

Measuring the Environmental Goods and Services Sector in the U.S

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Office of the Chief Economist



Fifth Statistics Conference
"Information to unlock the future"
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Accounting for Environmental Activity: Measuring Public Environmental Expenditures and the Environmental Goods and Services Sector in the US

Dennis Fixler, Julie L. Hass, Tina Highfill, Kelly M. Wentland & Scott A. Wentland

<https://www.nber.org/books-and-chapters/measuring-and-accounting-environmental-public-goods-national-accounts-perspective/accounting-environmental-activity-measuring-public-environmental-expenditures-and-environmental>



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Accounting for Ecosystem Services in Benefit-Cost Analysis

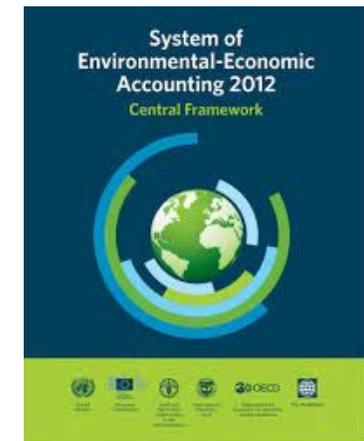
OMB BRIEFING ROOM BLOGS

By OIRA Administrator Richard L. Revesz and OSTP Director Arati Prabhakar

<https://www.whitehouse.gov/omb/briefing-room/2023/08/01/accounting-for-ecosystem-services-in-benefit-cost-analysis/>

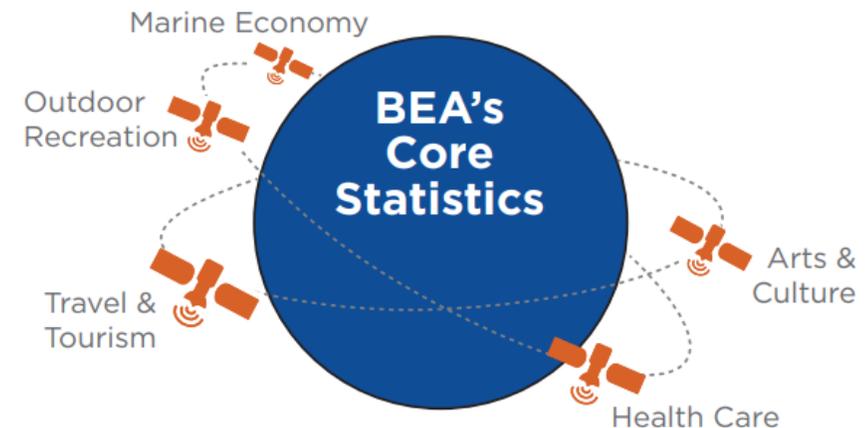
SEEA Central Framework and Environmental Activity

- What do we do?
 - First SEEA-based pilot estimates of environmental activity in the U.S. economy
 - Comparability – internationally & domestically (consistent with the SNA)
- SEEA Central Framework:
 - Physical flow accounts (Ch. 3)
 - **Environmental Activity Accounts (Ch. 4)**
 1. Environmental protection expenditures accounts
 2. Environmental goods and services sector (EGSS) accounts
 3. Tax and subsidy accounts
 - Environmental Asset Accounts (Ch. 5)



“economic activities whose primary purpose is to reduce or eliminate pressures on the environment or to make more efficient use of natural resources” (SEEA-CF, §1.30)

- BEA's **satellite account approach**
 - Primary data source: BEA's internal **supply-use table (SUT) data**
 - Drawn chiefly from the Economic Census and other sources
 - Very detailed product-level categories (5,300+ product categories)
 - Supplementary data sources to fill in gaps
 - Official sources:
 - US Department of Agriculture
 - US Department of Energy
 - US Department of Interior
 - Private: Refinitiv firm-level ESG data



- Determine relevant categories based on **SEEA Ch. 4 definitions**
 - Start with European Statistical System categories
 - Converting **CPA/NACE to NAPCS/NAICS** → mapping is imperfect
 - Use U.S. sources and prior work for clarifications on NAPCS/NAICS definition, including DOC/ESA’s “Measuring the Green Economy” appendix
 1. Fully aligned category (100% environmental)
 2. Partially relevant (<100%)
 3. Out of boundary/scope
 - 1 & 2 were then sorted into **CEPA and CReMA classifications**
 - **CEPA** – Classification of Environmental Protection Activities
 - **CReMA** – Classification for Resource Management Activities

