A Classification System for Final Ecosystem Goods and Services

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Humans Define and Classify Items of Importance in Order to Communicate

Chauvet Cave in the valley of the Ardèche River in France, 30,000-32,000 BP

Summary

We started looking at ecosystem services using the 2005 Millennium Assessment *approach*, but we found it deficient in several ways, therefore we developed the Final Ecosystem Goods and Services Classification System, that has proven to be an important advancement.

DESIRED CHARACTERISTICS OF AN Ecosystem Services CLASSIFICATION SYSTEM:

[proposed by collaborating social scientists]

Complete

Non-duplicative

Facilitates metrics

Links with beneficiary (HWB)

FEGS

"components of nature, directly enjoyed, consumed, or used to yield human well-being" *(Boyd & Banzhaf 2007)*

Environmental Class **+** Beneficiary ➜ FEGS

Estuaries and Near Shore Marine
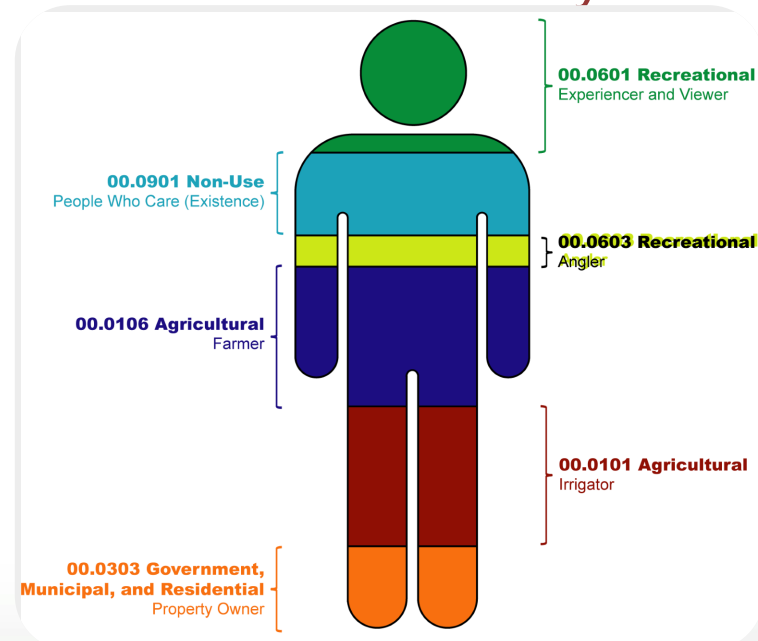
Recreational Food Pickers and Gatherers

Flora and fauna, such as mussels, seaweed, crabs, etc.

Beneficiary Categories

> "components of nature, directly enjoyed, consumed, or used to yield human well-being" *(Boyd & Banzhaf 2007)*

- Beneficiaries are the interests of an individual

- Synonymous with uses, households, or firms

- People are made up of multiple beneficiaries

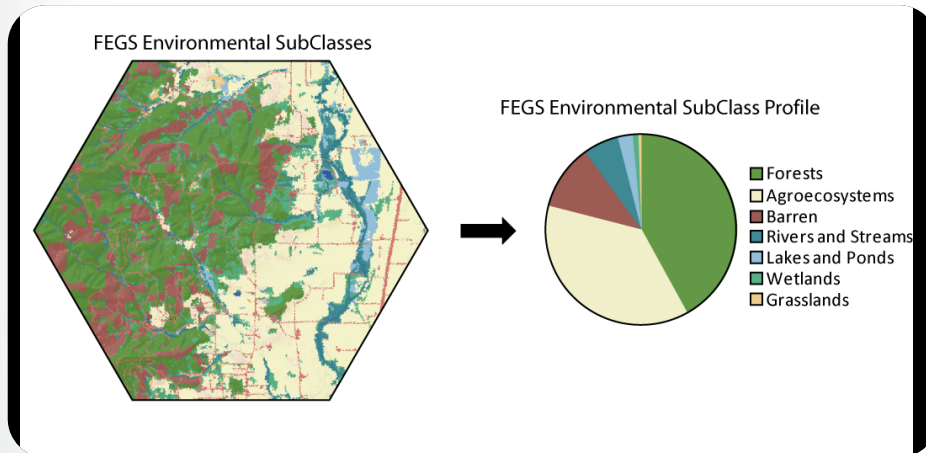- Identified 37 Beneficiary Sub-Categories

