



Prepared For:



US EPA Classification System for Final Ecosystem Goods and Services

Implications for Corporations

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INTRODUCTION

The USEPA has developed the Final Ecosystem Goods and Services Classification System (FECS-CS) as a step towards providing a framework and common language for evaluating ecosystem goods and services. It is a research document not associated with a particular regulatory program and so does not currently represent an official standard.

However, in areas such as ecological and human health risk assessments, these types of USEPA documents have steered the direction of future regulatory actions. The FECS-CS could become the de facto standard for classifying and ultimately valuing ecosystem services and natural capital. For example, the USEPA Offices of Water and of Air and Radiation are considering using the FECS-CS in their cost-benefit analyses.

Given the potential for the FECS-CS to be applied in a variety of regulatory contexts as the standard for ecosystem valuation, corporations should understand the system and its potential uses, limitations, and reach.

This white paper provides a brief summary of the proposed USEPA FECS-CS and describes the pros and cons it poses for corporations. Our general conclusions are:

- The FECS-CS is an improvement over past classification systems because it appropriately shifts the focus to measuring the value ecosystems provide to people and provides a useful lexicon for discussing the valuation of ecosystem services.
- FECS-CS could be a useful framework for jointly considering environmental and social impacts in decision making. It could be valuable for developing procedures to comply with both in-house and externally required analyses of the impact of corporate activities (e.g., compliance with IFC Standards).
- Although it may not have been the primary intent, the FECS-CS provides a framework for analyzing so-called credit stacking. The framework clearly shows there are multiple beneficiaries from a single environmental resource, such as a wetland, that should be included in measuring total credit value. Well-defined ecosystem markets could provide new revenue opportunities for many corporations.

Potential Uses of FECS Classification System – Financial reporting requirements/guidelines:

- International Finance Corporation (IFC) Reporting Standards
- The International Integrated Reporting Council (IIRC)
- Sustainability Accounting Standards Board (SASB)
- World Federation of Exchanges (WFE)
- Benefit/cost analyses of environmental regulations by federal/state agencies
- Sustainability reporting by Global Reporting Initiative (GRI) and other groups
- Due diligence reviews by investors and lenders
- Environmental liability estimates in the USA and Europe

- The framework would include the value of ecosystem services to so-called non-users. The techniques for measuring non-use values are at best controversial. While the FEES-CS appears to limit non-use values only to people who know about the service, the inclusion of non-use values is incompatible with the goal of reducing double-counting in ecosystem service valuation and of measuring things that people “consume, use or enjoy”. Non-use values are also incompatible with monetary values included in national income accounts and financial statements.
- There is some risk the FEES-CS could become an additional reporting framework, not a replacement for existing approaches. The FEES-CS is a valid approach for valuing ecosystem services and natural capital. However, it is incompatible with other corporate reporting, such as impacts on biodiversity and greenhouse gas (GHG) emissions.
- The FEES-CS could affect measuring liabilities from oil spills and non-permitted hazardous substance releases. If companies measure the value of their impacts and dependencies on natural capital, the results of such measurements, even if conducted for internal use, could affect liability from releases. Moreover, FEES-CS could require more extensive liability assessments than current practice (e.g., ecological production functions).
- FEES-CS could be used for regulatory and permitting requirements. New laws mandating the use of ecosystem service concepts are unlikely; however, agencies have wide discretion in how existing laws are implemented. For example, ecosystem service impacts, measured by FEES-CS, might be used in TMDLs, perhaps in setting targets, assessment of program success, or monitoring for compliance.
- As the FEES-CS notes, a critical next step is road testing the FEES-CS in a variety of contexts. Of particular interest would be using it in place of the other classification systems that are currently used in ecosystem service screening tools for corporations, measuring the total value of credits in ecosystem markets, and measuring the private and social value of green infrastructure.

DESCRIPTION OF THE FECS-CS

The goal of valuing ecosystem services is to ensure that the contributions of these services to creating economic value are accurately reflected in private and public decision-making. For example, a river may provide regional opportunities for fishing, swimming, and birding, drinking water to a town, and cooling water to a power plant. These ecosystem services are valuable, but it is difficult to quantify their value to communities and industry. How does the owner of a manufacturing plant know its water use is economically viable in the long run? How do we manage the competing uses of a river to maximize long-term benefits to a variety of stakeholders? Quantifying and monetizing ecosystem services can help answer such questions.

