



BOOK OF ABSTRACT

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I. SESSION DESCRIPTION

ID: T17

Accounting for ecosystem services: time for applications

	Title	Name	Organisation	E-mail
Host:	Dr.	Alessandra La Notte	EC Joint Research Center – Directorate D Sustainable Resources	alessandra.la-notte@ec.europa.eu
	Dr.	Ioanna Grammatikopoulou	Global Change Research Institute CAS	grammatikopoulou.i@cezhglobe.cz
	Dr.	Karsten Grunewald	Leibniz Institute of Ecological Urban and Regional Development	k.grunewald@ioer.de
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Abstract:

Accounting for ecosystem services requires not only the physical measurement, mapping as well as the monetary valuation. It also implies to comply with a series of mechanisms and rules to allow the integration / co-jointed analysis with the System of National Accounts (SNA).

After the System of integrated Environmental and Economic Accounts – Experimental Ecosystem Accounting (SEEA-EEA) was proposed in 2012 and few guidelines were offered by many sources (e.g. UNSD, World Bank, European Commission), there is a wide application of these accounting modules throughout the world.

The focus of this session is to show some of these accounting applications and highlight which are the main technical issues to be addressed and whether a common procedure is followed in terms of approach for accounting.

The applications presented will have “accounting tables” as the key element around which the whole measurement turns around. In fact, it is important that both biophysical assessment



and monetary valuation are presented consistently within the accounting frame of SEEA EEA, pointing out the elements of coherence with the SNA.

A precious value added to this session is the “policy use”: examples of accounting should be in line with countries’ policy priorities. Although ecosystem accounting is still in an experimental phase, its accomplishment needs to prove the usefulness. The effort to compile any accounting

table is expected to be justified by policy relevance. We hope through this session to provide an interim milestone in the long path toward an integrated accounting system for Natural Capital.

Goals and objectives of the session:

The goal of this session is to present a number of applications of ecosystem and ecosystem services accounts. The presentation of accounting modules is the key element. A valuable additional contribution is to show the policy uses of ecosystem accounts.

Planned output / Deliverables:

Joint publication JRC and BfN (proposal to be developed and confirmed).

Related to ESP Working Group/National Network:

[Thematic working group: TWG 17 - ES Accounting & Greening the economy](#)

II. SESSION PROGRAM

Date of session: Thursday, 24 October 2019

Time of session: 13:30 - 18:00

Timetable speakers

Chair: Beyhan Ekinci

Time	First name	Surname	Organization	Title of presentation
13:30–13:45	Sara	Vallecillo	Joint Research Centre	Ecosystem services accounts at the EU level: KIP INCA approach
13:45–14:00	Jennie	Wang	Statistics Canada	Statistics Canada's application of ecosystem accounts
14:00–14:15	Karsten	Grunewald	Leibniz Institute of Ecological Urban and Regional Development	Integration of ecosystems and ecosystem services into the Environmental Economic Accounts in Germany – foundations and first examples
14:15–14:30	Ioanna	Grammatikopoulou	Czechglobe	Progressing with ecosystem accounting at national scale; the case of Czech Republic
14:30–14:45	Pablo	Campos	Instituto de Políticas y Bienes Públicos	Ecosystem accounting: experimental application of SNA and SEEA–EEA Models A and B to Holm oak open woodlands in Andalusia–Spain
14:45–15:00	Megan	Nowell	Norwegian Institute for Nature Research	Applying urban ecosystem accounting to municipal policy and planning

Chair: Alessandra La Notte

16:30–16:45	Anthony	Dvarskas	University of Maryland	Ecosystem accounting for coastal and marine areas: Application and lessons learned from New York, USA
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16:45–17:00	Soile	Oinonen	Finnish Environment Institute	Marine ecosystem accounts to support sustainable marine management in the Baltic Sea
17:00–17:15	Stoyan	Nedkov	Bulgarian Academy of Sciences	Modelling water regulation in support of ecosystem accounting in Bulgaria
17:15–17:30	Tuija	Lankia	Natural Resources Institute Finland	Outdoor recreation in ecosystem service accounting: pilot accounts from Finland
17:30–17:45	Steven	King	World Conservation Monitoring Centre	Integrated Accounting for Wildlife Watching Tourism in Uganda
17:45–18:00	Sofya	Solovyeva	Lomonosov Moscow State University	Valuing biodiversity and ecosystem services: Russian context



III. ABSTRACTS

The abstracts appear in alphabetic order based on the last name of the first author. The first author is the presenting author unless indicated otherwise.

