA Central Framework. Moving forward, as the SEEA Experimental Ecosystem Accounts are advanced, the Ecosystem Unit (EU) described in the SEEA EEA Technical Guidance 2015 will be able to provide a framework for classifying wetland assets. The wetland EU can be tailored to country needs and be linked to condition assessments and wetland ecosystem services. The wetland EU can be adapted to both international (Ramsar) and national systems of wetland classifications.

Supplementary information for Alignment of SDG indicators 6.3.1, 6.3.2 and 6.3.3

Figure 3: Aligning Global Indicator 6.3.1 to SEEA definitions and methodology

	SEEA Aligned Indicator	SEEA Definition of Terms	SEEA-Defined Numerator (including IRWS data items)	SEEA-Defined Denominator
6.3.1	**Percentage of Wastewater that undergoes [primary/secondary/tertiray] treatment** *Total Wastewater Generated that undergoes [primary/secondary/tertiray] treatment / Total Wastewater Generated*	**Wastewater:** Water that is of no further immediate value with regard to the purpose for which it had been used or in the pursuit of which it was produced, because of its quality, quantity or time of occurrence. **Treatment Definitions:** -- *Primary Treatment* : A mechanical, physical or chemical process involving settlement of suspended solids or any other process in which the BOD of the incoming water is reduced by at least 20 per cent before discharge and the otal suspended solids of the incoming water are reduced by at least 50 per cent -- *Secondary treatment:* A process, following primary treatment of water and generally involving biological or other treatment with a secondary settlement or other process, that results in a BOD removal of at least 70 per cent and a COD removal of at least 75 per cent. -- *Tertiary treatment:* A process, following secondary treatment, of removing nitrogen, phosphorous or any other pollutant affecting the quality or a specific use of water, such as microbiological pollution or colour. (For more detail see IRWS)	FOR THE WHOLE ECONOMY: **Options for Defining 'Wastewater Safely Treated' (and IRWS data item formula)** 1. Total return flows after (at least primary/secondary/tertiary) treatment (= H.a.1+H.a.2+H.a.3 or = H.a.2+H.a.3 or = H.a.3) 2. Total wastewater sent to sewerage industry (=F.3.1+F.4.1) 3. Total return flows of water after treatment by economic unit (= H.a) BY ECONOMIC ACTIVITY: *Total Wastewater Safely Treated by industry can be defined for each ISIC category in the account - the degree to which economic activity classifications are aggregated depends on national preference / priorities.* **Defining Total Wastewater Safely treated by ISIC (including IRWS data items):** -- Wastewater sent to sewerage industry for treatment by each ISIC category **(=F.3.1+F.4.1)** *Flows of wastewater to the sewerage industry can be further disaggregated depending on the type of treatment received.*	FOR THE WHOLE ECONOMY: **Options for Defining 'Total Wastewater Generated' (and IRWS data item formula)** 1. Total Return Flows (= H) 2. Total Return Flows - Return Flows from Hydroelectric Power Generation and Cooling Water (= H - H.i - H.v) BY ECONOMIC ACTIVITY: *Total Wastewater Generated can be defined by each ISIC category in the account - the degree to which economic activity classifications are aggregated depends on national preference / priorities.* **Defining 'Total Wastewater Generated' for each ISIC category (and IRWS data item formula):** -- Wastewater to sewerage + Wastewater for Reuse + Return Flows (= F.3 + F.4 + H) *For specific industries (such as ISIC 35 - Electricity, gas, steam and air conditioning supply) further alterations can be made to exclude certain categories of wastewater (e.g. wastewater from hydroelectric power, which is typically included in the SEEA).*