The goal of the FECS-CS is to provide the first comprehensive classification system for ecosystem services designed to facilitate measurement and valuation. It is written for “individuals, communities, or firms in the public sector, private sector, and non-profit organizations that wish to measure, quantify, map, model, and/or value a standard, but complete, set of ecosystem services anywhere on earth” (Landers and Nahlik 2013). At the very least, the authors hope the document will create a common language among stakeholders for discussing and evaluating ecosystem services.

The first step is defining final ecosystem goods and services. The authors use a definition that fits well with economic (and business) models. FECS are defined as the components of nature that are directly enjoyed, consumed, or used to yield human well-being. They are also derived primarily environmentally without significant human input, and are the last step in the ecological production function before the user interacts with the ecosystem.

The FECS-CS definitions have important implications. First, they distinguish final *ecosystem* goods and services from general final goods and services, as the latter often include significant labor and capital investment by humans. Second, they prevent double-counting so that the FECS-CS will categorize (and ultimately value) only final ecosystem goods and services, rather than the intermediate goods and services that help produce the FECS. In other words, the system will categorize as final the fish that are caught, not the benthic invertebrates that feed the fish that are caught.

More explicitly, the FECS-CS proposes a set of seven “boundary principles” for determining FECS. These include:

Final and Intermediate Services – The Case for Automobiles

By way of analogy, a car is a complex entity and the role of each part is not known by most drivers. Drivers do experience and value speed and safety (final services), even if they don't know how various parts in an engine, transmission or suspension provide these (via intermediate services.)

Many current ecosystem service classifications include a mixture of final and intermediate services, which results in an overestimate of value.

- Cannot be intermediate ecological functions and structures that are not directly valued by beneficiaries, even if they are critical to a healthy ecosystem.
- Must be directly connected to the natural, not built, environment (i.e., both the lithosphere and hydrosphere).
- Must be self-sustaining in the environment, minimally dependent on human inputs.
- Policy endpoints are not FEES (e.g., endangered bird species protection).
- Incidental non-marketed environmental by-products of intensively produced goods and services may be FEES (e.g., vistas of agricultural lands, game associated with farmland).
- Increased value or happiness is not a FEES.
- The environment itself can be a FEES (i.e., presence of the environment).

Applying these principles results in 21 unique FEES categories (see Figure 1). The list seems reasonable and appropriate, although it will take considerable research to determine which categories become important for valuation purposes. Before describing the FEES in more detail it is worth considering what is not a FEES:

- Stocked fish, because they are not self-sustaining in the environment;
- Oil, coal and minerals, because they are not renewable;
- Crops, because they require significant human investment;
- Biodiversity, because people enjoy and use its effect on ecosystems, not biodiversity directly; and
- Carbon sequestration, because people do not directly know about, consume or directly benefit from it, but through its impact on water, land, and weather.

Specific FEES are classified using two components: environmental class and beneficiary category. The environmental class addresses the landscape where the FEES occurs (i.e., aquatic, terrestrial, and atmospheric), and the beneficiary category addresses the group of people who benefit from the FEES. There are also environmental sub-classes and beneficiary sub-categories, allowing for greater levels of detail. Each identified FEES is tied to an environmental subclass and a beneficiary subclass (see Figure 1), creating 358 unique FEES codes. Ultimately, the goal is to estimate the monetary value of each of the 358 categories.

