

## How to develop an accounting framework for ecologically sustainable Tourism

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## **Introduction**

Tourism is an area of specific interest in economic analysis, especially in a macro-economic perspective. It has become even more so with the increasing importance attached to issues related to sustainable development, given the many important implications of the sector in the economic and in the social sphere, as well as the pressure it may exert on the natural environment locally and world-wide.

In the debate on ecologically sustainable development Tourism is included among target sectors of environmental policy. Since integrated environmental and economic accounting is acknowledged as an important instrument for implementing a sustainability strategy, it would be interesting to develop a specific accounting module focussed on Tourism and its interrelationships with the natural environment. Such a methodological work can build on methodological achievements now available within official statistics.

A preliminary step towards the development of an integrated environmental and economic accounting module specific for Tourism is the definition of a system of economic accounts concerning the sector. Since a thorough economic analysis cannot be pursued within the central framework of the conventional economic accounts, what is needed is an economic satellite account for Tourism. The internationally agreed upon “Tourism Satellite Account – Recommended Methodological Framework” (TSARMF) is the answer to this need. It is essential to take this framework into account, if an accounting framework for Tourism is to be developed which addresses environmental issues while ensuring proper links with official economic information on the same sector.

The following step addresses the economic and environmental dimensions of sustainable development at once; this is crucial in general for a sustainability strategy to be successful, and the same applies in particular to Tourism. The main methodological reference for the analysis of the interrelationships between the environment and the economy in a satellite account form is the handbook “Integrated Environmental and Economic Accounts 2003” (SEEA2003).

Finally, as far as environmental pressures are concerned, the results of projects carried out in the nineties in the framework of the European System of Environmental Pressure Indices (ESEPI) are to be taken into account, in order to derive suitable inputs to the definition of an accounting framework for ecologically sustainable Tourism.

In the following paragraphs, Tourism is first considered in a macroeconomic perspective and a presentation of the TSARMF is made (§ 1). The structure of this accounting framework is analysed, highlighting that it offers a set of relevant indicators of the size of Tourism in an economy. Then the sector is considered in a sustainability perspective, with focus on environmental aspects and with the aim of arriving at a methodological proposal for an accounting framework (§ 2). After a brief introduction on analytical and accounting frameworks for ecologically sustainable development (§ 2.1), the SEEA2003 is introduced in paragraph 2.2.1; although none of the SEEA2003 accounts addresses Tourism as a sector and its interaction with the natural environment, one of the SEEA schemes, i.e. “hybrid flow accounts” – which combines national accounts in monetary terms (economic module) and flow accounts in physical units (environmental module) in a common matrix presentation – is proposed as a possible reference framework for analysing the interrelationship between Tourism and the natural environment. A presentation of ESEPI follows in paragraph 2.2.2, highlighting how the sector environmental pressures proposed in that framework

suit the proposed scheme, which combines physical indicators with national accounting monetary aggregates. Finally, paragraph 2.3 presents a proposal for an application of the “hybrid accounts” methodology to the sector Tourism; on the basis of the SEEA2003 reference framework, the main input for the economic module derives from the economic satellite account for Tourism as envisaged by the TSARMF, while the proposed content of the environmental module is based on the results of Eurostat projects carried out in the framework of the ESEPI. A first evaluation of the feasibility of the proposed hybrid flow account for the sector Tourism is then made in paragraph 2.4, making reference to a simplified framework for the case of Italy.

## **1 Tourism in a Macroeconomic perspective**

### ***1.1 The sector Tourism: a case for satellite analysis and accounting***

Tourism is one of the special cases for which a thorough economic analysis cannot be pursued within the central framework of the SNA which does not allow to fully identify its related activities and products. The main feature distinguishing Tourism from other activities - that are, instead, fully described and analysed through the same central framework - is that there are many examples in which a given activity or product is related to Tourism if tourists make use of it, while, if this is not the case, the same activity or product does not belong to Tourism. This is, for example, the case of transport activities. The identification of economic activities covered within the central framework of the SNA does not, instead, depend on the use that is made of them. Furthermore, tourists are a special type of consumers in that they can only be defined as such with reference to a temporary situation, whereas in the central framework of the SNA more permanent features, such as the residence place, are used to identify transactors. For this and other special cases that do not fit into the central framework, the SNA envisions the development of satellite accounts or systems<sup>1</sup>, that “expand the analytical capacity of national accounting for selected areas of social concern in a flexible manner, without overburdening or disrupting the central system” (UN 1993, § 21.4).

Two are the main types of satellite accounts:

1. The so-called “functional satellite accounts”, also known as “internal satellite accounts”, that maintain a fundamental consistency with the central framework core concepts, while introducing some additional elements, expanding and rearranging specific items so that to make the analysis of fields such as Tourism possible<sup>2</sup>;
2. The “external satellite accounts”, that introduce substantial alternative concepts such as an enlarged production boundary or set of assets, thus allowing, for example, the analysis of natural resources.

While the SNA itself provides the reference concepts for the development of satellite accounts in general, the detailed framework and the operational guidelines for each individual account need to be defined in specific manuals by the experts in the field.

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<sup>1</sup> See United Nations, 1993, Chpt. XXI.

<sup>2</sup> Another example of functional satellite account is the Environmental Protection Expenditure Account (EPEA). The Italian EPEA is available on the Istat web site <http://www.istat.it/Economia/Conti-nazi/index.htm> under the section “Dati”. References to the EPEA are also included.

## **1.2 Tourism Satellite Account – Recommended Methodological Framework (TSARMF)**

In the case of Tourism, efforts for the development of a Tourism Satellite Account (TSA) lead to the publication, in 2001 of the Recommended Methodological Framework (TSARMF) for the development of a TSA, jointly defined by the Commission of the European Communities – Eurostat, the Organisation for Economic Co-operation and Development (OECD), the World Tourism Organisation (WTO) and the United Nations Statistics Division (UNSD)<sup>3</sup>. The manual intends to provide the basic guidelines for the regular national production of statistical data on the effects of Tourism on the economy on an annual basis in a way that is internationally comparable, internally consistent and presented within widely recognised macroeconomic frameworks<sup>4</sup>.

The main purposes of the TSA are (see TSARMF §.1.14):

- to analyse in detail all the aspects of demand for goods and services which might be associated with Tourism within the economy
- to observe the operational interface with the supply of such goods and services within the same economy of reference, and
- to describe how this supply interacts with other economic activities.

To this aim the TSARMF presents reference definitions and classifications for the identification of the scope of the TSA as well as the tables and aggregates that constitute the satellite account itself.

As for any specific field in a satellite account framework, the starting point for the statistical representation of the sector Tourism is - according to the SNA recommendations - the analysis of the uses in order to find an answer to the question “how many resources are devoted to the specific field under examination?” These uses, i.e. the expenditures for the specific function at issue, are already included in the core framework of the SNA, but they need to be separately identified by specifying the scope of the TSA, i.e.:

- by defining the field of analysis; this is done through the definition of Tourism: it “comprises the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes not related to the exercise of an activity remunerated from within the place visited” (TSARMF § 2.1); persons belonging to this definition are called “visitors”
- by identifying and classifying goods and services that are **specific** to the field: i.e. products whose supply would cease to exist in meaningful quantity in the absence of visitors, whose absence might significantly affect tourism consumption and that represent a significant share of tourism consumption (TSARMF § 3.19); due to measurement difficulties, the proposed list of tourism-specific products includes up to now services only (TSARMF – Annex 1). Among specific products Tourism **characteristic** products and Tourism-**connected** products are distinguished; the first group covers specific products that can be considered characteristic for purposes of the international comparability of results in TSA compilation; connected products are “a residual category, including those that have been identified as Tourism-specific in a given

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<sup>3</sup> See Commission of the European Communities et al., 2001.

