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INTERNATIONAL YEAR
OF SUSTAINABLE TOURISM
FOR DEVELOPMENT



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Statistical Framework for Measuring Sustainable Tourism

*Preliminary Draft prepared
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Foreword

Tourism can be a true force for sustainable development. It is mentioned in three of the 17 universal Sustainable Development Goals (SDGs). Yet with its global reach, resilience and large value chain, tourism can contribute to all 17 Goals. Recognizing this, the UN declared 2017 as the International Year of Sustainable Tourism for Development.

So now is the time to really be aware of the contribution of tourism to development in each of our countries. Let us reaffirm our commitment to sustainability by measuring our progress. And ensure the positive impact of well-managed tourism on inclusive and equitable growth, sustainable development and peace.

How do we know if we are going in the right direction? We need to accurately assess our impact—economic, social and environmental. This will only be obtained credibly and in a way that can be comparable through statistics. There are two main reasons for this:

- (1) *The United Nations has called for statistics to be the base of the process to define indicators for the SDGs—the global goals that explicitly ask for more integrated policies for sustainable development;*
- (2) *Integrated policies need integrated data. We need an integrated base for the three dimensions of sustainable tourism: economic, social and environmental.*

We need a common language that is standardized across destinations, countries and regions to track our impact and our progress.

With the support of the United Nations Statistics Division, UNWTO has launched a project towards a statistical framework that targets achieving these aims: a Statistical Framework for Measuring Sustainable Tourism (MST). Overall, MST will help us to better inform our policies on sustainable tourism, create dialogue between different sectors, and support better decision making.

I trust MST can lead tourism into a new era of sustainable and inclusive development.

Taleb Rifai, Secretary-General, World Tourism Organization

The Statistical Framework for Measuring Sustainable Tourism (SF-MST) is an organizing structure for integrating statistics on the economic, environmental and social dimensions of sustainable tourism. This Preliminary Draft of the SF-MST has been prepared for the 6th International Conference on Tourism Statistics to convey the clear potential to advance statistical work in this area of measurement.

UNWTO is the UN agency with the responsibility to carry forward work on the measurement of tourism. With the motivation to improve tourism statistics in the area of sustainability, in 2015 it commenced, jointly with the UN Statistics Division, the MST project. A Working Group of Experts has been formed and will provide the technical direction required to advance the SF-MST. This group will operate under the auspices of the UNWTO Committee on Tourism Statistics and TSA and in concert with the UN Committee of Experts on Environmental-Economic Accounting.

This Preliminary Draft reflects the first synthesis of available material on the measurement of sustainable tourism from the perspective of official statistics. It builds on materials prepared for and discussed at the first meeting of the Working Group of Experts in October 2016 and discussion at the January 2017 UNWTO Committee of Tourism Statistics and TSA on a draft outline for the SF-MST. However, this Preliminary Draft has not been the subject of broad consultation and feedback. In that regard, it should be considered a starting point in the framework development process.

It is planned that a final SF-MST will be submitted for consideration by the UN Statistical Commission in March 2020 following an active process of research, discussion and consultation across multiple experts, sectors and stakeholders in the coming three years.

It should be recognised that the SF-MST is a somewhat different document relative to many other statistical frameworks since it has a scope which involves connections to many other statistical domains across economic, environmental and social statistics. As a result, the general ambition is to build on the wide range of existing statistical standards in relevant areas. For this reason the structure and content of the SF-MST varies to some degree from other statistical standards.

Chapter 1 is devoted to explaining the rationale for the development of a statistical framework for sustainable tourism. This is to ensure that the wide variety of stakeholders, many who are not official statisticians, have a common understanding and reference point for the application of the framework.

Chapter 2 provides an overview of the framework, its structure and coverage and an explanation of the way in which different statistical frameworks will be integrated.

Chapter 3 describes a distinctive but fundamental feature of the SF-MST, the need for statistics at multiple spatial scales – from destination and local levels to national and global levels. By creating a means by which data at different scales can be integrated, the resulting statistical information will be of greater relevance for tourism development.

Chapters 4, 5 and 6 describe the relevant concepts, definitions, measurement boundaries and related issues for the economic, environmental and social dimensions of sustainable tourism. Much more progress has been made since 2015 on the development of the framework in the economic and environmental dimensions and this is reflected in the balance of material drafted in the chapters.

All of the material in this Preliminary Draft should be considered a work in progress and requiring much further discussion among experts and stakeholders. Nonetheless, it is clear from engagement in the MST project to this point, that the broad framing and approach reflected in the SF-MST has substantive support from the statistical community and the broader tourism community. The work has received strong endorsement from the United Nations Statistical Commission at its most recent session in March 2017 and has been endorsed by the UN Committee on Tourism Statistics and TSA.

Beyond the development of this statistical framework, the MST project aims to develop relevant compilation guidance, including for example guidance on the compilation of TSA, and similar materials to support compilers. An early example of this is the first draft of a Technical Note on Linking SEEA and TSA also to be presented to the International Conference on Tourism Statistics in Manila, June 2017. In addition, the MST project is supporting pilot studies in a number of countries and will work towards the development of capacity building and implementation programs. This will ultimately lead to the compilation of data into an international database, to then feed into analysis and decision-making.

It is hoped that the provision of this Preliminary Draft SF-MST will further stimulate interest in the potential of this area of statistical development.

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List of abbreviations and acronyms

ILO	International Labour Organization
IRTS 2008	International Recommendations for Tourism Statistics 2008
MST	Measuring Sustainable Tourism
SDGs	Sustainable Development Goals
SEEA	System of Environmental-Economic Accounting
SEEA EEA	System of Environmental-Economic Accounting Experimental Ecosystem Accounting
SF-MST	Statistical Framework for Measuring Sustainable Tourism
SNA	System of National Accounts
TSA	Tourism Satellite Account
TSA: RMF 2008	Tourism Satellite Account: Recommended Methodological Framework 2008
UN	United Nations
UNCEEA	United Nations Committee of Experts on Environmental-Economic Accounting
UNSC	United Nations Statistical Commission
UNSD	United Nations Statistics Division
UNWTO	World Tourism Organization
WGE-MST	Working Group of Experts on Measuring Sustainable Tourism

1. Introduction

Notes to Chapter 1: The focus in this chapter is to provide a clear rationale for the measurement of sustainable tourism and of the relevance of a statistical framework. The discussion is intended to provide clear support for the task of statisticians in engaging with other stakeholders to advance this work which must take place in a cross-agency and cross-sector setting. This initial draft provides a starting point for further discussion and refinement concerning the broad scope, relevance and feasibility of the SF-MST.

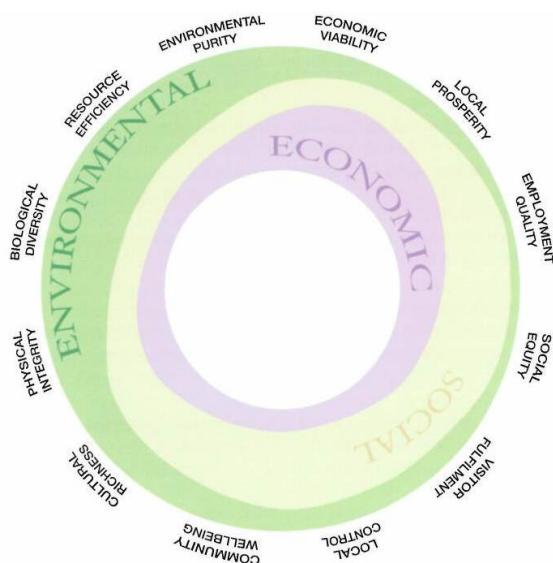
1.1. Sustainable tourism

Sustainable tourism has been a topic of discussion in tourism circles since the early 1990s. The interest in sustainable tourism culminated in 2017 being declared the United Nations International Year of Sustainable Tourism for Development. This was especially timely given the increasing momentum towards sustainable development following the adoption of the United Nations 2030 Development Agenda and the associated Sustainable Development Goals (SDGs).

The alignment of policy development and implementation behind these goals is an essential aspect in moving towards sustainable development. Further, this alignment must take place across sectors and across the economic, social, environmental and spatial dimensions. This need is very clear in the context of tourism.

The long-standing work of UNWTO in sustainable tourism is reflected in a range of contributions to policy and measurement. Using a focus on tourism destinations, the UNWTO has articulated that sustainable tourism should: (i) make optimal use of environmental resources; (ii) respect the socio-cultural authenticity of host communities; and (iii) ensure viable, long-term economic operations¹. It is also identified 12 key policy themes as shown in the figure 1 below.

Figure 1: Relationship between policy areas and the key dimensions of sustainability



Source: UNEP/UNWTO (2005)

¹ UNEP/UNWTO (2005) Making Tourism More Sustainable: A Guide for Policy Makers, Box 1.1

The interest in sustainable tourism has been driven by two key factors, first the energizing influence of the 1987 Brundtland Commission report “Our Common Future” and the subsequent 1992 Rio Summit on sustainable development. While the ideas around sustainable development had been under discussion for some time prior, this work and the high profile engagement, placed sustainable development clearly on the political “map”.

The second key factor has been the tremendous growth in tourism activity in the past 20-30 years. This growth has fuelled two lines of interest in the sustainable tourism space. First, the reality that in contributing a larger share of economic activity in most countries, tourism activity was contributing more to the use of environmental resources and its impact on the natural environment was increasingly significant. Second, the idea that tourism activity might provide a path by which lower income countries and region might improve their standard of living.

These two factors come together in the definition of sustainable tourism published by UNEP and UNWTO in 2005 – see Box 1 below. The definition makes clear that sustainable tourism is a multi-faceted concept and, depending on one’s perspective, different aspects and areas of focus will be relevant.

Box 1: Defining sustainable tourism

UNWTO definition:

Sustainable tourism development guidelines and management practices are applicable to all forms of tourism in all types of destinations, including mass tourism and the various niche tourism segments. Sustainability principles refer to the environmental, economic and socio-cultural aspects of tourism development, and a suitable balance must be established between these three dimensions to guarantee its long-term sustainability.

Thus, sustainable tourism should:

1. Make optimal use of environmental resources that constitute a key element in tourism development, maintaining essential ecological processes and helping to conserve natural resources and biodiversity.
2. Respect the socio-cultural authenticity of host communities, conserve their built and living cultural heritage and traditional values, and contribute to inter-cultural understanding and tolerance.
3. Ensure viable, long-term economic operations, providing socio-economic benefits to all stakeholders that are fairly distributed, including stable employment and income-earning opportunities and social services to host communities, and contributing to poverty alleviation.

Sustainable tourism development requires the informed participation of all relevant stakeholders, as well as strong political leadership to ensure wide participation and consensus building. Achieving sustainable tourism is a continuous process and it requires constant monitoring of impacts, introducing the necessary preventive and/or corrective measures whenever necessary.

Sustainable tourism should also maintain a high level of tourist satisfaction and ensure a meaningful experience to the tourists, raising their awareness about sustainability issues and promoting sustainable tourism practices amongst them.

Source: UNEP/UNWTO 2005, Making Tourism More Sustainable: A Guide for Policy Makers, Box 1.1

1.2. Sustainable tourism policy issues and questions

The work by UNEP and UNWTO also made clear that there are also a range of key global challenges, principles and policy themes relevant to sustainable tourism. Challenges highlighted in the 2005 report included climate change, poverty alleviation, support to conservation of natural resources and health, safety and security. Principles described included the polluter pays principle, the precautionary principle, the need to promote sustainable consumption and to consider the life cycle of products and services and the benefit of undertaking continuous monitoring using indicators that relate to sustainability goals.

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 option²? 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.

The challenges facing the development of tourism policy to achieve sustainable outcomes are wide ranging. Integration and balancing of many factors is required, usually in circumstances in which responsibility for decision making is distributed across layers of government, and also with the need to consider small businesses, large corporations and local communities. In this diverse context, the ability to provide all stakeholders with a single, comprehensive and agreed picture of the state and trends in tourism activity from all of its economic, environmental, social and spatial dimensions would appear an immediate benefit for decision makers.

While this provides a general rationale for improved measurement of tourism, more specific examples are needed to demonstrate the way in which improved measurement can support finding solutions to specific policy issues and questions. Understanding the key policy issues and questions is important as it highlights the areas of demand and interest – see the selected questions in Table 1. By knowing these areas, the development of improved measurement can be well targeted.

Table 1: Some examples of policy issues and questions on sustainable tourism

Sustainability dimension	Selected policy issues and questions
Economic	What value-added contribution do visitors from particular countries make? Which are the highest value-adding visitors?
	What patterns of visitor demand are likely in the future?
	What levels of investment in transport infrastructure are required to support likely visitor numbers?
	What are the indirect economic effects of tourism activity in a particular region? Are the indirect benefits of tourism activity captured in the local area?
	How competitive are the tourism destinations in a country?
	How should tourism activity be taxed in order to re-distribute the benefits among the community?
Social	What types of jobs are currently offered in tourism industries? Will there be a reduction in seasonal and part-time work in the future if tourism demand rises?
	How important are cultural and heritage sites in underpinning tourism demand?

² 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)

Sustainability dimension	Selected policy issues and questions
	Is there a suitable balance between the number of visitors to a destination and the wellbeing of the local community?
Environmental	Are protected areas and other natural features of a destination (e.g. beaches, national parks) being maintained in good or very good condition? How is their condition related to visitor numbers?
	Are tourism industries reducing their potential environmental impact in terms of reducing their consumption of water and energy, their release of GHG emissions and their treatment of solid waste?
	Will visitor numbers be affected by declines in local air and water quality?
	What are the trends in land use for tourism purposes and is there a suitable balance in terms of maintaining local landscapes?

Providing information to support discussion of these types of issues and questions and to inform relevant analysis is the focus of the SF-MST. All stakeholders and decision makers should have a common and robust set of data to work from. Indeed, the demand for evidence based decision making is fundamental to the development of a rigorous, statistical approach to the measurement of sustainable tourism.

1.3. Measuring sustainable tourism

UNWTO, as the specialized agency responsible for the promotion of responsible, sustainable and universally accessible tourism, is committed to ensure that tourism plays a key role in progress towards sustainable development. The long-standing work of UNWTO in sustainable tourism is reflected in a range of contributions to policy and measurement. Using a focus on tourism destinations, the UNWTO has articulated a definition of sustainable tourism (UNWTO & UNEP, 2005), provided a guide to the set of relevant policy themes (UNWTO & UNEP, 2005) and described a comprehensive range of indicators that may be used in measuring progress towards sustainable tourism at destination level (UNWTO, 2004).

Over the same period, there has been significant progress in the definition and collection of internationally comparable tourism statistics. This progress is reflected in the International Recommendations for Tourism Statistics (IRTS) (UNWTO, et al, 2008) and the Tourism Satellite Account: Recommended Methodological Framework (UNWTO & UN, 2008).