1. Type of submission: **Invited speaker abstract**

Session only allows invited speakers

Applying urban ecosystem accounting to municipal policy and planning

First author: David N. Barton

Other author(s): Zofie Cimburova, Alexander Venter, Megan Nowell, Benno Dillinger

Presenting author: Megan Nowell

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The SEEA EEA revision has struggled with recommendations for urban ecosystem accounts because they are highly modified landscape mosaics where it is difficult to identify ecosystem boundaries, to distinguish extent from ecosystem condition, to identify services from the 'natural' part of a highly modified system, and to price municipal ecosystem utilities which are open access or provided at cost.

In this paper we argue that a further limitation is lacking demonstration of the policy relevance of ecosystem accounting to municipal governments. Municipalities are not required to generate statistics on greenspace contribution to the city economy, as a national statistical agency would be if/when SEEA EEA became a UN accounting standard. Only the largest cities will have the technical capacity to compile the biophysical information necessary. Our experience is that even large cities will show subsidiary interest in accounting tables, primarily wanting to know how biophysical and monetary accounting information could be used to inform municipal planning and assessment.

In this paper we offer a series of examples of how Oslo municipality is using, or could use, information from extent condition, ecosystem service supply and monetary use accounts for different local impact and planning needs (Fig.1). What types of spatial, sector and temporal disaggregation are useful? The paper documents use and conditions accounts for urban green and tree canopy in Oslo. It provides examples of using this information for assessing (i) loss of large trees on private land due to urban densification, (ii) assessing recreation impacts of clear cuts in peri-urban forests, (iii) valuing ecosystem services from municipal trees to justify annual budget allocation to tree management, assessing the urban heat island effect of tree



canopy, (vi) calculating a utility fee for trees, (v) justifying tree liability calculations, and (v) raising awareness about the capital asset value of urban trees.

Keywords: Urban ecosystem accounting, municipal planning, decision-support

2. *Type of submission: Invited speaker abstract*

[Session only allows invited speakers](#)

Ecosystem accounting framework applications: refined SNA and SEEA-EEA versus the simplified Agroforestry Accounting System in holm oak woodlands in Andalusia-Spain

First author: Pablo Campos

Other author(s): Alejandro Caparrós, Jose L. Oviedo, Paola Ovando, Alejandro Álvarez, Bruno Mesa

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The scientific debate on how to make visible the linkages between the standard System of National Accounts (SNA) and its ongoing satellite System of Environmental Economic Accounting-Experimental Ecosystem Accounting (SEEA-EEA) is a challenge which is still pending. In previous publications we measured selected ecosystem accounting variables associated with Mediterranean forests and woodlands at market prices and simulated exchange prices in terms of ordinary net value added (NVA), ecosystem services (ES), environmental asset (EA), changes in environmental asset (CEA) and environmental income (EI) based on the Agroforestry Accounting System (AAS). In this study, we applied 'own refined SNA' (rSNA) and SEEA-EEA (rSEEA-EEA) and a simplified AAS (sAAS) to measure the aforementioned environmental variables at basic and social prices for 15 economic activities considered in 1,408 thousand hectares of the predominantly mixed Holm oak open woodlands (HOW) in Andalusia-Spain. We incorporate the government institutional sector in the rSNA and environmental income in the rSNA and rSEEA-EEA. The government is perceived as the collective owner of public economic activities. Our objectives are to measure and discuss consistencies in total environmental incomes accruing from the results of the ecosystem accounting frameworks applied to HOW. The discrepancies in government institutional sector ecosystem services between rSEEA-EEA and sAAS are due to the omission in the former

ecosystem accounting approach of the public farmer voluntary opportunity cost and government manufactured costs incurred in the supply of ordinary public products enjoyed free by the consumers. The most outstanding findings of this study are, firstly, that the EI of individual products for the period valued at social prices corresponds with the sustainable economic ecosystem services (except for private amenity), and according to the HOW scheduled modeling of future resource management, the EI also shows physical sustainability of individual natural base products. The ES and the EI of individual market products have the same values, whichever the ecosystem accounting framework applied. This is not the case with the ecosystem services of public products without market prices, due to the fact that rSNA estimates these products at production cost and rSEEA-EEA do not consider the total manufactured costs of the free ordinary final public products.