<sup>4</sup> There is no obligation on countries to produce TSAs. Up to now obligations exist only with reference to agriculture and social protection satellite accounts.

country but for which this attribute has not been acknowledged on a worldwide basis” (TSARMF § 3.17)

- by identifying and classifying the **characteristic activities**, i.e. activities that are typical of the field under study; in our case, they are productive activities that produce a principal output which has been identified as characteristic of Tourism.

For the development of the TSA basic set of tables, a list of Tourism characteristic products and a list of Tourism characteristic activities are recommended (TSARMF § 4.25); they are reported in Figure 1.

In relation to the concept of “visitor consumption” and the place where this occurs, as well as the need to distinguish resident and non-resident visitors, the following concepts are also defined (TSARMF § 2.61):

- Domestic Tourism: is the tourism of resident visitors within the economic territory of the country of reference
- Domestic Tourism Consumption: comprises the consumption of resident visitors within the economic territory of the country of reference
- Inbound Tourism: is the tourism of non-resident visitors within the economic territory of the country of reference
- Inbound Tourism Consumption: comprises the consumption of non-resident visitors within the economic territory of the country of reference and/or that provided by residents
- Outbound Tourism: is the tourism of resident visitors outside the economic territory of the country of reference
- Outbound Tourism Consumption: comprises the consumption of resident visitors outside the economic territory of the country of reference and provided by non-residents
- Internal Tourism: is the tourism of visitors both resident and non-resident, within the economic territory of the country of reference
- Internal Tourism Consumption: comprises the consumption of both resident and non-resident visitors within the economic territory of the country of reference and/or that provided by residents
- National Tourism: is the tourism of resident visitors, within and outside the economic territory of the country of reference
- National Tourism Consumption: comprises the consumption of resident visitors, within and outside the economic territory of the country of reference

**Figure 1** Tourism characteristic products and activities and their correspondence

<u>List of Tourism characteristic products</u>		<u>List of Tourism characteristic activities</u>
1 Accommodation		
1.1 Hotels and other lodging services	↔	1 Hotels and similar
1.2 Second homes services on own account for free	↔	2 Second home ownership (imputed)
2 Food and Beverage Serving	↔	3 Restaurants & similar
3 Passenger transport services		
3.1 Interurban railway transport services	↔	4 Railway passenger transport services
3.2 Road transport services	↔	5 Road passenger transport services
3.3 Water transport services	↔	6 Water passenger transport services
3.4 Air transport services	↔	7 Air passenger transport services
3.5 Supporting passenger transport services	↔	8 Transport supporting services
3.6 Passenger transport equipment rental	↔	9 Transport equipment rental
3.7 Maintenance & Repair services of passenger transport equipment <sup>5</sup>		
4 Travel agency, tour operator and tourist guide services		
4.1 Travel agency services		
4.2 Tour operator services		10 Travel agencies and similar
4.3 Tourist information and tourist guide services		
5 Cultural Services		
5.1 Performing arts		11 Cultural services
5.2 Museum and other cultural services		
6 Recreation & other Entertainment services		
6.1 Sports and recreational sport services		12 Sporting and other recreational services
6.2 Other amusement and recreational services		
7 Miscellaneous tourism services		
7.1 Financial & Insurance services		
7.2 Other good Rental services		
7.3 Other tourism services		

Source: adapted from TSARMF p. 58

On the basis of the concepts, definitions and classifications presented above, that define the boundaries of the sector under investigation, the TSARMF foresees the development of 10 main

<sup>5</sup> Does not correspond to a characteristic activity.

accounting tables that allow to analyse the economic features of Tourism, encompassing demand, supply, impact on employment as well as other aspects. All Tables are reported in Annex 1. The ten tables can be grouped into two different sets according to their degree of priority.

Specifically, Tables 1 to 7 and Table 10 are regarded as being high priority as they include the minimum set of accounts needed to pursue a comprehensive analysis of Tourism within a satellite framework; by contrast, Tables 8 and 9 have a lower priority level because of their complex nature and because of the burden posed on compilers in terms of data requirements. For the first group, a brief description of the Tables is given below:

- ❑ Tables 1 to 4 focus on the demand perspective and analyse **consumption**. In all tables rows record consumption by product classified consistently with the first column of Figure 1. Table 1, 2 and 3, devoted – respectively - to Inbound, Domestic and Outbound Tourism, record visitor final consumption expenditure in cash. Table 4, devoted to Internal Tourism consumption, records Tourism consumption in cash as well as in kind.
- ❑ Table 5 focuses on the supply perspective and analyses **production** of Tourism characteristic industries as well as other industries.
- ❑ Table 6, that includes the confrontation between **supply and internal Tourism consumption** is regarded as the core of the TSA.
- ❑ Table 7, provides a detailed description of **employment** in the Tourism sector.
- ❑ Table 10 presents a number of **non-monetary indicators** related to Tourism such as the number of trips and overnights, the number of establishments in Tourism characteristic and connected activities, etc.

The compilation of TSA Tables includes the calculation of the following aggregates:

- Internal Tourism Consumption in cash
- Internal Tourism Consumption (in cash and in kind)
- Value added of the Tourism industries
- Tourism value added
- Tourism GDP

These aggregates, to be used for international comparison in the first stage of TSA implementation, are considered as a set of relevant indicators of the size of Tourism in an economy (TSARMF §§ 4.77 and 4.78).

## **2 Tourism in a sustainability perspective**

### ***2.1 Analytical and accounting frameworks for ecologically sustainable development***

While the development of a TSA for a given country offers great possibilities for economic analysis, the investigation of environmental issues related to Tourism is outside the scope of the TSARMF described in paragraph 1.2.

In order to study the interaction between Tourism, the economy and the natural environment, a specific statistical tool needs to be developed starting from the consideration of frameworks for



ecologically sustainable development. Indeed, “frameworks are important for linking information pertaining to different areas, and for relating indicators to analytical questions and policy issues.” (De Haan – Kee, 2003, p. 2)

Two types of frameworks can be distinguished: analytical and statistical ones, the latter including accounting frameworks. Each type has its own specific features; both are important for developing statistical tools to be used in a sustainability perspective.

The best known example of an **analytical** framework in the environmental field is the Driving Force – Pressure – State – Impact – Response (DPSIR) model developed by the European Environment Agency (EEA) on the basis of the original OECD Pressure – State – Response (PSR) model<sup>6</sup>.