However, there is a significant gap from a statistical perspective in defining standards for a framework that integrates economic, environmental, social and destination level statistics that are required for assessment of sustainable tourism. With the aim of closing this statistical gap, in 2015 the UNWTO launched the Towards a Statistical Framework for Measuring Sustainable Tourism (MST) initiative (<http://cf.cdn.unwto.org/sites/all/files/docpdf/brochures.pdf>).

The main contribution of the UNWTO to date in the area of sustainable tourism measurement has been the ongoing work to develop relevant sets of indicators that respond to policy needs. The most significant work in this respect was the 2004 UNWTO Guidebook for Indicators of Sustainable Development for Tourism Destinations. Building on earlier work, the Guidebook for Indicators identified a very large number of indicators (over 700) across 13 issues. These and other initiatives worldwide have advocated the use and implementation of indicators, and the general principle of continuous monitoring, as a structural part of sustainable tourism development.

An important project in this context has been the establishment of UNWTO's International Network of Sustainable Tourism Observatories (INSTO) which brings together tourism observatories from around the world. Tourism observatories have been established in many destinations with the aim to better

understand, monitor and advise on policy towards more sustainable development of tourism. The design, implementation and analysis of indicators are a fundamental part of their work. INSTO proposes an institutional framework, nine issue areas considered to be of highest relevant to observatories, and an economic data sheet for reporting. It encourages the systematic application of monitoring, evaluation and information management techniques, as key tools for the formulation and implementation of sustainable tourism policies, strategies, plans and management processes.

Beyond UNWTO, other international organizations and agencies have also considered the measurement of sustainability related to tourism; especially notable is the work of Eurostat³, the OECD⁴ and the European Commission's initiative on a European Tourism Indicators System (ETIS) for sustainable destination management⁵.

The Eurostat work released in 2006 was a comprehensive review of the measurement of sustainable tourism. The work proposed 20 indicators, primarily from economic and environmental domains, and a further set of possible social/cultural indicators, all set within the DPSIR indicator framework⁶. The indicator set was intended to be applied at regional/sub-national level.

The OECD work was reflected in a workshop in 2010 considering the relationship between tourism and sustainable development. It saw three main challenges for sustainable tourism – climate change, resource conservation and social cohesion – consistent with the themes identified in earlier work.

The ETIS initiative which commenced in 2013 has a focus on indicators for sustainable destination management. To frame the indicators they have identified four main themes:

- Destination management
- Social / cultural impact
- Economic value
- Environmental impact

In determining these themes, they have recognized that sustainability is a contested concept but nonetheless see the importance of aiming for integration in support of global initiatives such as the UN 2030 Development Agenda and the related 10YFP on Sustainable Production and Consumption⁷. The 10YFP has initiated the development of a flexible Monitoring and Evaluation (M&E) framework to

³ See "Methodological work on measuring the sustainable development of tourism", available at: <http://ec.europa.eu/eurostat/web/tourism/methodology/projects-and-studies>.

⁴ See e.g. Workshop on sustainable development strategies and tourism (<http://www.oecd.org/cfe/tourism/workshoponsustainabledevelopmentstrategiesandtourism.htm>); Climate change and tourism policy in OECD countries (<http://www.oecd.org/cfe/tourism/48681944.pdf>)

⁵ See: http://ec.europa.eu/growth/sectors/tourism/offer/sustainable/indicators_en.

⁶ DPSIR: Driving force, Pressure, State, Impact, Response used by EEA. This framework is an extension of the pressure-state-response framework proposed for environmental indicators and indicators of sustainable development developed by [OECD](#) (1994). See also "Environmental indicators: Typology and overview" available at <http://www.eea.europa.eu/publications/TEC25>

⁷ The 10YFP, an outcome of Rio+20, is a global framework that enhances international cooperation to accelerate the shift towards SCP. It aims at developing, replicating and scaling up SCP and resource efficiency initiatives, at national and regional levels, decoupling environmental degradation from economic growth, and thus increasing the net contribution of economic activities to poverty eradication and social development. It has six initial programmes: Consumer Information; Sustainable Buildings and Construction; Sustainable Food Systems; Sustainable Lifestyles and Education; Sustainable Public Procurement; and Sustainable Tourism.

provide directions and vision and measure its progress on capacity enhancement for the shift towards Sustainable Consumption and Production (SCP)⁸.

The European Commission launched the European Tourism Indicator System (ETIS) which has defined 43 core indicators and has been trialed in a number of destinations, including NECSTouR⁹ regions.

The European Environment Agency (EEA) is developing a reporting mechanism for indicators linking tourism and environment (TOUERM) in order to provide a more comprehensive picture of tourism in the frame of monitoring and informing on pressures and impacts as well as sustainability trends of European industry sectors.

Country and regional level work on sustainable tourism, sometimes led by academic researchers, has also been in evidence over the past 25 years. Documentation on some of these country experiences, as well as the work currently being carried out by the pilot studies in the specific framework of MST, can be found on the MST website¹⁰.

At a corporate and business level there are many initiatives around sustainable tourism. Voluntary certification standards around sustainable tourism operation are also under ongoing development in sectors such as hotels and tour operators. The Global Sustainable Tourism Council (GSTC) is a leading facilitator in this space. The private sector is also increasingly aware of the need to measure and report in a consistent way, as demonstrated for example by initiatives such as Hilton hotels sustainability measurement platform¹¹ and the Hotel Water Measurement Initiative (HWMI) and its equivalent for carbon, promoted by the International Tourism Partnership (ITP) of Business in the Community¹².

All of the examples cited here are intended only to illustrate the breadth of work and interest in this area of measurement. It is recognized that there are many other initiatives on measuring sustainable tourism that are also of relevance in taking this work forward.

1.4. The benefits of a statistical approach

Of course, these policy issues and measurement questions are not new. Traditionally, however they have been discussed and solutions formed in silos. Thus, the economic issues have been addressed by economic, finance and development experts; environmental issues have been addressed by planning and environmental experts; and social issues have been addressed by experts in employment and culture.

To find better solutions, the recommended approach to sustainable tourism policy is to support and encourage engagement across these silos and among the diversity of stakeholders, particularly at local or destination level. A particular advantage in this approach is that it is possible to recognize that “one-

⁸ 20 general pilot indicators have been identified for the four 10YFP objectives, including 7 on Objective 4 (Contribute to resource efficiency and decoupling economic growth from environmental degradation and resource use, while creating jobs and economic opportunities and contributing to poverty eradication and shared prosperity): energy efficiency, mitigation of GHG and other atmosphere, soil and water pollutants, material use reduction, waste reduction, water-use efficiency, sustainable land-use, and decent employment.

⁹ Network of European Regions for a Sustainable and Competitive Tourism (NECSTouR).

¹⁰ http://statistics.unwto.org/studies_experiences

¹¹ <http://newsroom.hilton.com/index.cfm/news/hilton-wins-product-of-the-year-from-environmental-leader-for-corporate-responsibility-measurement-platform-lightstay>

¹² <http://tourismpartnership.org/water-stewardship/>

size-fits-all” solutions will generally be counter-productive in terms of outcomes at the local and destination level.

With the aim of encouraging and supporting this multi-lateral and multi-layered discussion, a statistical approach starts from the premise that data should be collected and analysed on a consistent basis over time and across different regions and countries. Implementation of a statistical approach involves developing standard definitions and concepts, non-overlapping measurement boundaries and clear means of aggregating and comparing different components.

The MST project thus aims to extending the current range of tourism statistics to cover the three dimensions of sustainable tourism – economic, environmental, social – and at relevant spatial scales – global, national and subnational. This would secure the following benefits:

- The provision of a common language for discussing sustainable tourism within the tourism sector and with other key policy areas such as planning, industry, infrastructure, environment, social affairs, finance and central banks;
- The capacity to compare the performance of the tourism sector and the impacts of different policies on a consistent basis with other sectors and in different destinations and countries;
- Offering a basis for improving co-ordination in data collection and organization, as well as for improving institutional arrangements for the governance and management of statistics on sustainable tourism;
- Providing a single, coherent and complete picture of the state of sustainable tourism and its trends, in all its dimensions and across all spatial scales.

There is no doubt that it is possible to develop an information base for sustainable tourism by allowing each destination and country to form its own definitions and associated measurement components. However, when the information challenge is tackled individually, the potential for comparison, sharing experience and embedding ongoing measurement is substantially reduced. Indeed, these are the strengths of the Tourism Satellite Account (TSA) that led to its worldwide recognition as a powerful tool for better understanding, managing and raising awareness about the importance of tourism.

At one level it may seem that integration of information for a single group of decision makers is sufficient, for example for local/destination managers, or for national tourism administrations. However, it is clear that decisions by different groups are inter-connected and, for example, local and national policy choices each affect the other. Given this reality, there may be considerable barriers to progress if different stakeholders have information based on varying definitions and measurement boundaries. A statistical approach as recommended in the MST project works to overcoming these informational barriers.

1.5. Structure of the SF-MST document

<<To be drafted following further discussion on the coverage and structure of the draft SF-MST.>>

2. Overview of the SF-MST

Note to Chapter 2: Unlike most other statistical frameworks, the SF-MST cannot be considered a stand-alone framework within a specific area of statistics. Rather, it reflects the integration of a range of existing statistical standards across the economic, environmental and social dimensions. The intention in this chapter is to convey the extent of the integration underpinning the SF-MST. In doing so it should

provide a clear context for the more detailed description of statistical definitions and measurement boundaries across the economic, environmental and social dimensions that are discussed in the following chapters. This initial draft provides a starting point for further discussion and refinement concerning the broad scope, relevance and feasibility of the SF-MST.

2.1. Introduction

A statistical framework is an organizing structure for data and statistics that provides a common understanding of concepts, definitions and related terminology. A framework is independent from the sources from which data might be collected and the methods used to compile the statistics. In this context, the SF-MST is a platform for integrating statistics on the various dimensions of sustainable tourism. This chapter provides an overview of the coverage, structure and logic of the SF-MST.

2.2. Coverage of SF-MST

SF-MST covers the three primary sustainability dimensions – economic, environmental and social. A balance across all three dimensions must be considered in the assessment of sustainability. Other concepts related to sustainability such as resilience, diversity and equality are considered in the context of these three primary dimensions.

The **economic dimension** covers the production and consumption associated with tourism activity in terms of associated goods and services and will commonly be reflected in measures such as visitor consumption and the output of tourism industries. The economic dimension also includes description of the characteristics of tourism industries and the production processes of tourism industries. It thus captures investments in produced capital (hotels, transport infrastructure, etc.); tourism employment, jobs and human capital (including skills and experience); and information on the size, industry class and ownership of tourism industries. A detailed description of the economic dimension of the framework is contained in Chapter 4.

The **environmental dimension** concerns the environmental assets, often referred to as natural capital, that support tourism activity (including land, beaches and coastal areas, national parks, rivers, etc.) through the provision of ecosystem services. As well, the environmental dimensions incorporates measurement of the flows of natural inputs to tourism production processes such as flows of water and energy and the flows of residuals that are generated from tourism production and consumption including GHG emissions, solid waste, wastewater and other pollutants. A detailed description of the environmental dimension of the framework is contained in Chapter 5.

The **social dimension** covers a range of social aspects related to tourism activity. It includes the local, traditional and indigenous cultural aspects that can support tourism activity or may be impacted by tourism. It also includes the outcomes of tourism production processes in terms of the provision of decent work and occupational health and safety; the contribution to individual and community health and well-being; performance in relation to gender equality, income equality and other aspects of equality; and the development of social capital reflected in the strength of community networks and institutional arrangements. A detailed description of the social dimension of the framework is contained in Chapter 6.

SF-MST also incorporates **spatial scale** as a fundamental component of the framework. Thus, SF-MST encompasses measurement from local and destination levels to regional (sub-national) and national levels. The global perspective is also captured through aggregation from the national level. The incorporation of spatial scale as an explicit aspect of the framework reflects the reality that many of the dimensions of tourism cannot be meaningfully assessed in terms of national averages.

Indeed the concept of sustainable tourism (Chapter 1) is generally embodied at a fine spatial level (e.g. in relation to host communities) since it is at this level that the economic, environmental and social dimensions interact in a given context and assessment of the balance among these dimensions may be most tangible.

At the same time, interactions at a local level occur within a broader setting and issues of that gain more relevance at national and global scales, such as concerning financial markets and climate change, need also to be considered.

Thus, from a statistical perspective, it is insufficient to consider measurement only at the level of individual destinations. With this motivation, the SF-MST integrates measurement from local to national to global levels ensuring a consistency of definition and measurement boundaries. A detailed description of the way in which spatial aspects are considered within the framework is contained in Chapter 3 to provide a basis for the discussion of measurement at different spatial scales for each of the dimensions which is presented in chapters 4, 5 and 6.

As for all statistical frameworks, the SF-MST is designed to be implemented on an ongoing basis to provide a consistent and coherent picture of sustainable tourism over time. The assessment of sustainability requires consideration of past and expected changes in each of the dimensions and in this context one-off studies do not provide a sufficient base for ongoing decision making. A long time series of data can help directly in framing assessments of sustainability.