Beneficiary

00.0601 Recreational
Experiencer and Viewer

00.0901 Non-Use
People Who Care (Existence)

00.0603 Recreational
Angler

00.0106 Agricultural
Farmer

00.0101 Agricultural
Irrigator

00.0303 Government, Municipal, and Residential
Property Owner

Environmental Classes

"**components of nature**, directly enjoyed, consumed, or used to yield human well-being" *(Boyd & Banzhaf 2007)*

Environmental Class

FEGS Environmental SubClasses

FEGS Environmental SubClass Profile

- Forests
- Agroecosystems
- Barren
- Rivers and Streams
- Lakes and Ponds
- Wetlands
- Grasslands

- 15 Environmental Sub-Classes

- Facilitate classification of any area in the world

- Boundaries can be identified and mapped using satellite (mostly)

Environmental Classes

1. AQUATIC
   11. Rivers and Streams
   12. Wetlands
   13. Lakes and Ponds
   14. Estuaries and Near Coastal and Marine
   15. Open Oceans and Seas
   16. Groundwater

...include (but are not limited to)
- saline lakes
- reservoirs
- quarries

...include (but are not limited to)
- rechargeable aquifers
- geysers
- water in caves

2. TERRESTRIAL
   21. Forests
   22. Agroecosystems
   23. Created Greenspace
   24. Grasslands
   25. Scrubland / Shrubland
   26. Barren / Rock and Sand
   27. Tundra
   28. Ice and Snow

...include (but are not limited to)
- uncut and wilderness area forests
- rainforests
- woodlots

...include (but are not limited to)
- parks, parkways, trees
- cemeteries and airfields
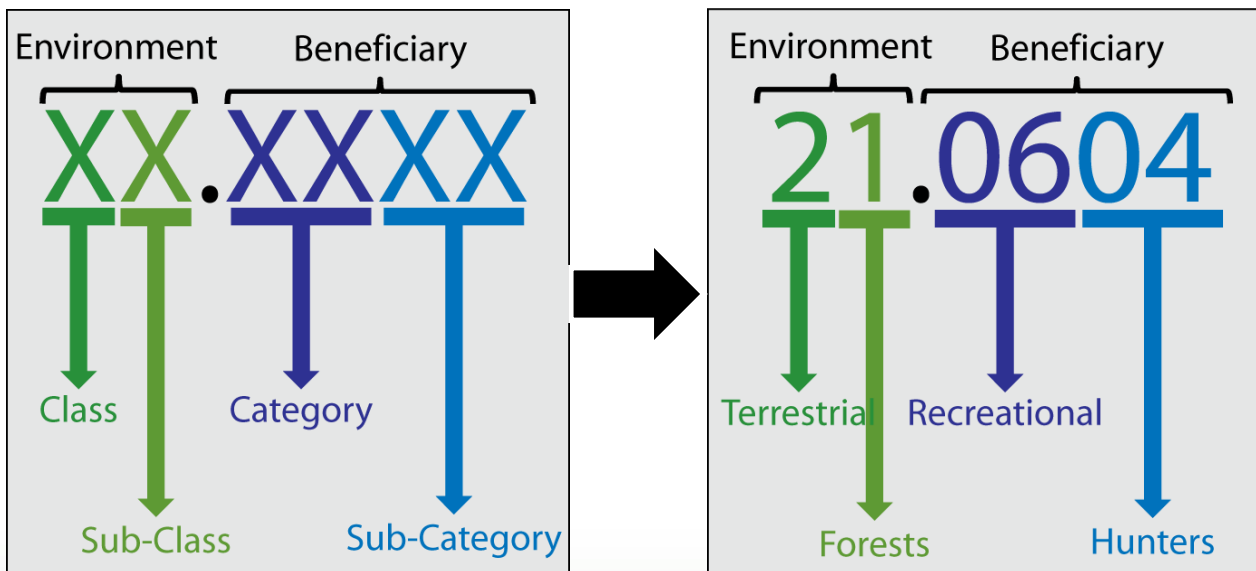- lawns and golf courses