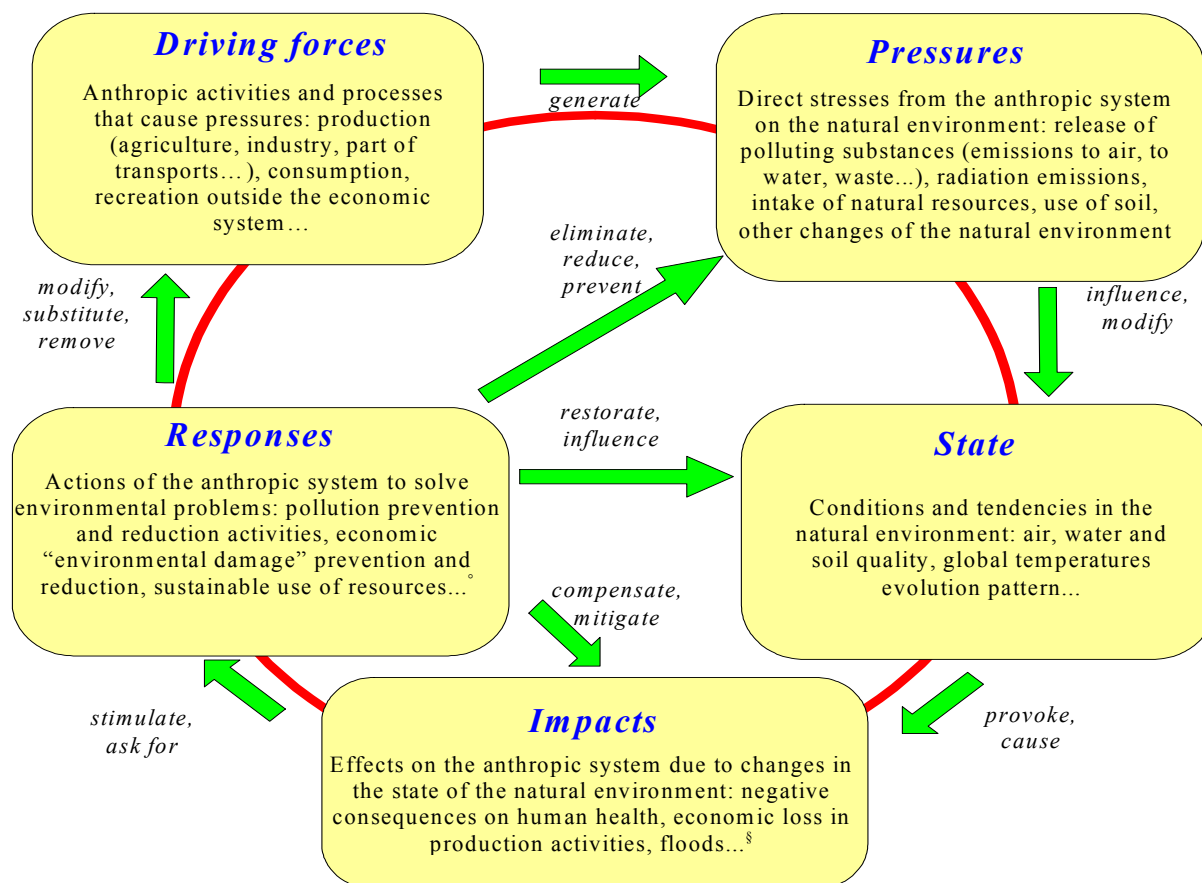
Figure 2 allows to understand the very effective representation of the environmental/economic interaction circuit provided by the DPSIR model: man, with all his activities (driving forces), causes stress (pressures) to the natural environment, whose conditions (state) tend to be modified as a consequence of this stress<sup>7</sup>; wherever these modifications of environmental conditions turn out to be undesirable for man (impact), the anthropic system tends, in turn, to react (response) to the environmental change, to eliminate the causes or the consequences; when these responses are intended to eliminate the causes, they retroact more or less effectively on the pressures carried out by man on nature.

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<sup>6</sup> Another variant is the Driving Force – State – Response (DSR) framework used initially by the United Nations Commission on Sustainable Development (UNCSD) in its work on sustainable development indicators.

<sup>7</sup> The fact that the conditions of the natural environment are the result of the combined effect of stress produced by the anthropic system and the spontaneous evolution of the natural system is not looked at here.

**Figure 2 The DPSIR circuit**



## NOTES

<sup>§</sup> The social system at large, and not just the economy, is affected by changes in the state of the natural environment. This may be an important source of demand for ecological sustainability policy and may retroact on the economy. To the extent that this occurs, impacts on the social system are accounted for in the environmental/economic interaction circuit even though they do not have, *per se*, an economic or an environmental dimension.

<sup>°</sup> There are examples of responses aimed at solving environmental problems which are addressed to the social system, e.g. information campaigns directed to changing social behaviour as a response to the need for energy saving. They are accounted for in the environmental/economic interaction circuit insofar as they imply economic costs and/or retroact on economic behaviour.

A map of the relevant relationships in the technosphere/ecosphere dialectic can thus be identified starting from the DPSIR model, in view of developing an organic and, to the extent possible, complete statistical description of the interrelationships between the economic and environmental dimensions of development. This does not mean, however – partly due to the heterogeneity of the elements that are included in the model and partly due to insufficient knowledge of complex interactions – that one can rely on a series of identities that tie all the elements of this environmental/economic interaction circuit in a unique accounting framework, in the same way as with the “income circuit” and the National Accounts. In other words, there is no way to derive from the DPSIR model directly a framework for describing the interrelationships between economy and environment in an accounting fashion.

**Accounting** frameworks are useful for analytical purposes, decision-taking and policy making in the economic realm, as it is recognised through the world-wide adoption of the System of National Accounts (SNA)<sup>8</sup> and, at the European level, of its fully consistent counterpart, the European System of National and Regional Accounts (ESA 1995)<sup>9</sup>. In this context, “an account is a means of recording, for a given aspect of economic life, the uses and resources or the changes in assets and the changes in liabilities during the accounting period, or the stock of assets and liabilities existing at the beginning or at the end of this period.” (ESA 1995 § 1.48).

In the broader domain of sustainable development, which requires the consideration of economic, environmental and social issues at the same time, there is no accounting framework comparable to the SNA or the ESA as regards the degree of standardisation across countries and the widespread adoption. Nevertheless, accounting frameworks are increasingly adopted at the national level to measure the interrelationships between the economic, social and environmental dimensions<sup>10</sup>.

Specifically, for the analysis of the interrelationships between the environment and the economy the main reference is the handbook “Integrated Environmental and Economic Accounts 2003” (SEEA2003), released on the web by the UN, the European Commission, the International Monetary Fund, the OECD and the World Bank<sup>11</sup>. The SEEA2003 provides, within an overall accounting framework, an articulated system of environmental accounts, concerning various aspects and moments of the environmental/economic interaction circuit (as represented by the DPSIR model) and integrated through a common basis of concepts, definitions and classifications. Each specific accounting scheme is supposed to contribute valuably to the measurement of economic/ecological aspects of sustainable development<sup>12</sup>.

A general advantage of accounting frameworks is that they, through a well-structured and systematic organisation of basic statistics, allow “making more out of primary data” (Steurer 2003, p.9). Their value added is many-fold; in particular, according to the Task Force “European Strategy

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<sup>8</sup> See United Nations, 1993.

<sup>9</sup> See Eurostat, 1996.

<sup>10</sup> See, *inter alia*, the papers presented at the OECD Workshop “*Accounting Frameworks in Sustainable Development*” held on 14-16 May 2003 in Paris.

<sup>11</sup> See United Nations – European Commission – International Monetary Fund – Organisation for Economic Co-operation and Development – World Bank, 2003.

<sup>12</sup> As regards the analysis of the relationship between the economic and social aspects of sustainable development – not considered here – an important reference framework is the Social Accounting Matrix (SAM), which can be derived from an expansion of national accounts matrices, as explained in the forthcoming “Handbook on Social Accounting Matrices and Labour Accounts” (see Battellini – Coli – Tartamella, 2003, and De Haan, 2003).

for Environmental Accounting”, the value added of environmental accounts stems from the fact that they:

- “allow to integrate and make good use of otherwise scattered and incomplete primary data, help structure existing data, improve consistency and provide the basis for estimates (e.g. when primary data are not available annually)
- are integrated with other data sets (especially with economic accounts and hence also aspects of the social dimension of sustainable development) thereby linking environmental information to the economic actors
- allow to derive coherent sets of indicators that are linked to one another
- are therefore a key basis for integrated economic and environmental analysis and modelling, including cost-effectiveness analyses, scenario modelling and economic and environmental forecasts
- through an integrative framework, allow to put sectoral policies and indicators in a comprehensive economic and environmental context
- ensure international comparability of results through common frameworks, concepts and methods
- play a role within the statistical system where environmental accounts frameworks can help guide and develop environmental statistics so as to ensure greater coherence with economic and social statistics, provide input, extra uses and positive feedback for other areas of statistics.” (Eurostat 2002, p. 4).