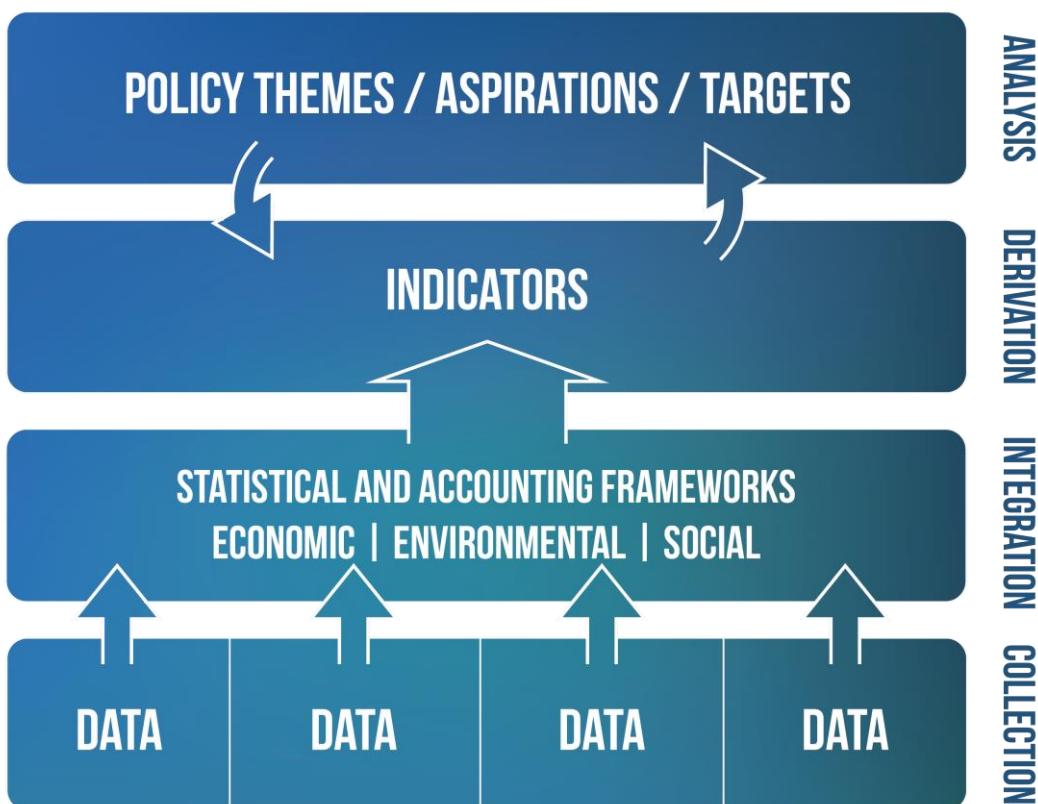
The concepts of the SF-MST can be applied to all frequencies, e.g. from monthly to quarterly to annual and less regular collections. Sub-annual information may be of particular interest in the analysis of sustainable tourism at sub-national levels where peaks in tourism demand may place specific pressures on local communities, ecosystems and infrastructure. In these cases, the use of annual averages in decision making may mask significant concerns. Decisions about the appropriate frequency of data collection and reporting should be based on the relevant policy and analytical questions and the available resources.

2.3. The overall structure of the SF-MST

The SF-MST sits at the intersection between data sources and the use of data for reporting and analysis. Within individual dimensions and statistical areas, such as the economic dimension, the role of statistical frameworks, such as the System of National Accounts (SNA), in translating multiple sources into a coherent single picture is usually invisible. This ensures that the focus of attention is where it should be: on the resulting data and its use in analysis and decision-making. The long term ambition for SF-MST is therefore that the definitions and structure that it provides becomes an invisible platform for the integration of all relevant information in the assessment of sustainable tourism.

The link between the layers of information is shown in Figure 2. Data sources across economic, environmental and social dimensions, and across spatial scales are integrated using the standard definitions, classifications and measurement boundaries of the SF-MST. The resulting data set can then be used to derive indicators and to support analysis. Without a standardizing framework, the meaningfulness of the indicators and analysis that uses different data sources may be questioned.

Figure 2: Using statistical frameworks to support derivation of indicators



The data of the SF-MST will be contained in system of different accounts and tables (see section 2.4) covering the economic, environmental and social dimensions. A useful bridge to the derivation of indicators and other forms of analysis is the use of tables known as “combined presentations” which bring together information on the key variables of interest. The accounts and tables of the SF-MST provide the technical basis for data consistency and quality. Combined presentations allow these data to be summarized and communicated. Combined presentations may be structured in different ways. Alternative approaches are discussed in section 2.5 along with potential indicators for sustainable tourism.

2.4. Statistical frameworks incorporated in the SF-MST

The SF-MST provides an integration of a number of existing statistical frameworks to provide a platform for the measurement of sustainable tourism. In this context, SF-MST covers three main types of statistical framework:

- the use of core statistical infrastructure to underpin the collection of data, in particular the use of business register

- the use of internationally agreed concepts, definitions and classifications for the measurement of individual data sets, for example the definition of employment or visitors
- the use of accounting frameworks to provide a basis for the integration of data across different data sets using consistently defined measurement boundaries and common terms and language; SNA, TSA and SEEA are crucial in this respect.

All three of these elements underpin the potential to develop and apply a statistical framework for the measurement of sustainable tourism. The use of core statistical infrastructure supports the co-ordination of data collection activity from multiple sources, the single collection-multiple use of information and improved long term planning for the ongoing collection of data. The use of agreed definitions and terms supports consistency in the collection of data over time and the comparison of data within and between countries. The use of accounting frameworks supports integration of data across domains (e.g. economic, environment and social) and also provides a basis for confronting and integrating multiple datasets to provide a description of trends over different reference periods, across a large number of variables and at different spatial levels.

Thus, while the development of the SF-MST is a new area of work, it builds upon much existing material that describes the relevant elements noted above. In relation to core statistical infrastructure, there is existing guidance on the development of statistics pertaining to the different domains (e.g. for business registers, 2015 UNECE Guidelines on Statistical Business Registers). In relation to statistical definitions there are many internationally agreed standards. Of most relevance for sustainable tourism are the 2008 International Recommendations on Tourism Statistics (IRTS), the 2013 Framework for the Development of Environment Statistics (FDES) and the various standards relating to the measurement of labour statistics. In relation to accounting frameworks the key publications are the SNA, the TSA:RMF and the SEEA.

An important aspect of the SF-MST is the development of data at a sub-national or destination level. In concept all of the statistical standards and guidelines just described can be applied at all levels of spatial detail (in the same way as they are equally applicable for countries of different size). In most cases the challenge is not conceptual but rather the collection of appropriate information at sub-national levels. At the same time there are a range of measurement considerations and given the importance of spatial detail to the assessment of tourism Chapter 3 is devoted to a discussion of the relevant issues.

2.5. Use of a national accounting approach

2.5.1. Introduction

The SF-MST takes as its starting point the national accounting frameworks of the System of National Accounts (SNA), Tourism Satellite Accounts (TSA) and System of Environmental-Economic Accounting (SEEA). These three statistical frameworks provide an extensive coverage of many aspects of sustainable tourism in a coherent and consistent manner.

The SNA 2008 (EC et al, 2009) is the most recent version of this international standard and provides the basis for the measurement of economic activity and economic wealth. Compilation of SNA consistent datasets is standard practice in all countries and consequently the majority of economic statistics available within a country will be collected in such a way as to be consistent with or at least closely

aligned to the relevant definitions and measurement boundaries. By using the SNA as a starting point, the SF-MST ensures that measurement of the economic dimension of sustainable tourism can be directly aligned with measures of the economic performance of other sectors.

The application of the SNA to tourism is encapsulated in the international standard for TSA - the TSA: Recommended Methodological Framework (TSA:RMF) (UN, 2008). This document describes in detail and using a set of 10 interlinked tables and accounts, the framework for describing tourism's role in ecosystem activity. The TSA:RMF is underpinned by the International Recommendations for Tourism Statistics (IRTS) which provides the international standard for the definition of visitors, tourism consumption and other tourism data.

The employment and human capital aspects of the economic dimension are captured in the SF-MST using national accounting consistent approaches that have been developed by the ILO in the context of employment and in associated accounts and research in the case of human capital.

The SEEA 2012 is the international standard for the measurement of the environment and its relationship to the economy. It has four key elements: accounting for environmental flows, accounting for natural resources, accounting for environmental transactions and accounting for ecosystem assets and services. The first three elements are described in the SEEA 2012 Central Framework and the fourth element is described in the SEEA 2012 Experimental Ecosystem Accounting.

The SEEA, like the TSA:RMF, is a national accounting based framework that is based on the accounting principles of the SNA. The SF-MST takes advantage of this common origin which allows the environmental dimension of sustainable tourism to be coherently integrated with the economic dimension.

National accounting approaches for the measurement of the social dimension are not well developed at this stage. To the extent possible, the SF-MST takes advantage of research and practice concerning cultural satellite accounts that are under development as applications of SNA principles. In other areas of the social dimension measurement will be based to the extent possible on other statistical standards, for example, the ILO definitions of decent work.

More broadly, it is recognized that the application of an accounting approach to the social dimension could ultimately bring into consideration the measurement of social capital. Changes in the extent and quality of social capital over time (for example, in terms of the quality of community networks) would represent an important aspect in the measurement of sustainable tourism. There will also be changes in social outcomes to be assessed that can be brought to account within a framework that covers all types of capital and all associated services and benefits.

While the SF-MST encompasses the full range of types of capital and does so within a broad accounting rationale, it should be recognized that the SF-MST does not reflect, nor does it aim to be, a fully integrated and consolidated “triple-bottom line” approach. Conceptually, this would require a full monetization of all economic, environmental and social aspects. Rather, the focus is on using the national accounting rationale to place all relevant information in appropriate context and ensure the potential for assessments of sustainability to be undertaken in a comparable and consistent manner.

2.5.2. Key features of an accounting approach

All of the accounting approaches just described have common features that support the compilation of coherent and comparable statistics. This section provides a brief summary of these features to provide a basis for description of the general structure of the SF-MST. The detailed description of national accounting principles is contained in the SNA 2008 and, in the relevant chapters of the SF-MST references are made to these principles as required.

In essence, accounting reflects the integration of information on stocks and flows over an accounting period, such as a year. Accounting for stocks concerns the measurement of the quantity and monetary value of different forms of assets that are owned or used by individuals, households, businesses, governments and other institutional units. In its broadest form accounting would include produced, non-produced and financial economic assets, human capital, environmental assets and social capital. Estimates of stocks are reported in balance sheets which show, at a given point in time, a complete picture of the asset or capital base for a single unit, a region or country.

The measurement of changes in stocks is also an important feature of accounting. The reported balances of stocks at given points in time will change for a range of reasons including investment, natural growth, discovery, extraction, catastrophic loss, depreciation and degradation and revaluation. An accounting framework provides guidance on how each of the different reasons for a change in stocks should be treated such that the aggregate change in stocks between the beginning and end of an accounting period is fully explained. The changes in stocks are reported in asset accounts.

The third key feature is the measurement of flows. Most focus in accounting is placed on the measurement of flows related to the production, consumption and accumulation of goods and services. While accounting approaches have developed the relevant concepts in relation to economic activity, the SEEA demonstrates how these same concepts can be applied to consider environmental flows and they have also been applied to the measurement of human capital where labour services are the relevant flows. Other flows reflect returns, distributions and transfers such as those of dividends, interest, social welfare payments and taxes, among many others.

2.5.3. Types of accounts

Information on stocks, changes in stocks and flows are brought together to form different types of accounts. Each account stands alone in the sense of applying specific accounting identities such that there is a complete and balanced set of information in each account. At the same time, each account operates as part of an overall system of accounts in which linkages can be made to different accounts each focusing on a specific aspect. The SF-MST thus comprises a series of accounts and tables, each covering specific aspects of sustainable tourism, but defined in an aligned and coherent fashion.

There are two primary types of accounting structures used in the SF-MST – the supply and use table (SUT) and the asset account. Supply and use tables may be compiled in both monetary and non-monetary terms and relate to balancing the flows of goods and services among different economic units, including households, and between the economy and the environment. They may also be structured so as to show flows between different spatial areas. SUT compiled in monetary terms contain the information required to estimate gross domestic product and related measures of economic activity.

Asset accounts may also be compiled in monetary and non-monetary terms. They are designed to show the opening and closing stocks of specific asset types (e.g. produced assets, environmental assets, human capital, social capital) and changes in the stocks of assets over an accounting period (e.g. one year). An aggregate of all asset accounts for all asset types provides an estimate of the net wealth of a given territory.

The various SUT and asset accounts for economic, environmental and social dimensions are described in chapter 4, 5 and 6. In addition, there will be other complementary information required to support understanding sustainable tourism that will not fit directly into these accounting structures. To ensure consistency and comparability of data, these other data will be grouped and classified, to the extent relevant, using the same classifications that are used in the SUT and asset accounts. This will support the integration of data and enhanced data analysis. The relevant classifications will be documented in chapters 4, 5 and 6 as appropriate.

2.5.4. Accounting principles

Where accounts are developed for SF-MST they will be developed to ensure alignment with the existing accounting principles and standards of the SNA, the SEEA and the TSA:RMF. The relevant principles concerning, for example, the definition of economic territory, time of recording, and monetary valuation, are not summarized here. Instead compilers are encouraged to read the relevant sections of the accounting standards just listed. As well, relevant chapters of the SF-MST discuss those situations where the application of accounting principles may raise specific concerns or challenges.

2.6. Summary of SF-MST accounts and tables

<<To be developed following further discussion of the specific accounts and tables of the economic, environmental and social dimensions described in Chapters 4-6. >>

2.7. Using the SF-MST to derive indicators and support analysis

2.7.1. Introduction

Most commonly, statistical frameworks generate two types of outputs to support policy and analysis:

- i. **indicators** of the state and trends in sustainable tourism
- ii. **models** that use statistically based data to estimate likely outcomes in the future or in alternative scenarios, e.g. under alternative taxation arrangements.

Indicators are particularly important in providing clear signals concerning the effects of current policy decisions and choices – for example through monitoring the growth in visitor numbers, the trends in visitor expenditure, the patterns of water use and the changes in tourism employment. Regular and reliable information on these types of indicators is best provided by a statistical framework since it ensures consistency in definition of indicators over time, the coherence between different indicators and the ability to compare indicators among destinations, regions and countries. If each destination defined tourism industries and employment in a different way, then there would be no means to be confident that trends monitored in one destination could be sensibly compared to trends in other destinations.

Information to support economic and social modeling is the second important output from statistical frameworks. Discussion of many of the questions posed in Table 1 cannot be supported simply through the use of indicators and instead data relating to a number of different areas must be brought together to underpin analysis. Examples include analyzing tourism demand and employment, assessing visitor numbers and water use, and comparing the location of tourism businesses and changes in condition of local waterways. In each of these cases, ensuring that the data from the different areas are compatibly defined helps ensure the relevance and accuracy of the analysis.

2.7.2. Combined presentations

The SF-MST incorporates combined presentations to support the communication of information on sustainable tourism and to underpin the derivation of indicators. Combined presentations provide a means to bring together a range of information from different sources and hence present a summary of key measures and provide a basis for the derivation of indicators. In this context, the accounts and tables provide the means to ensure that summary data and indicators are based on coherently and consistently compiled data for any given topic, for example, environmental flows of water or energy. Many forms of combined presentation are possible depending on the focus of communication and the range of data available. The proposal shown in the table below brings together some commonly available information on tourism industries compiled within the TSA framework, with information on environmental flows compiled following the core accounts described in the previous section.

The data items included in the combined presentations should be of relevance to policy makers and which, often in combination, can be used to calculate indicators, for example for reporting on progress on the SDGs. The same level of industry disaggregation used above is maintained, allowing countries to present key information at a sector specific level.

