

Measuring Sustainable Tourism (MST): Developing a statistical framework for sustainable tourism

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Discussion Paper #2

APPLYING AND INTEGRATING THE TSA AND SEEA FRAMEWORKS FOR MEASURING SUSTAINABLE TOURISM

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1. Introduction

Context

When trying to provide a picture of sustainable tourism, the underlying question that is being addressed within a decision making process is whether, in relation to tourism activity, a country or region can continue to “keep doing what is currently being done” – i.e. is business as usual a long term option¹? Of course, the answer to this question will depend on broader societal preferences and these are not the subject of discussion within descriptive statistics. However, the use of a statistically based approach can provide an integrated picture of what business as usual actually looks like in terms of past trends and current structures.

Statistical information on tourism activity should inform a discussion of three distinct but related concepts of sustainability:

- The extent of imbalances in tourism activity
- The extent to which current activity is reaching assessed capacity or thresholds
- The degree of resilience to shocks

The answers to these questions do not emerge directly from statistical information but appropriately measured and well-framed data should ensure an informed discussion of these issues. It is in providing a common understanding of the history and current state of tourism activity from a range of perspectives that the data from a statistical framework will prove of most value.

In concept, as described in Discussion paper #1 Framing Sustainable Tourism, a statistical framework for measuring sustainable tourism would encompass many areas of statistics, such as those related to tourism activity, economic, environmental, social and governance domains, see Box 1. This broad scope is required to ensure coverage of all policy themes that are relevant when dealing with the role of tourism in sustainable development. Initially however, a narrower scope is considered appropriate for MST. The focus is on the tourism

¹ In the sense of the Brundtland report, i.e. development that “meets the needs of the present without compromising the ability of future generations to meet their own needs” (Our Common Future, 1987)

activity, economic and environmental domains since this scope provides a clear basis to demonstrate the value of a statistical framework for measuring sustainable tourism, and also underpins the derivation of a large number of indicators (and the data to populate them) relevant in a sustainable tourism context.

Discussion paper #3 The Role of Statistical and Accounting Frameworks, describes the relevance of statistical and accounting frameworks to underpin analysis of sustainability. Its conclusion forms the basis for the description of a statistical framework that brings together the tourism activity, economic and environmental domains. The proposal is to describe a framework that provides appropriate measurement boundaries, concepts and definitions, and highlights underlying relationships between stocks and flows.

The development of the statistical framework for measuring sustainable tourism is based in large part on the integration of existing accounting frameworks that have been developed for measuring tourism activity and its economic contribution, Tourism Satellite Accounts (TSA), and for measuring the interaction between economy and environment, the System of Environmental-Economic Accounting (SEEA). Both of these frameworks are based on the accounting framework for measuring the economy – the System of National Accounts (SNA). While the TSA and SEEA frameworks have been developed separately, there have been interesting parallels in their development and the associated statistics as reflected in Figure 1.

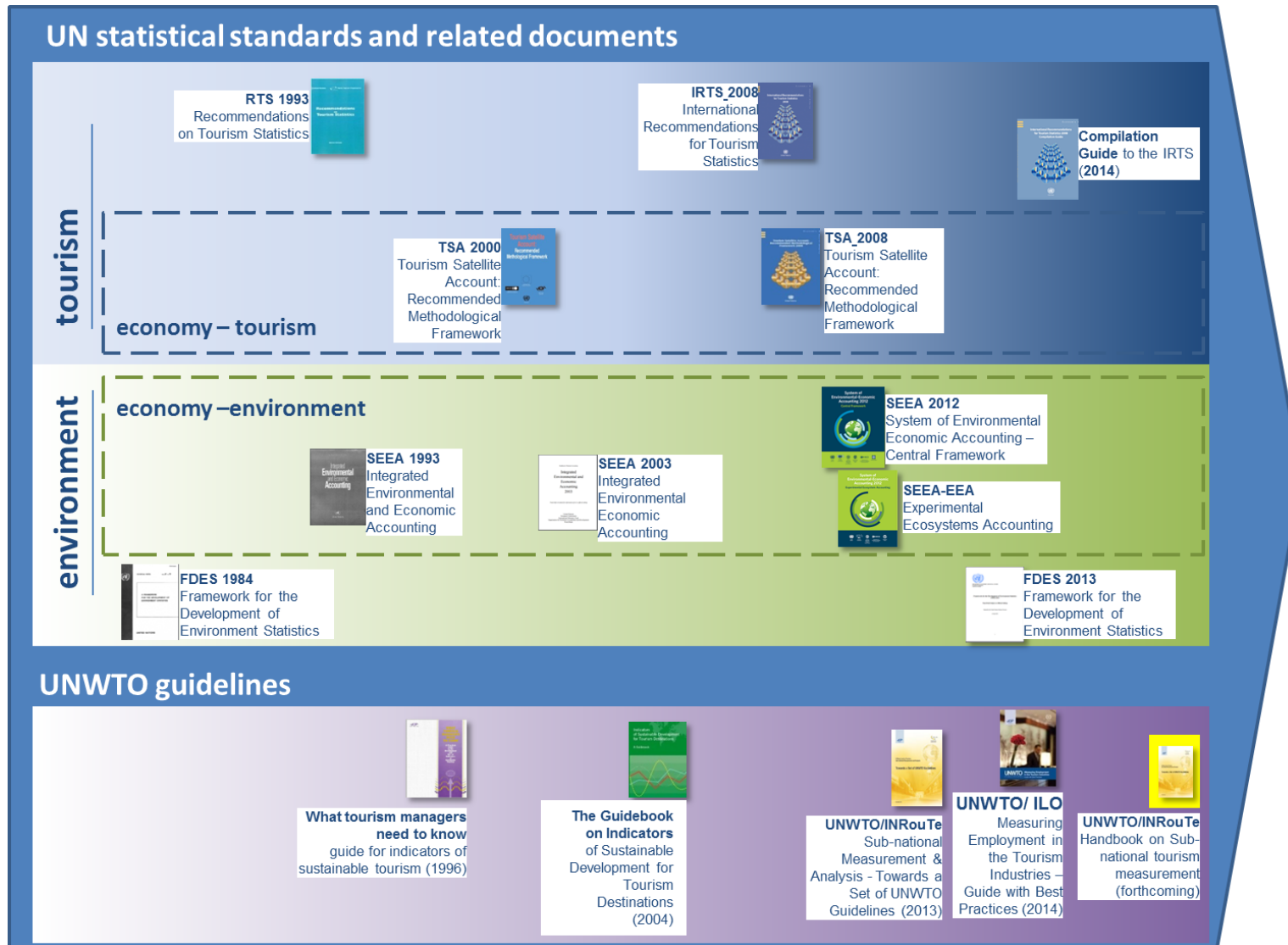
Box 1: Primary statistical domains of the MST*