Paragraph 2.2 will investigate – starting with a presentation of the above mentioned SEEA2003 – the extent to which existing statistical frameworks centred on environmental aspects allow to develop an accounting statistical tool for the description and analysis of Tourism and Sustainable Economic Development, with focus on the interrelationships between the environment and the economy.

## ***2.2 Relevant statistical frameworks for studying the interaction between Tourism and the natural environment***

In addition to the TSARMF discussed in paragraph 1.2 – which deals with the impact of Tourism on the economy – two international statistical frameworks are worth considering in order to develop an accounting framework for ecologically sustainable Tourism. They deal with:

- the interrelationships between the economy and the environment (overall integrated environmental and economic accounting – SEEA2003)
- the environmental pressures exerted on the natural environment by the anthropic system, specifically by environmental policy target sectors, among which Tourism (European System of Environmental Pressure Indices – ESEPI).

### **2.2.1 Integrated Environmental and Economic Accounts 2003 (SEEA 2003)**

The most comprehensive international approach to the analysis of the relationship between the environment and the economy in a satellite account form is the handbook “Integrated Environmental and Economic Accounts 2003” (SEEA2003) whose final version has been released

on the web by the UN, the European Commission, the International Monetary Fund, the OECD and the World Bank.

The SEEA2003 covers physical flow accounts, hybrid flow accounts (integration of physical and monetary accounts), accounting for economic activities and products related to the environment, accounting for other environmentally related transactions and asset accounts, including the valuation of natural resource stocks; it also deals with valuation techniques for measuring degradation as well as with environmental adjustments to the flow accounts.

None of the SEEA2003 accounts addresses Tourism as a sector and its interaction with the natural environment. For the purpose of developing a specific environmental accounting framework for Tourism, among the different types of accounting modules dealt with in the SEEA2003, hybrid flow accounts are a possible starting point<sup>13</sup>.

In hybrid flow accounts, national accounts in monetary terms (economic module) and flow accounts in physical units (environmental module) based on common national accounts principles are presented in a common matrix presentation (hence the use of the term “hybrid”). Both the economic module and the environmental module can assume different forms, depending on the purposes of the analysis and data availability. The economic module generally consists of a supply and use table, of an input-output table or of a National Account Matrix (NAM)<sup>14</sup>. The reference framework for the environmental module are the physical flow accounts describing how natural resources and ecosystem inputs are used in the economic system and how residuals are created by the economy itself<sup>15</sup>.

Figure 3 presents an example of a hybrid flow account where the monetary supply and use table represented by the shaded cells is extended by adding physical flow accounts.

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<sup>13</sup> See United Nations – European Commission – International Monetary Fund – Organisation for Economic Co-operation and Development – World Bank, 2003, Chapter 4 “Hybrid flow accounts”.

<sup>14</sup> For more details on matrix style accounts see UN, 1993, Chapter XV “Supply and use tables and input-output” and Chapter XX – section B “A matrix presentation of SNA accounts”.

<sup>15</sup> See United Nations – European Commission – International Monetary Fund – Organisation for Economic Co-operation and Development – World Bank, 2003, Chapter 3 “Physical flow accounts”.

**Figure 3 Hybrid supply and use table**

	Products	Industries	Consumption	Capital	Exports	Residuals
Products		Products used by industry (intermediate consumption)	Products consumed by households	Products converted to capital	Products exported	
Industries	Products made by industry					Residuals generated by industry
Consumption						Residuals generated by households
Capital						Residuals generated by capital
Imports	Products imported					Residuals imported
Margins	Trade and transport margins					
Value added		<i>Value added by industry</i>				
<i>Monetary totals</i>	<i>Total products supplied</i>	<i>Total industry inputs</i>	<i>Total household consumption</i>	<i>Total capital supplied</i>	<i>Total exports</i>	
Natural resources <sup>16</sup>		Natural resources used by industry	Natural resources consumed by households		Natural resources exported	
Ecosystem inputs <sup>17</sup>		Ecosystem inputs used by industry	Ecosystem inputs consumed by households		Ecosystem inputs exported	
Residuals <sup>18</sup>		Residuals re-absorbed by industry		Residuals going to landfill	Residuals exported	
Other information		Employment Energy use	Energy use			

Source: SEEA p.4-9

Most applications (mainly in the EU countries) of hybrid flow accounts have taken the form of hybrid supply and use tables and developed the residuals accounts within the environmental module

<sup>16</sup> Minerals, energy resources, water and biological resources are included (SEEA §2.31).

<sup>17</sup> Includes “water and other natural inputs (e.g. nutrients, carbon dioxide) required by plants and animals for growth and the oxygen necessary for combustion” (SEEA §2.31).

<sup>18</sup> Includes solid, liquid and gaseous wastes (SEEA §2.31).

focussing specifically on air emission accounts. These application are known under the name of NAMEAs (National Account Matrix including Environmental Accounts) despite the fact that they are not always based on a NAM<sup>19</sup>.

Interest for hybrid accounts is also due to their many potential analytical and policy uses<sup>20</sup>; among the most common ones are:

- the **comparison of economic and environmental indicators** at the national level or at a sectoral level. In both cases the national level the time trends of national accounts figures such as GDP, employment, etc. can be supplemented by, for example, air emissions or waste time trends. Moreover, for a given grouping of industries, the “economic contribution” – represented for example by their percentage share of total value added, total output and total employment – is compared to the “environmental burden” – represented e.g. by their percentage share of total air emissions; this comparison is called *environmental-economic profile* (see SEEA §§ 4.99-4.107)
- the calculation of **direct coefficients of environmental pressure intensity** by industry, where environmental pressure can be represented i.e. by residuals generation, material or energy use; these indicators are obtained by dividing indicators of environmental pressure due to one industry by the output of the industry itself (see SEEA § 11.15)
- the measurement of **direct and indirect environmental pressures** – i.e material and energy requirements and residuals generation - **due to final demand** (see SEEA §§ 4.119-4.135)
- the assessment of different sources of change in environmental pressure over time through **decomposition analysis** and (see SEEA §§ 4.136-4.143 and 11.21-11.26)
- **dynamic modelling** for strategic planning (see SEEA, Chapter 11, Section B 2).

A proposal for an application of the “hybrid accounts” methodology for the sector Tourism is presented in paragraph 2.3, following a brief discussion of the possible input provided by ESEPI to the definition of the proposed accounting framework (next paragraph).

### **2.2.2 European System of Environmental Pressure Indices (ESEPI)**

In a communication addressed to the Council and the European Parliament in 1994, the Commission of the European Communities defined the “Directions for the EU on Environmental Indicators and Green National Accounting” (Commission of the European Communities, 1994); such directions included, among other things, the development of a European System of Environmental Pressure Indices – “ESEPI action”. As a follow up, Eurostat then launched a number of projects, including six Sectoral Infrastructure Projects (SIPs), focussed on sector environmental pressure indicators. The different SIPs concerned the five target sectors identified as areas of special attention in the 5<sup>th</sup> Environmental Action Programme for the European Communities<sup>21</sup> – i.e., Agriculture, Energy, Industry, Transport, Tourism – plus Waste management<sup>22</sup>.

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<sup>19</sup> See Eurostat, 1999 and 2001.

<sup>20</sup> Some of the analytical applications described below require the availability of hybrid input-output tables; in addition, in some cases time series of hybrid accounts tables are necessary.

<sup>21</sup> See Commission of the European Communities, 1993.

