

UNWTO Statistics and Tourism satellite Account Programme

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**OPTIONS FOR ALLOCATING
ENVIRONMENTAL FLOWS TO TOURISM
THROUGH INTEGRATION OF DATA FROM
TOURISM AND ENVIRONMENTAL-ECONOMIC
ACCOUNTS**

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Options for allocating
environmental flows to
tourism through
integration of data from
tourism and
environmental-
economic accounts

Introduction

The environmental dimension of sustainable tourism (SF-MST - Chapter 5)

Chapter 5: Accounting for the environmental dimension of sustainable tourism

- Accounting for environmental flows for tourism industries
 - Water
 - Energy
 - GHG emissions
 - Solid waste
- Accounting for environmental flows of visitors (i.e. a consumption perspective on water use, energy use, GHG emissions and solid waste)
- Accounting for environmental activity and transactions (incl. environmental protection, taxes, eco-tourism)
- Accounts 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

Linking the SEEA and the TSA (Technical note - Chapter 3)

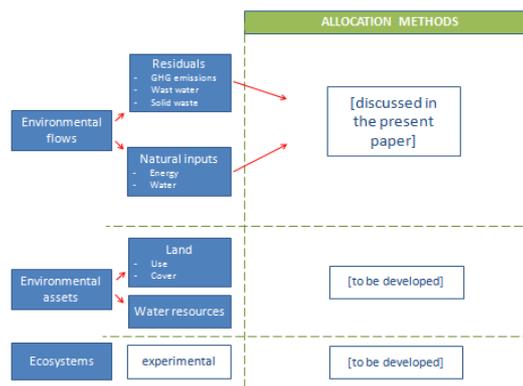
Chapter 3: Initial core accounts for tourism businesses

- Introduction to core accounts and their role
- Description of core accounts for tourism industries (initial drafts of the following accounts are presented in the following section of this paper)
 - Water
 - Energy
 - GHG emissions
 - Solid waste
- Defining environmental flows (natural inputs such as water and energy and residuals such as emissions, wastewater, solid waste) with respect to tourism
- Methods for the estimation of tourism share of environmental flows
- Treatment of environmental flows concerning international transport

SF-MST's main points of interest

Concepts, definitions, classifications, data structures and sources ..., **measurement challenges** ...

Methods for measuring tourism-related environmental assets and allocating environmental flows to tourism



From SEEA-CF physical flow accounts to extended TSAs - 1

Tourism from the perspective of SEEA-CF ph. flow accounts

Surface water or groundwater may be abstracted as an essential resource for use as an input e.g. for sanitation purposes in tourism resorts. Also, flows of wastewater may be returned to the environment from hotels, instead of being sent to treatment facilities, while flows of air emissions may be released as side-effects of heating ... **tourism activities normally cause impacts on the natural environment through material flows** from the natural system to the economic system and vice-versa; these flows are **caused by economic activities serving visitors' demand and by visitors themselves.**

Only direct flows are accounted for in physical flow accounts, like in core national accounts and TSAs. This is deemed to be an advantage because by recording direct flows it is possible to develop any type of complex analysis, as they just describe straightforward facts.

From SEEA-CF physical flow accounts to extended TSAs - 2

Environmental flows according to SEEA-CF

Natural inputs are physical flows that enter the economic system from the natural environment and are directly used by enterprises through production processes. Included are natural resource inputs like e.g. mineral and energy or biological resources, as well as other natural inputs like e.g. inputs from soil.

Residuals are physical flows that are caused by both enterprises and households. They take place as a result of production, accumulation or consumption processes. Physical flows of GHG emissions, wastewater and solid waste are important examples.

Tourism activities impact on the natural environment through flows of both natural inputs and residuals as defined in the SEEA-CF.

From SEEA-CF physical flow accounts to extended TSAs - 3

Measuring shares of environmental flows starting from SEEA-CF aggregates to allocate them specifically to tourism

The ideal would be direct collection of environmental data related to tourism activities following SEEA-CF accounts' structures, but this cannot be envisaged at this stage, at least within official statistics.