Figure 4: Aligning Global Indicator 6.4.1 to SEEA definitions and methodology

	SEEA Aligned Indicator	SEEA Definition of Terms	SEEA-Defined Numerator (including IRWS data items)	SEEA-Defined Denominator
6.4.1	**Water Productivity:** ***Sectoral:*** *Value Added by ISIC / Total Water Use (by ISIC)* ***Aggregate:*** *GDP / Total Water Use* -- Note that Total Water Use can be replaced with 'Total Water Consumption' or 'Total Water Abstraction' depending on policy preference	**Water use:** Water intake of an economic unit. Water use is the sum of water use within the economy (i.e. one economic unit intaking water received through distribution from another economic unit.) and water directly abstracted from the environment. **Water Abstraction:** The amount of water that is removed from any source, either permanently or temporarily, in a given period of time for final consumption and production activities. Water used for hydroelectric power generation is also considered to be abstraction. **Water Consumption:** That part of water use which is not distributed to other economic units and does not return to the environment (to water resources, sea and ocean) because during use it has been incorporated into products, or consumed by households or livestock. It is calculated as the difference between total use and total supply; thus, it may include losses due to evaporation occurring in distribution and apparent losses due to illegal tapping as well as malfunctioning metering. (note also referred to as 'final water use')	FOR THE ECONOMY AS A WHOLE: 1. GDP (from the National Accounts) FOR INDIVIDUAL INDUSTRIES 1. Value Added for by each economic activitiy (in the System of National Accounts) ***Scope for Sectoral Disaggregation:*** *For this indicator, sectoral efficiencies will be calculated for different ISIC categories (i.e. industries) which are then aggregated for the whole economy using the economy totals in the accounts. Development of SEEA accounts for water would mean that Water Usecan be attributed by ISIC categories, in the same way that value added is attributed by ISIC categories in the national accounts.*	FOR THE ECONOMY AS A WHOLE: **Defining 'Water Use/Abstraction/Consumption for the whole economy (and IRWS data items)** 1. Total Water Use = The Sum of Water Abstraction across economic activities plus water that is received from foreign economic units. (=E + G.2 + G.4) 1. Total Water Abstraction = Sum of Abstraction of Water across all economic activities (=E) 3. Total Water Consumption = The sum of water consumption by economic activity. (=E + G - F - H) FOR INDIVIDUAL INDUSTRIES Defining 'Water Use/Abstraction/Consumption for each Economic Activity (industries categorised by ISIC)(and IRWS data items) 1. Use of Water = Abstracted for Own Use + Water received by Economic Units (=E.a + G) 2. Abstraction of Water (=E) 3. Water Consumption = Abstraction for Own Use + Water Received by Economic Units - Supply of Water to Other Economic Units - Total Returns (=E.a + G - F - H)

Figure 5: Aligning Global Indicator 6.4.2 to SEEA definitions and methodology

	SEEA Aligned Indicator	SEEA Definition of Terms	SEEA-Defined Numerator (including IRWS data items)	SEEA-Defined Denominator
6.4	**Level of Water Stress (also known as water withdrawal intensity):** *Total Abstraction / Total Actual Renewable Water Resources*	***Internal Renewable Water Resources (IRWR)**: Average annual flow of rivers and recharge of groundwater generated from endogenous precipitation. (note: can be computed from the matrix of flows between the water resources) ***External Renewable Water Resources (ERWR):** Part of the country's renewable water resources shared with neighbouring countries. Total external resources are the inflow from neighbouring countries (transboundary groundwater and surface water inflows), and the relevant part of the shared lakes or border rivers. ***Total Actual Renewable Water Resources (TARWR):** The sum of IRWR and ERWR, taking into consideration the quantity of flow reserved to upstream and downstream countries through formal or informal agreements or treaties and reduction of flow due to upstream withdrawal. It corresponds to the maximum theoretical amount of water actually available for a country at a given moment.	FOR THE WHOLE ECONOMY: 1. Abstraction of Water (=E) FOR INDIVIDUAL INDUSTRIES *The data items suggested can be calculated for each ISIC group to get figures for each industry.* 1. Abstraction of Water (=E)	**Defining 'Total Actual Renwewable Water Resources'** 1. Total Actual Renewable Water Resources = [Internal Renewable Water Resources + Actual External Renewable Water Resources] = [external inflows + surface water run-off + groundwater recharge - (overlap + treaty obligations)] *Where overlap is defined as natural transfers of groundwater to surface water - natural transfers of surface water to groundwater.* *= (B.1.a + D.6 + B.2.1 + B.2.2.b - C.2.1.1.a.a - olp)*

Data Items needed to define SEEA-aligned SDG indicators 6.3.1, 6.4.1 and 6.4.2

Data Item E. Abstraction of Water: The volume of water that is removed or collected by economic units directly from the environment within the territory of reference, per year.