U.S. Environmental Goods & Services Sector



Table 1a. Estimates of gross output for environmental goods and services (EGSS) (in millions \$)

CEPA/CReMA	CEPA/CReMA category	2015			2019		
		Producer Value	Margins	Purchaser Value	Producer Value	Margins	Purchaser Value
10	Protection of ambient air and climate	\$2,976	\$2,686	\$5,662	\$2,611	\$4,513	\$7,124
20	Wastewater management	\$84,384	\$1,370	\$85,754	\$95,508	\$2,192	\$97,700
30	Waste management	\$126,204	\$27,298	\$153,502	\$152,873	\$33,605	\$186,478
40	Protection and remediation of soil, groundwater and surface water	\$7,581	\$3,626	\$11,207	\$12,379	\$7,810	\$20,189
60	Protection of biodiversity and landscapes	\$79,665	\$0	\$79,665	\$93,494	\$0	\$93,494
70	Protection against radiation	\$1,765	\$484	\$2,249	\$2,950	\$981	\$3,931
90	Other environmental protection	\$6,160	\$0	\$6,160	\$6,798	\$0	\$6,798
100	Management of water	\$103,391	\$1,802	\$105,193	\$122,391	\$2,228	\$124,618
110	Management of forest resources	\$2,185	\$0	\$2,185	\$4,357	\$0	\$4,357
111	Management of forest areas	\$3,537	\$0	\$3,537	\$3,578	\$0	\$3,578
112	Minimisation of the intake of forest resources	\$339	\$0	\$339	\$368	\$0	\$368
120	Management of wild flora and fauna	\$4,072	\$0	\$4,072	\$3,378	\$0	\$3,378
131	Production of energy from renewable sources	\$53,131	\$2,323	\$55,454	\$56,824	\$3,097	\$59,920
132	Heat/Energy saving and management	\$27,077	\$41,878	\$68,955	\$30,119	\$40,190	\$70,309
Mixed	Mixed	\$31,101	\$709	\$31,810	\$35,941	\$702	\$36,644
Unclassified	Unclassified	\$3,910	\$898	\$4,808	\$4,711	\$928	\$5,639
		\$537,479	\$83,074	\$620,553	\$628,280	\$96,246	\$724,526

Note: Scenario 1 - Excluding EGS where we do not have source data to estimate the "environmental" portion of the commodity.