Statistical domains	
Tourism activity	Tourist numbers and movements Tourism demand and expenditure Tourism business production and characteristics Tourism satisfaction and ratings Events, sites and cultural assets
Economic	Employment and income Transport statistics Infrastructure
Environment	Water and sewage Waste Energy and GHG emissions Environmental condition Environmental expenditure
Social	Community attitudes and participation Training and qualifications Health Crime and safety
Governance	Tourism planning, promotion and management General planning and other policies

Source: Based on analysis of indicators from UNWTO (2004) Indicators of Sustainable Development for Tourism Destinations: A Guidebook. See Discussion paper #1 Framing Sustainable Tourism

The statistical domains used in this paper have been developed by the author for illustrative purposes. They are based on a general understanding of the main areas about which official statistics are published and take into consideration the likely application of data and common data sources.

Figure 1. Some key building blocks for a statistical framework for measuring sustainable tourism



Since both of these accounting frameworks have their origins in the SNA, the conceptual step of integrating tourism activity from an economic perspective and related environmental stocks and flows is considered within reach. This paper explores the pathways forward towards integration and application of the TSA and SEEA frameworks.

Linking TSA and SEEA

Work on combining the TSA and SEEA frameworks has been considered previously, for example in work by Canada² and Italy³. An example of connecting TSA and SEEA has also been included in the SEEA Applications and Extensions, Chapter 4. Using these earlier studies, the MST will look to ensure a full articulation and resolution of various technical issues (see Discussion paper #7) while recognizing the need for the framework to be widely applicable around the world.

A general issue that must be considered is that accounting as applied in the SEEA framework is primarily from a supply or **production** perspective – i.e. the common focus is on natural inputs (e.g. water, minerals, energy) to economic units and residual flows (e.g. GHG emissions, wastewater, pollutants, soil waste) from economic units.

Tourism statistics and the associated TSA also reflect a demand or **consumption** perspective whereby the measurement scope depends primarily on the characteristics of the consumer, i.e. whether or not the consumer is a visitor. Further, the status of an individual consumer as a visitor will change over time as people move in and outside their usual environments. Box 2 articulates this point precisely with respect to the TSA.

Box 2: Relationship between the Tourism Satellite Account and the central framework of the System of National Accounts 2008

Tourism direct gross value added (TDGVA), the aggregate used in the TSA to measure the size of tourism, is defined as part of the gross value added generated in the economy by tourism industries and other industries directly serving visitors in their supply of goods and services in response to internal tourism consumption. Part of this aggregate may be generated by tourism industries, and part of it may also be generated by other industries. The measurement scope of the TSA does not depend primarily on the industries involved, its main focus being on the tourism consumption of goods and services provided by the same industries. On the other side, not all the gross value added of tourism industries (GVATI) is part of TDGVA since these industries may also serve non-visitors, in the same way that non-tourism industries may serve visitors and thus generate part of TDGVA. The latter monetary aggregate does not correspond to the gross value added of any set of productive units developing similar production processes, as is the case of such measurements in the central framework of the SNA 2008.