This data item can be disaggregated along a number of lines:
---------*BY SOURCE:*
E.1 - From Inland Water Resources
  E.1.1 - From surface water
  E.1.2 - From ground water
  E.1.3 - From soil water
E.2 - Collection of Precipitation
E.3 - Abstraction from the sea
------- *BY PURPOSE*
E.a - For own use: The volume of water abstracted and used by the same economic units within the territory of reference, per year.
E.b - For distribution: The volume of water abstracted by an economic unit for the purpose of being supplied to other economic units, often after treatment, within the territory of reference, per year.

Data Item F. Water supplied to Economic Units: The volume of water that is provided by one economic unit to another economic unit through mains, artificial open channels, sewers, drains, trucks or other means, per year. This excludes the losses of water in distribution which are included in data item I and the supply of bottled water (CPC, Ver. 2, 9410), which is one of the supplementary data items.

This can be disaggregated into:
F.1 - Water supplied by resident economic units to resident economic units
F.2 - Water exported to the rest of the world (water exports)
F.3 - Wastewater supplied by resident economic units to resident economic units
  F.3.1 - For treatment or Disposal
  F.3.2 - For Further Use
F.4 - Wastewater exported to the rest of the world (wastewater exports)
  F.4.1 - For treatment or Disposal
  F.4.2 - For Further Use

Data Item G. Water Received by Economic Units: The volume of water that is provided by one economic unit to another economic unit through mains, artificial open channels, sewers, drains, trucks or other means, per year. This excludes the losses of water in distribution which are included in data item I and the supply of bottled water

This can be disaggregated into:
G.1 - Water received by resident economic units from resident economic units
G.2 - Water received by resident economic units from the rest of the world (water imports)
G.3 - Wastewater received by resident economic units from resident economic units
  G.3.1 - For treatment or Disposal
  G.3.2 - For Further Use
G.4 - Wastewater received by resident economy units from the rest of the world (wastewater imports)

G.4.1 - For treatment or Disposal
G.4.2 - For Further Use

Data Item H. Returns of Water to the Environment by Economic Units: The volume of water that flows from economic units directly to inland water resources, to the sea or to land, within the territory of reference, per year. This includes urban storm water, losses due to leakage and burst pipes, irrigation water that infiltrates into groundwater or ends up in surface water, and the discharges of cooling water and water used for hydroelectricity generation. It excludes evaporation because evaporation is consumption.

This data item can be disaggregated along a number of ways;
---------- *BY DESTINATION*
H.1 - Returns to inland water resources
H.2 - Returns to the sea
H.1 - Returns to land
----------- *BY TREATMENT*
H.a - After treatment by economic unit
H.a.1 - After primary treatment
H.a.2 - After secondary treatment
H.a.3 - After tertiary treatment
H.b - Without treatment
---------- *BY SOURCE*
H.i - From hydroelectric power generation
H.ii - From irrigation
H.iii - From mining
H.iv - From urban run-off
H.v - From cooling water
H.vi - After being used for other purposes

Data Item B: Inflow of Water to a territory's inland water resources: The volume of water that flows into a territory's inland water resources, consisting of precipitation and inflows from upstream territories, per year.
B.1 – Precipitation
B.2 – Inflow of Water from Neighbouring territories
B.2.1 - Secured through treaties
B.2.2 – Not secured through treaties

Data Item C. Outflow of water from a territory's inland water resources: The volume of water that flows out of a territory's inland water resources, consisting of evapotranspiration from inland water resources and the outflow of surface water and groundwater to downstream territories and the sea, per year. This excludes water and sewage exported since these are flows between economic units and the rest of the world, after being abstracted from the environment.
C.1 - Evapotranspiration from inland water resources
C.2 - Outflow of water to neighbouring territories and the sea
C.2.1 - To neighbouring territories
C.2.2 - To the sea

Data Item D. Natural transfers with other resources in the territory: The volume of water that moves between inland water resources of a territory, per year.

D.1 - From surface water to groundwater
D.2 - From groundwater to surface water
D.3 - Between surface water resources
D.4 - Between ground water resources