Table 2: Possible combined presentation for tourism industries with respect to economy-environment linkages

	UNIT	Tourism industries			Other industries	Total all industries
		Food & beverage	Passenger transport	Culture, sports & recreation		
		Tsm Total	Tsm Total	Tsm Total	Tsm Total	Tsm Total
1. Monetary flows						
Output		\$				
Gross value added		\$				
Expenditure on tourism characteristic products		\$				
Intermediate consumption						
Water		\$				
Energy		\$				
Waste treatment		\$				
2. Employment		000				
Tourism employment		000				
3. Environmental flows						
Net water use		m3				
Own-account water abstraction		m3				
Wastewater generated		m3				
Net energy use		j				
Use of energy from renewable sources		j				
GHG emissions		tonnes				
Solid waste generation		tonnes				
4. Potential indicators						
Water use in tourism / Tourism VA						
Share of renewable energy use in final energy use						
GHG emissions / Tourism output						

It should be apparent that there are many potential indicators that might be formed from the information contained in the accounts and tables of the SF-MST through combination with existing information on tourism industries. For example, analysis might be extended to consider environmental flows by size of tourism business. The intention in describing combined presentations is to provide a starting point for discussion between compilers of accounts and decision makers to ensure that the measurement and derivation of indicators is both feasible and relevant.

2.7.3. Sustainable tourism indicators for the SDGs

The demand for high quality indicators to monitor progress has been most recently underlined by the adoption of the SDGs and the recognized importance of establishing clear and measurable indicators of progress towards these goals. There are three targets that relate directly to sustainable tourism, namely:

- Target 8.9: By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products.
- Target 12.b: Develop and implement tools to monitor sustainable development impacts for 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

Among the current suite of over 200 SDG indicators, the current proposals for indicators for these targets concern tourism GDP (TGDP) and tourism employment and jobs. Both of these areas of measurement are within scope of the SF-MST.

At the same time, it is also accepted that considering only these two areas of measurement provides a partial picture of progress towards sustainable tourism and more broadly does not give a sense of the broader potential of sustainable tourism to contribute to the wider sustainable development agenda and the other SDGs. These broader connections are well summarized in the UNWTO release *Tourism and the Sustainable Development Goals* (<http://icr.unwto.org/publication/tourism-and-sustainable-development-goals>).

Work is ongoing to define a broader set of sustainable tourism indicators and alignment will be ensured between the definition of these indicators and the scope of the SF-MST.

2.7.4. Environmentally extended Input-Output tables and related analysis

One of the distinct advantages of organizing and integrating data using an accounting framework is that the information can be directly linked to economic modeling that uses input-output tables summarizing the structure and inter-linkages of the economy. This is possible due to the use of consistent definitions of income and production and the use of common industry classifications.

There are many examples of the use of environmental flow information in connection with standard input-output tables and an introduction to the principles and summary of the relevant literature is provided in SEEA Applications and Extensions. Examples already exist in the area of tourism, for example the work for Wales on the connections of tourism and GHG emissions (ref needed). Advancing

the measurement of integrated TSA and SEEA accounts will further support these efforts in understanding the broader connections between tourism activity and the environment and ensuring that environmental data can be taken into account in economic modeling of tourism.

3. Defining spatial areas for the measurement of sustainable tourism

Notes to Chapter 3: The measurement of the various dimensions of sustainable tourism will commonly be conceptualized at different scales from local level to national and global levels. In practice, the assessment of sustainable tourism and the implementation of relevant policy responses has often taken place at a sub-national level, while the measurement of tourism statistics is usually coordinated at national level. The Sustainable Development Goals embody the tracking of progress globally in a way that is comparable across countries.

This chapter aims to describe a conceptually sound but practical approach to integrating data to underpin measurement across the economic, environmental and social dimensions. There is little doubt this is a challenging area of measurement.

The intent is to provide a common framing and language about spatial areas in the measurement of sustainable tourism to support the discussion and interpretation of data and to provide opportunities for the enhanced integration of data from different dimensions.

The current text is uses material developed in the context of research undertaken for the MST project to be presented at the 6th International Conference on Tourism Statistics. It provides only a starting point for further discussion and no specific proposals are yet presented here. It is expected that substantial progress in this area will take place through the development of the SF-MST.

3.1. Introduction

The development of the concept of sustainable tourism over the past 25 years has had a clear and direct focus on the sustainability of tourism activity at a destination level as distinct from considering the broader sustainability of tourism at national or global levels. In this context, tourism destinations have commonly been conceptualized as relatively small, local areas such as cities or small islands. Using this small spatial area perspective, the sustainability discussion and related measurement and indicator activity is focused on encompassing and finding balance among the three dimensions of sustainable tourism – the economy, the environment and society.

As described in *Framing Sustainable Tourism*¹³ this small spatial area perspective is very distinct from the broader national perspective that has been the focus of official tourism statistics. The significant statistical developments of the International Recommendations on Tourism Statistics (IRTS) and the Tourism Satellite Accounts: Recommended Methodological Framework (TSA:RMF) in 2008 provide an excellent platform for measuring tourism activity. However, as both documents have a national and global focus, they do not provide direct guidance for sub-national measurement although they continue to provide an underlying conceptual reference for measurement at sub-national levels.

¹³ Discussion paper drafted for the Meeting of the Working Group of Experts on MST, Madrid, 20-21 October, 2016

The purpose of this chapter is to describe how a bridge can be built between these two perspectives – the smaller scale sustainable tourism perspective and the larger scale official tourism statistics perspective. It is important to recognize however that building a bridge is not simply a case of examining the extent to which currently available national level data can be “downscaled” to provide information at a destination level. Or whether the type of data desired at a destination level can be collected using statistical processes. Rather, the ambition is to describe how both detailed spatial data and national level data may be best integrated to provide a “single best picture” of tourism activity that is of most use to decision makers and other stakeholders at different scales.

Compiling a single best picture does not imply that all economic, environmental and social information is available at every spatial scale. This would not only provide an endless compilation challenge but also likely produce a substantial volume of data that are not useful. Rather the ambition should be that the information set compiled is both appropriate for the spatial level of analysis and use, and coherent with information at other spatial levels. For example, estimates of visitor movements at national level should align with estimates of visitor nights in accommodation at destination level.

The importance of coherence emerges from a policy perspective as it is recognized that decisions made at each spatial scale – local, regional, national, global – are not independent. Choices made at a local level will have impacts on broader regions, and national and global policies will influence outcomes at a local level. These inter-connections are best understood and interpreted when the data organized at each level tells a consistent and coherent picture of the structure of tourism activity and the change over time.

There are some data that may seem relatively non-spatial in nature. For example, visitor perceptions, migrant labour movements and climate change indicators. It is certainly the case that the way in which these types of indicators connect to locations is less direct than, for example, indicators of visitor consumption on accommodation and restaurants. However, this paper starts from the general premise that “everything happens somewhere” and hence connection to spatial areas is meaningful for all types of measurement. Thus, visitor perceptions will concern a location or set of locations and the visitor will be resident somewhere. Climate change is a globally diffuse phenomenon but actions that contribute to climate change can be spatially located and the impacts of climate change occur in specific locations.

The framework discussion does not prescribe which data might be most relevant at different spatial scales. Rather the focus is on the way in which different spatial scales and spatial areas might be defined or delineated in a consistent manner within a country. This will support all stakeholders, but particularly statisticians, to work towards a common approach within their country for the collection and use of data at different spatial scales with relevant stakeholders.

The approach described comes from the perspective of official statistics in the sense of imagining the potential for a nationally coordinated, internationally comparable, set of information. However, it is important that the perspectives of many other areas of expertise are incorporated to better support decision making.

The initial framing described in this chapter builds on a range of work including the statistical guidance of the IRTS and the TSA:RMF, the spatial accounting in the System of Environmental-Economic Accounting Experimental Ecosystem Accounting (SEEA EEA) (UN et al, 2014b), and work on sub-national and sustainable tourism of the UNWTO and the INRouTe network, among a number of other materials. It does not provide a definitive and final word on this topic which will be the focus of ongoing discussion within the MST project.

3.2. Terminology with respect to spatial areas

Discussion of the topic of defining spatial areas immediately suffers from the choice of language and wording to describe the different scales of measurement and analysis that different stakeholders are considering. The section proposes some terminology to be applied in the MST framework.

The broadest scale is considered the **global** scale encompassing both all countries and all marine areas.

The **national** scale is the most common level of statistical measurement and is the level of government that sets the overarching legislative and policy frameworks and engages with other countries.

The **regional** scale is used to refer to the level of administrative unit directly below the national level. This use of the term is the same as applied in the recent INRouTe document (INRouTe, 2016) and corresponds to the NUTS 2 level in the EU territorial classification scheme (although it is noted that compilation at the NUTS 1 level may also be relevant) (Eurostat, 2015). Countries may also use the terms state, province, county, etc. It does not refer to aggregations of countries.

The **municipal or city-region** scale is used to refer to the level of administrative units corresponding to local but relatively large populations. Large cities may have a number of municipalities. In rural areas, the municipal scale may encompass both some urban and agricultural areas.

The **local** scale is used to refer to the areas or zones within a given municipality that exhibit particularly concentrations or clusters of commonly purposed or aligned activities and businesses. In the context of this paper the focus is on concentrations of tourism activity but other activities may also be of particular interest. It is not expected that administrative units would be defined at this spatial level.

The term **sub-national** is used to refer to the three spatial scales below the national level. In different countries and contexts some of these scales may merge or there may be additional scales within the five scales described here. However, these five scales are considered sufficient for the purposes of discussing the relevant concepts.

The term **tourism destination** might refer to any of these scales (except perhaps global). Thus a destination might be a country, a region, a municipality or a location. In the discussion of sustainable tourism, the concept of a tourism destination appears to be most commonly associated with spatial areas defined at the local or municipal level and, when the term destination is used, it is this smaller conception of tourism area that is being applied.

The intent in the MST is to integrate economic, environmental and social data. For many of these data, it is appropriate to consider that the scales listed above would be appropriate, in the sense that data should be able to be attributed to a location and hence to the other, larger scales. The important exception to this will be cases where large ecosystems, for example forests, agricultural areas, etc., or other environmental scales, for example water catchments, national parks, etc., cross municipal, regional or national boundaries. The appropriate approaches for integrating data in these situations requires further discussion.

3.3. The statistical challenge in defining spatial areas¹⁴

The need for coherent spatial boundaries

From a statistical perspective, the methodological challenge is to develop the structure and tools to support providing relevant information for policy and analysis at the appropriate spatial scale. As noted above, most commonly, the starting point for statistical measurement is the national scale. Thus, national statistical agencies will tend to focus primarily on the collection and dissemination of economic, social and environmental data at national level. This reflects their primary role as providing a service to national governments.

At the same time, many countries operate statistical systems that are federated in nature. That is, national level data are compiled using information collected at the sub-national level. Thus there are commonly regional and sometimes municipal level statistical processes and outputs.

While both national and sub-national level data sets are commonly produced, a standard feature of a statistical approach to spatial data is to ensure consistency and coherence across spatial scales. Thus, for any given data set, a national level aggregate must be consistent with the results obtained for the component regions or municipalities.

Importantly, this does not imply that for every data sets, precisely the same sub-national boundaries must be used. For example, data on water is likely best considered in terms of water catchments at sub-national level. Given this potential variation there are two challenges to consider, the first is ensuring that for each data set the spatial boundaries are internally coherent and second is determining which spatial boundaries should be used to facilitate comparison across data sets.

This requirement for internal coherence should ensure that there are mutually exclusive and exhaustive spatial boundaries – i.e. the different spatial scales are defined or delineated in such a way that all areas within a country are included and no areas are covered more than once.

This requirement for the delineation of spatial areas such that there is complete and non-overlapping coverage within a country poses a quite different challenge to the situation in which measurement is being designed for a single region, municipality or location. Thus, if there is a focus on only one spatial area, it can be defined without consideration of neighbouring areas.

Unfortunately, this area specific approach limits the potential to compare data between similar types of spatial area, since they may be delineated in overlapping ways, but more significantly, limits the potential to compare data across spatial scales. Thus unless there is an agreed and nested structure to spatial areas it is not possible for national level analysis to easily integrate information available at smaller municipal and local type scales if these have been defined in alternative, non-nested ways.

Thus, for the purpose of official statistics, it is important that a set of commonly agreed spatial boundaries are delineated for different datasets. This is not to say however that the process of reaching such a common set of spatial boundaries must be top-down. Instead, it will be essential that those working at the various sub-national levels are involved in the discussion and their insights into how

¹⁴ The focus in this discussion is on methodological issues surrounding spatial data. In addition, it should be recognized that there are likely to be significant institutional challenges to be faced in developing spatial data sets including establishing co-ordination and management across levels of government and ensuring appropriate data sharing and use arrangements are in place.

spatial areas are defined can generate information that are suitable for analysis and policy at those sub-national level. One pathway forward in reconciling top-down and bottom-up perspectives may be the delineation of spatial areas at very fine levels that can then be aggregated to form different intermediate spatial areas for analysis and reporting. For example, a combination of small spatial areas may be used to represent a single tourism destination.

The application of statistical and accounting principles

In the context of spatial areas, all statistical standards clearly specify the geographical boundaries for the collection, compilation and dissemination of data but these boundaries are almost exclusively related to national scales of measurement. As a consequence the general understanding is that statistical standards pertain primarily to the compilation of national level data sets. This extends, for example, to the expectations concerning the appropriate measurement of the substantial global value chains that exist in tourism and other sectors. Statistical standards will tend to consider these chains in terms of linkages between countries rather than as linkages between (or within) businesses for specific goods and services.

In fact, statistical and accounting principles are independent of scale. By way of example, the national accounting principles outlined in the System of National Accounts (SNA) apply equally to a large and diverse economy of the United States and the small island nation of Tonga. Most definitely, the measurement of the national accounts will be a more involved task in the United States, and in both countries different types of data are likely to be used, but the principles applied are the same. The same logic applies in sub-national situations since the essential difference between national and sub-national scales is one of size.

Often it is imagined that there are quite fundamental differences in measurement principles at sub-national scales. In fact, the differences lie in the application of the principles and hence in developing sub-national level statistics, the important considerations are primarily of feasibility (i.e. are resources available to measure national level statistics at finer spatial scales) and relevance (i.e. should all national level data be compiled at finer spatial scales).

Nonetheless, there are two specific measurement challenges that are significant in the context of tourism that should be noted. The first concerns the recording of information on transport and visitor movements at a sub-national level and the associated attribution of production activity, particularly of transport companies. This is no doubt a challenging measurement issue. However, recognizing that conventions have been established to deal with such issues between countries then, at least in principle, and assuming unlimited resources, it would be conceivable that each location or municipality within a country could be considered a separable area for transport purposes and all movements and production allocated using the national level treatments.

Second, again at least in principle, it should be possible to estimate the allocations to tourism activity that are required to calculate, for example, tourism gross value added. In practice this can be challenging at national level and is likely to involve additional issues in finding appropriate data at a sub-national level. Conceptually as well, the allocation of data for a single business operating across multiple locations within a country is not straightforward. A key issue therefore is establishing which data should be compiled at which spatial scales.

