Standards and Classification –
Final Ecosystem Services, Modular Classification, and a Path for Standardizing Terms and Metrics – the Role of the *National Ecosystem Services Classification System*

Modified deck from:

USGS – Natural Capital Accounting Working Group

October 25, 2016

for

Wageningen Experts Workshop

November 16-18, 2016

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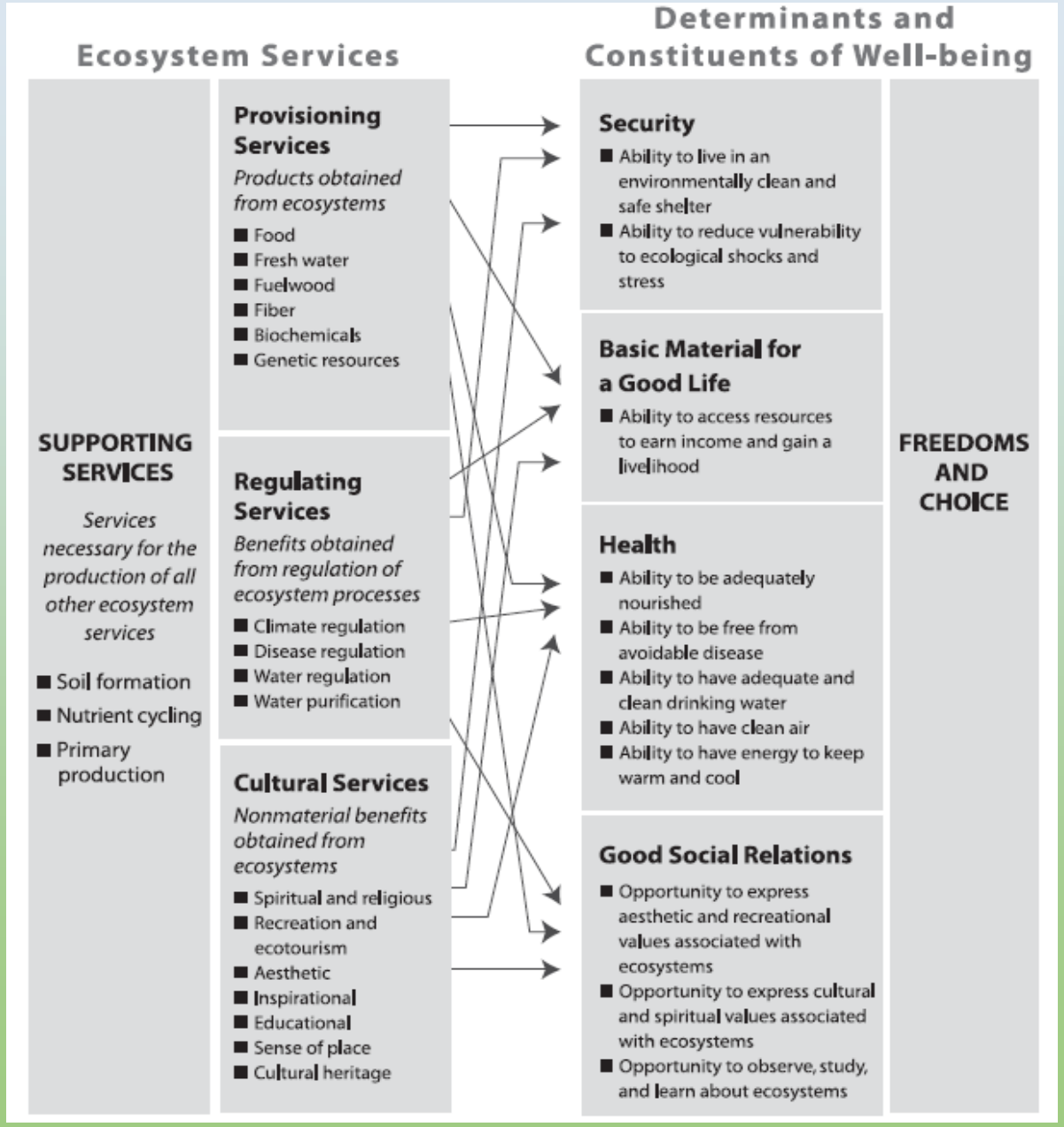
Millennium Ecosystem Assessment Categorization of Ecosystem Services and their Links to Human Well-Being

Source: Millennium Ecosystem Assessment. 2003. Ecosystems and human well-being: a framework for assessment, 266p.