Source: TSA: RMF 2008 Annex 2

By way of example, the supply and use of water is measured for the whole economy in a SEEA physical flow account for water, including supply and use in the household sector. Among many other pieces of information, this provides, for example, an estimate of the total use of water by restaurants.

A tourism perspective on the other hand, requires an understanding of the share that is attributable to the expenditure/activity of visitors, i.e. those people outside of their usual environment.⁴ An important measurement question is therefore what share of water use by restaurants should be considered attributable to visitors (and thus attributable to tourism).

² Jackson, C. et al. (2008), "Linking the Canadian Tourism Satellite Account and the Canadian System of Environmental and Resources Accounts to measure the environmental impact of tourism in Canada: An exploratory study for two pilot countries", presented to the 9th International Forum on Tourism Statistics, Paris, November 19-21, 2008.

³ Constantino, C. and A. Tudini (2005) "How to develop an accounting framework for ecologically sustainable tourism" in Lanza A., Markandya P.F. (eds.) *The Economics of Tourism and Sustainable Development*, Edward Elgar, UK.

⁴ A visitor is a traveller taking a trip to a main destination outside his/her usual environment, for less than a year, for any main purpose (business, leisure or other personal purpose) other than to be employed by a resident entity in the country or place visited. ... Tourism refers to the activity of visitors. (IRTS 2008, para. 2.9).

The challenge of integrating production and consumption perspectives in an accounting context will be discussed through the course of developing the statistical framework. Importantly, there are a range of presentations of data following the core TSA and SEEA frameworks that can be envisaged that provide information to support a discussion of sustainable tourism – i.e. no single account or table will provide all of the relevant information. The role of the framework is thus to place the right information in the right context and hence support better informed decision making.

Presentations based on accounting conventions of the SEEA and TSA can be used to derive relevant indicators of sustainable tourism, and to facilitate access to the data needed to populate these indicators. Some of these possible presentations and indicators are shown in this paper.

Scoping a statistical framework for measuring sustainable tourism

This discussion paper proposes ways in which a statistical framework for measuring sustainable tourism might be developed. The concept of a statistical framework envisaged here includes the application of existing statistical standards for tourism and other statistics, and for accounting as just described. It is also extended to the application of statistical guidance for establishing statistical infrastructure, i.e. the arrangements put in place, commonly at national level, to support the collection and organization of data. Of particular interest is the use of business registers which can form an important base for information about tourism businesses as well as ensuring that there is a good and consistent coverage of information on tourism activity over time.

While all data are potentially of interest to policy and analysis, the design of a statistical framework must balance two driving factors: (i) ensuring a broad coverage of information such that ongoing data collection identify important changes in structure for example, due to changes in visitor behaviour, and (ii) ensuring that the information is presented at a level of detail most suitable to current policy and analytical requirements. Too much focus on either factor will lead to an imbalance in the resulting data set being either too specific and hence unsuitable for capturing structural change over time, or too general and hence unable to support current decision making.

Importantly, and especially with respect to accounting aspects of the framework, there is no a priori prescription on the data sources and methods that are used to collect data that are integrated within the framework. Put differently, a statistical framework should not be considered to relate to a single survey or data collection. Rather, the intent is to create a platform into which all relevant data, irrespective of source, can be considered and from this a single integrated picture of sustainable tourism can be painted. This includes, for example, the potential to integrate information that may be more immediately available such as data on visitor transactions, with information collected of a more structural nature on an annual or 3-yearly basis.

To provide a clear starting point for the description of a statistical framework, the accounting frameworks of the TSA and the SEEA are used as a base and the different possible components of the framework are described in four extensions. Collectively these extensions form a broad statistical framework to underpin measurement of the tourism activity, the economic and the environmental domains relevant in sustainable tourism, consistent with the proposed scoping for the initial phases of MST.

These proposals have not yet been the subject of discussion among experts in this area and should be considered initial ideas aimed solely at demonstrating the potential in this area and also the technical challenges. Further, the descriptions of the accounting extensions in this paper do not imply a requirement for the production of additional data, at least in the short term. Rather, the descriptions are intended to serve as a basis for discussion on how different pieces of information, many of which may be currently available, can be placed within a broader, sustainable tourism context.

Four extensions of the TSA and SEEA accounting frameworks

Four extensions of the frameworks are described: (i) extensions within the TSA framework; (ii) connections between SEEA based accounts for individual environmental flows (e.g. water, energy, waste) and tourism activity; (iii) accounting for economic and environmental assets following the SNA and the SEEA; and (iv) integration through spatial accounting applying the logic of SEEA based ecosystem accounting.

In the first three extensions, the descriptions of the accounting framework in the following sections are presented at the national level and in terms of annual data. In all cases however, the concepts can be applied at finer spatial levels, including at the level of destinations and sub-national regions, and are suitable for the organization of sub-annual data. In this sense, the accounting framework provides the basis for the comparison and aggregation of information at different spatial levels and at different frequencies, recognizing that not all possible combinations of spatial detail and frequency will be needed or relevant.

