

# NATIONAL ECOSYSTEM SERVICES CLASSIFICATION SYSTEM (NESCS)

The term *ecosystem services (ES)* suggests society consider accounting for benefits from nature that we tend to overlook or undervalue. The term may seem to have come into common use, but it has not really, because definitions are not consistent or precise enough to identify what different entities mean when they use it (Nahlik et al., 2012).

Standardizing a definition of ecosystem services requires a tight classification system that appeals to multiple users. Establishing a common vocabulary would accelerate measurement and valuation of ES, simplify attempts to unify metrics and outcomes across quantitative analyses, and increase the speed with which policy makers can apply the ES concept.

Boyd and Banzhaf (2007) bring to the debate over ES definition a perspective from economic accounting designed to prevent double counting. They separate *intermediary* ES, from *final* ecosystem services that directly pass to the human value system.

Nature decomposes trees. But counting decomposition as an ES separate from wild mushrooms on a decomposing tree, when *only* the mushrooms are *directly valued* by a user, double counts just as if one counts the labor in a tire twice when costing out the labor in a finished car. This is an important consideration in ES classification, as many *potential* “ES” span multiple processes, and can easily cluster in different types.

Focusing measurement and valuation efforts on those ES at the hand-off point between ecological production and human use or appreciation does not ignore intermediate natural processes – whose dynamics must be appreciated in any comprehensive evaluation – it simply avoids double counting.

The National Ecosystem Services Classification System (**NESCS**) systematically maps distinct pathways by which final ES enter and find value in human systems. Accurate mapping through mutually exclusive categories allows the separate calculation of one set of final ES against another – offering policy makers a tool to gauge how welfare effects differ between one environmental management option and another. A policy change affects an environment and its ES processes, which changes the profile of final ES, which NESCS maps to the direct uses and users in the economy, for ultimate welfare changes. This allows policy analysis according to incremental changes in relevant factors, an approach common in many economic analyses.

By design, NESCS aligns end categories of uses and users with the main economic classification system in North America, the North American Industry Classification System (**NAICS**, and its production-side sibling, **NAPCS**, that is organized by Product rather than by Industry). Thus, while the “pathway-mapping” NESCS provides is its own contribution, NESCS also

classifies results in a way useful to those seeking to expand industrial accounting to “green” applications.

If we consider natural environments and their processes to yield candidate “ES,” these may be seen as “supply-side” elements, across from which would be the human-valued “demand-side” elements.

Supply-side elements provide the linking categories and components entering the NESCS, and demand-side elements provide the linking categories and components exiting the NESCS. By “Use/User”, NESCS output can designate codes compatible with NAICS/NAPCS – so a compatible standardized demand-side classification structure exists.

NESCS looks to the FEGS-CS from Landers and Nahlik (2013) for a “supply-side” classification system with carefully defined environmental sub-classes and ES components that are discrete and final. The FEGS-CS identifies “specific biophysical components of [ES] goods and services... principally derived from nature across...[a] landscape... ”

NESCS thus matches to external classification systems on the supply and demand sides. NESCS itself comprises a four-part structure, with two “supply-side” parts (NESCS-S), and two “demand-side” parts (NESCS-D). The (nested hierarchical) structure is flexible – detail and sub-levels may be added, and aggregating to different levels is accommodated.

The first part, *Environment*, identifies environmental classes and sub-classes. The second part, *End-products of nature*, lists by type the biophysical components of nature that are directly used or appreciated by humans. The third part, *Direct Use/Non-Use*, begins the NESCS-D structure, with use/non-use categories for how end-products are used by humans, and continues through consumptive/extractive and non-consumptive uses. The fourth part, *Direct User*, has categories and sub-categories representing economic sectors that directly use (or have non-use values for) end-products of nature, or final ES.

Final ecosystem services flows are represented by the connection from end-products to human uses, i.e., from the last NESCS-S part to the first NESCS-D part. Each combination of environmental class, end product, use, and user identifies a unique *potential* pathway for linking policy changes with human welfare. Different four-part combinations through the levels and sub-levels identify multiple mutually exclusive pathways. The

NESCS structure allows for the same end product to be used in multiple ways and allows for the same use to be linked to different sectors. For example, recreational uses can benefit households directly (recreational anglers) or benefit the production processes of the transportation sector (tourism and sightseeing).

A recent EPA-sponsored workshop attended by many organizations served as a proof-of-concept rollout of NESCS. A methodology report is forthcoming. The NESCS team is seeking to establish a forum that will assist in continuing the build-out of the structure, while identifying metrics for quantification and valuation, and bringing together related databases. Building a user-friendly NESCS software to inform policy analysis is a continuing objective.

**FOR MORE INFORMATION:**

NESCS website, including September, 2013 workshop materials:

[water.epa.gov/learn/confworkshop/NESCS.cfm](http://water.epa.gov/learn/confworkshop/NESCS.cfm)

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Landers, DH, and Nahlik, AM. 2013. *Final Ecosystem Goods and Services Classification System (FEGS-CS)*. EPA/600/R-13/ORD-004914. U.S. Environmental Protection Agency, Office of Research and Development, Washington, DC.

Nahlik, AM, Kentula, ME, Fennessy, MS, and Landers, DH. 2012. Where is the consensus? A proposed foundation for moving ecosystem service concepts into practice. *Ecological Economics*, 77:27-35.

**4-Part NESCS Structure**