"These categories overlap extensively, and the purpose is not to establish a taxonomy but rather to ensure that the analysis addresses the entire range of services"

(p. 38).

- **Porous categories**
- **Double Counting**

US EPA – Regulatory Policy Needs

- Benefit-Cost Analyses (BCA)
- Adding more ES *cannot* bring poorly identified metrics or double counting into BCA or policy analyses

EPA's ORD, OW, OAR: within constraints of MA's four groups, can researchers derive a set of clear, unique, unduplicated ecological and economic *measures for ES that matter to people and policy*?

Boyd and Banzhaf (2007) indicate a potential way forward:

count only those ES that directly enter the human economy, at the point they do – ***Final Ecosystem Services***

Final Ecosystem Services

At the point they enter human systems "ecological endpoints" have no price – no human pays nature for birdsong, seashells, or soil productivity

Ecosystem Services Perspective and Economics

Final ES are *defined* as not having prices:

- A key information signal between providers (supply) and consumers (demand) in markets is *missing*
- The ES perspective *may*, and Environmental Economic Accounts *do* attempt to model/*mimic*/ approximate a Price-Quantity relationship (equilibrium) for ES

The result *must* be awkward and clunky

Knowing this:

1) careful identification of supply- and demand-*like* elements becomes critical to "modeling success"

2) data may be judged relevant as it informs identified supply- and demand-*like* elements

"Supply" *from* a specific environment | "Demand" *from* specific humans

Approaches to definition and identification of ES (outside of accounting needs) seem to split between:

Those seeking formalization and standardization of ES definitions and identification

- bound to formal analysis
  - marginal/scenario/cost-benefit analyses
- seek long-term tool development
  - "full-spectrum" *identification*
  - precise, reproducible, and specific field *metrics*
  - precise final ES for known users/beneficiaries to *value*
  - common tracking of relevant ES metrics with the *goal* of "allowable" benefits transfer

Ad-hoc pragmatists

- frustrated with slowness of adoption of ES perspective
- focused on limitations of full-scale ES assessment for very few ES
  - 1 to 6 "ecosystem services"
- question the efficacy of formalizing classification

Core Features for a Desirable Final Ecosystem Services Classification System

Exhaustive and Mutually Exclusive

uniquely identifies all **structures, processes, functions, and products of natural systems (separate from human-driven systems) that humans use or appreciate**

Non-Duplicative

focuses attention and measurement **on those ecosystem services that humans use or appreciate directly (*final* versus intermediate *ecosystem services*), *to avoid double-counting***

Practical for Users

groups or separates candidate elements in a way easy to conceive and use, with clear definitions, and rules for classifying that appeal across disciplines and users –
avoiding overwhelming complexity, confusion, fuzzy classification boundaries, and thus avoiding divergent choices for similar cases by similar users

Helpful for Selecting Appropriate Metrics

uniquely identifying **the environment, the precise flows of ecosystem services, the users, and how they use the ES, all**
help to determine what ecologists and economists should measure

Wish List:

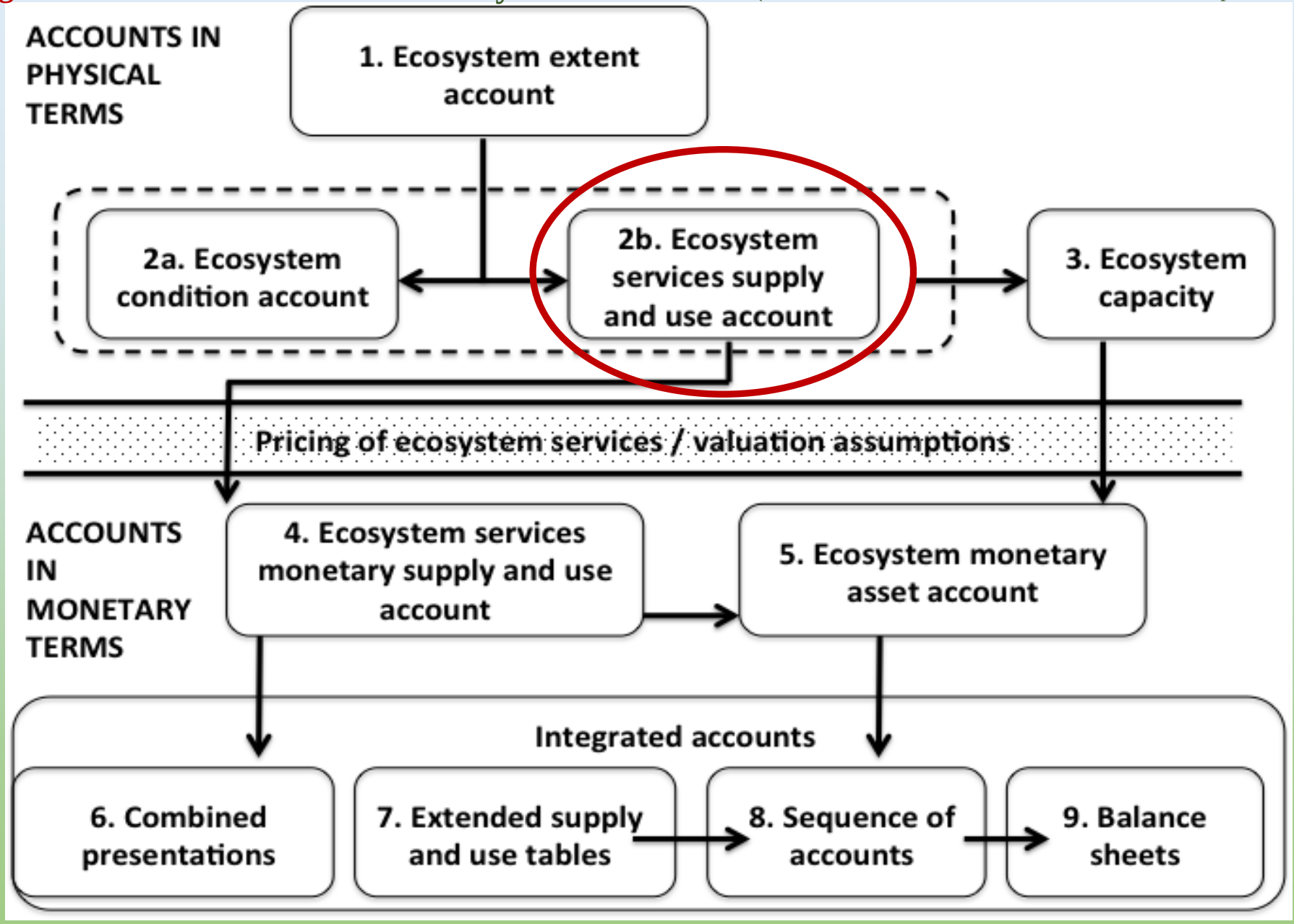
Modular

a "bonus" for practical use, if system interfaces with other standard classification systems or ecosystem service tools without extensive exceptions and patching

Appropriate to be a Standard

a "bonus" for practical use, if system is stable, its rules for use are well-explained, and it is practical enough to serve as the standard for many types of applications

Figure 4.1 Connections between ecosystem accounts (SEEA-EEA Technical Rec.s, Consultation Draft, p. 31, Dec15)



"NB: The dotted line around boxes 2a and 2b indicates that the development of these two accounts may often be completed in parallel, and iteration between them is appropriate in developing a single best picture."

- **Identification / Classification**
  - **Quantification and Measures**
    - **Valuation and Monetization**


Common International Classification of Ecosystem Services (CICES): Consultation on Version 4, August-December 2012

Report to the European Environment Agency

Revised January 2013

EEA Framework Contract No: EEA/IEA/09/003

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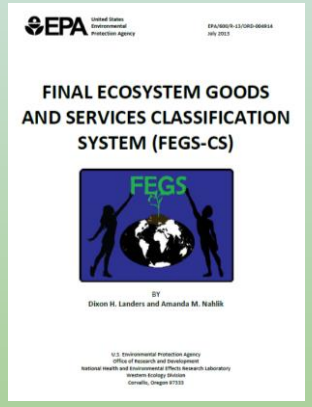
CEM

The Common International Classification of Ecosystem Services

CICES http://cices.eu


EPA United States Environmental Protection Agency

EPA/600/R-13/ORD-004914
July 2013

FINAL ECOSYSTEM GOODS AND SERVICES CLASSIFICATION SYSTEM (FEGS-CS)