In the fourth extension, spatial accounting, the accounting framework naturally operates from a destination type level of detail and hence will be applicable to the organization of information at that level of detail. Spatial accounting may also be conducted on a sub-annual basis; however, since it is at heart an approach that encourages consideration of broader systemic developments over time, a focus on annual data is likely sufficient.

2. Extension #1: Extending the TSA framework

The TSA

The TSA framework is articulated in *TSA: Recommended Methodological Framework 2008*⁵. It covers a number of topics from both the demand and the supply side of tourism statistics, framed into 10 core tables. The main economic phenomena covered by these tables include:

- Production, income and value added of tourism characteristic activities
- Tourism expenditure (inbound, outbound, domestic, etc)
- Employment
- Gross fixed capital formation

In sum, the TSA framework provides an agreed basis for defining the extent and structure of tourism activity within an economy using a measurement framework that is the same as used to define the extent and structure of other economic activity such as agriculture, manufacturing, retail, and education.

The TSA uses as its starting point the activity of those people defined as visitors. The accounts of the TSA framework record the tourism expenditure, i.e. the amount paid for the acquisition of consumption goods and services, as well as valuables, for and during tourism trips. This expenditure is matched with the supply of the associated goods and services, ensuring a balance is recorded between supply and use.

Box 3. Categories of tourism characteristic consumption products and activities (tourism industries)	
Consumption products	Activities
1. Accommodation services for visitors	1. Accommodation for visitors
2. Food and beverage serving services	2. Food and beverage serving activities
3. Railway passenger transport services	3. Railway passenger transport
4. Road passenger transport services	4. Road passenger transport
5. Water passenger transport services	5. Water passenger transport
6. Air passenger transport services	6. Air passenger transport
7. Transport equipment rental services	7. Transport equipment rental
8. Travel agencies and other reservation services	8. Travel agencies and other reservation services activities
9. Cultural services	9. Cultural activities
10. Sports and recreational services	10. Sports and recreational activities
11. Country-specific tourism characteristic goods	11. Retail trade of country-specific tourism characteristic goods
12. Country-specific tourism characteristic services	12. Other country-specific tourism characteristic activities

⁵ The United Nations Statistical Commission (UNSC) took note of the TSA: RMF 2008 document at its 39th session (26-29 February 2008). It updates and replaces the previous TSA:RMF 2000 which had been approved by the UNSC at its 31st session (29 February-3 March 2000)

The majority of visitor expenditure is on goods and services produced by tourism characteristic activities (see Box 3) and hence there is a particular focus in the TSA accounts on understanding the production, income, employment, investment and value added of these activities.

Using data from the core TSA for measuring sustainable tourism

Given the structural information on tourism activity in the TSA, there is data in the core TSA accounts that can be used to inform on sustainability without any particular extension of the core framework. At a global level this has been recognised in the development of indicators for the measurement of progress towards the UN Sustainable Development Goals (SDGs), where indicators of Tourism GDP and Tourism employment derived from the TSA are considered to be key indicators for Targets 8.9 and 14.7⁶.

In addition, the structural information from a TSA would help to identify potential imbalances in the types of visitors (inbound, outbound or domestic, or based on purpose of travel), use of imports to support tourist demand, and the mix of value added across different tourism activities.

Extensions in the form of additional detail within TSA core tables, might be considered to integrate information on specific market segments such as relating to cruise ships, eco-tourism, meetings industries (sometimes referred to as MICE⁷), etc. Each of these different views will inform on the past trends and current structure in an integrated way in which all of the data are confronted.

Assessing seasonality

In many locations, a key aspect in understanding the sustainability of tourism activity is the pattern of activity through the year. Since the TSA accounts are framed for the production of annual data they will not necessarily provide the information to support the assessment of sub-annual trends. Nonetheless, it will often be the case that for key variables such as visitor arrivals and hotel occupancy, the information underpinning the TSA estimates will be sub-annual (monthly or quarterly). A relevant extension to the TSA framework would therefore be to present certain sub-annual series ensuring that these data have been appropriately integrated with other information within the TSA framework. Information on visitor arrivals in particular may point to issues associated with the use and availability of resources (such as water) in peak times and questions of access and mobility.

The role of a business register

The compilation of TSA accounts can be undertaken using a number of different approaches but generally it will be based on a combination of information from business surveys and visitor surveys. For business surveys it is expected statistical practice that these are conducted using a common or central business register that lists all businesses in the economy and classifies them to standard industry classes.

By using basic information provided by business registers, for those businesses classified to industries corresponding to tourism characteristic activities it should be possible to assess the structure of tourism by size of business (e.g. in terms of turnover or employment)⁸, by ownership (resident or non-resident), by legal entity (corporation, household business), and by other characteristics, depending on the range of information held. By combining this data with information on the value added, employment, tourism share and other data from TSA core tables, a rich picture of tourism activity can then be developed which may be significant in a sustainability perspective. It is worth noting that such a result can be obtained from a standard statistical infrastructure that brings coherence of data across all economic statistics.