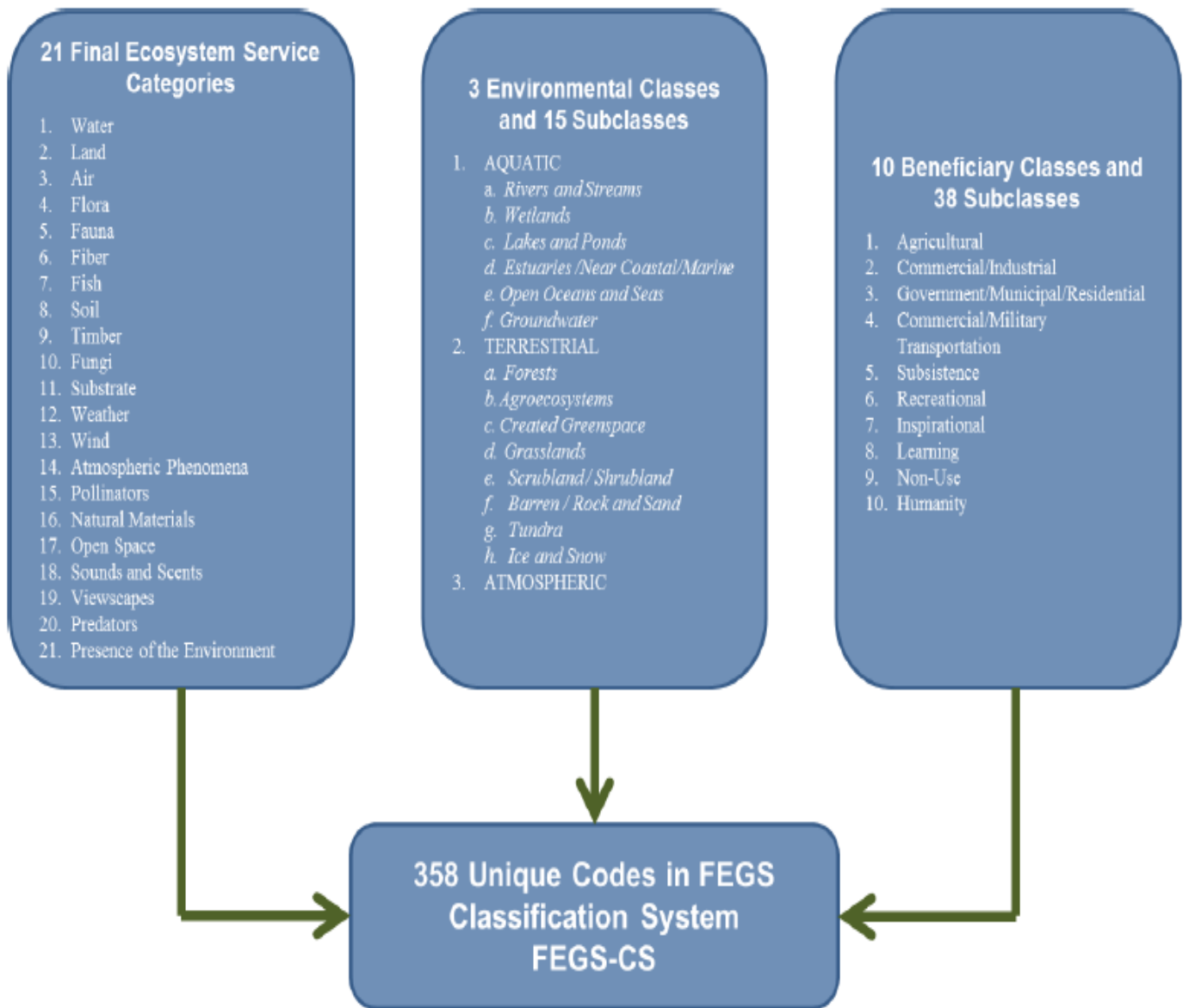


FIGURE 1 - FECS-CS

CATEGORIES AND CLASSES

Corporations are a key beneficiary group. They could be in several classes, including agricultural and commercial/military transportation, but appear most prominently in commercial/industrial. The sub-categories in this category include:

- Food extractors
- Timber, fiber, and ornamental extractors
- Industrial processors
- Industrial dischargers
- Electric and other energy generators
- Resource-dependent businesses
- Pharmaceutical and food supplement suppliers
- Fur/hide trappers and hunters