Keywords: Ordinary environmental net operating margin, ecosystem services, changes in environmental asset, environmental net worth, environmental income

3. *Type of submission: Invited speaker abstract*

[Session only allows invited speakers](#)

Ecosystem accounting for coastal and marine areas: Application and lessons learned from New York, USA

First author: Anthony Dvarskas

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Recent international efforts have focused on the development of metrics to supplement or adjust Gross Domestic Product (GDP) to better account for the broader environmental and social impacts of economic development. In this regard, the United Nations System of Environmental-Economic Accounting, through its Experimental Ecosystem Accounting (EEA) work, is developing a standardized approach to accounting for the value of ecosystem services generated by ecosystems and documenting the relationships between ecosystem services and economic activity. Limited examples exist of the application of the EEA approach to coastal and marine habitats. The purpose of the current research is therefore to develop a pilot process for applying the EEA within a coastal area, using New York's coastal waters as a target geography. The research focuses on a subset of priority ecosystem service benefits for the



region—recreational use of coastal areas and recreational and commercial fishing. Indicators of ecosystem condition and ecosystem services are proposed, drawing from previous academic literature and ongoing monitoring plans for the region, data are compiled for the study site, and population of EEA tables as proposed by the United Nations is undertaken. Results indicate significant data gaps for marine and coastal areas that may limit the immediate ability to fully compile these ecosystem accounts. However, based on identified data gaps and implementation challenges, the process undertaken at the pilot site provides guidance for iterative approaches to developing coastal and marine accounts and potential future research activities. Recommendations are also provided for connecting the ecosystem services to industrial and product classifications.

Keywords: Marine, coastal, fisheries, beach recreation, accounting

4. *Type of submission:* **Invited speaker abstract**

[Session only allows invited speakers](#)

Progressing with ecosystem accounting at national scale; the case of Czech Republic

First author: Ioanna Grammatikopoulou

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In Czech Republic the policy need for developing ecosystem accounting has been recently highlighted in the updated version of the National Biodiversity Strategy for 2016–2025. In light of these, several activities were launched under the aim, first, to initiate a discussion with respect to ecosystem accounting and, second, to proceed to applications of accounts in line with the System of Environmental–Economic Accounting (SEEA) framework. These activities were initiated within a 2-year research project in “Developing and testing experimental ecosystem accounting in the Czech Republic” (2016–2017). This project concluded into developing a methodological protocol for ecosystem accounting. Pilot accounts were also compiled with special focus on ecosystem extent, condition accounts, and monetary asset accounts. Ecosystem extent accounts revealed, for the period 2006–2012, a shift towards more “natural” land cover types. Ecosystem condition accounts showed an improvement based



on the positive changes of the Mean Species Abundance indicator. In monetary terms ecosystem assets presented a net gain of EUR 4 billion in present value terms during 2006–2012. The positive change was caused mainly by the transformation of arable land into pastures and by the increase of forested areas. The progress remains still at an infant state and hence policy needs, priorities, identification and assessment of available data (and related data gaps) will be further examined. In the forthcoming years Czech Republic plans to develop more thoroughly ecosystem accounts, including ecosystem asset, ecosystem extent and supply and use ecosystem services accounts at national scale. The exact area of interest will be clarified through consultation with stakeholders such as Czech Statistical Office, Ministry of Environment, Czech Nature Conservation Agency and other relevant institutions. Furthermore special attention will be placed on the use of the benefit transfer method as a potential alternative valuation method that would facilitate applications of ecosystem accounting at national scale and its pilot use in valuing forest ecosystem services.