U.S. EGSS including partial categories

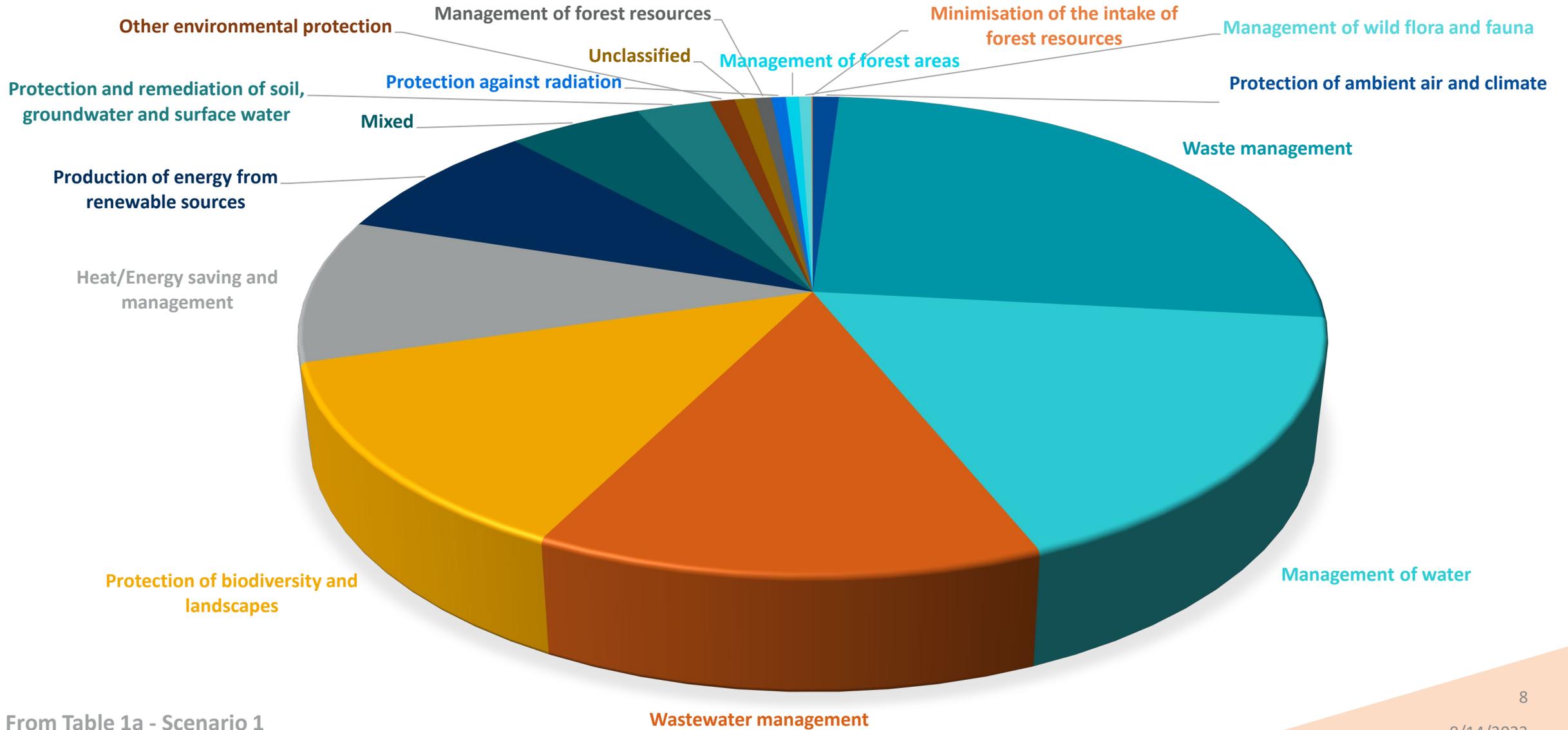


Table 1b. Estimates of gross output for environmental goods and services (EGSS) (in millions \$)