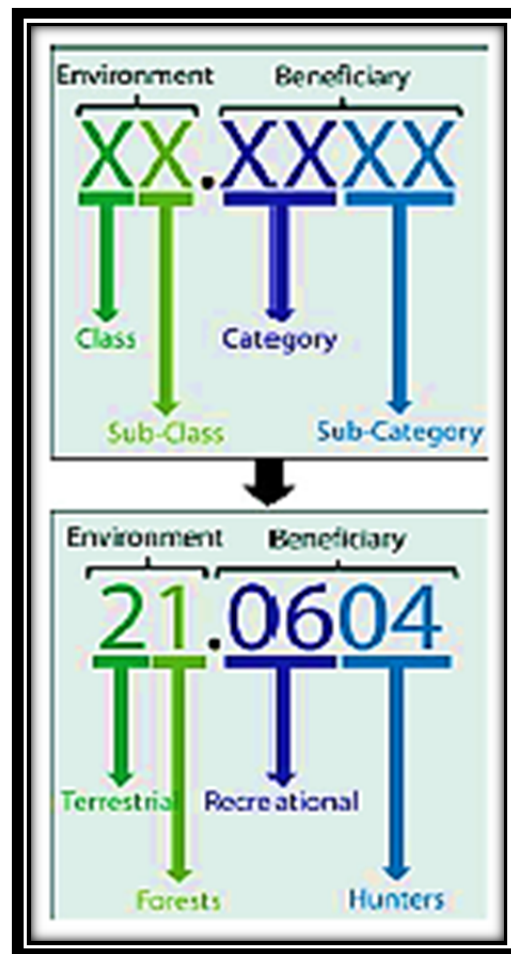


FIGURE 2 - EXAMPLE OF A FEGS

An example can clarify how the classification system works for corporations and shows which FEGS they are dependent upon. Consider the beneficiary category, Commercial/Industrial (02):

- It contains the sub-category Industrial Processors (0203), which are companies that use water for cooling and processing, not involving edible products.
- These companies benefit from the FEGS category of water, which is associated with the aquatic environmental class (01), which includes:
 - Rivers and Streams (11);
 - Wetlands (12);
 - Lakes and Ponds (13);
 - Estuaries and Near Coastal Marine (14); and
 - Open Oceans and Seas (15); and Groundwater (16).
- These companies also benefit from the FEGS category, Presence of the Environment, which is linked to the Atmospheric environmental class (31).

Thus, under the FECS-CS, ultimately metrics and monetary values would be needed for the following seven codes for Industrial Processors: 11.0203; 12.0203; 13.0203; 14.0203; 15.0203; 16.0203; 31.0203.

The FECS-CS can be used to classify impacts and dependencies. In the example above, Industrial Processors are dependent on (i.e., beneficiaries of) seven FECS-CS. By our count, the FECS-CS identifies 135 classifications where corporations may be a beneficiary and depend on final ecosystem goods and services.

Looking at ecosystem impacts, if a company (or regulator) wanted to understand the FECS impacts associated with Industrial Processors, they would need to look at information for all beneficiaries in environmental sub-classes 11, 12, 13, 14, 15, 16, and 31 in the areas where this industry (or company) operates. This could be a significant effort, as the FECS-CS lists a total of 190 beneficiaries in these categories.

Although the FECS-CS is currently only a classification system, the authors foresee expanding the research into developing the tools to measure, quantify, map, model, and/or value FECS. More specifically, the research steps could entail the following:

- Measurement and quantification involves identifying metrics and indicators appropriate to each FECS, and determining how they can be aggregated.
- Mapping environmental sub-classes could provide spatial representations of where specific FECS may exist, and the relative abundance of each in a given area.
- Modeling FECS would allow stakeholders to predict future conditions under a variety of scenarios, explicitly analyzing the tradeoffs and associated economic and social outcomes.
- Valuation would provide a common currency among FECS as well as non-environmental goods and services.

The authors are planning pilot studies or demonstrations to explore using the FECS-CS with ecosystem service mapping, modeling, valuation, and quantification, including collaboration across disciplines with interested parties and revisions to the FECS-CS as needed.

IMPLICATIONS FOR CORPORATIONS

The FECS-CS provides both challenges and opportunities for corporations. In addition, the proposed system faces several technical challenges which may limit its usefulness. We discuss each of these below.

Opportunities

A potentially significant value of FECS-CS is to bring more clarity to very confusing discussions and ideas about valuing ecosystem services. A generally accepted categorization system for ecosystem services is clearly needed to ensure that all stakeholders are using a common language. Further, accurately measuring natural capital to improve decision making requires a clear delineation of the types, sources, and beneficiaries of ecosystem benefits that avoids double counting and missing categories.

Existing classification systems are not up to the task: they fail to provide specific links between the ecosystem services and benefits to people, many of the definitions and metrics are ambiguous, and they don't supply a framework that avoids inappropriate aggregation of values. Even routine communications among natural and social scientists, policy makers, corporations, and the public are a challenge because the language of ecosystem services is unclear.

There are risks to corporations from the failure to have a common framework and language. Examples include:

- Expectations for measuring a laundry-list of outcomes in sustainability reporting or benchmarking;
- Poorly constructed benefit-cost analyses of regulations or company actions that affect the environment;
- Confusion and ill-will generated during stakeholder engagements.