Tourism is a subset - in terms of products purchased - **of the same industries to which natural inputs and residuals are allocated within environmental-economic accounts.**

Therefore, starting from estimates of environmental flows obtained from **SEEA-CF accounts**, by applying suitable ratios to such estimates, proper **shares could be derived for apportioning specifically to tourism.**

From SEEA-CF physical flow accounts to extended TSAs - 4

The rationale for apportioning procedures

Both the TSA 2008 and the SEEA-CF are linked to the classifications used for the SUTs in core national accounts. Conceptually, then, apportioning procedures are possible because both the **physical flows of natural inputs and residuals** as estimated according to the SEEA-CF and the **monetary flows estimated for tourism** following the TSA 2008 are compiled by industry or product item, and **the underlying classifications are the same.**

Thanks to this, links between environmental flows estimates available from SEEA-CF physical flow accounts and TSA 2008 monetary aggregates that measure e.g. tourism expenditure or production matching tourism's demand **can be established.**

From SEEA-CF physical flow accounts to extended TSAs - 5

Alignment of the level of industry and product detail among TSAs and SEEA-CF accounts

When statistical offices start developing TSAs as part of their national accounting work, **it may be the case that no new collection of basic data is launched** for that specific purpose; however, **the break-down by industry of available output data from SUTs may not be sufficient** for the purposes of implementing the TSA 2008.

Also, the stage of actual development of **SEEA-CF accounts** and the way they are implemented have an impact on **their industry and product level of detail**.

As a result of this, **the industry and product level of detail may not be aligned among TSAs and SEEA-CF physical flow accounts**.

Methods proposed for allocating SEEA-CF estimates of environmental flows specifically to tourism - 1

General assumptions

It is assumed that **SUTs, TSAs and SEEA-CF physical flow accounts are regularly compiled**.

Monetary data of both tourism characteristic activities and other industries are cross-classified by product and industry. Estimates concerning the use of resources such as energy or water and the generation of residuals, e.g. GHG emissions, are available; environmental flows caused by tourism are embedded in them. In so-called combined presentations these estimates are allocated to industries and households as appropriate.

The same industry and product level of detail is assumed to be available for TSAs and SEEA-CF physical flow accounts data.

Methods proposed for allocating SEEA-CF estimates of environmental flows specifically to tourism - 2

The measurement challenge

Natural inputs are used and residuals are generated by production processes and additional residuals are generated by consumers when using certain products.

With reference to a given industry, the typical measurement challenge is **to measure for each of the environmental flows** commonly associated to that industry's production (both natural inputs and residuals), **the part that can be assigned to the output directly purchased for tourism purposes.**

With reference to a given product for which additional residuals are generated at the stage of its use by visitors, the challenge is **to measure for each of the environmental flows** commonly associated to households (residuals) **the part that can be assigned to visitors** (associating them to visitors' specific expenditures).

Methods proposed for allocating SEEA-CF estimates of environmental flows specifically to tourism - 3.1

Using output ratios to allocate environmental flows

Rationale

1) Industries' output is obtained as a result of production processes at the same time that use of natural resources and generation of residuals take place as direct inputs or side-effects; 2) the link between production and natural inputs or residuals is relevant first of all because of the physical reality of this connection.

Calculation

The ratio of the tourism share (in value) to the total output of a given industry is applied to estimates of total environmental flows as recorded for the same industry in SEEA-CF accounts.

Implicit assumption

The amount of environmental flows per unit of output of a given industry is the same for production processes from which generate output for tourism demand and for all other outputs.