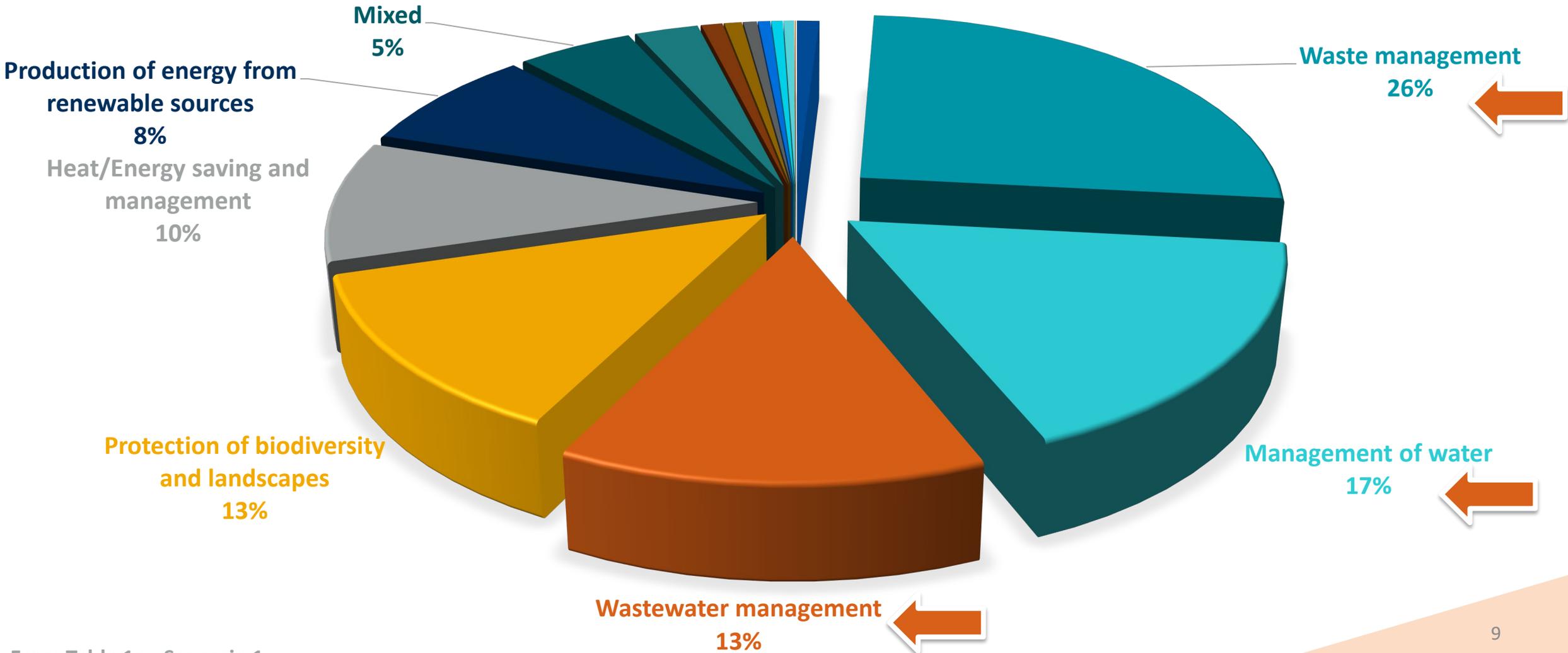
CEPA/CReMA	CEPA/CReMA category	2015			2019		
		Producer Value	Margins	Purchaser Value	Producer Value	Margins	Purchaser Value
10	Protection of ambient air and climate	\$2,976	\$2,686	\$5,662	\$2,611	\$4,513	\$7,124
20	Wastewater management	\$84,384	\$1,370	\$85,754	\$95,508	\$2,192	\$97,700
30	Waste management	\$126,494	\$27,390	\$153,884	\$153,281	\$33,744	\$187,025
40	Protection and remediation of soil, groundwater and surface water	\$9,771	\$3,626	\$13,397	\$14,592	\$7,810	\$22,402
60	Protection of biodiversity and landscapes	\$79,665	\$0	\$79,665	\$93,494	\$0	\$93,494
70	Protection against radiation	\$1,765	\$484	\$2,249	\$2,950	\$981	\$3,931
90	Other environmental protection	\$6,160	\$0	\$6,160	\$6,798	\$0	\$6,798
100	Management of water	\$103,391	\$1,802	\$105,193	\$122,391	\$2,228	\$124,618
110	Management of forest resources	\$4,873	\$835	\$5,708	\$6,686	\$845	\$7,531
111	Management of forest areas	\$3,537	\$0	\$3,537	\$3,578	\$0	\$3,578
112	Minimisation of the intake of forest resources	\$566	\$55	\$622	\$565	\$59	\$624
120	Management of wild flora and fauna	\$4,422	\$9	\$4,431	\$3,877	\$11	\$3,889
131	Production of energy from renewable sources	\$55,617	\$2,571	\$58,188	\$59,190	\$3,239	\$62,429
132	Heat/Energy saving and management	\$27,208	\$41,915	\$69,123	\$30,233	\$40,223	\$70,456
Mixed	Mixed	\$34,411	\$1,076	\$35,487	\$39,539	\$1,044	\$40,583
Unclassified	Unclassified	\$4,544	\$960	\$5,504	\$5,113	\$994	\$6,107
		\$549,784	\$84,779	\$634,563	\$640,407	\$97,882	\$738,288

Note: Scenario 2 - For a sensitivity analysis we use a placeholder of 10% for EGS for partial categories without source data to estimate the “environmental” portion of the commodity.

2019 EGSS Breakdown



2019 EGSS Breakdown



U.S. EGSS – Public vs. Private (2019)



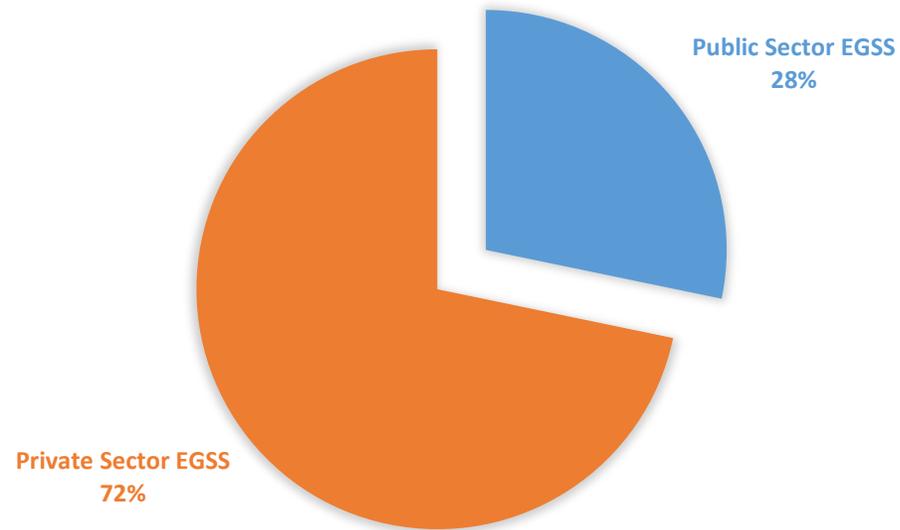
Table 3. 2019 Environmental goods and services sector (EGSS) output by type – public sector vs. private sector output