...include (but are not limited to)
- abandoned (dry) quarries
- dry desert
- beaches, unvegetated dunes

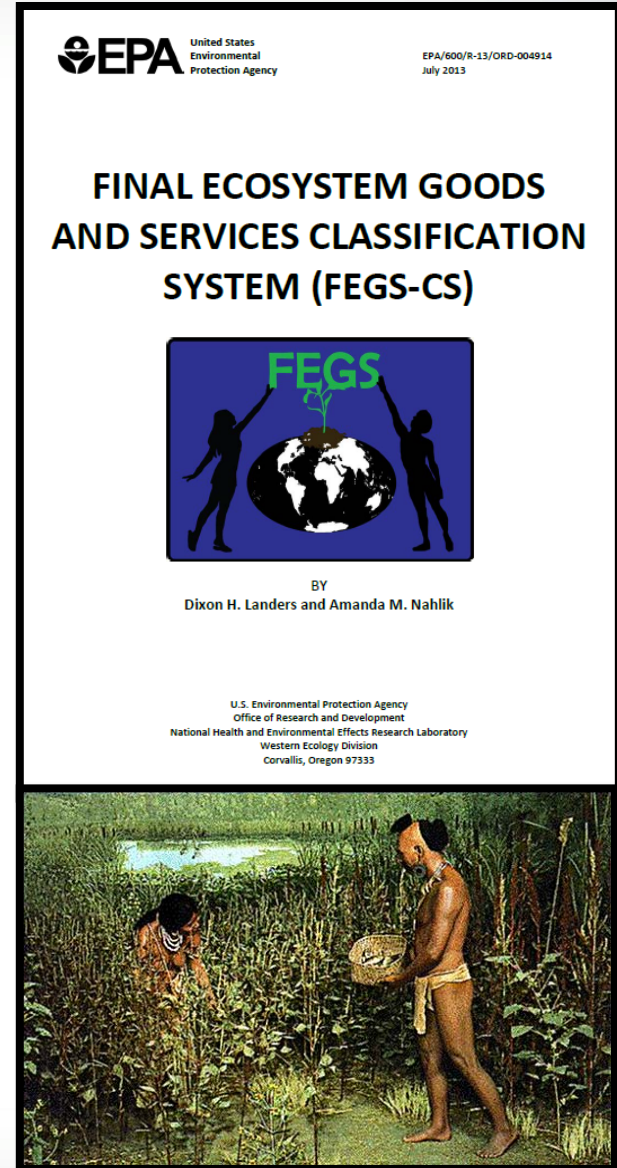## 3. ATMOSPHERIC
   31. Atmosphere
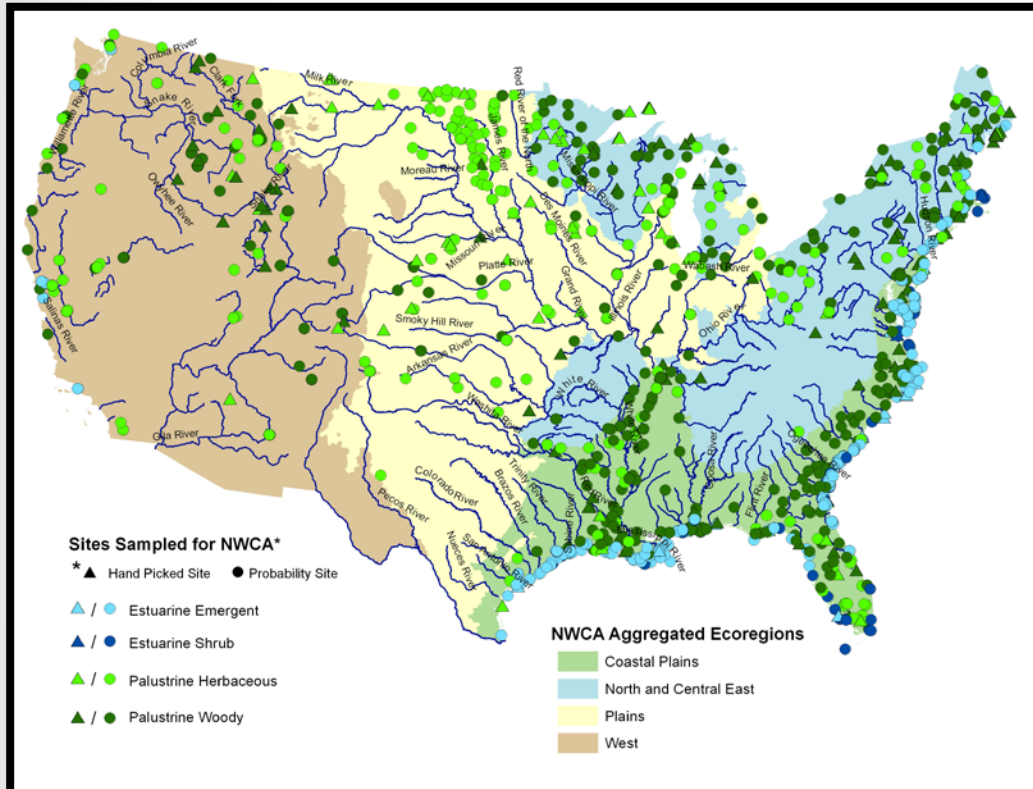
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Our Classification Scheme