FEGS

BY
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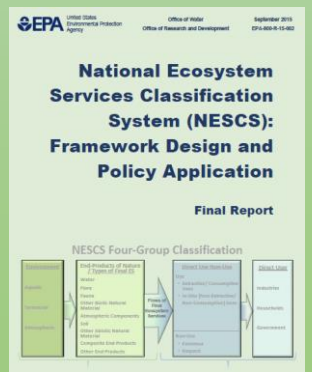
U.S. Environmental Protection Agency
Office of Research and Development
National Health and Environmental Effects Research Laboratory
Western Ecology Division
Corvallis, Oregon 97333

The Final Ecosystem Goods and Services Classification System

FEGS-CS Published EPA Report: EPA/600/R-13/ORD-004914

Interactive FEGS-CS website at http://gispub4.epa.gov/FEGS


EPA United States Environmental Protection Agency

Office of Water
Office of Research and Development

September 2015
EPA-800-R-15-002

National Ecosystem Services Classification System (NESCS): Framework Design and Policy Application

Final Report

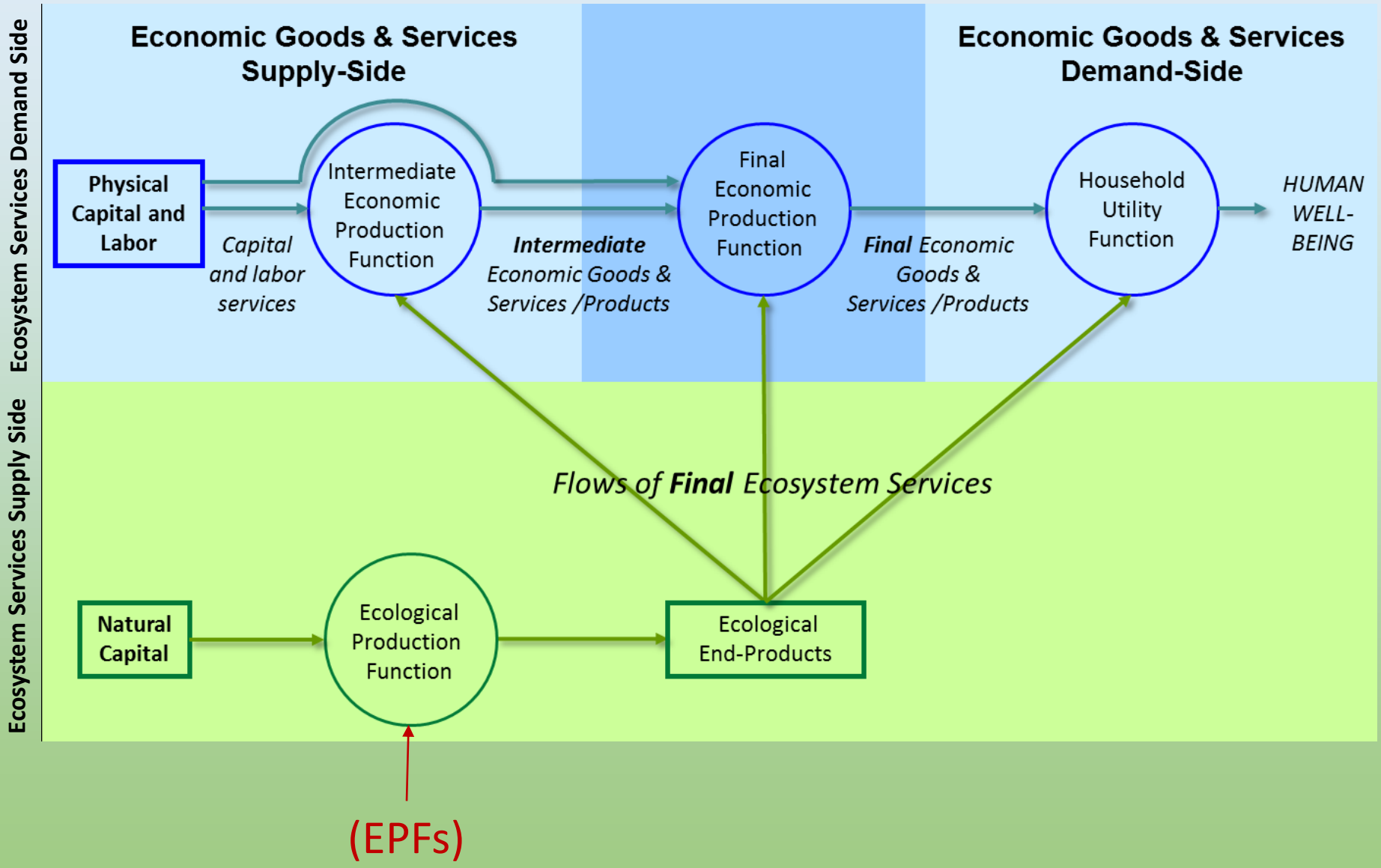
NESCS Four-Group Classification

The National Ecosystem Services Classification System

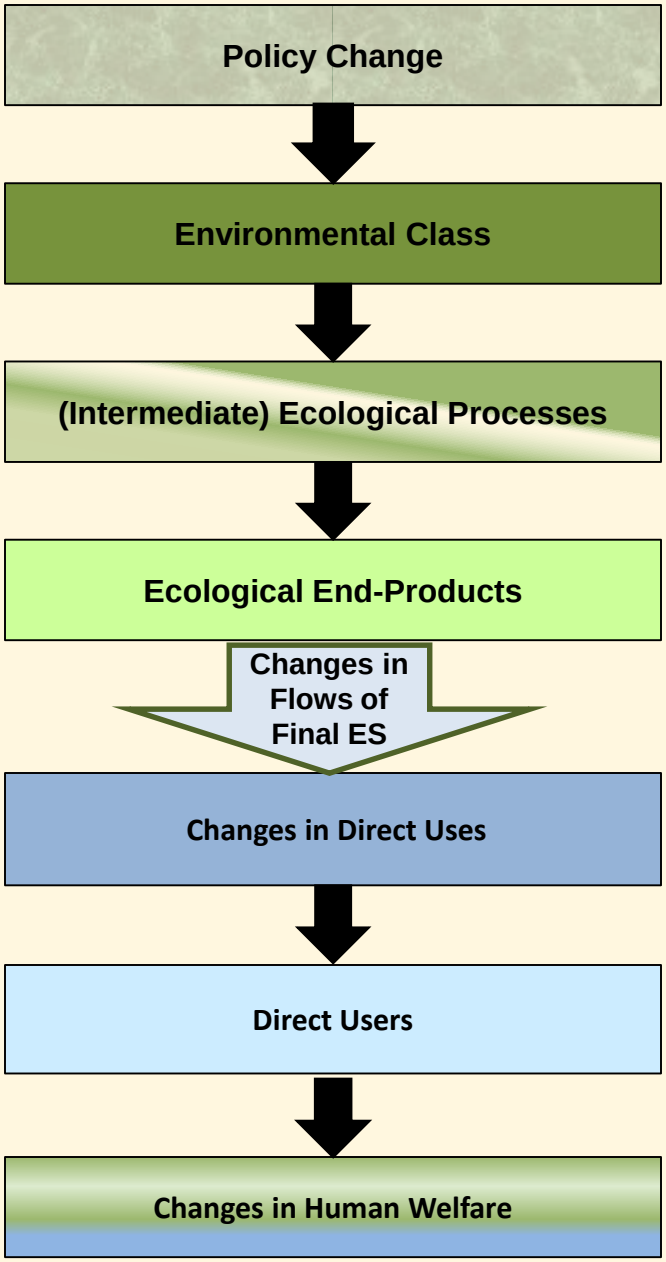
NESCS Published EPA Report: EPA-800-R-15-002

http://www.epa.gov/eco-research/ecosystems-services

The NESCS Conceptual Framework – The "Blue-Green Diagram"