<sup>22</sup> It should be noted that, even if the sectors at issue are looked at separately, they are not necessarily unlinked, given possible overlapping such as that between e.g. the Transport and the Energy sectors.

In this context, a project for the sector Tourism was carried out jointly by Istat and Statistics Sweden<sup>23</sup>, followed by another project carried out by Istat with the aim of harmonising the results obtained by the SIPs for the different sectors (Costantino, Femia, 2002)<sup>24</sup>. The focus here is on the results of these two projects<sup>25</sup>.

In the two studies human action at large has been taken into account, with no limitation, in principle, to economic activities as dealt with by national accounts<sup>26</sup>. A national accounting rationale has nevertheless inspired the approach followed, leading to methodological solutions that incorporate national accounting concepts.

A crucial step has been the delimitation of the target sectors under examination in terms of activities causing environmental pressures. With reference to this, a first distinction has been made between production and consumption activities recorded in the national accounts and other human activities that are to be taken into consideration according to the chosen perspective<sup>27</sup>. This distinction is basically tantamount to identifying, in addition to the production activities recorded in the national accounts, other possible activities that may or may not have a direct counterpart in transactions recorded in this system, but which create environmental pressures to be considered in addition to those already associated to production activities.

The approach followed is described in Figure 4, which shows the application of the adopted basic scheme to the sector Tourism. As can be seen, different sets of activities are distinguished. On one side there are the production activities at the service of tourism and on the other side there are tourists' activities<sup>28</sup>; within the latter, furthermore, the use of services and the use of goods by tourists plus other important tourist activities are distinguished. As far as the use of services by tourists is concerned, there is concomitance between the purchase and the use by tourists of the products at issue, while the use of material goods bought as such can be differed in time with respect to the act of purchasing them. The consumption of services provided by activities included in the NACE Rev.1 does not create separate environmental pressures, as the environmental pressures generated at the time of use of a service – for example, a trip in a taxi – coincide with the ones due to its production, already accounted for among those considered in the relevant sector. Acts of differed consumption plus other tourists' activities which do not immediately involve economic transactions<sup>29</sup> may generate, on the contrary, specific environmental pressures<sup>30</sup> that do

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<sup>23</sup> See Cammarota – Costantino – Fängström, 1999.

<sup>24</sup> See Costantino – Femia, 2002.

<sup>25</sup> Both projects obtained financial contribution from the European Commission.

<sup>26</sup> Paragraph 2.3 of Cammarota et alii, (1999) reads: "Tourism is not treated as a sector in the statistical classification of economic activities, NACE. This means that a "translation" of the sector Tourism, as defined in the 5th Environmental Action Programme for the European Communities, into activities within the NACE system is an important, even if not a straightforward, step to take. In addition to that, it has to be mentioned that the impacts of the sector tourism depend also on activities outside the formal classification system of NACE. The influence on the environment of e.g. holiday travels by private cars, changes of area occupied by privately owned secondary houses or trips with an increasing number of privately owned pleasure boats could be considerable, even if there are few data that can confirm this. In some groups or classes of NACE activities related to the sector Tourism can be identified. A specification of activities related to Tourism from the supply side has already been published by Istat (1991)".

<sup>27</sup> As said, the focus is on human action at large.

<sup>28</sup> The practical implication of the distinctions at issue relate to the fact that the identification of those activities that are not "economic activities", may not be immediate and may require "ad hoc" investigations (no standard classification, such as the NACE for production activities, is available).

<sup>29</sup> E.g. recreational activities such as hunting.



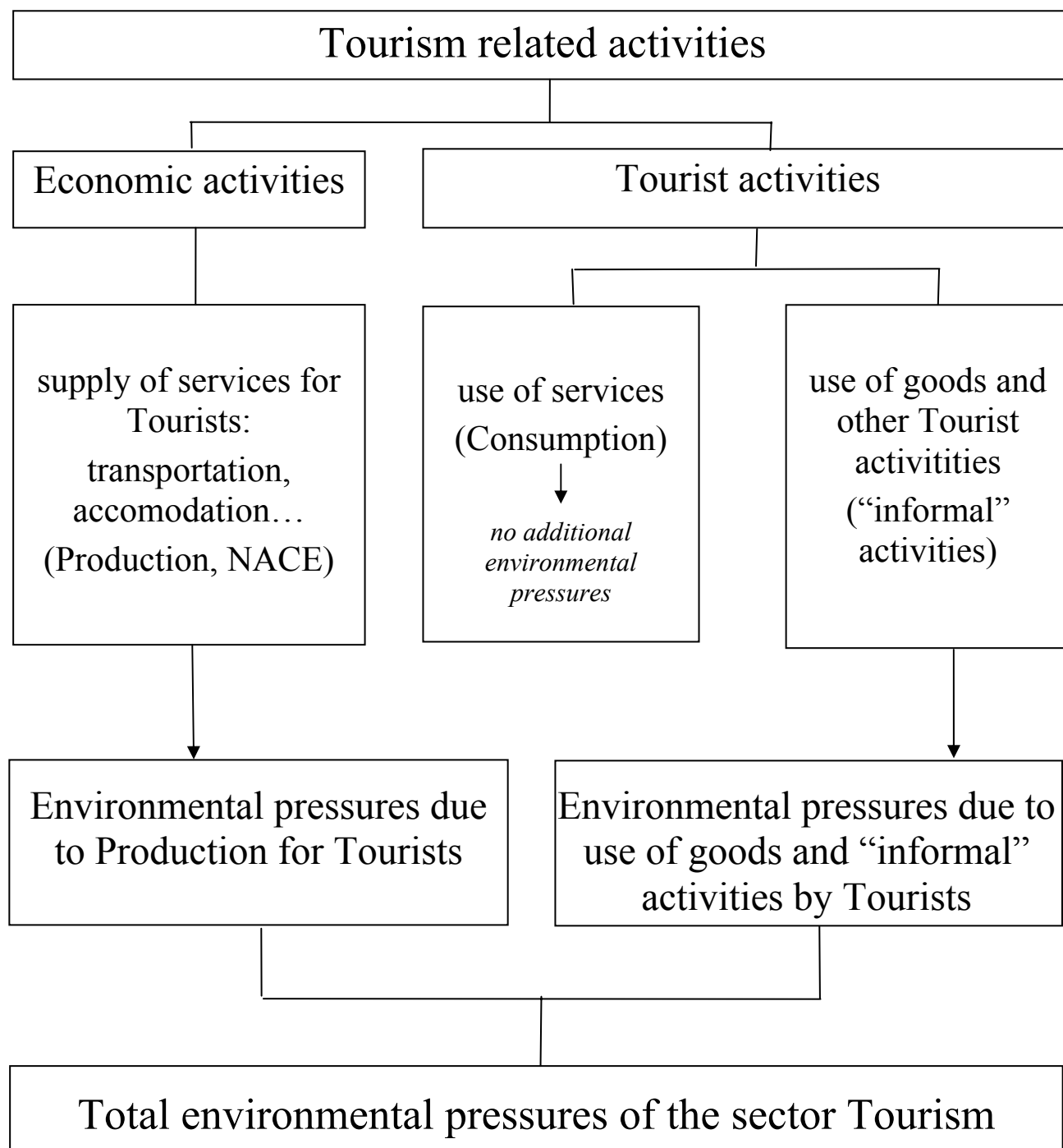
not depend on the use of any particular product; for this reason they are labelled as “informal” activities and constitute a distinct set of activities with respect to supply and use of services. Activities carried out within the economic system (supply of services for tourists) and “informal” activities exhaust, then, the set of human activities, and the union of their respective environmental pressures gives the set of all anthropogenic environmental pressures<sup>31</sup>.

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<sup>30</sup> E.g. an extra amount of animals killed through hunting by tourists.