Keywords: ecosystem accounting, extent accounts, monetary asset, supply and use ecosystem services account

5. *Type of submission: Invited speaker abstract*

Session only allows invited speakers

Integration of ecosystems and ecosystem services into the Environmental Economic Accounts in Germany – foundations and first examples

First author: Karsten Grunewald

Other author(s): Beyhan Ekinci, Jesko Hirschfeld, Burkhard Schweppe–Kraft, Ralf–Uwe Syrbe, Roland Zieschank

Affiliation: Leibniz Institute of Ecological Urban and Regional Development, Germany

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Our economic and social activities are constantly putting pressure on our ecosystems, changing their condition and their capacity to produce the services we desire in a sustainable manner. Against this background, the integration of ecosystems and their services in the national economic accounts seems necessary since it offers considerable potential for improving political steering capacities. In Germany this is a policy driven process.



Our presentation explains methodological foundations of the ecosystem accounting in Germany following international Guidelines (UNSD). On the hand of two case studies (initial accounts) we discuss types and units of accounts, the assessment and valuation techniques as well as preliminary results. Finally we explain the foreseen policy uses of the accounts as well as ongoing steps.

Keywords: Biodiversity, Economical assessment, Ecosystem accounting, Germany, Natural capital

6. *Type of submission: Invited speaker abstract*

[Session only allows invited speakers](#)

Integrated Accounting for Wildlife Watching Tourism in Uganda

First author: Steven King

Other author(s): Mark Eigenraam, Claire Brown, Carl Obst, Godwin Kamugisha, Francis Ogwal, Ronald Kaggwa, Margaret Nakirya

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The tourism industry is the highest foreign exchange earner in Uganda, contributing US\$ 1.9 billion to Uganda's GDP (7.3%) and employing 6% of her labour force (2017/18). A key motivation for tourists visiting Uganda is to observe iconic species and habitat, such as gorillas, chimpanzees, lions, elephants, lakes and forests. However, Ecosystem Accounts for Uganda published in 2017 reveal significant reductions in the extent of suitable habitat for Elephants (-103,735 ha) and Chimpanzees (-72,326 ha) between 2005 and 2015.

The Uganda Green Growth Development Strategy (UGGDS) acknowledges the risk such declines in natural capital (ecosystems) pose to tourism and other sectors. In response, it targets natural capital management as a catalytic investment area. The Tourism and Wildlife Sector is one of four natural capital sectors targeted, with an ambition to quadruple the value of foreign tourism by 2030. The UGGDS also identifies Environmental-Economic Accounts as the fundamental source of information to support policy interventions to achieve natural capital related development targets.



This paper sets out a set of integrated environmental–economic accounts that provide information on the ‘Stocks’ of natural ecosystems, their iconic species and the ‘Flows’ of ‘enabling wildlife watching tourism’ services they provide to the tourism sector (e.g., Uganda Wildlife Authority and Uganda Tourism Board). This tourism sector relies on a healthy stock of ecosystems to supply tourism related goods and services to different consumers, thereby realising value from them (e.g., international tourists visiting protected areas or national tourists engaging in cultural tourism associated with ‘totemic’ species). By providing this coherent picture of the link between healthy ecosystems and wildlife watching, investments can be targeted towards maintaining ecosystem assets that support wildlife watching tourism, unlocking opportunities to develop tourism and marketing tourism packages in support of the UGGDS. This work is funded by the UK Government’s Darwin Initiative.

Keywords: Ecosystems, Tourism, Species, Green Growth

7. *Type of submission: Invited speaker abstract*

[Session only allows invited speakers](#)

Outdoor recreation in ecosystem service accounting: pilot accounts from Finland

First author: Tuija Lankia

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Ecosystem accounting is a coherent framework for integrating measures of ecosystems and the flows of services from them with measures of economic and other human activity. Here we focus on the accounting of cultural ecosystem services, particularly nature–based recreation. The aim is to improve national capacity to proceed to the ecosystem accounting by showing gaps and possibilities in existing data and knowledge. We apply the UN SEEA EEA framework for the recreation accounting to test its applicability, and to show how existing national forest and outdoor recreation related data sets can support accounting. The assessment for the supply of recreational resources is based on land use categories and on the data set of public recreation services. We illustrate how the nationwide data collection that provides the estimate of number of recreational visits in nature areas is a solid base for physical measures, and also



for monetary values of the recreational visits. We identify gaps both in demand and supply data.