It is also the case, on the other side, that many sets of indicators for sustainable tourism that have been developed in the past - such as those in the UNWTO Guidebook - commonly provide information that reflect what can generically be understood as characteristics of tourism businesses: e.g. indicators on whether the business

⁶ Target 8.9: By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products. Target 14.7: By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism

⁷ Meetings, incentives, conventions, exhibitions.

⁸ For example, the UNWTO *Compendium of Tourism Statistics* compiles a selection of such information from countries worldwide; see: <http://statistics.unwto.org/content/compendium-tourism-statistics>

at issue have appropriate training schemes, undertake environmental activity, engage with local communities, are connected to central sewage systems, have sustainable tourism policies in place, etc. To date, however, it has been unclear as to how such information might be collected on a standardized basis.

All considered, a business register can play a unique role in providing an underpinning framework for the collection of information on business characteristics.

This is not to suggest that it is a simple consideration to add questions to existing surveys, many factors need to be brought into play. It is simply noted here that, where measurement of sustainable tourism would be better informed by the collection of additional business characteristics, the use of a statistical approach in the form of the business register - which also underpins the data presented in the TSA - would be an excellent starting point.

Extending the TSA to record environmental transactions

A potential application of the SEEA Central Framework that might be directly considered within a TSA setting is to extend/adapt the TSA accounts for expenditures showing so-called environmental transactions. Environmental transactions encompass payments of environmental taxes and resource rents, receipts of environmental subsidies, and expenditure on environmental goods and services, environmental protection and resource management. Following the economy wide definitions provided in the SEEA Central Framework, recording these transactions in relation to tourism activity could be developed.

3. Extension #2: Connecting SEEA physical flow accounts and tourism activity

The accounting framework of the SEEA includes accounts across a wide range of environmental stocks and flows. The SEEA Central Framework records information on individual environmental stocks and flows such as mineral resources, land, soil, water, timber, energy, GHG emissions and solid waste. It accounts for these stocks and flows in either (i) asset accounts, where stocks of environmental assets and changes in these stocks are measured over an accounting period; or (ii) physical flow accounts where the interactions between the environment and the economy are recorded.

The SEEA Experimental Ecosystem Accounting (SEEA EEA), on the other hand, records information on environmental stocks and flows as they co-exist within a local area, i.e. within an ecosystem. The focus is thus on understanding how local ecosystems are changing over time and whether the capacity of these ecosystems to provide benefits to society is changing.

While tourism activity depends, in many instances, on the use of the natural environment (e.g. beaches, reefs, forests, etc), tourism is not a primary user of individual environmental stocks such as minerals, timber and fish. Consequently, there is less direct interest for MST in considering changes in these types of natural resources.

The main focus in understanding the connections between tourism activity and the environment by means of a statistical framework that is based on a combination of TSA and SEEA thus lies in recording

- the use in tourism activity of environmental flows such as water and energy
- the generation by tourism activity of environmental flows such as GHG emissions, solid waste, wastewater and other pollutants
- the changing condition of individual environmental assets, that provide flows used in tourism activity, e.g. water and energy flows, as well as of ecosystems, providing services to tourists.

The types of accounts that are required for the first two categories of environmental flows follow the structure of the standard physical flow accounts of the SEEA Central Framework, Chapter III, with additional industry detail to highlight tourism activity. Accounting in physical units for these environmental flows is discussed hereafter, while tourism's connection to individual environmental assets and to ecosystems is discussed in the following section.

Physical flow accounts highlighting tourism characteristic industries

The most straightforward connection between SEEA and tourism activity is through compiling physical flow accounts that highlight the flows for tourism characteristic activities. Tourism characteristic activities are the activities that typically produce tourism characteristic products. Tourism characteristic products are those that

satisfy one or both of the following criteria: (a) tourism expenditure on the product should represent a significant share of total tourism expenditure (share-of-expenditure/demand condition); (b) tourism expenditure on the product should represent a significant share of the supply of the product in the economy (share-of-supply condition)⁹. Box 3 provided a list of the twelve categories of tourism characteristic activities. Categories 1 through 10 comprise the core categories for international comparability purposes. The remaining two categories are country specific: category 11, covering retail trade of goods that may be relevant in the country; category 12, covering other tourism characteristic activities producing services that are country-specific.

The SEEA presents a range of physical flows accounts, the primary ones concerning energy flows, water flows including wastewater, air emissions, solid waste and emissions to water. All of these topics may be of interest in the context of assessing sustainable tourism. A series of these accounts would help to inform discussion of, for example, energy use efficiency, water use efficiency, greenhouse gas emissions, and flows of solid waste by tourism characteristic industries.