<sup>31</sup> From an institutional sector accounting standpoint one can see that, in addition to the relevant production activities, some activities carried out by households, that come under the realm of target sector policies, but that are not economic activities, have been explicitly taken into consideration. Such activities generate environmental pressures that are additional to those put down to production. As a matter of fact, these additional environmental pressures are generated either during a consumption phase which is separate from the production of the goods being consumed, or in activities that, as such, do not have any counterpart in terms of production, although their execution contributes – as, for example, in the case of many recreational activities – to satisfying households’ needs.

**Figure 4** Delimitation and schematic representation of the environmental pressures due to the sector Tourism



Based on the concepts developed for the delimitation of the sector as described above, an extensive set of possible environmental pressures for Tourism has been identified; the proposed list is reported in Annex 2. They are intended as flows directly generated by given activities belonging to the sector Tourism and crossing the boundary between the same activity and the natural system<sup>32</sup>.

Apart from a sub-set of general indicators proposed as a preliminary step – mainly not directly associated to a specific environmental issue nor a specific tourist activity – the list of proposed indicators includes a number of sub-sets, each specifically associated to one of the policy fields considered in the framework of ESEPI. The indicators selected describe different kinds of environmental pressure due to different tourism related activities or phenomena; these can be distinguished in three main levels: the first one concerns the tourist transportation, the second one is related to tourist accommodation and the last one concerns the remaining tourist activities<sup>33</sup>. *Core* and *additional* indicators are distinguished<sup>34</sup>.

### ***2.3 A possible accounting framework for ecologically sustainable Tourism (AFEST)***

The two statistical frameworks considered in paragraphs 1.2 and 2.2.2, dealing specifically with Tourism, focus on either economic aspects (TSARMF) or environmental pressures (ESEPI). The former provides an accounting framework; the latter, while conceived also according to an accounting rationale, is not structured in an accounting fashion. An accounting framework that deals with economic and environmental aspects at the same time is provided, instead, by the SEEA2003 (paragraph 2.2.1), though without specific reference to Tourism.

In order to develop an accounting framework specifically aimed at studying the interrelationships between Tourism and environment, the SEEA2003 is a crucial reference. In addition to that, one can rely on elements that can be found in the other two statistical frameworks.

One possible framework could be designed according to the SEEA2003 “hybrid accounts” concept and, specifically, on the basis of Figure 3 that presented a hybrid supply and use table.

Figure 5 shows the AFEST scheme that results from applying to the SEEA hybrid supply and use model the key inputs provided by the TSARMF and ESEPI statistical frameworks, concerning Tourism specific economic and environmental aspects respectively.

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<sup>32</sup> Environmental pressures indirectly generated via other activities that are either “up-stream” or “down-stream” the activity at issue – in an organisational or technical sense – are excluded. As for value added and employment in national accounting, however, indirect environmental pressures are important from an analytical and normative point of view. They can be calculated starting from direct environmental pressures, provided that these are known for all the relevant intermediate steps; for example, this can be done via the vertical integration of sectors with the Input-Output technique, at the branch-of-activity level.

<sup>33</sup> In addition to transportation and accommodation aspects, tourists staying in a certain area may themselves generate some environmental burdens. The presence of tourists within a limited area, first of all, will increase energy consumption, water use as well as waste generation. Moreover, all open space activities related to tourism such as trips on mountains, in wooded areas and countryside, riding, tracking and sport activities (skiing, golf, climbing, sailing, hunting, fishing, etc.) can cause damage to the environment.

<sup>34</sup> Core indicators had been originally identified by scientific advisory groups of experts, within ad hoc ESEPI projects; additional indicators have been proposed for the first time in Cammarota – Costantino – Fängström, 1999, already mentioned.

**Figure 5 Schematic diagram of a possible AFEST**

	Products (TSA breakdown)	Industries (TSA breakdown)	Consumption	Residuals
Products (by CPC with TSA breakdown)		Products used by industry (intermediate consumption) N. B: only CPC breakdown required	Products consumed by tourists	
Industries (TSA breakdown)	Products made by industry			Residuals generated by industry
Consumption				Residuals generated by tourists
Imports	Products imported			Residuals imported
Taxes less subsidies on products	Taxes less subsidies on products			
Value added		Value added by industry		
Monetary totals	Total products supplied	Total industry inputs	Total tourists consumption	
Natural resources <sup>35</sup> Ecosystem inputs <sup>36</sup> Residuals <sup>37</sup>		Natural resources used by industry Ecosystem inputs used by industry Residuals re-absorbed by industry	Natural resources consumed by tourists Ecosystem inputs consumed by tourists	
Other information		Employment Energy use	Energy use	

<sup>35</sup> Minerals, energy resources, water and biological resources are included (SEEA §2.31).

<sup>36</sup> Includes “water and other natural inputs (e.g. nutrients, carbon dioxide) required by plants and animals for growth and the oxygen necessary for combustion” (SEEA §2.31).

<sup>37</sup> Includes solid, liquid and gaseous wastes (SEEA §2.31).

Given the focus of the SEEA2003 on interrelationship between the economy and the natural environment, and for the sake of maximising consistency with the SNA, the ESEPI approach is followed as far as environmental pressures are concerned, but not to the extent of considering human action at large. In practice, the key input from ESEPI is given by the proposed list of Tourism environmental pressure indicators, without going into tourist “informal activities”.

The economic module in Figure 5 (identified by the shaded cells) includes all the items of the corresponding economic module of Figure 3 that are relevant in the case of Tourism; they can be derived from the TSA Tables, particularly from Table 6 “Domestic supply and internal tourism consumption, by products”<sup>38</sup>. In order to maintain the focus on tourism, TSA-consistent classifications are introduced; specifically:

- ❑ For products, the classification is the Central Product Classification (CPC)<sup>39</sup> with the additional breakdown of some CPC items into tourism characteristic and connected products (see Figure 1); the Tourism specific product breakdown is required for all the items that sum up to obtain total supply at purchasers prices - i.e. output, imports, taxes less subsidies on products – as well as for internal tourism consumption. In the case of intermediate consumption, instead, consistently with the structure of TSA Table 6, only the CPC 1<sup>st</sup> digit breakdown is needed<sup>40</sup>.
- ❑ For industries, the TSA classification (see Figure 6) is used. As in TSA Table 6, for each item of the industry classification, both total output and the specific tourism share are provided.

The environmental module, taking as a reference the Tourism environmental pressure indicators developed in the context of the “ESEPI action” (see paragraph 2.2.2), could include, for example:

- for the category “natural resources” – the use of mineral oil or natural gas as a fuel, the use of energy and water abstraction due to Tourism
- for the category “residuals” - air emissions, water emissions, waste;

the category “ecosystem inputs” cannot be directly related to Tourism.

At present, since “products” in the TSA only refer to services, the cell “residuals generated by tourists” cannot be filled in. In a more general framework, residual generation by tourists would include, for example, the emissions due to tourists’ private transport; the corresponding item in the economic module, under products consumed by tourists, would be related to expenditure for fuels used for tourists’ private transport.

## ***2.4 Preliminary feasibility assessment of an AFEST: the Italian example***

As far as the economic dimension is concerned, the spur coming from the TSARMF as well as the economic importance of Tourism for Italy have called for the development of a TSA within official statistics. A group of Istat experts produced a first feasibility study on the possibility to build a TSA for Italy consistently with the international guidelines, thus building the basis for carrying out a first pilot implementation of a TSA for Italy<sup>41</sup>. The same group is currently analysing in detail, in the

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<sup>38</sup> The correspondence between the cells of the economic module in the Figure and parts of Table 6 (TSA) is shown in Annex I – Table 6 (shaded).