Pathway Linking Policy Changes to Human Well-Being



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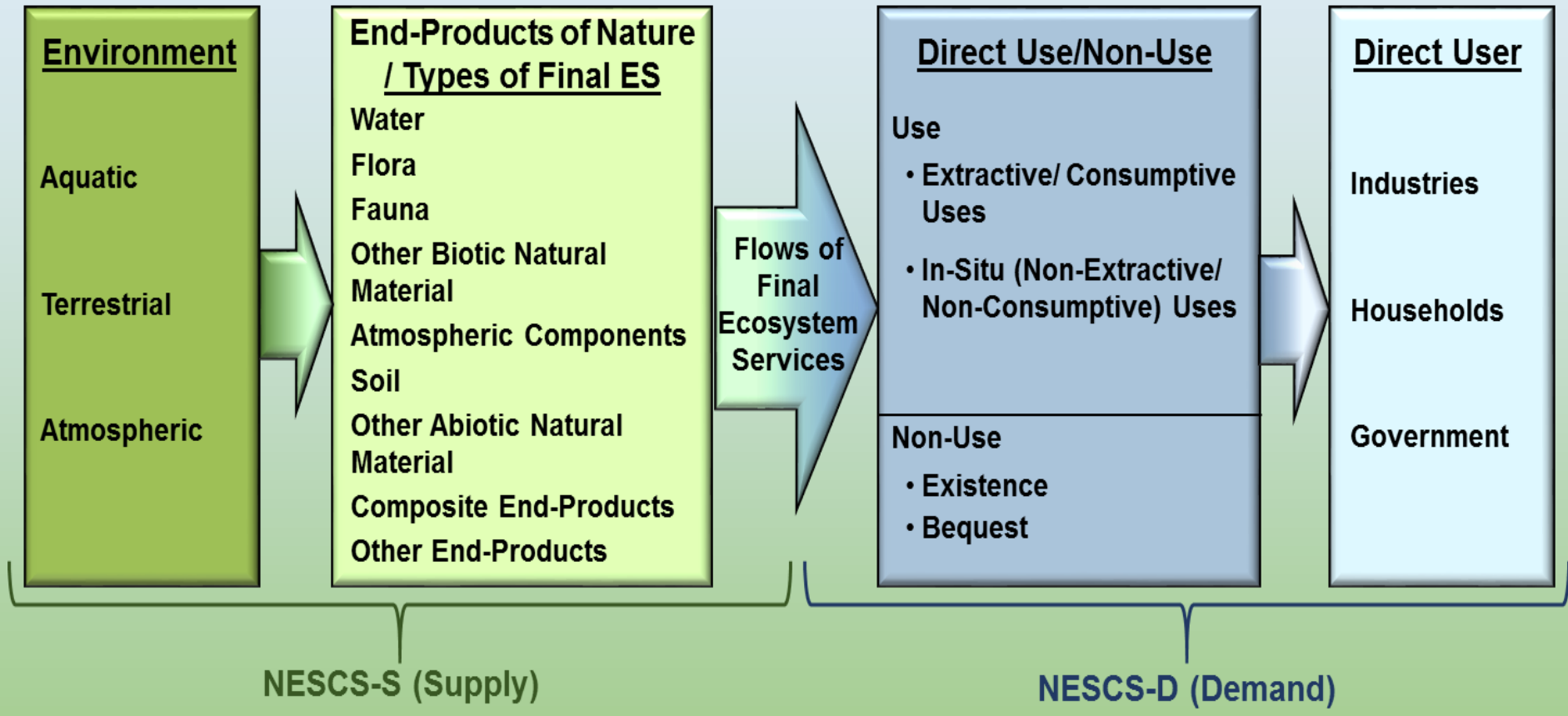
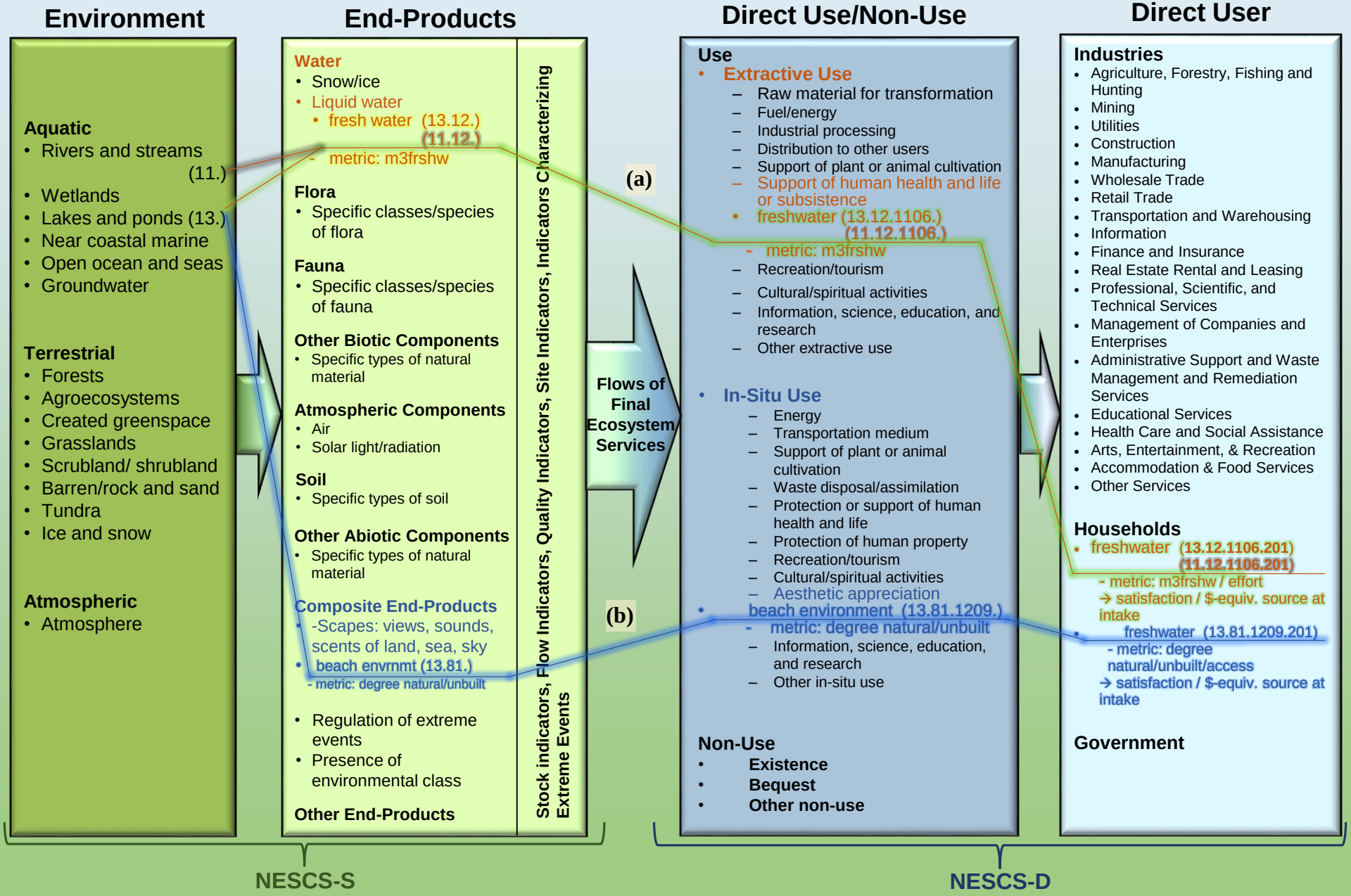
NESCS Four-Group Classification Structure (condensed)