3.4. The feasibility and relevance of compiling sub-national data

Although statistical and accounting principles could be applied at all spatial scales, the reality is that this does not take place and generally there will be far less data available at sub-national scales than at national scales. This reality arises for two key reasons. First, the available resources for statistical collection are generally allocated so as to optimize the compilation of national level estimates and this means that finer level detail is generally either not produced or is of relatively poor quality (e.g. very high standard errors).

Second, there are commonly different decisions made at national levels compared to regional and municipal levels and hence there are different types of data that are relevant. For example, detailed data on the performance of the financial markets is not of relevance at sub-national levels.

These two points provide an explanation for the most common situation of a lack of standardized coverage of spatially detailed official statistics. For national level decision making, this may be satisfactory for macro-economic management, but it is generally unsatisfactory for many other areas of policy and decision making where understanding the location and context is imperative. Put differently, relying on national averages is often likely to be misleading and ignore important variations among different areas within a country.

At sub-national level, the immediate demand for standardized spatial areas from decision makers may be less clear since they will have a focus on data for their own spatial area. However, there may be significant benefits in being able to discuss policy and other issues with other sub-national areas and with national level decision makers on the basis of a common understanding of the different spatial area within a country.

The case for extending and improving sub-national statistics is very apparent in considering sustainable tourism. Sustainable tourism requires the integration of data across the environmental, economic and social dimensions and assessing sustainability across these dimensions really is only possible at finer spatial scales. The need to consider sustainability at these fine spatial levels is evident in the almost complete focus on destinations in the conceptual and policy work on sustainable tourism. The case for sub-national statistics for sustainable tourism has been made strongly in much previous work, including by INRouTe and the OECD (OECD, 2016) and this has been picked up in the MST project.

Although the case for sub-national level data is strong and statistical principles can, in theory, be applied equally at sub-national level, it is not the case that the logical ambition is to replicate all national level statistical outputs at all sub-national spatial scales. Aside from the potential cost, since the types of decisions made at different spatial scales vary, not all data will be equally relevant at all scales. Indeed, some data may be most relevant at finer scales and not relevant or meaningful at national scales, e.g. data on traffic congestion.

3.5. The current state of play

From a statistical perspective, there is little standardized advice on sub-national tourism statistics. The IRTS has a brief mention of the need for sub-national tourism statistics but provides no guidance on how sub-national areas might be delineated. The TSA:RMF does not consider sub-national measurement.

The concept of a tourism destination is not defined from a statistical perspective although it has been defined by UNWTO for tourism management purposes (see Box 2). Unfortunately this definition, while clearly linked to a spatial concept, does not provide the means by which a standardized approach to delineating sub-national tourism areas can be established within a national context.

Box 2: Destination management definition

A Tourism Destination is a physical space with or without administrative and/or analytical boundaries in which a visitor can spend an overnight. It is the cluster (co-location) of products and services, and of activities and experiences along the tourism value chain and a basic unit of analysis of tourism. A destination incorporates various stakeholders and can network to form larger destinations. It is also intangible with its image and identity which may influence its market competitiveness. (UNWTO, 2016).

INRouTe proposes a series of classes to support the organization of statistical information at sub-national levels. Those classes are shown below in Box 3. The classes are placed in two groups - regional and local. The classes are not defined in a hierarchical manner, i.e. they are not nested such that smaller areas lie within larger areas, and hence information associated with the different classes cannot be meaningfully aggregated or disaggregated. Thus, the classes provided by INRouTe do not provide a classification as such but rather a typology of different spatial areas that may be of interest. This is certainly useful in furthering the understanding of statisticians and other stakeholders of the levels at which information is required. However, since there is no specific connection between the different classes, particularly between the local and regional levels, it is not clear precisely how a coherent set of spatial areas might be defined.

Box 3: INRouTe sub-national classes

REGIONAL

- Region
- Multi-regional (supre-national)
- Multi-regional (intra-national)
- Other administrative units
- Analytical units

LOCAL

- Municipality
- Multi-local
- Other administrative units
- Analytical units

It is worth emphasizing that the ambition of developing a nested set of spatial areas for the organization and aggregation of statistical information on tourism should remain the objective recognizing that it is likely that the resulting set of spatial areas will not satisfy all requirements or analytical demands.

Perhaps the most established approach to sub-national area classification is the European NUTS classification (Eurostat, 2015) that was originally established in 1970. It has four levels and two additional levels that allow for further disaggregation. The boundaries are established based on the three principles of population thresholds, administrative divisions and stability through limited amendments over time (<http://ec.europa.eu/eurostat/web/nuts/principles-and-characteristics>). The fully nested nature of the NUTS classification scheme perhaps provides a structure within which tourism destinations can be identified.

At national level, there are also classifications of areas that may be relevant. In Australia, primarily for the purpose of organization of population census information, but also for the organization of other socio-economic data, a classification of spatial areas based on concentrations of population has been implemented. This works from so-called “mesh-blocks” at the finest level through to a series of larger areas known as “statistical areas”. Statistical area boundaries are nested/constrained to the regional level of aggregation but different aggregations of mesh blocks are used to generate municipal level information. Thus, from a fine level spatial area alternative and complementary aggregate spatial areas can be defined. In the UK, at fine level, “neighbourhood” statistics have been developed where neighbourhoods are delineated on the basis of census output areas or electoral boundaries (electoral wards).

No doubt there are many other examples of national approaches to sub-national classification. The majority are likely to have a close link to administrative units. The proposals in this paper should therefore be considered in the light of existing national practice. At the same time, it is relevant to recognize that administrative boundaries are commonly based upon locations of populations and the households they comprise, particularly at finer spatial levels. Using boundaries delineated in this way to analyse the behavior of visitors, the productive activities of tourism industries and associated environmental stocks and flows may suggest alternative factors need to be considered.

The System of National Accounts briefly discusses the idea of sub-national/regional accounting systems, a topic also picked up by Eurostat (2010). The System of Environmental-Economic Accounting (SEEA) Central Framework (UN et al, 2014a) focuses almost exclusively on national level statistics although recognizes that environmental assets and flows will be recorded in relation to a specific location. The SEEA Experimental Ecosystem Accounting (UN et al., 2014b) explicitly takes a spatial perspective in defining ecosystem assets.

3.6. Pathways forward in defining spatial areas for measuring sustainable tourism

Overall, there are a number of examples of statistically based classifications of sub-national spatial areas. On the whole, aside from the ecosystem accounting approach, the approaches used start from administratively defined areas and have a nested delineation of progressively smaller areas. At the same time, complementary areas may also be defined for the purposes of being able to present statistics in reference to different spatial areas.

Finding a pathway forward will require reconciling the general motivation of statisticians to provide data based on administratively defined spatial boundaries and the reality that the spatial areas of most relevance for the analysis of sustainable tourism do not conform to these boundaries. There is thus a balance to be found between feasibility on the one hand and relevance on the other.

Ultimately, relevance must take the highest priority and methodologies should be developed that support implementation. Providing data at a spatial scale that is currently most feasible but which is not relevant for decision making and analysis, would not represent a good return on investment. Nonetheless, to the extent that the provision of data on the basis of administrative areas is relatively more tractable it is then important that these spatial areas retain an important place in the proposed structure. Discussion of the types of data for which administratively based areas would be most appropriate is relevant in this context. The next step is to consider how areas of relevance for the analysis of sustainable tourism might be delineated.

From the literature it appears the clearest approach is to define areas on the basis of significant functions or roles. This reflects the type of approach that underpins the delineation of social-ecological systems (see, for example, Leslie et al., 2015), the way in which ecosystem accounting (described in the SEEA EEA) delineates between different ecosystem assets and in relation to spatial areas for tourism (see, for example, Hernandez-Martin, 2014).

Methodologically, the primary issue then becomes which factors or characteristics should be considered to determine whether tourism is significant in a particular location. It should be noted that the choice of characteristics for delineation is not an independent process but rather needs to be conducted by involving all stakeholders such that the resulting statistics are meaningful for policy and analysis at all levels to the greatest extent possible.

In this regard, it should be accepted that the delineation of spatial areas for statistical purposes will not result in spatial areas that are considered ideal for all purposes. However, the alternative of applying different spatial boundaries for every project and in every context significantly limits the potential to compare across projects, across dimensions of sustainability and over time. It is a focus on improving the potential to compare that is at the forefront of efforts to measure sustainable tourism.

Characteristics of significance for delineating sub-national spatial areas

Given the multi-faceted nature of tourism that is encompassed by tourism statistics there are two perspectives to be considered – (i) a tourism supply perspective in which the focus is on the location and concentration of tourism industries and (ii) a visitor demand perspective in which the focus is on the places visited.

The supply perspective is perhaps the most tractable pathway to delineating smaller spatial areas. This would involve using information on the location of tourism characteristic industries and determining a boundary around particular concentrations of these industries. In many cases it is likely that such areas are relatively well known and evidenced by known concentrations of hotels and associated restaurants. In some areas it may be a concentration of, for example, theme parks and similar attractions. For statistical purposes, it would be relevant to provide methodological guidance on how relevant concentration thresholds may be estimated at sub-national and national levels (as distinct from proposing universal standards to be applied which would not be appropriate). This would be developed as part of the MST framework.

Delineation from the perspective of visitor demand will, in many cases, overlap with a delineation based on tourism supply. That is, in cases where the visitor receives goods and services from a tourism business, the relevant location is the same in both perspectives. However, there will also be instances where visitor activity takes place away from, or at least adjacent to, the location of tourism businesses. Particular examples will be national parks, beaches, reefs, cultural sites, etc. In addition there will be many exchanges between visitors and non-tourism businesses. Taken together both the demand and supply perspectives should enable a description of a set of tourism areas within a country.

At this stage, no specific guidance has been developed beyond these initial descriptions. It is intended that the development of the MST framework will facilitate further discussion and the descriptions in this preliminary draft represent a starting point for this discussion and research. Some particular points for discussion include:

- describing the relationship between small tourism areas and the concept of “usual environment” that underpins tourism statistics

- developing suitable criteria for determining tourism significance for application in delineating small tourism areas
- considering with particular care the application of the approaches to delineation in large cities where tourism activity will be important but one of many activities taking place
- understanding the extent to which the delineation of small tourism areas raises questions of maintaining confidentiality in the release of statistics
- appropriately integrating environmental and social data for small tourism areas and, at the same time, related areas such as water catchments.

4. Accounting for the economic dimension of sustainable tourism

Notes to Chapter 4: This chapter will describe the ways in which the key existing statistical frameworks related to tourism – the IRTS and the TSA:RMF - can be applied and adapted to support the measurement of sustainable tourism. The chapter provides a short overview of the key aspects of these two statistical frameworks before a discussion on specific aspects of these frameworks that are of most relevance for sustainable tourism. The measurement of employment and human capital related aspects is also included building on the ongoing advances in this area by UNWTO and ILO. Finally, the chapter will provide a discussion on the measurement of the economic dimension at a sub-national level.

In this preliminary draft, the focus has been limited to a description of the key aspects of measuring economic activity. Future drafts will incorporate material to expand the introduction to tourism statistics, to cover the employment and human capital aspects and to discuss sub-national measurement.

Since the material in this section will be drawn from established statistical sources it is not envisaged that substantive issues for discussion will emerge in the finalization of the SF-MST for this dimension. At the same time, while the conceptual basis for measurement of the economic dimension is well founded, there remain practical challenges in implementation for these areas of tourism statistics that will be the focus of capacity building and related work within the MST project.

4.1. Introduction

<< To be drafted>>

4.2. Key aspects of tourism statistics and the TSA framework

4.2.1. Tourism statistics

<< This section to summarise key aspects of tourism statistics as articulated in the IRTS. The aim is to provide a basis for discussion of other dimensions of sustainable tourism by defining key terms and concepts.>>

Topics to be covered include:

- Visitors and the usual environment
- Visitor movements – inbound , outbound, domestic – purpose
- Visitor consumption

4.2.2. The TSA framework

The TSA framework is described in the TSA:RMF. It is designed for the measurement of tourism activity and its economic contribution in a manner consistent with the measurement of value added and gross domestic product (GDP) from the SNA. 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)
- Employment
- Gross fixed capital formation

In sum, the TSA framework provides an agreed basis for defining the extent and structure of tourism activity.

Because tourism activity is defined from a demand perspective; i.e. it is the value added arising due to the economic activity people outside of their usual environment (visitors), it cannot be observed through a focus only on the standard industry based views of economic activity. For example, a measure of the value-added of restaurants cannot be solely attributed to tourism. The TSA provides the framework to identify the tourism component of economic activity in a standardized way.

Key aspects of the TSA are:

- The definition and scope of tourism expenditure and consumption
- The definition and classification of tourism products, tourism characteristic activities and tourism industries
- The definition of tourism direct gross value added, tourism direct gross domestic product, tourism employment and gross fixed capital formation of tourism industries

The TSA:RMF describes all of the relevant accounting aspects of these aspects and presents standard tables and aggregates. The TSA:RMF is aligned with the IRTS and uses the definitions and classifications of visitors to ensure that the collection of tourism statistics, such as those on visitor movements and tourism expenditure, can be utilized directly in the compilation of TSA.

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 4. 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

Consumption products	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

The majority of visitor expenditure is on goods and services produced by tourism characteristic activities (see Box 4) and hence there is a particular focus in the TSA accounts on understanding the production, income, employment, investment and value added of these activities.

4.3. Measuring economic activity of tourism

4.3.1. Accounting for tourism activity at aggregate level

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 14.7¹⁵.

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 MICE¹⁶), 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.

4.3.2. Accounting for characteristics of tourism industries

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)¹⁷, by ownership (resident or non-resident), by legal entity (corporation, household business), and by other characteristics, depending on the range

¹⁵ 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

¹⁶ Meetings, incentives, conventions, exhibitions.

¹⁷ 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>

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 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.

4.3.3. Accounting for tourism infrastructure and investment

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.

4.3.4. 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.

4.3.5. Measuring the sharing economy

<< This section to describe the conceptual aspects of accounting for the emerging sharing economy as an important phenomenon in tourism statistics. >>

4.3.6. 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.

4.4. Measuring the employment aspects of tourism

<<This section to be drafted building on material from the IRTS and TSA:RMF and also recent work by ILO related to the measurement of tourism employment and jobs.>>

Topics to be incorporated:

- Tourism employment and jobs
- Accounting for the human capital aspects of tourism
 - Demographic information (age, gender, etc)
 - Skills and training
- Green jobs in tourism

4.5. Accounting for the economic dimension at sub-national level

<<This section to describe the application of the principles of sub-national measurement described in Chapter 3 to the measurement of economic and employment aspects of tourism described above.>>

5. Accounting for the environmental dimension of sustainable tourism

Notes to Chapter 5: This chapter is centred on discussion of the ways in which the statistical standards and principles for accounting for the environment, the SEEA, can be applied and adapted to the measurement of sustainable tourism.