Methods proposed for allocating SEEA-CF estimates of environmental flows specifically to tourism - 3.2

Example of application of output ratios

TSA - Table 6 - industries' output					SEEA-CF - Air emissions account -	Tourism share of CO ₂ emissions released to the environment by industries (in tonnes)
Industries		Total output (at basic prices)	Tourism share (in value)	Output ratio	Total CO ₂ emissions released to the environment by industries	
headings	ISIC items	(1)	(2)	(3) = (2)/(1)	(4)	(5) = (4)*(3)
- Tourism industries -						
1. Accomodation for visitors	i1_1	44000	43200	0.98	910200	893651
	i1_2	23900	21600	0.90	492100	444743
	i1_3	79500	18600	0.23	1272700	297764
...
5. Water passenger transport	i5	13600	3800	0.28	22003800	6148121
...
10. Sports and recreational industry	i10_1	400	300	0.75	736900	552675
	i10_2	6300	6100	0.97	51800	50156
	i10_3	14300	12100	0.85	326800	276523
- Other industries -						
...

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Methods proposed for allocating SEEA-CF estimates of environmental flows specifically to tourism - 3.3

The big difference between tourism industries and other industries

In **tourism industries** the great majority of production processes are linked to tourism's demand. For these industries, then, **the quality of estimates obtained by using output ratios will not be affected remarkably by the assumption implicit in this method.** The same does not apply to non-tourism industries but, given the relatively little size of tourism shares in this case, the overall estimate of tourism-related environmental flows probably will be not affected by this specific bias.

When output ratios are high enough, as normally is the case with tourism industries, gross value added ratios may turn to be suitable substitutes for output ratios in calculations of environmental flows.

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Methods proposed for allocating SEEA-CF estimates of environmental flows specifically to tourism - 4.1

Using gross value added ratios to allocate environm. flows

Rationale

On conceptual grounds there is no reason for using value added ratios similar to the one put forward with reference to output ratios, but in practice the latter can be replaced by value added ratios as far as tourism industries are concerned, if output data is missing while value added data is available.

Calculation

The ratio of the tourism share (in value) to total gross value added of a given industry is applied to estimates of total environmental flows as recorded for the same industry in SEEA-CF accounts.

Implicit assumption

The share of industry value added directly attributable to tourism equals the share of industry output due directly to tourism (see Statistics Canada).

Methods proposed for allocating SEEA-CF estimates of environmental flows specifically to tourism - 4.2

Example of application of value added ratios

TSA - Table 6 - industries' gross value added					SEEA-CF - Air emissions account -	Tourism share of CO ₂ emissions released to the environment by industries (in tonnes)
Industries		Total gross value added (at basic prices)	Tourism share (in value)	Gross value added ratio	Total CO ₂ emissions released to the environment by industries	
headings	ISIC items	(1)	(2)	(3) = (2)/(1)	(4)	(5) = (4)*(3)
- Tourism industries -						
1. Accommodation for visitors	i1_1	24864	24593	0.99	910200	900305
	i1_2	9541	8623	0.90	492100	444749
	i1_3	69571	16277	0.23	1272700	297764
...
5. Water passenger transport	i5	4238	1882	0.44	22003800	9770808
...
10. Sports and recreational industry	i10_1	190	121	0.64	736900	469583
	i10_2	1540	1492	0.97	51800	50189
	i10_3	6802	5873	0.85	326800	282179
- Other industries -						
...

Methods proposed for allocating SEEA-CF estimates of environmental flows specifically to tourism - 5.1

Using intermediate consumption ratios to allocate the use of natural inputs

Rationale

Natural inputs enter production processes; their market value contributes to determining the value of intermediate consumption. It makes sense to use intermediate consumption ratios to the extent that these actually differ from output ratios; that depends on how they are calculated.

Calculation

The ratio of the tourism share (in value) to total intermediate consumption of a given industry is applied to estimates of the total use of natural inputs as recorded in SEEA-CF accounts for the same industry.