Importantly, by recording these environmental flows for tourism characteristic industries within the SEEA framework, the estimates are reconciled to the whole economy flows rather than considering stand alone estimates of water use. This improves data quality but also supports comparison and benchmarking between tourism industries and other industries.

Examples of potential structures of accounts for water use and GHG emissions are shown in the following two tables. For simplification of these accounts, five tourism characteristic activities are shown¹⁰ but alternative presentations could be used. The same ideas as presented here can be extended to other physical flow accounts such as for energy and solid waste, i.e. by adapting the corresponding accounts from the SEEA Central Framework.

The physical flow account for water has been somewhat simplified for demonstration purposes compared to the standard table in the SEEA Central Framework. In practice, a more complete account incorporating flows of recycled and reused water would be developed in line with the format in the SEEA Central Framework.

These tables reflect a production or supply perspective and hence do not require changes to the conceptual framework for physical flow accounts outlined in the SEEA Central Framework. The largest challenge in compiling accounts like these will be collecting data on the physical flows for the specific tourism industries.

⁹ See IRTS paras 5.8-5.11 & 5.18.

¹⁰ All types of passenger transport (rail, road, water and air) are grouped together, and cultural and sports and recreational activities are also grouped together.

Table 1: Physical flow account for water for tourism characteristic activities

Physical supply table for water															
Abstraction of water; Production of water; Generation of return flows															
	Tourism characteristic activities						Water collection, treatment and supply	Sewerage	Other industries	Households	Flows from the rest of the world Imports	Flows from the environment	Total supply		
	Accomm odation	Food & beverage	Transport	Culture & Recreation	Other	Total									
(I) Sources of abstracted water															
Inland water resources															
Other water sources															
Total abstracted water															
(II) Abstracted water															
For distribution															
For own-use															
(III) Wastewater generated															
(IV) Return flows of water															
(V) Evaporation of abstracted water, transpiration and water incorporated into products															
Total supply															
Physical use table for water															
Abstraction of water; Intermediate consumption; Return flows															
	Tourism characteristic activities						Water collection, treatment and supply	Sewerage	Other industries	Households	Final consumption	Accumulation	Flows to the rest of the world Exports	Flows to the environment	Total use
	Accomm odation	Food & beverage	Transport	Culture & Recreation	Other	Total									
(I) Sources of abstracted water															
Inland water resources															
Other water sources															
Total use abstracted water															
(II) Abstracted water															
Distributed water															
Own use															
(III) Wastewater															
(IV) Return flows of water															
(V) Evaporation of abstracted water, transpiration and water incorporated into products															
Total															
Total use															

Table 2: Physical flow account for GHG emissions for tourism characteristic activities

	Supply table for air emissions							Total supply of emissions	Use table for air emissions		
	Generation of emissions								Accumulation	Flows to the Environment	Total use of emissions
	Tourism characteristic activities						Other industries				
Type of substance	Accommodation	Food & beverage	Transport	Culture & Recreation	Other	Total			Emissions released to the environment		
Carbon dioxide											
Methane											
Dinitrogen oxide											
Nitrous oxides											

In addition to being aware of the practical challenge of data collection, it is important to recognize also a conceptual issue. Due to the production perspective followed, the aggregate physical flows across tourism industries shown in these tables would overstate the direct contribution of tourism activity since some proportion of the flows recorded in these tables would relate to non-tourism activity. For example, not all of the water used by the food and beverage industry will relate to tourism activity. On the other hand, there may be flows relating to non-tourism characteristic industries that are part of the provision of products to visitors that would be omitted in such an aggregation.

For some physical flows, particularly water, it is likely to be particularly important to understand the sub-annual and seasonal patterns. In most locations, tourist activity will peak at certain times of the year and the sustainability of tourism activity will require an understanding of whether the peak demand can be satisfied given expected patterns of supply of natural resources, which may also be affected by seasonal variation. It is also likely to be appropriate in certain cases, again including water, to understand the spatial distribution of flows within a country. The development of the MST statistical framework will need to consider appropriate means by which sub-annual and sub-national information can be incorporated. This is discussed further in Discussion paper #4.

When collecting information on these environmental flows it may be useful to also gather information that highlights some characteristics of tourism businesses as distinct from only the physical flows. For example, it may be possible to collect information on the number of tourism businesses with renewable energy sources, the extent to which they are connected to sewage treatment systems or their use of alternative/private sources of water, including e.g. desalination plants.

Embodied environmental flows for tourism characteristic products

All products are outputs from production processes which are, at an aggregate level, reflected in standard supply and use tables. By using the information on the relationships between inputs and outputs of goods and services reflected in these tables, in principle it is possible to determine a link between the environmental flows of specific production processes and the outputs that are ultimately consumed. For example, it could be possible to estimate the quantity of energy embodied in the provision of accommodation services for visitors. The same logic can be applied for other environmental flows such as water and GHG emissions.