Using FEGS-CS to Identify the Final Ecosystem Goods and Services

- Environmental Class
  - ▷ *12. Wetlands*
- Beneficiary Category
  - ▷ *12.05 Subsistence*
- Beneficiary Subcategory
  - ▷ *12.0505 Traditional Medicine Subsisters*
- FEGS Categories
  - ▷ *02 Flora*
  - ▷ *04 Fauna*

http://gispub4.epa.gov/FEGS

⊛EPA United States Environmental Protection Agency

EPA/600/R-13/ORD-004914
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FINAL ECOSYSTEM GOODS AND SERVICES CLASSIFICATION SYSTEM (FEGS-CS)

BY
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Opportunity to use Existing Data from NWCA

Sites Sampled for NWCA*
* ▲ Hand Picked Site ● Probability Site
△ / ○ Estuarine Emergent
▲ / ● Estuarine Shrub
△ / ○ Palustrine Herbaceous
▲ / ● Palustrine Woody

NWCA Aggregated Ecoregions
- Coastal Plains
- North and Central East
- Plains
- West

- 1138 sites were sampled using a stratified-random, probabilistic sampling design
  - ▷ *Plant species richness and relative cover data were collected in the field in 2011*

- Each plant species was cross-referenced with University of Michigan's *Native American Ethnobotany* database
  - ▷ *Any plant species identified as being used for drugs, medicines, pharmaceuticals, or supplements were considered a potential FEGS for the Traditional Medicine Subsister beneficiary*

Descriptive Results

- Potential FEGS to Traditional Medicine Subsisters are provided by a very high percentage of wetlands throughout the Nation.

  ▷ *96.6% of wetland area in the nation has at least one plant species associated with medicinal use*