Implicit assumption

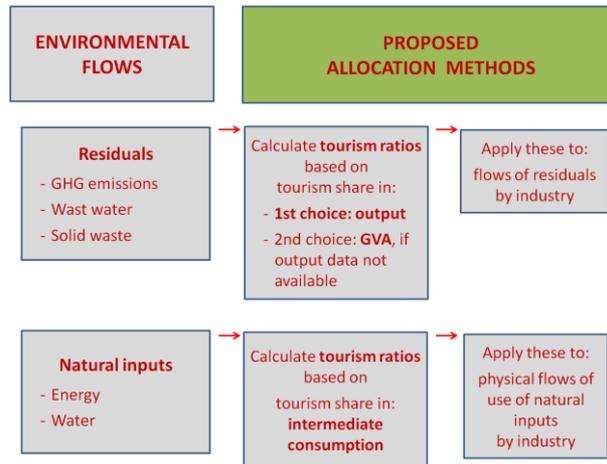
The use of natural inputs per unit of intermediate consumption of a given industry is the same for products matching tourism's demand and for other products.

Methods proposed for allocating SEEA-CF estimates of environmental flows specifically to tourism - 5.2

Example of application of intermediate consumption ratios

TSA - Table 6 - industries' intermediate consumption					SEEA-CF -	SEEA-CF - Physical use table		Tourism	
Industries	ISIC items	Total intermediate consumption (at purchasers' prices)	Tourism share (in value)	Intermediate consumption ratio	Physical supply table for energy Flows from the environment - Inputs of energy from renewable sources	for energy - Inputs of energy from renewable sources - intermediate consumption		share of use of inputs of energy from renewable sources (in joules)	
		(1)	(2)	(3) = (2)/(1)	(4)	Electric power generation, transmission and distribution	(5)	(6) = (5)*(3)	
- Tourism industries -					403229 * 10 ¹²	- Tourism industries -			
1. Accommodation for visitors	i1_1	19136	18607	0.97		...	20831*10 ¹²	...	20255*10 ¹²
	i1_2	14359	12977	0.90		...	4406*10 ¹²	...	3982*10 ¹²
	i1_3	9929	2323	0.23		...	655*10 ¹²	...	153*10 ¹²
...
5. Water passenger transport	i5	9362	1918	0.20		...	78*10 ¹²	...	16*10 ¹²
...
10. Sports and recreational industry	i10_1	210	179	0.85		...	175*10 ¹²	...	149*10 ¹²
	i10_2	4760	4608	0.97		...	2046*10 ¹²	...	1981*10 ¹²
	i10_3	7498	6227	0.85		...	1144*10 ¹²	...	950*10 ¹²
- Other industries -					...	- Other industries -			
...	

Overview of allocation methods proposed for assigning environmental flows to tourism industries



Concluding remarks

few remarks on previous discussion:

The focus on linking SEEA-CF and TSA 2008 accounts and the idea of apportioning environmental accounting data specifically to tourism have their merits: a systems based approach would be followed; the methods would be relatively straightforward to implement.

Against this, direct collection of tourism-related environmental data most probably would not be an option.

Statistical information more detailed than satellite accounting data probably could help to refine apportioning procedures based on the use of that data.

The soundness of using the proposed tourism ratios is substantial. The use of output and intermediate consumption ratios could be considered for possible recommendations.

Concluding remarks *continued*

TASs and SEEA-CF physical flow accounts cannot be assumed to be already in place when the SF-MST will start being implemented within official statistics.

The methods actually used for compiling TASs and SEEA-CF physical flow accounts may have an impact on possible options for apportioning environmental flows specifically to tourism, including on assumptions that may be implicit in those methods.

with a view to further work:

Environmental flows could be calculated for tourism characteristic activities first. Would it be good to limit the scope of such calculations to tourism industries as far as environmental flows caused by production processes are concerned?

Concluding remarks *continued*

still with a view to further work:

Type of product (beyond tourism consumption expenditure as a whole) and forms of tourism (inbound, outbound etc) seem to be additional dimensions of allocation of environmental flows to tourism to be further investigated.

One question is whether guidance from the TSA 2008 and the SEEA-CF, which are focused on the national scale, might be adapted in some way also for the purposes of estimating tourism-related environmental flows at sub-national levels.

... What about for countries where no plan for developing TASs and SEEA-CF accounts is envisaged?

Many thanks you for your attention!

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