The techniques of attributing environmental flows to categories of final demand are well established and widely applied. The SEEA Applications and Extensions provides an introduction to the relevant approaches and associated literature in Chapter III and, in Chapter IV, it provides an example of applying this approach in relation to household consumption. It could be possible to use the principles outlined in SEEA Applications and Extensions to attribute environmental flows to tourism characteristic products, potentially using information on tourism expenditure also to differentiate this attribution by different types of visitor.

4. Extension #3: Assessing the environmental asset and tourism infrastructure base

The third area of extension and application of the TSA and SEEA to the measurement of sustainable tourism lies in recording information on the asset base that underpins the production of tourism goods and services. This includes both tourism infrastructure and individual environmental assets. The TSA provides an entry point for the measurement of economic infrastructure through recording of gross fixed capital formation, while the SEEA provides a comprehensive framework for the measurement of environmental assets. This section considers both of these asset types.

Recording information on environmental assets

The SEEA describes two approaches to the measurement of environmental assets. The first concerns the measurement of individual assets such as minerals, energy resources, timber, fish, soil and water. This is described in the SEEA Central Framework. Many of these assets are the focus of extraction or use by primary industries and do not directly support tourism activity. Consequently, there is likely to be little need to develop estimates of the stocks and changes in stocks for these resources in the context of measuring sustainable tourism.

The main exception in this regard is the measurement in physical terms of water resources. In locations and countries where there are concerns about the availability of water to support tourism activity, it will not be sufficient to record only the levels of water use by tourism activities as described in the previous section. In addition it will be necessary to record information on the stock of water and changes in this stock. The appropriate account is the water resources asset account – shown below in Table 3. This account records the stock of water at the beginning and end of the accounting period and the changes in the stock of water due to both human activities and natural phenomena such as precipitation and evaporation. The information can provide a basis for the assessment of the pressure being exerted on water resources through abstraction for economic activity including for tourism.

Ideally, as explained in the SEEA Central Framework, water resources asset accounts would be compiled for each water catchment across a country. In the context of assessing sustainable tourism it would be appropriate to focus only on those catchments where tourism activity is significant.

Another individual asset for which asset accounts might be developed are accounts for selected species of wild animals, for example, animals that provide the focus for safari and related activities in national parks. Recording changes in the stock of key species over time, perhaps utilizing park management information, would support an understanding of the environmental assets supporting tourism activities.

Finally, land is also an individual asset described in the SEEA Central Framework which is to be considered. Accounting for changes in the composition of land is a fundamental feature of the SEEA since land provides the space in which economic and social activities are undertaken and also because meaningful groupings of land areas can be used to provide a measurement basis for ecosystem accounting. The development of land accounts for both land use and land cover as articulated in the SEEA Central Framework would help to provide the basis for understanding the spatial context within which tourism activity takes place.

The second approach to measuring environmental assets in the SEEA is accounting for the extent and condition of ecosystem assets as described in the SEEA Experimental Ecosystem Accounting (SEEA EEA). This approach is discussed in the following section.

Table 3: Water resources asset account (cubic metres)

	Surface water				Groundwater	Soil water	Total
	Artificial reservoirs	Lakes	Rivers & streams	Glaciers, snow & ice			
Opening stock of water resources							
Additions to stock							
Returns							
Precipitation							
Inflows							
– from other territories							
- from other inland water resources							
Discoveries of water in aquifers							
<i>Total additions to stock</i>							
Reductions in stock							
Abstraction							
of which: for hydro power generation							
for cooling water							
for tourism purposes							
Evaporation & Actual evapotranspiration							
Outflows							
– to other territories							
- to the sea							
- to other inland water resources							
<i>Total reductions in stock</i>							
Closing stock of water resources							

Tourism infrastructure

Another key aspect in assessing the sustainability of tourism activity concerns the capacity and condition of tourism infrastructure and similar assets such as airports, ports, transport equipment, roads and hotels. The core TSA tables include recording of gross fixed capital formation in these types of assets but do not require recording the so-called capital stock. The development of capital stock estimates is a relatively involved process and would not be an immediate area of focus for measurement for MST. However, it would likely be relevant to collect information on indicators of infrastructure capacity and condition to provide insight to the discussion of sustainable tourism. Examples of such indicators include number of beds/rooms in hotels, road quality indicators, number of scheduled flights, cruise ship berths, number of taxis. Such information would support a discussion on the requirements for investment in infrastructure.

5. Extension #4: Connecting sustainable tourism and ecosystem accounting

Sustainable tourism has commonly been conceptualized and applied at a destination level. This focus on specific areas within a country has a natural connection to the spatial accounting approach used in ecosystem accounting described in the SEEA EEA. One area of focus in the development of the statistical framework will therefore be on developing a set of information that supports analysis at a sub-national spatial level.

The SEEA EEA describes a number of ecosystem accounts. The common basis for these accounts is the delineation of spatial areas across a landscape into different ecosystem types – e.g. forests, coastal zones/beaches, wetlands, agricultural areas. Each distinct spatial area reflecting a single ecosystem type is considered to provide the boundary of an ecosystem asset. Ecosystem assets may change in area over time, e.g. through deforestation, and may change in condition over time – i.e. the ecosystem functioning, integrity or health may rise or fall. These changes in ecosystem assets can be recorded in accounts.