Proposed 4-Group NESCS Structure – "Wiring Diagram" with Proposed Metrics By Group

Example: (a) lake, river, or stream water for drinking – m^3 fresh water (m3frshw)

(b) same water in composite viewing environment – degree natural/unbuilt



Understanding NESCS
in contrast to other Tools and Approaches

- **The NESCS is *NOT* a list –**
  - the 4-Group Structure and Guidelines for Use (under construction) provide a framework, operators, and general rules
  - can be used to make a list for any application, but there is little use for a comprehensive list (which could include *thousands* of potential FFES)
- **Final ES are *NOT* in any of the 4-Group Structure columns or tables**
- **The NESCS does *NOT* – do any economic valuation**

Understanding NESCS
in contrast to other Tools and Approaches

- **The NESCS is a *modular* (final) ES identification tool**
- **The NESCS looks *outside* of its own framework, structure, and rules for:**
  - ***Ecological Production Functions*** –
    to describe/project dynamics of *FFES* from an area, over time, and in response to exogenous influences
  - **all *final* selection of metrics, indicators, and qualitative or quantitative measures;**
    proper use of NESCS can guide choices, not make them
  - **stakeholders vet the *appropriate set* of identifiable FFES**
    and the appropriate subsets for environmental measurement and for valuation
  - ***choosing which* research and methodology gaps –**
    to improve future ES assessment efforts

Status and Outstanding Questions in 3-Systems" work with UNSD

- UN Statistics Division seeks most of the same 6 Core features for ES-CS that the 3 Systems claim to fulfill (Exhaustive and Mutually Exclusive, Non-Duplicative, Practical for Users, Helpful for Selecting Appropriate Metrics, Modular, Appropriate to be a Standard)
  - "Practical for Users" may include business accounting needs?
- Many desirable features seem to overlap
- Reporting needs do differ from (scenario/marginal analysis/) policy needs
  - can't have elements in an ES-CS for SEEA EEA already in SEEA CF?
  - accountants must have some version of product classification?
- Ecosystem accounting vs. ecosystem services accounting

Is a single (final) ES classification system possible?
Is it appropriate?
How would or could we break path dependency?