		2019					
CEPA/CReMA	CEPA/CReMA category	Government	Government	Government	Public Sector	Private Sector	Private Sector %
		Portion of EGSS Gross Output (Producer Value) (1)	Portion of Margins (2)	Portion of EGSS Gross Output (Purchaser Value) (3)	% of Total EGSS Gross Output (Purchaser Value) (4)	EGSS (Purchaser Value) (5)	of Total EGSS Gross Output (Purchaser Value) (6)
10	Protection of ambient air and climate	\$2,611	\$809	\$3,420	48.0	\$3,704	52.0
20	Wastewater management	\$43,790	\$0	\$43,790	44.8	\$53,910	55.2
30	Waste management	\$15,642	\$0	\$15,642	8.4	\$170,836	91.6
40	Protection and remediation of soil, groundwater and surface water	\$2,351	\$0	\$2,351	11.6	\$17,838	88.4
60	Protection of biodiversity and landscapes	\$93,494	\$0	\$93,494	100.0	\$0	0.0
70	Protection against radiation	\$65	\$14	\$79	2.0	\$3,852	98.0
90	Other environmental protection	\$788	\$0	\$788	11.6	\$6,010	88.4
100	Management of water	\$22,480	\$2	\$22,482	18.0	\$102,136	82.0
110	Management of forest resources	\$4,357	\$0	\$4,357	100.0	\$0	0.0
111	Management of forest areas	\$3,578	\$0	\$3,578	100.0	\$0	0.0
112	Minimisation of the intake of forest resources	\$368	\$0	\$368	100.0	\$0	0.0
120	Management of wild flora and fauna	\$3,177	\$0	\$3,177	94.0	\$201	6.0
131	Production of energy from renewable sources	\$21	\$0	\$21	0.0	\$59,899	100.0
132	Heat/Energy saving and management	\$469	\$139	\$608	0.9	\$69,701	99.1
Mixed	Mixed	\$2,763	\$0	\$2,763	7.5	\$33,881	92.5
Unclassified	Unclassified	\$104	\$11	\$115	1.8	\$6,366	98.2
		\$196,056	\$976	\$197,032	27.2	\$528,336	72.8

Note: This table divides the portion of the EGSS estimates from Table 1a into public and private sector output for 2019.

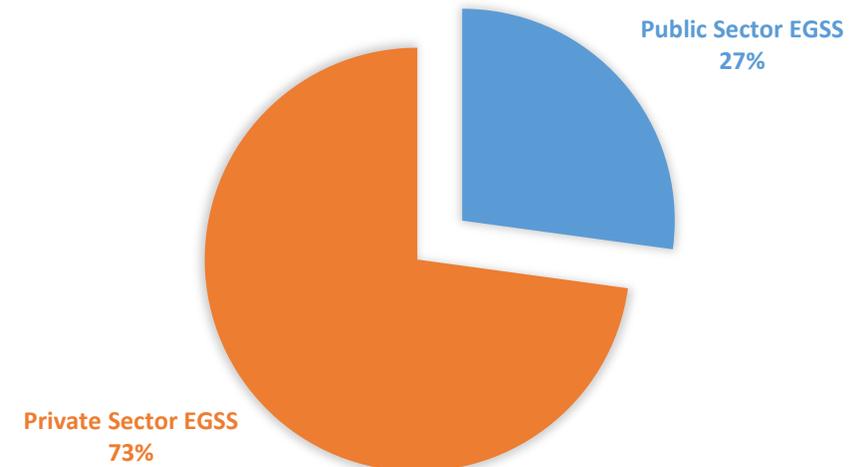
EGSS – Private vs. Public Sector Output

EGSS PRIVATE VS. PUBLIC SECTOR (2015)