Each ecosystem asset supplies a stream of ecosystem services, essentially outputs of the ecosystem functioning, which are very often used by economic units as inputs to production processes or consumed by individuals and society at large. Ecosystem services are commonly categorized into provisioning, regulating and cultural services. For tourism activity, flows of cultural services in which individuals engage with nature for recreation and enjoyment is perhaps of foremost interest. The supply and use of ecosystem services can be recorded in accounts and linked to the production of other outputs by economic units.

Although much further discussion on the application of ecosystem accounting to tourism is required, there appears a direct link that can be made between the spatial detail required for ecosystem accounting and the most common focus of sustainable tourism on destination level indicators. Put differently, application of ecosystem accounting principles and the development of ecosystem accounts should provide an information set that can be directly used at destination level to progressively build a picture of tourism's use of and impact on local ecosystems.

- Understand the size and location of ecosystem assets that are of primary interest in the local area
- Record how these ecosystem assets are changing in condition and the extent to which the change in condition is a result of tourism activity
 - This could be negative e.g. where tourism activity leads to poor quality water due to lack of sewage treatment, or loss of forest condition due to excessive numbers of tourists
 - Or it could be positive where activity by tourism business leads to ecosystem restoration or protection.
- Understand the flows of ecosystem services that are used by tourism businesses, for example in the production of ecotourism outputs.

The ecosystem accounts that might be developed in this section would provide a framework for incorporating information on

- protected areas
- biodiversity and iconic species
- water quality
- beach, seas water and reef quality/condition
- air quality

In concept, adapting ecosystem accounting to tourism would require the delineation of spatial areas for analysis including the tourism destination itself and related ecosystems, for example beaches, national parks, marine areas, etc. For each spatial area, an assessment would be made of ecosystem condition, for example using indicators of the quality of beaches, which could be tracked over time to provide insight into the environmental impact that could be attributable to tourism activity. From a supply perspective, the scope of accounting might be extended to include the changing condition of water catchments and groundwater systems that underpin the provision of water to support tourism activity.

Further, assessment could be made of the supply of ecosystem services from the various ecosystems including those services that contribute to tourism activity but also other services that may be jointly produced. For example, carbon sequestration of forests which are visited by tourists. An important distinction might be identified

between visitor direct consumption of natural inputs, e.g. water; and visitor use of ecosystems for recreation, e.g. lakes, rivers and beaches. The allocation of ecosystem services to various beneficiaries, including visitors, permanent residents of the area and others, can support a broader discussion on the potential changes in the mix of ecosystem services supply, and also on (related) economic alternatives, associated with tourism activity and development.

In the first instance, ecosystem accounting in physical terms would be a likely focus. However, there may be interest in the valuation of ecosystem services and related ecosystem assets. To this end, the fact that much information on tourism can be attributed to specific destinations, may provide information to support direct valuation of ecosystem services. This may in turn be used to support broader work on ecosystem accounting. These issues are discussed further in Discussion paper #4.

Finally, it is noted that the spatial accounting for ecosystem assets envisaged in the SEEA EEA, can also be extended to consider a broader range of assets that are present in the landscape. For example, to understand changes in particular spatial areas it may be relevant to consider the influence and condition of infrastructure that supports tourism such as walkways and viewing platforms and camping sites. Also, it would be appropriate to account spatially for cultural assets that may be frequently visited. In short, the spatial accounting principles of ecosystem accounting provide a basis for capturing many aspects of relevance at a destination level.

6. Conclusions

The purpose of this paper was to provide some initial proposals on the design of a statistical framework for measuring sustainable tourism. This has been achieved by describing four extensions to the existing international accounting standards for TSA and SEEA. The extensions proposed highlight that in some areas it may well be possible to make direct use of available information to compile relevant data. In other areas, particularly in relation to environmental stocks and flows where the underlying statistics are commonly less developed, it will be necessary to collect additional information.

At the same time, by making the connection between the measurement of sustainable tourism and these established accounting frameworks, it will be possible to take advantage of measurement improvements that take place, particularly in the area of environmental accounting. This approach will support not only the more efficient collection of information for measuring sustainable tourism but will also facilitate the compilation of comparable data between tourism and other activities.

More generally, the development of a statistical framework, following the types of extensions noted here will help secure the advantages of statistical and accounting frameworks highlighted in Discussion paper #3. These advantages which have long been held by users of economic data are within reach of users of data on sustainable tourism.

As noted at the outset of this paper, these proposals have not been the subject of discussion and debate among experts in this field. They should therefore not be considered definitive and modification and refinement of the proposals should be expected. A key feature of the first round of discussion should be the gathering of many different perspectives to ensure that the final proposals for a statistical framework are both relevant and feasible.