The chapter provides an introduction to the SEEA highlighting the key features of environmental-economic accounting. It then describes measurement in the following areas:

- Accounting for environmental flows for tourism industries
 - Water
 - Energy
 - GHG emissions
 - Solid waste
- Accounting for tourism related environmental assets and their use

- Tourism land accounts, including protected areas and national parks
- Accounting for tourism related ecosystems and biodiversity
- Accounting for tourism related natural resources including stocks of water resources

The material to develop this chapter is well established and developing the environment-economy linkage has been a key focus of the MST project to date. There are remaining issues requiring discussion, especially in the area of accounting for the consumption perspective of environmental flows, but clear advances in these discussions are taking place and there is an active program of testing and pilot studies underway.

An important output of MST has been the development of a Technical Note Linking SEEA and TSA which has been prepared under the joint auspices of the UNWTO Committee on Tourism Statistics and TSA and the UN Committee of Experts on Environmental-Economic Accounting. The content of that Technical Note provides important material for this chapter.

5.1. Introduction

<<To be drafted>>

5.2. Key aspects of the SEEA framework

The SEEA framework has been developed since the early 1990s to provide a means by which environmental information can be integrated with the standard economic data provided in the national accounts. It is the desire to convey a more complete picture of economic activity through the integration of environmental data that is at the heart of the SEEA approach.

The SEEA can be separated into four broad types of accounting:

- *Accounting for environmental flows* in physical terms; into, within and from the economy. This includes accounting for flows of water, energy, air emissions, solid waste and emissions to water; and can be extended to account for individual elements and substances such as carbon and nitrogen.
- *Accounting for natural resources* in terms of stocks and changes in stocks (e.g. discoveries of resources, depletion). This includes accounting for stocks of mineral and energy resources, timber, fish, water and soil.
- *Accounting for environmental transactions* that are included in the SNA but not specifically identified as “environmental”. This includes accounting for environmental protection and resource management expenditure, environmental taxes and subsidies and the supply and use of environmental goods and services.
- *Accounting for land and ecosystems*. In this type of accounting the focus is on understanding the changing composition of the area of a country in terms of land use and land cover and the quality of the land in terms of the condition of its ecosystems. Accounting for ecosystem also involves the measurement of ecosystem services and evaluating the capacity of ecosystem to continue to generate market and non-market ecosystem services.

Accounting within the SEEA framework can be undertaken in physical and monetary terms. As a result the focus of the SEEA is on the alignment of measurement boundaries such that environmental data can be directly and meaningfully related to associated economic data, for example through the use of consistent definition and classification of economic units.

5.3. Accounts for environmental flows for tourism industries

5.3.1. Introduction

At this stage in the development of the broader statistical framework for MST, an initial set of four accounts for environmental flows are described focused on linking measurement of environmental flows following the SEEA with tourism industries as accounted for in the TSA. The four accounts cover flows of:

- water
- energy
- greenhouse gas (GHG) emissions
- solid waste.

The level of detail and industry disaggregation of these four accounts is relatively uniform with a clear focus on tourism industries. In addition, specific industries relevant to each account are included, such as the water collection, treatments and supply industry and the sewerage industry in the case of the water account.

The accounts described here are presented in terms of compilation for annual frequencies and at national level. While this is a suitable basis for description of the accounts, for sustainable tourism both sub-national and sub-annual compilation of accounts is likely to be relevant. In general, the same conceptual considerations will apply, but there may be additional data and compilation issues to take into account.

It is noted that a focus on annual and national level compilation will likely suit the needs for national and international policy and reporting (for example, for the SDG indicators) but, for sustainable tourism management and analysis, this level of detail will usually not be sufficient. Nonetheless, the framework described here will provide a base for the co-ordination of information at finer levels of detail and this will, in turn, support and more integrated understanding of tourism activity. 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.

All of the environmental flow accounts described here are compiled from a production perspective, i.e. by considering for each tourism industry the relevant flows of water, energy, GHG emissions and solid waste. This is distinct from starting the analysis from the set of products purchased by visitors which will embody these flows in their production. The relationship between the production and the consumption perspectives is considered further later in this chapter.

While having a specific focus on tourism industries, the accounts encompass an economy wide view such that the various environmental flows for tourism can be compared to economy wide aggregates. It is important to recognize however, that for any given industry, including tourism industries, not all of the output is purchased by visitors. In which case, when viewed from a production perspective, not all environmental flows for the tourism industries should be attributed to tourism. For example, only a part of the water use by the restaurant industry should be attributed to tourism - its tourism share. This same principle also applies in the case of non-tourism industries since some of their output and associated environmental flows will be attributable to tourism. The estimation of tourism shares is considered further later in this chapter.

5.3.2. Accounts for water flows for tourism industries

The first account is a physical supply and use table for flows of water. It contains information on the supply and use of water and provides an overview of water flows from the environment into tourism and other industries, the distribution and use of this water and the generation and treatment of wastewater. It is likely that, in practice, only relatively few cells in the table will be of significance and these should form the focus of initial development. These cells are highlighted in red.

Physical supply and use tables for water can be compiled at various levels of detail, depending on the required policy and analytical focus and data availability. Of particular interest for sustainable tourism are the seasonal patterns in water use since in specific locations there will be peaks in the demand for water. Also, consistent with the advice in the SEEA Central Framework, it would be preferable for the tables to be compiled for individual catchments since the pressures on water supply will vary by location.

The breakdown of economic activities identified in the tourism industries water flow account distinguishes the main tourism industries and the main industries associated with water supply and use. Recognizing that in any given industry not all water flows will be attributable to tourism, the distinction between tourism and non-tourism flows should be made following the methodological advice discussed below.

In both the supply table and the use table, the rows are grouped into five sections, which each capture different aspects of water flows. These sections follow the structure of the physical supply and use table for water presented as core account #1 in the SEEA Technical Note on water accounting, i.e. Account 1: Physical supply and use table for water.

For the purposes of describing the application to tourism, the full set of entries has been reduced to provide a focus on those entries expected to be of most relevance to the analysis of water flows for tourism industries. Ideally, the accounting for these flows would be undertaken as part of an economy wide accounting for water and the structure described supports this approach.

Table 3: Tourism industries water flow account (cubic metres)

Physical supply table for water		Abstraction of water; Production of water; Generation of return flows										Flows from the Rest of the world		Flows from the Environment		
		Tourism industries										Water collection, treatment and supply	Sewerage	Other industries	Households	Total supply
		Accommodation for visitors	Food & beverage serving	Passenger transport	Culture, sports & recreation	Other tourism ind.	Total tourism ind.									
1. Sources of abstracted water		Tsm Total	Tsm Total	Tsm Total	Tsm Total	Tsm Total	Tsm Total									
Total supply abstracted water																
2. Water																
Distribution of abstracted water																
Own-use of abstracted water																
3. Wastewater and re-used water																
Wastewater to treatment																
Own treatment of wastewater																
Re-used water produced (for distribution)																
Total Wastewater and Re-used water																
4. Return flows of water																
Total Return flows																
5. Evaporation of abstracted water, transpiration and water incorporated into products																
Total																
TOTAL SUPPLY																
Physical use table for water		Abstraction of water; Intermediate consumption; Return flows										Accumulation	Flows to the Rest of the world	Flows to the Environment	Total use	
		Tourism industries														
		Accommodation for visitors	Food & beverage serving	Passenger transport	Culture, sports & recreation	Other tourism ind.	Total tourism ind.									
1. Sources of abstracted water		Tsm Total	Tsm Total	Tsm Total	Tsm Total	Tsm Total	Tsm Total									
Inland water resources																
Other water sources																
Total use abstracted water																
2. Water (use)																
Use of distributed water																
Own-use of abstracted water																
3. Wastewater and re-used water																
Total Wastewater and Re-used water																
4. Return flows of water																
Total Return flows																
5. Evaporation of abstracted water, transpiration and water incorporated into products																
Total																
TOTAL USE																

NB: Dark grey cells are null by definition

5.3.3. Accounts for energy flows for tourism industries

The second account is a physical supply and use table for flows of energy. It contains information on the supply and use of energy by type of energy product including energy from renewable and non-renewable sources. It is likely that, in practice, only relatively few cells in the table will be of significance and these should form the focus of initial development. These cells are highlighted in red.

Physical supply and use tables for energy can be compiled at various levels of detail, depending on the required policy and analytical focus and data availability. For example, where there may be limitations in the availability of energy from specific sources, understanding the seasonal patterns in energy use may be of interest. It is likely to be important to include estimates for the generation of energy on own-account for example through the installation of solar panels. The changing demand for energy will be missed if such own-account production is excluded.

The breakdown of economic activities identified in the tourism industries energy flow account distinguishes the main tourism industries. All other industries are grouped in a single column and hence for additional breakdowns and comparisons, an economy wide energy flow account will need to be considered. Recognizing that in any given industry not all energy flows will be attributable to tourism the distinction between tourism and non-tourism flows should be made following the methodological advice discussed below.

In both the supply table and the use table, the rows are grouped into four sections, which each capture different aspects of energy flows. These sections follow the structure of the physical supply and use table for energy presented as core account #1 in the SEEA Technical Note on energy accounting, i.e. Account 1: Physical supply and use table for energy.

For the purposes of describing the application to tourism, the full set of entries has been reduced to provide a focus on those entries expected to be of most relevance to the analysis of energy flows for tourism industries. Ideally, the accounting for these flows would be undertaken as part of an economy wide accounting for energy and the structure described supports this approach.

A useful extension is to distinguish the use of energy products between energy from renewable and non-renewable sources.

Table 4: Tourism industries energy flow account (joules¹⁸)

Physical supply table for energy		Production energy products & Generation of residuals										Households	Accumulation	Flows from the rest of the world Imports	Flows from the environment	TOTAL
		Tourism industries						Electricity and gas supply	Other industries							
		Accommodation for visitors	Food & beverage serving	Passenger transport	Culture, sports & recreation	Other tourism ind.	Total tourism ind.									
1. Energy from natural inputs		Tsm Total	Tsm Total	Tsm Total	Tsm Total	Tsm Total	Tsm Total	Tsm Total	Tsm Total	Tsm Total	Tsm Total					
Natural resource inputs																
Inputs of energy from renewable sources																
Other natural inputs																
2. Energy products																
Total production of energy products																
3. Energy residuals																
Total energy residuals																
4. Other residual flows																
Residuals from end-use for non-energy purposes																
Energy from solid waste																
TOTAL SUPPLY																
Physical use table for energy		Intermediate consumption; Use of energy resources; Receipt of energy losses										Final consumption	Accumulation	Flows to the Rest of the world	Flows to the environment	TOTAL
		Tourism industries						Electricity and gas supply	Other industries							
		Accommodation for visitors	Food & beverage serving	Passenger transport	Culture, sports & recreation	Other tourism ind.	Total tourism ind.									
		Tsm Total	Tsm Total	Tsm Total	Tsm Total	Tsm Total	Tsm Total									
1. Energy resources																
Natural resource inputs																
Inputs of energy from renewable sources																
Other natural inputs																
2. Energy products																
Transformation of energy products - Total																
End-use of energy products by SIEC class																
Coal																
Peat and peat products																
Oil shale / oil sands																
Natural gas																
Oil																
Biofuels																
Waste																
Electricity																
Fuel oil																
Nuclear fuels and other fuels																
Total end-use for energy purposes																
End-use for non-energy purposes																
3. Energy residuals																
Total energy residuals																
4. Other residual flows																
Residuals from end-use for non-energy purposes																
Energy from solid waste																
TOTAL USE																

NB: Dark grey cells are null by definition

¹⁸ According to the International Recommendations for Energy Statistics (IRES), energy statistics are supposed to be compiled by converting physical measures of mass and volume such as tonnes, litres and cubic metres into a common unit representing energy content in net calorific terms. Joule is the common unit generally used for expressing energy flows.

5.3.4. Accounts for GHG emissions for tourism industries

The third core account is a physical supply and use table for flows of GHG emissions. It contains information on the generation of GHG emissions by tourism industries by type of GHG emissions and is adapted from the air emissions account in the SEEA Central Framework (Table 3.7). Key cells for the compilation of this account are highlighted in red and focus on release of carbon dioxide emissions by tourism industries.

In general, the generation of GHG emissions will be “used”/received by the atmosphere directly. Generally, compilation of GHG emissions on an annual basis and at national level will be sufficient for policy and analytical purposes. Of particular interest will be the GHG emissions associated with transport. In this regard the method for attributing emissions to individual countries, particularly in the case of air and water transport is of direct interest. This is discussed in more detail below.

The breakdown of economic activities identified in the tourism industries GHG emissions account distinguishes the main tourism industries. Recognizing that in any given industry not all GHG emissions will be attributable to tourism, the distinction between tourism and non-tourism flows should be made following the methodological advice discussed below.

Table 5: Tourism industries GHG emissions account (tonnes)

Supply table for GHG emissions		Generation of emissions						Accumulation Emissions from landfill	Flows from the Environment	Total supply of emissions			
		Tourism industries											
Type of substance	Accommodation for visitors Tsm Total	Food & beverage serving Tsm Total	Passenger transport Tsm Total	Culture, sports & recreation Tsm Total	Other tourism ind. Tsm Total	Total tourism ind. Tsm Total	Tsm Total						
Carbon dioxide													
Methane													
Dinitrogen oxide													
Nitrous oxides													
Total CO ₂ equivalent													
Use table for GHG emissions													
Emissions released to the environment								Flows to the Environment	Total use of emissions				

NB: Dark grey cells are null by definition

5.3.5. Accounts for solid waste for tourism industries

The fourth core account is a physical supply and use table for flows of solid waste. It contains information on the generation, collection and disposal of solid waste by type of waste. It is likely that, in practice, only a few cells in the table will be of significance and these should form the focus of initial development. These cells are highlighted in red.

In both the supply table and the use table, the rows are grouped into two sections, corresponding to the fact that while the materials at issue appear in the economy as “residuals”, they may also be purchased. These sections follow the structure of the physical supply and use table for solid waste presented in Table 3.9 Solid waste account in the SEEA Central Framework. The items selected for the categories of solid waste are those deemed relevant for tourism industries and for the activities of other industries that meet visitors’ demand.

Physical supply and use tables for solid waste would generally be compiled at a national level and at annual frequency but it may be relevant to compile accounts for specific municipal areas in which tourism is a significant activity and, depending on the capacity for the treatment and disposal of waste, measurement at sub-annual frequencies to monitor peaks in waste generated by tourism activity may be relevant.