<sup>39</sup> See United Nations, 1993, Annex V, Part I, G.

<sup>40</sup> Intermediate consumption is not required for tourism connected industries and for non specific industries.

<sup>41</sup> See Cerroni – Di Leo – Maresca – Mirto – Perez – Siesto, 2001.

framework of a project for Eurostat, all the steps required to compile the Tables that constitute the TSA including the identification of data sources, of methodological problems and possible solutions. The output of the project – available around the end of 2003 – will allow, *inter alia*, to realise to what extent Table 6, i.e. the main source for the economic module of the AFEST, can be compiled.

As regards the environmental dimension, the focus could be on residuals generated by industry and specifically on the case of air emissions. The steps needed to build the accounts for this kind of environmental pressure should reflect the Istat experience gained from the construction of air emission accounts within the NAMEA framework<sup>42</sup>. The objective would be the calculation of emissions with the industry breakdown appearing in the columns of Table 6 of the TSA (see first column of Figure 6). For each activity both total emissions and tourism share need to be distinguished consistently with the structure of the economic module.

As regards **total emissions** by industry, since the Italian NAMEA actually includes air emissions data by economic activity, the first step is to look at the extent to which NAMEA data can be used to achieve the objective of calculating emissions with the Table 6 industry breakdown<sup>43</sup>. To this purpose column 2 and 3 of Figure 6 show the link between the various industries of Table 6 (listed in column 1) and the industry breakdown available for emissions in the Italian NAMEA, in terms of NACE Rev. 1 codes.

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<sup>42</sup> Data and explanatory notes on the Italian NAMEAs for the years 1990-1994 are available on the Istat web site <http://www.istat.it/Economia/Conti-nazi/index.htm> under the section “Dati”. Data for the year 1999 will be produced by the end of September 2003, and the 1990-2000 time series will be available in the second half of 2004. See also Battellini F. – De Lauretis R. – Femia A. – Moauro F. – Spagnolo S. – Tudini A. and Coli A. – De Lauretis R. – Femia A. – Greca G. – Romano D. – Tudini A. – Vetrella G (forthcoming).

<sup>43</sup> In the absence of any source of air emissions data by industry, the calculation would start from the official data source for air emissions, i.e. the Italian CORINAIR, in which data are classified according to the process-based SNAP97 classification. In order to shift from the CORINAIR process-based classification to the AFEST economic activity-based classification, three main steps would be needed:

- ❑ analysis of the qualitative link between each SNAP97 process and AFEST activities, i.e. identification of the AFEST activities in which a process takes place
- ❑ allocation of the emissions of each SNAP97 process to the related AFEST activities either directly (for processes linked to one activity only) or through specific indicators (for processes linked to more than one activity)
- ❑ calculation of total emissions by AFEST activity.

**Figure 6 Link between the TSA and the NAMEA industry classification**

Industry classification in Table 6 of the TSA	NACE Rev. 1 codes of the TSA industry breakdown	NACE Rev. 1 codes of the industry breakdown available for emissions in the Italian NAMEA
<i>Tourism characteristic industries</i>		
1 Hotels and similar	55.11, 12, 21, 22, 23	55
2 Second home ownership (imputed)	70.2	70-74
3 Restaurants & similar	55.30, 40, 51, 52	55
4 Railway passenger transport services	60.1	60.1
5 Road passenger transport services	60.21, 22, 23	60.2+60.3
6 Water passenger transport services	61	61
7 Air passenger transport services	62.1; 62.2	62 (includes 62.3)
8 Transport supporting services	63.2	63
9 Transport equipment rental	71.1; 71.21, 22, 23	70-74
10 Travel agencies and similar	63.3	63
11 Cultural services	92.31, 32; 92.52, 53	92
12 Sporting and other recreational services	92.61*; 92.62; 92.33; 92.71, 92.72*	92
<i>Tourism connected industries</i>	50.2; 50.4, 60.24, 92.34, 92.51	50-52, 60.2+60.3, 92
<i>Non specific industries</i>	All other	All other

\* part of

As shown in the Figure, only in the case of the characteristic activity “4. Railway passenger transport services”, the required total emissions can be directly derived from the NAMEA as they are available at the same breakdown level. In all other cases NAMEA data are available at a more aggregated level than necessary. Hence, for these activities, the specific AFEST industry emissions can be calculated by applying the coefficient  $\frac{\text{output of the AFEST activity}}{\text{output of the NAMEA activity}}$  to the corresponding NAMEA total emissions number.

The **tourism share of the total emissions** for each AFEST activity can be assumed to be equal to the tourism output share for the same activity.

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## ***Annex 1 – Tables of the TSA***

## ***Annex 2 – Environmental pressure indicators proposed in the framework of ESEPI***

**Table A      General Indicators**

1)	<i>Ratio tourists / residents</i>
2)	<i>Ratio tourist overnight stays / residents * (365 - k), where k is the number of days spent by residents outside the area considered</i>
3)	<i>Number of tourists/km<sup>2</sup> (in the reference period and in peak season)</i>
4)	<i>Passenger-km travelled by tourists in relation to total passenger-km, divided by type of transport</i>

**Table B      Air Pollution**

<b>Core Indicators</b>	<b>Unit of measurement and reference period</b>
<i>Emissions of NO<sub>x</sub> due to tourist transportation</i>	<i>tonnes, yr</i>
<i>Emissions of NO<sub>x</sub> due to energy used for tourist accommodation</i>	<i>tonnes, yr</i>
<i>Emissions of NMVOC due to tourist transportation</i>	<i>tonnes, yr</i>
<i>Emissions of NMVOC due to energy used for tourist accommodation</i>	<i>tonnes, yr</i>
<i>Emissions of SO<sub>2</sub> due to tourist transportation</i>	<i>tonnes, yr</i>
<i>Emissions of SO<sub>2</sub> due to energy used for tourist accommodation</i>	<i>tonnes, yr</i>
<i>Emissions of particles due to tourist transportation</i>	<i>tonnes, yr</i>
<i>Emissions of particles due to energy used for tourist accommodation</i>	<i>tonnes, yr</i>
<i>Emissions of CO due to tourist transportation</i>	<i>tonnes, yr</i>
<i>Emissions of CO due to energy used for tourist accommodation</i>	<i>tonnes, yr</i>
<b>Additional Indicators</b>	
<i>Number of air conditioned rooms in hotels (for emissions of chlorofluorocarbons (CFCs) and halons)</i>	
<i>Number of refrigerators in hotels (for emissions of chlorofluorocarbons (CFCs) and halons)</i>	

**Table C Climate Change**

<b>Core Indicators</b>	<b>Unit of measurement and reference period</b>
<i>Emissions of CH<sub>4</sub> due to tourist transportation</i>	<i>tonnes, yr</i>
<i>Emissions of CO<sub>2</sub> due to tourist transportation</i>	<i>tonnes, yr</i>
<i>Emissions of CO<sub>2</sub> due to energy used for tourist accommodation</i>	<i>tonnes, yr</i>
<i>Emissions of N<sub>2</sub>O due to tourist transportation</i>	<i>tonnes, yr</i>
<i>Emissions of N<sub>2</sub>O due to energy used for tourist accommodation</i>	<i>tonnes, yr</i>
<i>Emissions of NO<sub>x</sub> due to tourist transportation</i>	<i>tonnes, yr</i>
<i>Emissions of NO<sub>x</sub> due to energy used for tourist accommodation</i>	<i>tonnes, yr</i>
<i>Number of air conditioned rooms in hotels (for emissions of chlorofluorocarbons (CFCs) and halons)</i>	<i>number, yr</i>
<i>Number of refrigerators in hotels (for emissions of chlorofluorocarbons (CFCs) and halons)</i>	<i>number, yr</i>
<i>Emissions of particles due to tourist transportation</i>	<i>tonnes, yr</i>
<i>Emissions of particles due to energy used for tourist accommodation</i>	<i>tonnes, yr</i>
<b>Additional Indicators</b>	
<i>Emissions of CO due to tourism transportation</i>	
<i>Emissions of CO due to energy used for tourism accommodation</i>	
<i>Emissions of NMVOC due to tourism transportation</i>	
<i>Emissions of NMVOC due to energy used for tourism accommodation</i>	