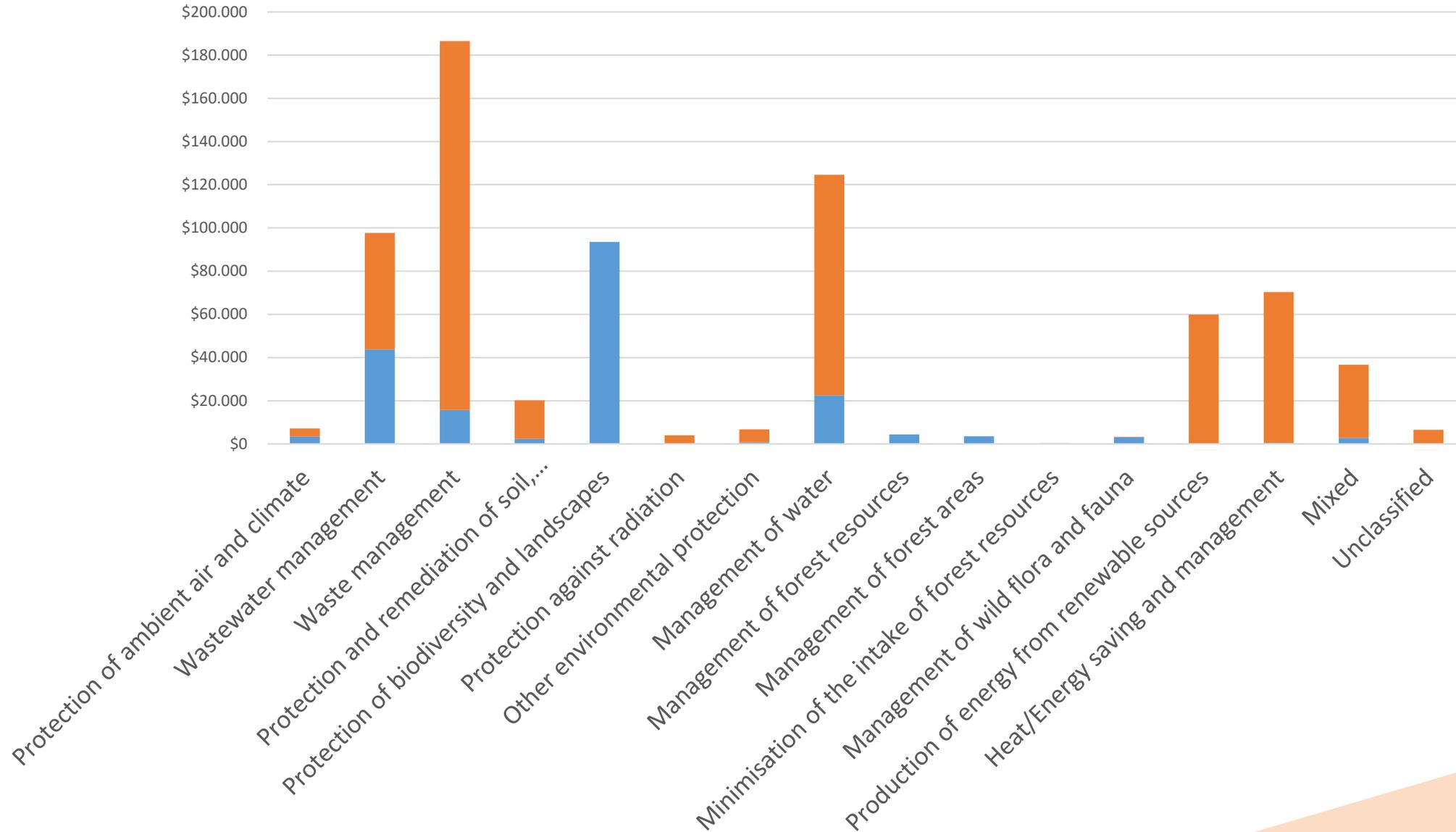
From Table 2

EGSS PRIVATE VS. PUBLIC SECTOR (2019)



From Table 3

Public vs. Private Sector (from Table 3 – 2019)



- EGSS gross output was **\$725 billion in 2019**
 - About **1.9% of the total gross output** of the US economy
 - Public/Government sector is about 27-28% of the EGSS
 - \$738 billion when a portion of the partial categories are included
 - Not a particularly large gap between scenarios
- What's quantitatively most important in the U.S.?
 - Waste management, wastewater management, water management
- Imperfect mapping of NAPCS/NAICS to “environmental” definition in SEEA
 - Revision cycle to NAPCS/NAICS could incorporate better alignment with SEEA environmental product/industry categories
 - Better data & methods required for estimating proportion of partial categories