The FECS-CS could put the field onto a path that reduces these risks. For example, we recently conducted a stakeholder workshop to construct an ecosystem service decision tool for a group in Maine. We found the FECS beneficiary focus to be very useful in facilitating the exercises.

The FECS-CS also provides opportunities for improving long-run corporate decision making. It could help companies measure and understand the difference between their internal costs for natural resource services and the value of those services to the company and to other beneficiaries. For example, if a manufacturing company has a water scarcity issue, the FECS-CS may help identify how water is used by other parties and identify who wins/loses with different courses of action. Many companies have internal procedures for qualitatively including environmental issues in decision making, but they are often vague or inconsistent throughout the corporation. FECS-CS could provide some much needed structure to the analysis.

For a variety of internal and external reasons, corporations are increasingly concerned with measuring and potentially reporting both their environmental and social impacts. For example, IFC Performance Standard 1 – Assessment and Management of Environmental and Social Risks and Impacts, lays out activities that clients seeking funding for capital projects must adhere to in order to be eligible for funding. It requires: defining the regions that may be affected by the project; describing the potential impacts; assessing risks and discussing how they will be minimized or mitigated; and implementing monitoring programs. All of these activities can be accomplished more cost-effectively through a framework like FECS-CS because it integrates environmental impacts. The FECS-CS does not really alter how corporations should think about ecosystem services. It does provide value to firms in identifying how various stakeholders may be affected by ecosystem services.

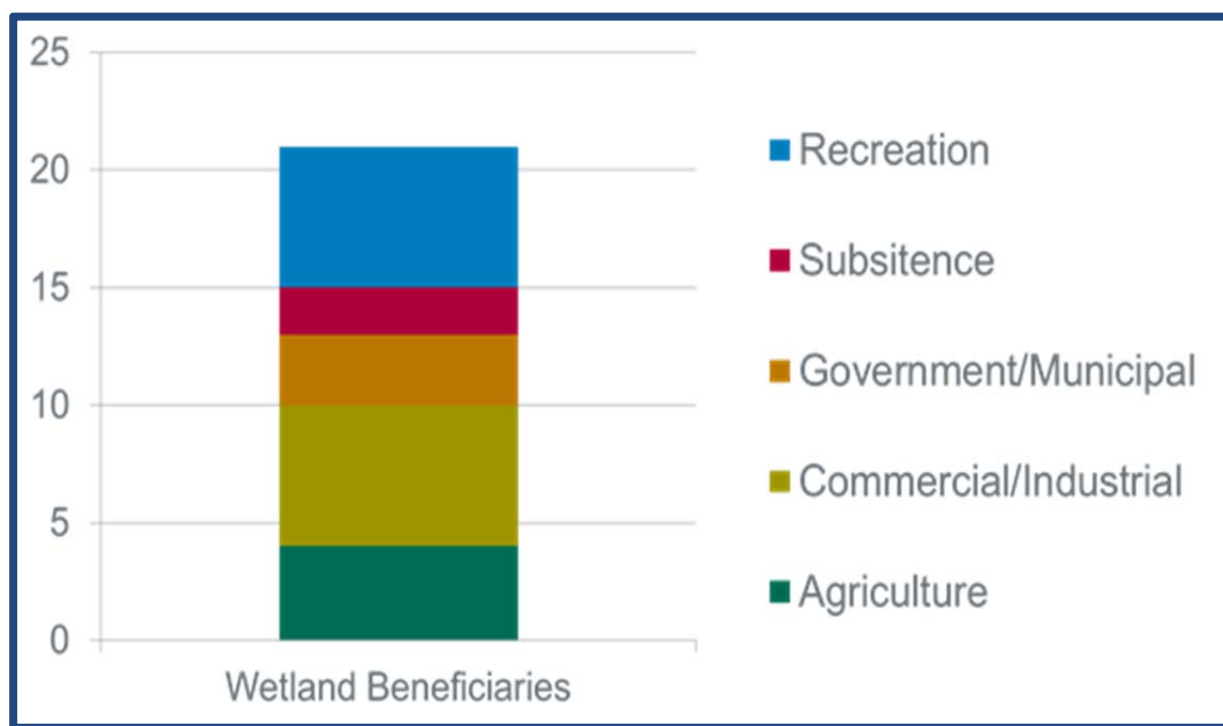


FIGURE 3 - WETLAND BENEFICIARIES FOR ASSESSING CREDIT VALUE

Another important potential value of the FECS-CS is providing a framework for appropriately stacking credits for ecosystem service markets. The FECS-CS system clearly recognizes that there are multiple beneficiaries from ecosystem services at a single location. For example, Figure 3 shows that there are over 20 potential different beneficiaries of wetlands. The value of the wetland to all beneficiaries should be included in assessing credit value. Many people believe that the lack of an effective method for appropriately valuing all of the ecosystem services from a parcel of land has hindered the development of effective markets to protect those services. If land owners, including corporations, are able to fully benefit from the value of the ecosystem services, it may significantly increase the size of ecosystem markets.