**Table D      Loss of Biodiversity**

<b>Core Indicators</b>	<b>Unit of measurement and reference period</b>
<i>Percentage of area occupied by tourist establishments in relation to total land area within certain types of land, e.g. mountain area, beaches</i>	<i>% , yr</i>
<i>Percentage of area changed for tourism purposes (time series of the previous one)</i>	<i>% , yr</i>
<i>No. of visitors per km<sup>2</sup> in protected areas</i>	<i>number/ km<sup>2</sup>, yr</i>
<i>Area occupied by roads, railways, ports, airports, with regard to the total area of a given country</i>	<i>% or km<sup>2</sup>, yr</i>
<b>Additional Indicators</b>	
<i>Percentage of animals killed through hunting by tourists in relation to all animals killed through hunting</i>	
<i>Percentage of fish catch of certain valuable species taken by tourists</i>	

**Table E Marine Environment and Coastal Zones**

<b>Core Indicators</b>	<b>Unit of measurement and reference period</b>
<i>Percentage of nutrients (N and P) discharged through sewage water attributable to tourism</i>	<i>%, yr</i>
<i>Percentage of coastal zones occupied by tourist establishments in relation to total land area in coastal zones</i>	<i>%, yr</i>
<i>Change in the percentage of coastal zones, etc. (time series of me-b)</i>	<i>%, yr</i>
<i>Percentage of coastal zones covered by roads, railways, ports, airports in relation to total land area in coastal zones</i>	<i>%, yr</i>
<i>Total no. of tourists arriving into the country by sea in relation to total no. of sea passengers</i>	<i>%, yr</i>
<i>Total no. of yachts and other pleasure boats arriving to countries</i>	<i>number, yr</i>
<i>Amount of waste discharged from the increased no. of ships during the tourist season</i>	<i>tonnes, yr</i>
<i>Discharge of sewage water to coastal water by type of treatment</i>	<i>tonnes, yr</i>
<i>Percentage of organic substances (BOD) discharged through sewage water attributable to tourism</i>	<i>%, yr</i>
<i>Number of boats, yachts rented by tourists</i>	<i>number, yr</i>
<b>Additional Indicators</b>	
<i>Percentage of certain fish and other marine species caught by tourists (e.g. lobster, salmon)</i>	
<i>Number of tourist ports</i>	

**Table F      Ozone Layer Depletion**

<b>Core Indicators</b>	<b>Unit of measurement and reference period</b>
<i>Number of air conditioned rooms in hotels (for emissions of chlorofluorocarbons (CFCs) and halons)</i>	<i>number, yr</i>
<i>Number of refrigerators in hotels (for emissions of chlorofluorocarbons (CFCs) and halons)</i>	<i>number, yr</i>
<i>Emissions of NO<sub>x</sub> due to tourist transportation</i>	<i>tonnes, yr</i>
<i>Emissions of NO<sub>x</sub> due to energy used for tourist accommodation</i>	<i>tonnes, yr</i>



**Table G      Resource Depletion**

<b>Core Indicators</b>	<b>Unit of measurement and reference period</b>
<i>Annual use of mineral oil or natural gas as a fuel attributable to tourism</i>	<i>tonnes or km<sup>3</sup>, yr</i>
<i>Water abstraction due to tourism in relation to total water abstraction for household purposes, divided by groundwater and surface water</i>	<i>%, yr</i>
<b>Additional Indicators</b>	
<i>Percentage of area occupied by tourist establishments in relation to total land area within certain types of land, e.g. mountain area, beaches</i>	
<i>Percentage of area occupied by tourist establishments in relation to total residential area</i>	
<i>Percentage of area changed for tourism purposes (e.g. ski centres, golf courses, beach areas owned by hotels, pleasure ports, etc)</i>	
<i>No. of visitors per year and per km<sup>2</sup> in protected areas</i>	
<i>Percentage of area occupied by roads, railways, ports, airports, with regard to the total area of a given country</i>	
<i>Percentage of fish catch of certain valuable species taken by tourists</i>	
<i>Percentage of animals killed through hunting by tourists in relation to all animals killed through hunting</i>	
<i>Annual use of energy attributable to tourism</i>	

**Table H      Dispersion of Toxics**

No core indicator was selected.

<b>Additional Indicators</b>
<i>Percentage of batteries in municipal wastes during tourist seasons in comparison to other periods of the year</i>
<i>Amount of petrol containing lead sold per month during tourist seasons in relation to the same amount outside tourist seasons</i>
<i>Emissions of lead from the transport sector due to tourism</i>

**Table I      Urban Environmental Problems**

<b>Core Indicators</b>	<b>Unit of measurement and reference period</b>
<i>Discharge of sewage water within “tourist urban areas” attributable to tourism, by type of treatment</i>	<i>tonnes, yr</i>
<i>Water supply to the sector tourism within “tourist urban-areas”</i>	<i>litres, yr</i>
<i>Percentage of waste attributable to tourism within “tourist urban-areas”</i>	<i>%, yr</i>
<b>Additional Indicators</b>	
<i>Emissions of air pollutants due to tourist transport in “tourist urban-areas”</i>	
<i>Road traffic density during the tourist season in relation to road traffic density during other periods of the year (for noise) within “tourist urban-areas”</i>	
<i>Air traffic density during the tourist season in relation to air traffic density during other periods of the year within “tourist urban-areas” (for noise)</i>	
<i>Railways traffic density during the tourist season in relation to railways traffic density during other periods of the year within “tourist urban-areas” (for noise)</i>	
<i>Boat traffic density during the tourist season (for example: Venice, Amsterdam) in relation to boat traffic density during other periods of the year within “tourist urban-areas” (for noise)</i>	
<i>Number of discotheques in open spaces within “tourist urban-areas”</i>	
<i>Number of water based theme parks within “tourist urban-areas”</i>	

**Table J      Waste**

<b>Core Indicators</b>	<b>Unit of measurement and reference period</b>
<i>Percentage of waste attributable to tourism</i>	<i>%, yr</i>
<b>Additional Indicators</b>	
<i>Amount of sludge from sewage treatment plants attributable to tourism</i>	
<i>Emissions of CH<sub>4</sub> due to the percentage of waste attributable to tourism</i>	
<i>Emissions of NO<sub>x</sub> due to the percentage of waste attributable to tourism</i>	

**Table K      Water pollution and water resources**

<b>Core Indicators</b>	<b>Unit of measurement and reference period</b>
<i>Water abstraction due to tourism in relation to total water abstraction for household purposes, divided by groundwater and surface water</i>	% , yr
<i>Total no. of tourists arriving into the country by inland boat in relation to total no. of inland boat passengers</i>	% , yr
<i>Discharge of sewage water to lakes and rivers attributable to tourism, by type of treatment</i>	tonnes, yr
<b>Additional Indicators</b>	
<i>Total no. of yachts and other pleasure boats arriving at inland ports</i>	
<i>Amount of waste discharged from the increased no. of ships during the tourist season</i>	
<i>Percentage of organic substances (BOD) discharged through sewage water attributable to tourism</i>	
<i>Percentage of nutrients (N and P) discharged through sewage water attributable to tourism</i>	