  ▷ *Median number of medicinal plant species per site is 18.*

  ▷ *Maximum number of medicinal plant species per site is 88.*

- ◈ Medicinal plant species are largely

  ▷ *Native species,*

  ▷ *Forbs and woody plant types, and*

  ▷ *Facultative wetland species.*

Number of Plant Species
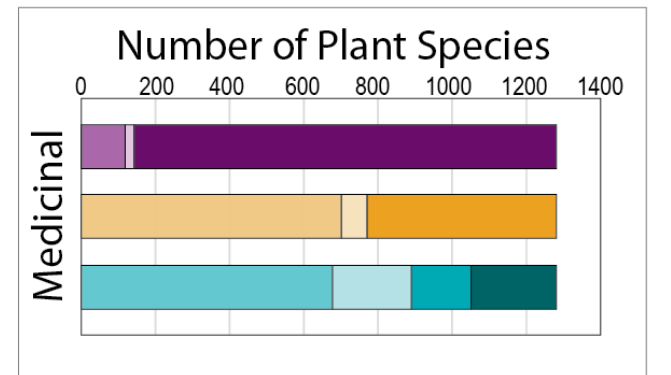
Native Status
- Nonnative
- Mixed
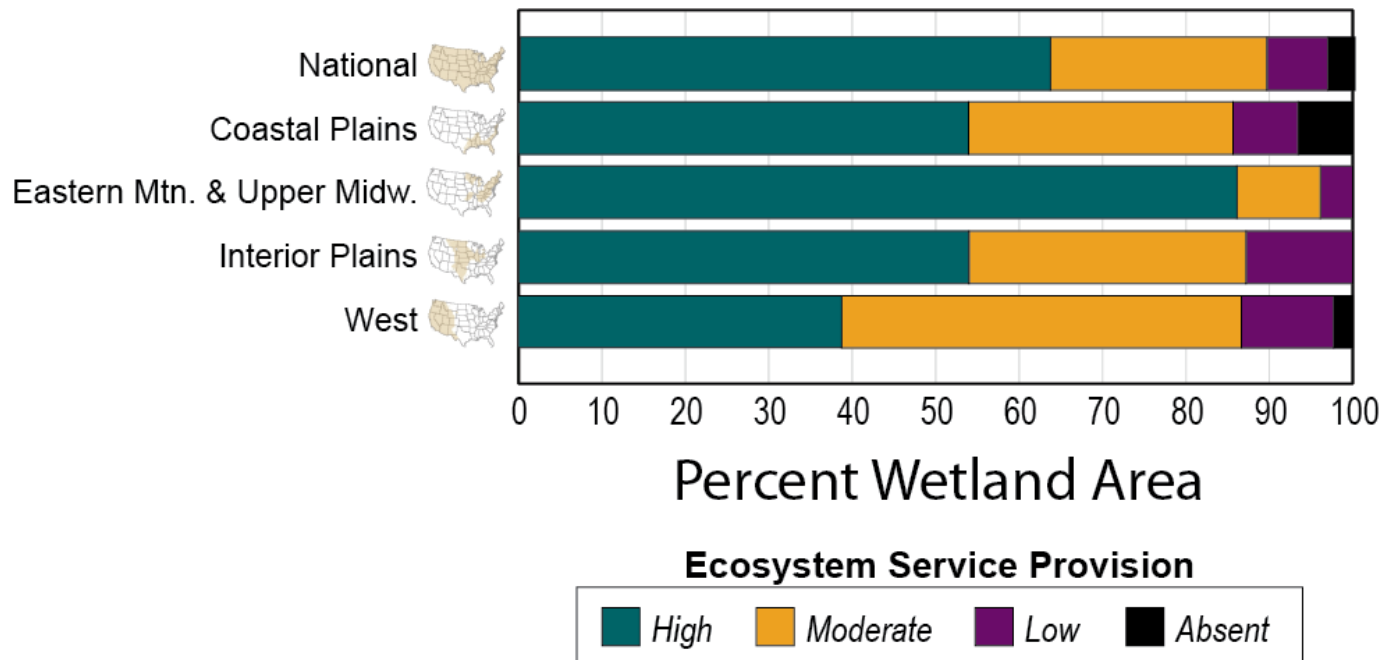- Native

Growth Habit
- Forb
- Graminoid
- Woody

Wetland Indicator Status
- Facultative
- Mixed
- Obligate
- Upland

EPA

National and Regional Results

- Potential FEGS to Traditional Medicine Subsisters are provided by a very high percentage of wetlands throughout the Nation.
  - ▷ *96.6% of wetland area in the nation has at least one plant species associated with medicinal use*

Identifying FEGS

- By using the FEGS approach, an infinite list of ecosystem services was pared down to 338 FEGS

- FEGS-CS is an operational framework that standardizes identification of ecosystem services at multiple spatial scales

- Published EPA Report
  - *Available at* cfpub.epa.gov/si/
  - *EPA/600/R-13/ORD-004914*

- Interactive FEGS-CS website (LIVE!)
     http://gispub4.epa.gov/FEGS
  - *Create and download custom checklists of potential FEGS*
  - *Link with EnviroAtlas, mapping and models*
  - *Provide comments to the authors*
  - *Participate in forum discussions*

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