Keywords: Ecosystem service accounting, Cultural ecosystem services, Recreation

8. *Type of submission: Invited speaker abstract*

[Session only allows invited speakers](#)

Modelling water regulation in support of ecosystem accounting in Bulgaria

First author: Stoyan Nedkov

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The EU Biodiversity Strategy to 2020 provided an important push to the implementation of ecosystem services concept by the initiative for mapping and assessment of ecosystems and their services (MAES) which developed a conceptual framework and guided the countries in their efforts to fulfil the requirements of the strategy. The MAES process in Bulgaria started in 2014 with the preliminary mapping of ecosystems and the next stage was the development of a methodological framework and its implementation through nine mapping projects corresponding to the main ecosystem types in MAES typology. The work on these projects led to the development of knowledge and data which can be used for the next step of the implementation of the strategy i.e. to promote the integration of ecosystem values into accounting and reporting systems at national level. This is also the main scope of the MAIA (Mapping and Assessment for Integrated ecosystem Accounting) project which aims to mainstream natural capital and ecosystem accounting in EU Member States based on the SEEA–EEA framework. Water regulation is considered as one of the main regulating ecosystem services by SEEA–EEA. It includes water retention, storm and high water protection (including flood control) and it is also closely related to erosion and sedimentation control. Although there is some progress in the accounting of water-related regulating services, further development in this area is much needed. The main objective of our work is to apply GIS-based modelling of water regulation which could provide the necessary information for different aspects of the water cycle that cannot be extracted through direct measurements. We aim to examine how water regulation can be quantified at different scales and define the



appropriate mapping units for quantification of water regulation appropriate for the need of ecosystem accounting. The methodological approach is based on process-based biophysical modelling with GIS-based hydrologic tool ArcSWAT. This work addresses mainly the physical component of the accounting related to ecosystem extend and services supply. The modelling results in form of Hydrological Response Units (HRU) enable to define the areas of ES supply in high resolution.

Keywords: Extend account, service supply, water regulation, modelling, ArcSWAT

9. *Type of submission: Invited speaker abstract*

Session only allows invited speakers

Marine ecosystem accounts to support sustainable marine management in the Baltic Sea

First author: Soile Oinonen

Other author(s): Susanna Jernberg, Liisa Saikkonen, Elina Virtanen, Kirsi Kostamo, Samuli Korpinen, Markku Viitasalo, Samuli Korpinen

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Development of marine ecosystem accounts is lagging far behind of those in the terrestrial ecosystems. With the focus on the Baltic Sea, this paper reviews the System of Environmental-Economic Accounting – Experimental Ecosystem Accounting SEEA-EEA guidance against the existing ecosystem models, data and indicators developed to support Marine Strategy Framework Directive (MSFD), Water Framework Directive (WFD) and Maritime Spatial Planning (MSP). The statistical framework is applied to suit the specific Baltic Sea ecosystem properties. The results show how unique data of 160,000 samples on underwater marine species, communities and habitats in Finnish sea areas can be transformed based on trait groupings into functional diversity metrics, and how ecosystem service hotspots (and coolspots) can be identified and assessed using spatial prioritization methods to develop several physical marine ecosystem accounts. State of the art ecosystem valuation methods e.g. Simulated Exchange Value will be applied to existing data sets to illustrate monetary ecosystem accounts. Finally the policy use of the accounts is discussed.



Keywords: Extent account, Condition account, Capacity account, Ecosystem services supply account, economic valuation

10. Type of submission: Invited speaker abstract

Session only allows invited speakers

Valuing biodiversity and ecosystem services: Russian context

First author: Sofya Solovyeva

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Over the past 20 years the problems related to ecosystem services have been reflected in scientific developments and in official conceptual documents of the RF. Ecosystem services and payments for these services have become important in the economic and political parts of these documents.

The authors give an overview of economic research in the field of identification and economic valuation of ecosystem services in Russia. The main approaches to the definition of ecosystem services and their adequate economic evaluation in the regions of Baikal, Altai, the Far East and many other territories in Russia are analyzed. Most calculations were based on the concept of total economic value. Direct use value of ecosystem services was estimated as the sum of benefits derived through tourism development, limited wild crop gathering, recreational fishing, firewood collection, water use. educational, and other services.