The breakdown of economic activities identified in the tourism industries solid waste flow account distinguishes the main tourism characteristic activities and the main industries associated with waste collection and disposal. The categories of solid waste are described in Annex 1 of the SEEA Central Framework. As yet there is no standardized classification of solid waste but these categories can provide a basis for collection of data and compilation of accounts. It may be of interest to compile estimates of the total quantity of solid waste, irrespective of type.

Table 6: Tourism industries solid waste account (tonnes)

Physical supply table for solid waste										Flows from the rest of the world	Flows from the environment	Total supply	
Generation of solid waste										Other industries	Households	Imports of solid waste	Recovered residuals
		Accommodation for visitors	Food & beverage serving	Passenger transport	Culture, sports & recreation	Other tourism ind.	Total tourism ind.						
		Tsm Total	Tsm Total	Tsm Total	Tsm Total	Tsm Total	Tsm Total	Tsm Total					
A. Generation of solid waste residuals													
Metallic waste and other recyclables													
Discarded equipment and vehicles													
Mixed residential and commercial wastes													
Other wastes													
Total solid waste													
B. Generation of solid waste products													
Total solid waste													
Physical use table for solid waste													
Intermediate consumption; Collection of residuals										Final consumption	Flows to the rest of the world	Flows to the Environment	Total use
Waste collection, treatment and disposal industry										Tourism industries	Other industries	Households	Exports of solid waste
		Landfill	Incineration and reuse	Recycling and reuse	Other treatment	Total		Tsm Total	Tsm Total				
C. Collection and disposal of solid waste residuals													
Total solid waste													
D. Use of solid waste products													
Total solid waste													

NB: Dark grey cells are null by definition

5.3.6. Estimating the tourism share of environmental flows

As noted in the introduction to this section, the available statistical information on environmental flows does not make reference to tourism, though environmental flows related to tourism activity are embedded in the estimates. For example, data on GHG emissions generated by production processes that produce output purchased by visitors (e.g. accommodation or transport services) is not available

with specific reference to the tourism share. What is required therefore, are techniques to estimate the proportion of a given environmental flow that is attributable to visitor activity. A number of different techniques were examined in Costantino (2017) and the findings are summarized here.

The paper recognizes that, at least in theory, data on environmental flows related to visitors may be collected directly in cases where tourism and non-tourism businesses are capable of providing information on the different environmental flows as they relate to visitors and non-visitors. While some detailed information may be available in some cases (and should be used if at all possible), the paper concludes that it is unlikely to envisage these data being available on a regular basis for official statistics.

In the absence of directly collected data, three different tourism shares are described – output shares, value added shares and intermediate consumption shares – that could be taken into account to estimate, for each industry, the proportion of an environmental flow (water, energy, GHG emissions, solid waste, etc.) attributable to visitor activity and hence to tourism.

For example, the tourism share of water use in the restaurant industry may be estimated by multiplying the total water use of that industry by the output share attributable to visitor consumption. Output shares are calculated by dividing an industry's output sold to visitors by its total output. Value added and intermediate consumption shares are derived using the same approach with the relevant variable. These shares can be derived from a TSA.

Some care should be taken in the use of the different tourism shares for different environmental flows. Output shares should be used where the magnitude of the environmental flow of interest is directly related to the level of production (e.g. GHG emissions and solid waste) while intermediate consumption shares are best applied for those environmental flows that are inputs to production (e.g. energy).

Value added shares can be used when output or intermediate consumption shares are not available and estimating value added shares can turn out to be relatively more affordable, but they are not preferred. Their use depends on the extent to which it can be assumed that there is a close relationship between the value added share and the share of output or intermediate consumption. At the same time, where output and intermediate consumption shares are quite high then it is likely that the value added share is also high and then value added ratios may be good proxies for output ratios or intermediate consumption ratios.

The more general assumption in estimating tourism shares is that the production function (mix of outputs and inputs) for an industry is the same for visitors and non-visitors. For example, the amount of water used to make a restaurant meal is invariant between consumers. In concept, this assumption is likely reasonable provided that information is available at a relatively fine level of industry detail. For example, estimates of energy use may vary between air freight and air passenger transport and more accuracy in the tourism shares will be obtained if calculations can be completed at the finer level. However, in practice it may be difficult to source suitably fine levels of industry detail in which case the appropriateness of the assumption will depend on the extent of differences in the consumption patterns of visitors compared to residents and the mix of products within the industry.

5.3.7. Distinguishing the consumption and the production perspectives

To this point, the discussion in this section has focused on the measurement of environmental flows from the perspective of tourism industries, i.e. a production perspective. The next step is to consider, for the same environmental flows (water, energy, GHG emissions and solid waste), the methods that would be appropriate in estimating the attribution of flows based on visitor activity.

First of all, the investigation should consider the environmental flows associated with tourism activity where households and individuals undertake activity on their own-account. For example, the energy and GHG emissions associated with driving one's own car on holiday. Also for consideration are the environmental flows associated with visitors staying with friends and relatives. In allocating SEEA estimates to tourism, these environmental flows should be taken into account in addition to those caused by production processes discussed in this section.

Furthermore, in line with SEEA directions concerning possible applications and extensions of economic-environmental accounts, one way to consider the measurement challenge from a consumption perspective is to recognize that 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 along the whole supply chain linked to tourism demand and the outputs that are ultimately consumed by visitors. For example, it would be possible to estimate the quantity of energy embodied in the provision of accommodation services for visitors. The same logic could 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.

Beyond the considerations noted above, more investigation of this topic is required to resolve specific issues. For example, since visitors are by definition outside of their usual environment, there is the dual challenge of both attributing a flow to visitors and also assigning that flow to the residence of the visitors. There is no doubt overlap here with the production perspective but differences in scope do exist.

A conceptual issue lies in appropriately defining the spatial boundaries for consumption. This is especially so since environmental boundaries are open, and visitors travel between countries. The aim here is thus to describe possible methods of presenting a consumption perspective in relation to the environmental flows under investigation. It is quite likely that different approaches are relevant for different flows. Ultimately there should be an alignment of methods here with the delineation of spatial boundaries for destinations but at this stage it should be possible to develop relevant criteria for presenting the consumption perspective without knowing precisely how destinations might be defined. This discussion provides a brief introduction to the topic and further investigation and discussion of this topic should be undertaken to support compilation activities.

5.3.8. Allocating environmental flows associated with transport activity

Within the general discussion of the estimation and allocation of environmental flows to tourism activity a particular consideration concerns flows related to transport activity. Because transport businesses operate by moving people and products between locations within and between countries, the allocation of relevant environmental flows to specific countries and destinations is not as straightforward as for other businesses. There are national accounting conventions, particularly concerning the definition and treatment of resident units, that apply in relation to the treatment of expenditures and revenue by these businesses. Hence, the starting point for measurement from a production perspective in a joint SEEA / TSA approach is to consider that these conventions apply in the case of environmental flows.

However, a question requiring further consideration is whether there are any additional considerations in relation to transport that emerge when considering a consumption perspective on these flows. For example, what is the best way to consider allocation of the GHG emissions from a British Airways plane travelling between Singapore and London and carrying passengers from the United States and Australia. At this stage, no specific answers have been developed and it remains an area requiring further investigation and discussion before more concrete advice can be provided.

5.4. General features of measuring environmental assets

5.4.1. Introduction

Following the *SEEA Central Framework* (UN et al, 2014a), environmental assets are defined broadly as “the naturally occurring living and non-living components of the Earth, together constituting the biophysical environment, which may provide benefits to humanity.” (para 2.17).

There are so many different types of environmental assets, ranging from pristine wilderness to areas heavily influenced by people (such as, city parks and beaches), that applying a single definition can be problematic. The intention however, from a measurement perspective, is to consider that the scope of environmental assets is suitably broad ranging.

Given the range of environmental assets, it is not surprising that many perspectives and associated measurement approaches are adopted. Indeed, in the biophysical sciences, it is clear that there are many specialties including hydrology, geology, climatology, and ecology, and specialisations concerning specific types of ecosystems (e.g. marine areas, forests, deserts) and species (insects, mammals, conifers). Given this variety and the associated breadth of methods and areas of focus, it is perhaps not surprising that there has been, to date, relatively little integration of environmental data into standard national statistical operations.

Nonetheless, there is a very substantial quantity of data and expertise about environmental assets. The challenge from an ongoing measurement perspective is to find ways of gathering, standardizing and presenting the information in a manner that (i) can be integrated with economic and social data, (ii) is useful for policy making, and (iii) respects the underlying science. The accounting framework of the SEEA is designed to provide a platform to meet this challenge.

5.4.2. Approaches to accounting for environmental assets

The SEEA describes two approaches to the measurement of environmental assets. The first approach 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. There are two main exceptions in this regard: the measurement in physical terms of water resources and the measurement of individual species (e.g. gorillas, wild boar). Accounting for both of these types of environmental asset are described below (sections 4 and 5).

The second approach is accounting for the extent and condition of land and ecosystem assets as described in the *SEEA Experimental Ecosystem Accounting* (SEEA EEA) (UN et al., 2014b). In the SEEA, land is a unique and fundamental environmental asset. At one level it can be accounted for as an individual resource by recording changes in the composition of land use and land cover within a territory over time. In this way indicators of deforestation and urbanization may be derived.

At the same time, land defines the space within which all activity takes place and other assets are situated and it is the spatial aspects of land that need special and distinct consideration. In the context of environmental assets, accounting for land and ecosystems involves separating an overall territory (e.g. country, region) into distinct spatial areas, known as ecosystem assets, each categorized according to different characteristics. Generally, this will relate to different vegetation types and hence, at an aggregate level there will be a mix of ecosystem assets such as forests, wetlands, coastal areas, farmland, savanna, etc. delineated within a territory. The approaches to land and ecosystem accounting in the context of tourism activity are described further below (sections 6, 7 and 8).

Environmental asset accounts

Accounting for all environmental assets follows basically the same logic. The first step is assessing the stock of the particular environmental asset at a point in time (in accounting terms the beginning of the accounting period). This will likely involve some measurement of the physical stock of the asset using different measurement units depending on the asset. Numbers of wildlife and cubic metres of water would be common metrics.

The second step involves measuring changes in the stock of the asset, both additions and reductions, over an accounting period. Ideally, measurement would be undertaken each year but, for many environmental assets, monitoring over 3-5 year periods might be sufficient to support policy discussion. The measures of the changes in stock must then be reconciled to measures of the stock at the end of the accounting period (i.e. the first step is repeated at a later point in time). This accounting identity that $\text{opening stock} + \text{additions} - \text{reductions} = \text{closing stock}$ is a powerful equation that supports telling coherent stories over time. Table 7 shows the basic form of an asset account that reflects this identity.

Table 7: Basic form of an asset account

Opening stock of environmental assets
Additions to stock
Growth in stock
Discoveries of new stock
Upward reappraisals
Reclassifications
<i>Total additions of stock</i>
Reductions of stock
Extractions
Normal loss of stock
Catastrophic losses
Downward reappraisals
Reclassifications
<i>Total reductions in stock</i>
Revaluation of the stock*
Closing stock of environmental assets

^a Only applicable for asset accounts in monetary terms.

Often gathering the information to measure each of the accounting entries in Table 7 is very challenging and hence biophysical models may be applied that provide estimates of, for example, additions to the stock of timber resources using information on the size and age of the forest and the primary species. In this sense, the accounting framework provides a means by which a variety of environmental information can be integrated with economic data since the underlying recording principles are the same.

An important feature of the SEEA's environmental asset accounting is that it can be conducted in both biophysical (quantitative) terms and in monetary terms. In the first instance, the focus is most commonly on recording data in biophysical terms and indeed, in a sustainability context, understanding the actual physical stock is a fundamental requirement. As well, this information is generally the focus of measurement since the biophysical characteristics can be observed and monitored.

The valuation of environmental assets in monetary terms is a challenging area of research and measurement. It is necessary in cases where the information demand is for comparing environmental assets to other assets or for estimating the capital cost of using environmental assets in the generation of income (e.g. estimating depletion adjusted GDP). However, there are a range of methodological challenges and assumption associated with valuation of environmental assets since they are not commonly traded on markets. Issues associated with valuation are not pursued further in this paper and interested readers are invited to consider material in SEEA Central Framework, Chapter 5 and SEEA EEA, Chapters 5 and 6.

5.4.3. Accounting for water resources

As highlighted earlier, 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. In addition it will be necessary to record information on the stock of water and changes in this stock. The appropriate account for this task is the water resources asset account – shown below in Table 8. 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 there is a significant connection to tourism activity. The water resources asset account provides information as to the stocks and changes in stock of the overall resource and hence the use of water by tourism activities can be seen in context. As a consequence, there are no specific issues pertaining to tourism that need to be considered in developing an appropriate water resource asset account.

Table 8: Water resources asset account (cubic metres)

Accounting entries	Type of water resource				Total	
	Surface water			Groundwater		
	Artificial reservoirs	Lakes	Rivers and streams			
Opening stock of water resources						
Additions to stock						
Returns						
Precipitation						
Inflows from other territories						
Inflows from other inland water resources						
Discoveries of water in aquifers						
Total additions to stock						
Reduction in stock						
Abstraction						
of which: for tourism purposes						
Evaporation and actual evapotranspiration						
Outflows to other territories						
Outflows to the sea						
Outflows to other inland water resources						
Total reductions in stock						
Closing stock of water resources						

The compilation of water resource asset accounts is described at length in a range of materials. These include:

- SEEA Central Framework
- SEEA Water
- International Recommendations on Water Statistics
- SEEA Technical Note: Water accounting

Commonly, the estimates of stocks and changes in stocks of water will be based on hydrological monitoring and associated models concerning precipitation, evaporation, run-off and other flows. Direct measurement of stocks of water, particularly with respect to surface water is more challenging but is likely to be relevant where abstraction from groundwater is a primary source.

In some situations, for example in island nations, it may be relevant to assess changes in the quality of available water resources as increases in the salinity of groundwater are a known concern and will limit the availability of water, and/or increase the costs of providing water for tourism activity.

A significant issue in some tourism areas will be the seasonality of tourism activity. Where storage capacity is limited, it may be highly relevant to monitor both water use and changes in the stock of water on a monthly basis such that information for monitoring the capacity to meet peak tourism demand is well established. This may be particularly important as weather and climate patterns vary such that rainfall and peak visitor arrivals do not align well.

To provide a complete picture with respect to water resources, it will be relevant to compile estimates of water use within tourism activities. Approaches to the collection of these data and the attribution to visitors are described in the Technical Note linking the SEEA and the TSA.

Focus in the SEEA is on the active use of water that occurs as it is abstracted and distributed to economic units and households. This will include for example, the abstraction of water to fill swimming pools and related water park facilities. Beyond this, tourism activity will also use water resources passively. Examples include surface water (lakes and rivers) and coastal waters being used for recreation and swimming, and water providing the medium for water transport (ferries, cruises, etc.). Passive uses of water are not the focus of accounting in the SEEA however application of the principles of land accounting (section 6), in terms of accounting for land use, may be applied to provide information to support management of these areas.