- August 2023
 - Release of guidance on accounting for ecosystem services on BCA
 - BCA is widely used throughout the US Government for assessing regulatory impact
 - For public comment (deadline 9/18)
 - <https://www.federalregister.gov/documents/2023/08/02/2023-16272/request-for-comments-on-proposed-guidance-for-assessing-changes-in-environmental-and-ecosystem>



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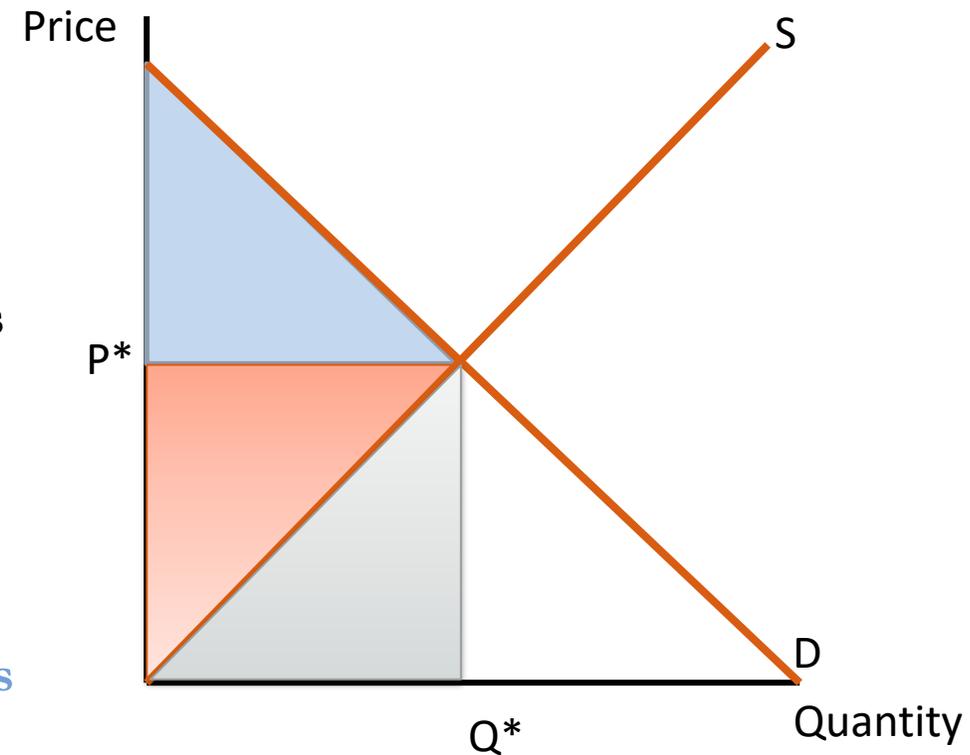
Accounting for Ecosystem Services in Benefit-Cost Analysis

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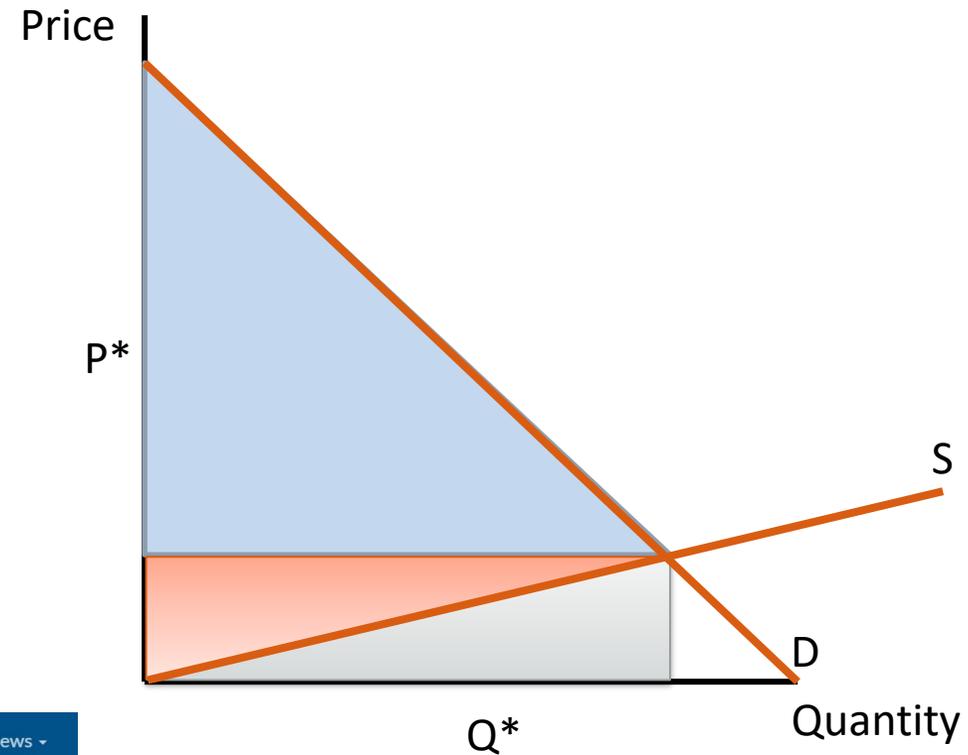
A Note on Valuation in NCA