The FECS-CS may provide a useful framework for commenting on or responding to regulatory initiatives. For example, applying a FECS-CS approach to the USPEPA's proposed approach for defining waters of the U.S. (WOTUS) would further highlight the significant deficiencies with EPA's benefits analysis. Similarly, FECS-CS may provide a useful framework for assessing or re-assessing the impacts of TMDLs. We have found the USEPA guidance on benefit cost analysis to be useful in developing comments for industry and companies about the adequacy of government analyses. There may be a similar opportunity with FECS-CS. With the exception of non-use values, the FECS-CS is analytically sound. Therefore, the FECS-CS should be useful in evaluating the appropriateness of regulatory initiatives.

Challenges

If the FECS-CS truly is just the first step in a long process for developing a reliable approach for valuing FECS, then potential challenges to corporations could be modest. As long as it is an evolving approach then corporations should have the ability to make a meaningful contribution to its' future structure and content.

However, it is often the case that the development of solutions to major, complex policy problems stalls because of technical and political problems. As a result, we are left with "good enough" solutions where simplifications and their repeated use become standard practice. Thus, if the current version of the FECS-CS becomes the de facto framework, it could pose significant liability, regulatory, and financial reporting risks for corporations. Moreover, it is more likely to be used in a rulemaking context, as opposed to a law making context, which may limit a company's ability to influence how it is used.

A significant shortcoming of the current FECS-CS is that it implicitly maintains the analytical fiction that non-use values are real and can be reliably measured. The framework includes two non-use beneficiaries: existence (i.e., moral or ethical connection to preserving the environment, or fear of unintended consequences) and option/bequest (i.e., tradition, future use or benefit from the environment by self or future generations). The framework assumes these are distinct groups whose values can be measured and double counting within the two groups can be avoided. Moreover, it assumes that these non-use values are held in addition to the values to other beneficiaries. To the extent that non-use values represent altruism, including them as a distinct category will result in double counting.

Materiality of Non-Use Values in 2007, the Gross Domestic Product of Hawaii was \$65 billion.

A NOAA study estimates the annual non-use value of just Hawaii's Coral Reefs to the U.S. was \$34 billion. A full accounting of non-use values could easily dwarf National GDP.

The framework takes a step in the right direction by noting these beneficiaries only include those who know the specific resource exists in the first placeⁱ. However, the reality is that when it comes time to value non-use benefits, practitioners, including regulators, may default to using “benefits transfer” from existing literature, which are unreliable and rarely account for these subtleties.

If the FECS-CS becomes the de facto approach for valuing ecosystem services and companies are required to report “material” impacts, then including non-use values could significantly increase liability estimates. In addition, if including non-use values becomes the de facto standard for regulatory benefit-cost analysis, non-use values could sway the analysis.

Even absent non-use values, the data and information requirements to use the FECS-CS for reporting, regulatory or internal business analysis purposes could be significant. Even a screening level analysis to determine potential materiality could be burdensome. A corporation involved in multiple lines of business operating on multiple continents could find itself needing to evaluate impacts on hundreds of FECS. Similarly, in responding to proposed regulatory initiatives, corporations may need to devote significant resources to evaluating FECS-CS impacts in order to be effectively heard. Finally, we believe that many within the business community who are striving to convince their leadership about the business case for natural capital management may find the task more difficult because of the perceived complexity of the FECS-CS.

There is a risk that FECS-CS could simply lead to more reporting requirements, rather than becoming a replacement for existing ones. Although the FECS-CS appropriately focuses on final ecosystem goods and services, other reporting systems focus on the intermediate goods and services. For example, the IFC Performance Standards and many of the GRI environmental categories are for intermediate outputs such as energy use, greenhouse gas emissions, and biodiversity impacts. Similarly, the proposed reporting requirements for the Sustainability Accounting Standards Board (SASB) focus on the impact of corporations stemming from using non-renewable natural resources as factors of production or sinks for waste disposal, which are not necessarily FECS. Companies desiring to comply with these existing efforts may find FECS-CS is just an additional requirement.