An important issue related to both the active and passive use of water resources is water quality and the associated issue of the treatment of wastewater. The issue of wastewater treatment is covered in the discussion of the supply and use of water in the Technical Note linking the SEEA and the TSA. Water quality is a challenging area of measurement as introduced in the SEEA Water, although in part this challenge lies in providing aggregate measures of water quality at a national or other larger scale. Approaches to the measurement of water quality in specific locations are well established and it is likely of relevance, particularly in coastal tourism destinations, to collect and record water quality information on an ongoing basis. Approaches to recording this information are described in the section below on ecosystem accounting.

5.4.4. Accounting for wildlife and key species

Another individual asset for which asset accounts might be developed are accounts for selected species of wild animals, for example, animal species that provide the focus for safari and related activities in national parks and species that are a focus for recreational hunting and fishing.

Recording changes in the stock of such key species over time would support an understanding of the environmental assets supporting tourism activities. Related areas of measurement such as measurement of biodiversity and protected areas are considered under the topic of land and ecosystem accounting (see following sections).

A basic, but potentially very useful, asset account would focus on numbers of particular species monitored at regular intervals and entered into an asset account format. This might be extended to show additions (e.g. through natural births and releases from breeding programs) and reductions (e.g. through natural losses, poaching), to provide more detail concerning the nature of the changes over time. Such an account over multiple time periods is shown in Table 9 for the Big Five mammals of southern Africa. Further extensions to integrate information on the age and composition of the stock of

animals, for example to understand the number of breeding females, could also be made. The same approach can be applied for all species that may support tourism activity (e.g. Californian redwoods, penguins, wild boar, trout, etc.), noting that many possibilities may be considered.

Table 9: Stylised asset account for the Big Five mammals of southern Africa (numbers of animals)

Accounting entries	Species									
	Lion		African elephant		Cape buffalo		Leopard		Black rhino	
	Total	In Protected areas	Total	In Protected areas	Total	In Protected areas	Total	In Protected areas	Total	In Protected areas
Opening stock										
Additions to stock										
Natural births										
Breeding programs										
Other additions										
Reductions in stock										
Natural losses										
Poaching										
Other reductions										
Net change in stock										
Closing stock										
Opening stock										
Additions to stock										
Reductions in stock										
Closing stock										
:										

Information of this type for key species may well be available to managers of national parks and protected areas or from active research programs. The aim of accounting is to provide a platform for this information to be placed in context alongside information on visitors and tourism activity and hence provide a more complete picture for decision makers. Indeed, the relevance of this type of information has been highlighted in a recent UNWTO briefing paper Towards Measuring the Economic Value of Wildlife Watching Tourism in Africa (UNWTO, 2015).

For wildlife, there will be a direct link between the stock and the condition (quality) of the associated ecosystem, such as a forest, wetland or savanna. As well, it is common for the assessment of the numbers of species to be determined on the basis of the extent of suitable habitat and hence there will be connections to approaches used in ecosystem accounting.

5.4.5. Land accounts for tourism

The use of land for tourism activity and development is often the most contentious aspect of ongoing tourism growth. The contention arises where there are limitations in the availability of land to satisfy all potential users and hence choices must be made in terms of how land is used and who is provided with the opportunity to secure the associated benefits.

In this context, land accounts can provide an important information source to support discussion of planning and land allocation decisions. Following the basic structure of the asset account described above, land accounts report the opening and closing stocks (areas) of land classified by different

classes of use, cover or ownership. Thus land accounts provide information that shows the changing composition of land over time. This information can be extended by examining the types of additions and reductions for different land classes during an accounting period.

Another important output that can be directly related to land accounts are maps showing the areas of land classified by use, cover or ownership. Maps are important tools since they are able to convey the actual configuration of an area that is not apparent when looking at a set of accounts in tabular form.

Both land cover and land use accounts are likely to be of interest in measuring sustainable tourism. For a given territory (country, region, destination), accounts for land cover will provide an understanding of the relative size of areas that are covered by, for example, forests, wetlands, rivers, built-up areas, agricultural areas, grasslands, coastal areas and beaches, etc. If converted into maps, this information will clearly identify key environmental areas and ecosystems and their relative significance and configuration. An interesting overlay of this information would be to incorporate information on protected areas and national parks which might be a focus for certain tourism activities. Changes in the size of such areas might be of particular interest.

Accounts for land use will be able to highlight the relative significance of land used by tourism industries such as hotels, restaurants, recreational facilities, transport hubs, etc. When mapped, this will highlight whether there are particular clusters and how these might be changing over time. While such tourism maps might be regularly produced for cities and regions, the advantage of using a SEEA based land accounting framework is that the information on tourism activity is fully integrated with information on other activities in a mutually exclusive and comprehensive manner. This means that it is not a competition between sectors but that everyone starts from the same common information base.

For tourism purposes, the land account structure that is likely to be of most value is an account that shows an integration of land use and land cover classes. This would involve starting from a land cover account with broad classes, as suggested above (forest, grasslands, etc.) and within the class of built-up areas breaking this down further into various tourism industry use of land and non-tourism uses. Further, within the non-urban land cover classes it would be logical to determine the area of land that was most relevant for tourism activities – e.g. beaches. A map of these various classes, produced on a regular basis, would provide substantive input to planning and other tourism related discussions. An account showing these types of classes is shown in Table 10. It represents a melding and adaptation of the interim land use and land cover classifications described in the SEEA Central Framework.

The proposed classes should not be considered definitive and are included to give a sense of the potential structure of a tourism land account. Descriptions of the relevant classes are provided in the SEEA Central Framework, Annex 1.

Table 10: Tourism land account (hectares)

Land classes	Accounting entries				
	Opening stock	Additions to stock	Reductions in stock	Net change in stock	Closing stock
Built-up areas / artificial surfaces					
Transport and storage					
Commercial, financial and public services					
Hotel and catering services					
Retail trade					
Other commercial services					
Recreational facilities					
Residential areas					
Other built up areas					
Crops (herbaceous, woody, other)					
Grassland					
Tree-covered areas					
Mangroves					
Shrub-covered areas					
Shrubs and other vegetation, aquatic and regularly flooded (incl wetlands)					
Sparingly natural vegetated areas					
Terrestrial barren land					
Permanent snow and glaciers					
Inland water bodies					
Coastal water bodies and intertidal areas					
Total area					

The compilation of land accounts is the focus of much ongoing statistical attention. The SEEA Technical Note on land accounting provides an introduction to this area of work. Generally speaking, the compilation of land accounts will require a close relationship to be established with experts in geo-spatial data since there should be a relatively direct connection between land accounts (along the lines of Table 10) and maps showing the same information.

Land accounts can be compiled at different scales. The key from a SEEA perspective is consistency in the application of classifications across spatial scales such that different land accounts (and associated maps) can be nested using consistently defined boundaries. This type of approach, which will likely require some level of national co-ordination, will directly support the type of cross-jurisdictional interaction and discussion that is considered necessary for progressing sustainable tourism.

5.4.6. Accounting for tourism related ecosystem assets

Introduction

The final type of environmental asset to consider is ecosystem assets. While ecosystems are not new concepts, the logic of fully incorporating ecosystems into an accounting structure is quite recent. In a statistical context, this was first presented in the SEEA EEA. The approach involves identifying (delineating) separate spatial areas within a country each representing an ecosystem asset. Most commonly, these separate areas are determined on the basis of different vegetation types but other factors can be incorporated. In effect, each spatial area – referred to as an ecosystem asset – is a statistical representation of an ecosystem as understood by an ecologist.

Ecosystem extent

Consistent with SEEA accounting principles, all ecosystem assets (i.e. discrete spatial areas) within a territory are classified to a type of ecosystem asset in a non-overlapping manner. Each of these ecosystem assets might change in size – extent – over time. One key role of ecosystem accounting is to record these changes in extent, and measure the composition of a territory in terms of its ecosystem types at points in time. In this regard, there are strong connections to the land cover accounts discussed in the previous section.

Ecosystem extent accounts for tourism could be used to record the current composition and changes in composition of tourism areas according to different ecosystem types. For example, the changing composition of ecosystems such as beaches, coastal zones and dunes, mangroves, rivers and estuaries, forests, wetlands and urban areas may be tracked over time. Maps of these changes may also be useful policy tools. The delineating and mapping of ecosystem assets provides the underlying framing for ecosystem accounting.

Ecosystem condition

In addition to measuring the extent of ecosystem assets, ecosystem accounting records changes in the condition of each asset. This is done by considering, for each asset type, a range of characteristics relevant to the assessment of the overall integrity and functioning of the asset. Characteristics may include water flow and quality, species abundance and diversity, vegetation density and cover, soil fertility, etc. The choice of characteristics is ideally determined at the local level by ecologists familiar with the various ecosystem types. The ecosystem accounts provide a structure within which this ecological information can be brought together and tracked over time. The same approach can also be used to monitor the condition of coastal waters and reefs that may be of importance in some tourism areas, for example by recording changes in coral cover.

Ecosystem services

The next stage in ecosystem accounting involves measuring the flows of ecosystem services generated by ecosystem assets. Commonly, ecosystem services are grouped into three broad classes: provisioning services, regulating services and cultural services. Provisioning services relate to the extraction and harvest of materials from the environment including timber, fish and water. These will largely be inputs to primary industries, e.g. agriculture, forestry and fisheries, but there will be cases of relevance for tourism, for example when a hotel or resort abstracts water from the environment.

Regulating services are generally the least recognized and the most taken for granted. These services include the filtering and purification of water and air by ecosystems, the regulation of soil and water flows to minimize the impacts of flooding and the sequestration of carbon, to name just a few. Communities and tourism activities gain directly from these services but usually do not pay for them.

Cultural services concern the opportunities provided by ecosystems to enjoy and learn from nature. They include educational and scientific connections and, most significantly for tourism, cultural and recreational opportunities including wildlife watching, hiking, camping, visits to national parks, swimming and other outdoor recreation, etc.

Application of ecosystem accounting to tourism

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 common destination level focus of sustainable tourism. Thus the application of ecosystem accounting principles and the development of ecosystem accounts should provide information that can be directly used at destination level to progressively build a picture of tourism's use of and impact on local ecosystems. For example, it would be possible to:

- 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 businesses 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.

Overall, 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. This would complement the water resources asset account described above.

Assessment could also 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 impacts of 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 data to support direct valuation of ecosystem services.

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 destinations it may be relevant to consider the influence and condition of infrastructure that supports tourism such as walkways, 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 to sustainable tourism at a destination level.

6. Accounting for the social and cultural dimension of sustainable tourism

Notes to Chapter 6: Accounting for the social and cultural dimension of sustainable tourism is the least developed from a statistical perspective but this is not to suggest a lack of importance of this dimension in measurement. Developing this area of measurement is a high priority on the MST research agenda. As an initial framing, it is proposed that this chapter would cover the following areas of measurement many of which are less amenable or less developed in accounting terms.

- Accounting for cultural aspects of sustainable tourism, including measures related to local products and sustaining indigenous cultures (potentially building on work on cultural satellite accounts)
- Measurement of social capital in the context of sustainable tourism, including for example:
 - Measures of community well-being, crime rates, perceptions of residents / host communities
 - Measures of social equity
- Decent work in tourism including occupational health and safety,
- Measures of visitor satisfaction, visitor health experiences, visitor access and mobility
- Indicators of management and governance for sustainable tourism

Relative to the economic and environmental dimensions of sustainable tourism, the development of statistical standards in a number of social aspects is less developed. Nonetheless there is an active body of research and measurement practice on which to build and the development of the SF-MST will seek to take advantage of this work.

Annexes

Relevant classifications

Research agenda

The following research program for the Measuring Sustainable Tourism (MST) project was developed for discussion among the UNWTO Committee on Statistics and TSA at its January 2017 meeting. It was developed in light of (i) the framing and discussion of MST at the MST Working Group meeting in October 2016 and (ii) with the aim of producing substantive drafts of a statistical framework for MST and an associated Technical Note¹⁹ focused on linking economic and environmental aspects of tourism through the first half of 2017. The outputs from the research program will contribute directly to these planned outputs.

Work has commenced on some of the research tasks summarized in the table below and progress on others is planned to commence in the coming weeks. Other tasks are considered to be medium to longer term in nature and work would be expected to commence later in 2017 or in 2018.

The research tasks have been grouped into seven themes

1. Environmental flows
2. Environmental assets and ecosystems
3. Tourism employment, green jobs and environmental activity
4. Tourism destinations
5. Sustainable tourism indicators
6. Cultural and social dimensions of sustainable tourism
7. Data sources and compilation methods

Table 1: Proposed MST Research Program – January 2017

Theme	Task	Research task	Status @ June 2017
1. Environmental flows			
	1	Options for allocation of business resource use and residual flows to tourism/visitors	Draft discussed at Committee mtg
	2	The consumption perspective – how can it be applied	To be commenced
	3	Allocation of transport related flows (fuel, emissions) to visitors, countries and destinations	To be commenced
	4	Supply chain allocations / measurement of embodied environmental flows	To be commenced
2. Environmental assets and ecosystems			
	5	Developing environmental asset accounts	Draft paper completed
	6	Application of ecosystem accounting to sustainable tourism	Draft paper completed
3. Tourism employment, green jobs and environmental activity			
	7	Approaches to measuring tourism employment and green jobs for sustainable tourism	Draft paper completed
	8	Approaches to recording environmental protection expenditure, environmental taxes, env. goods and services and green jobs	To be commenced
4. Tourism destinations			
	9	Defining destinations and destination typologies	Research commenced
	10	Modelling and integrating data for TSA and SEEA at destination level	To be commenced

¹⁹ A Technical Note is a relatively short document concerning a particular theme of measurement (e.g. water, land) that describes basic concepts, main areas of measurement and accounting, associated indicators and approaches to compilation and data collection.

Theme	Task	Research task	Status @ June 2017
5. Sustainable tourism indicators			
	11	Review and comparison of ST indicators sets and related research – confirm indicator themes and potential for use of statistical and administrative data	Commenced
	12	Approaches to the communication of indicators and connections to policy uses (incl. SDG)	Commenced
	13	Options for indicators for an SDG sustainable tourism indicator theme	Commenced
6. Cultural and social dimensions of sustainable tourism			
	14	Options for the measurement of cultural dimensions and local products	To be commenced
7. Data sources and compilation methods			
	15	Examining the potential of big data and geo-referencing	Commenced
	16	Development of guidance on accounts compilation including development of a TSA compilation guide	Commenced
	17	Potential approaches to the derivations of indicators in situations where accounts have not been developed	Commenced

Glossary

<<To be developed>>

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