- The national economic accounts essentially measure $P*Q$
 - Some caveats (e.g., govt. expenditures at cost, imputed owner-occupied housing, etc.)
- Economists care about $P*Q$
 - Describes the observable market transactions (income perspective)
 - A subset of that is essentially **producer surplus** (profit)
- Economists **ALSO** care about **consumer surplus**
 - Policy analysis & welfare
 - Cost-benefit analysis



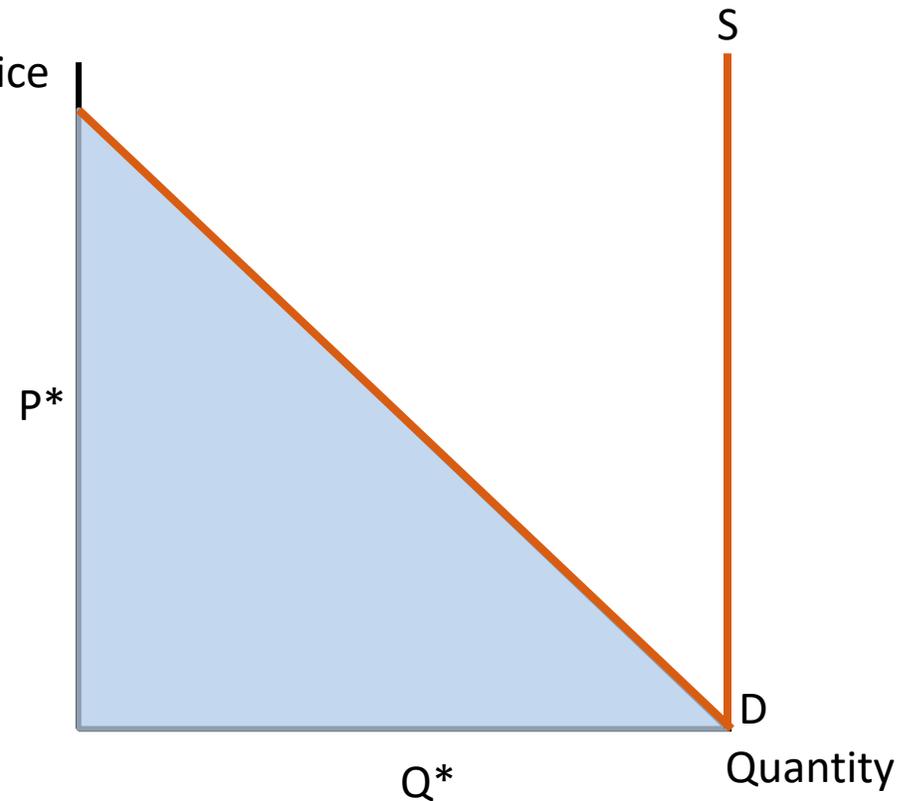
A Note on Valuation in NCA

- But what if consumer surplus is large??
 - We see this a lot in the national accounts (and satellite accounts)



A Note on Valuation in NCA

- But what if consumer surplus is **REALLY** large??
 - We observe this a lot with the environment.
 - *Non-national* accounts valuation
 - Cost-benefit analysis
 - Policy analysis
 - May use WTP measures, etc.
 - Quantities
 - Environmental-economic accounts may measure relevant physical quantities



Thank You!



Additional questions/comments?

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