Similarly, FECS-CS could become part of the regulatory compliance and monitoring analyses. By design, policy endpoints are not FECS. According to the authors, policy endpoints involve processes that can be regulated. They are not necessarily the components of the environment that people interact with or value. Using FECS-CS to value policy endpoints may require extensive analysis (or heroic assumptions) to convert what is measured to what should be valued. Thus, although the framework is analytically sound, the devil is in the details of how it might be used.

ⁱ It could also be argued that the resource must be in some way unique. Putting aside our inability to measure non-use values, it is easy to believe that there are non-use values for preserving the Grand Canyon, but not a specific swath of wetlands.

CONCLUSIONS

The USEPA classification system for FEES represents an important step forward in thinking about ecosystem valuation, but it is only the first step. The key features of this system are the explicit focus on final ecosystem goods and services, value to human beneficiaries, and creation of a common language to be used by many different stakeholders in different contexts. Although it is not currently clear that a single framework can meet the analytical needs of many different stakeholders, the goal is to ultimately develop such a system through refinement of the proposed FEES-CS, continued discussions among stakeholders, and additional research in both the natural and social sciences.

Ecosystems are the foundation of the industrial sector and the economy... While the goods and services provided in the economic sector are well-accounted for... the contribution to the economy of ecosystem goods and services has been a challenge (*Lander and Nahlik 2013*).

Currently, scientific and economic knowledge about ecosystem service measurement, interconnectedness, and valuation cannot support the use of this framework in meaningful ways for stakeholders. However, the past several decades of research have led to huge strides in our understanding of ecosystem services, and these strides will continue.

In order to improve FEES-CS for use by corporations, we believe the following would be beneficial:

- NGOs that have built screening tools for corporations, such as the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), should evaluate the extent to which the FEES-CS affects the user-friendliness, reliability, and cost-effectiveness of their tools.
- FEES-CS would be much better served by sticking to categories that clearly meet the criteria that beneficiaries “enjoy, use, or consume” the FEES. Putting aside non-use values, at least for now, and focusing on refining the classification system and metrics would provide more momentum for FEES-CS and increase buy-in by corporations.
- Although beyond the scope of this white paper, from a technical perspective it seems that future development of FEES-CS should focus on either its’ use in national income accounting or benefit-cost analysis. These are two very different uses with different needs and different languages. Taking a single path may be more practicable and avoid future confusion about valuation.

For corporations, the FEES-CS may be the first step to a greater understanding of the financial contribution of ecosystem services to long-run profitability, which can provide companies with information to find new opportunities and better manage risks. The classification system is useful in very broad terms for identifying the types of ecosystem goods and

services, the environments in which they occur and the people who benefit from them. FEGS-CS clearly delineates the distinction between the business case and the social case for considering environmental impacts and dependencies. It is vital that firms look at how their reliance on ecosystem services affects their own internal performance metrics like profit. In the absence of appropriate prices, the key risks, dependencies, and impacts on other beneficiaries may be missed in decisions. This is the essence of natural capital management by corporations. However, there is no reason to assume that in all cases the business case will yield the same outcome as the social case. Indeed, helping find instances where the two are different may be a significant value of the system.

In order to benefit from the FEGS-CS, corporations should consider the following activities:

- Evaluate the extent to which FEGS-CS adds value to existing internal decision making processes. Most firms have a process to consider capital projects, product development, and supply chains. It should be straightforward to assess whether FEGS-CS can improve the process by providing a common language and analytical framework; reducing decision costs and uncertainties; and potentially leading to different decisions.
- Review whether the company is collecting (or could easily collect) the type of information needed to evaluate FEGS-CS. Many corporations are already collecting significant data for sustainability reports or through internal environmental management systems. Understanding whether the necessary data exists for using FEGS-CS for internal decision making will affect the potential value of the framework.
- Identify potential opportunities to use FEGS-CS in regulatory/compliance analyses. The framework is consistent with economic theory and could be useful in supporting the business and social case about regulations.
- Monitor the development of FEGS-CS. The classification system clearly corrects some problems with other classification systems. However, the system raises many questions about how it might be put to practical use and the information and requirements of using the system could be significant.