Case studies of Kamchatka Nature Reserves, Baikal region and other protected areas demonstrate that the main part of economic value is indirect use value, which is associated with the role of these areas in regulating local and global environmental processes — carbon storing, air purification, protection of habitats and populations of endangered and commercial species, flow regulation.

The cost of existence, or non-use value of protected areas was measured as residents' and visitors' «willingness to pay» for the existence and conservation of Kamchatka Kronotsky Reserve, South-Kamchatka Sanctuary, Baikal protected areas.



The authors present the attempts to create a Russian classification of ecosystem services, as part of the prototype of the national report “Ecosystem Services of Russia: Volume 1 – Services of Terrestrial Ecosystems” produced with the support of the TEEB–Russia project. The TEEB–Russia 2 report “Assessment of biodiversity and ecosystem services in the Russian Federation – management principles and international processes” is scheduled ready in November 2019. A new section on economic assessments of ecosystem services at the national level is planned to be included in the report. As a result of the implementation of the TEEB–Russia–1 and TEEB–Russia–2 projects, by 2020 a basis will be formed for the methodical development of a national system for the assessment and monitoring of ecosystem services in Russia.

The current and foreseen policy uses are identified as economic assessment of the benefits of monetarization from ecoservices at the national and regional levels; “capitalization” of ecosystem contributions based on various payment mechanisms for ecosystem services; and the formation of financial mechanisms to support Russian regions with large ecosystem capital.

Keywords: ecosystem services; classification of ecosystem services; economic assessment of ecosystem services; the regions of Baikal, Altai, the Far East of Russia; financial mechanisms for ecosystem services

11. Type of submission: Invited speaker abstract

[Session only allows invited speakers](#)

Ecosystem services accounts at the EU level: KIP INCA approach

First author: Sara Vallecillo

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Ecosystem services accounts are a useful tool that provides relevant information on the role of ecosystems in delivering services and the society in using and benefiting from them. The 7th Environment Action Program and the Biodiversity Strategy to 2020 of the European Union (EU) include objectives to develop natural capital accounting in the EU. In this sense, the European Commission has set the Knowledge and Innovation Project on an Integrated system for Natural Capital and ecosystem services Accounting (KIP INCA), with the aim to develop



accounts of ecosystems and their services at the EU level. This paper presents the accounting workflow for ecosystem services adopted by the KIP INCA. This includes: 1) The biophysical assessment of ecosystem services; 2) Monetary valuation and 3) Compilation of accounting tables. Supply and use tables are presented for the six ecosystem services assessed to this point: crop provision, timber provision, global climate regulation, crop pollination, flood control and nature-based recreation. Supply table shows woodland and forest, followed by wetlands as the ecosystem types with higher value from the ecosystem services point of view. Analyses of changes over time (years 2000, 2006 and 2012) show an overall increase of the values of ecosystem services, mainly due an increase in the demand for them. We also discuss advantages and disadvantages of adopting a fast-track approach based on official statistics or accounting strategies that are based on spatial models. The development of the experimental ecosystem services account makes a significant contribution to the further development of the technical recommendation for ecosystem services accounts.

Keywords: accounting tables, official statistics, spatial models, drivers of changes, monetary value

12. Type of submission: Invited speaker abstract

[Session only allows invited speakers](#)

Statistics Canada's application of ecosystem accounts

First author: Jennie Wang

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Statistics Canada is working to implement System of Environmental-Economic Accounting – Experimental Ecosystem Accounting (SEEA – EEA). This presentation will highlight some of the data and tables the organization has produced to date, including tables on ecosystem extent and condition, land and water and a brief overview of the main data sources and techniques. It will also discuss some of our initial work on developing ecosystem service accounts, including reporting on marine and forest provisioning services, beneficiaries of cultural services such as recreation and tourism, and monetary estimates of the value of recreation services provided by a national park. We will discuss potential areas targeted for further research, such as carbon sequestration services from forests and ecosystem services provided



by urban areas and their policy applications. Finally, we will cover some of the challenges we face as we move forward to produce these new accounts.

Keywords: Ecosystem accounts, Ecosystem extent and condition, Monetary valuation