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Aligning Ecosystem Services Endpoints and Assessment Tools to Support Risk Assessments in Contaminated Site Cleanups

Background

The Superfund and Technology Liaison Research (STLR) Program at EPA provides an opportunity for Office of Research & Development (ORD) and regional staff to collaborate on research that addresses high-priority, near-term, Superfund-related regional needs.

A STLR project proposed by EPA Region 2 and ORD was funded to incorporate existing EPA Ecosystem Goods and Services (EGS) tools and concepts into established Ecological Risk Assessment (ERA) processes. The project's goal was to enhance ERA results with the help of EPA's EGS tools.

The project involved five steps:

1. Identifying existing EGS tools relevant to ERA.
2. Understanding the ERA steps.
3. Cross-walking potential tools to ERA steps.
4. Hosting a workshop with participants across EPA.
5. Identifying next steps.

Step 1: Identifying EGS Tools

Over the past two decades, EPA researchers have developed and applied EGS tools, including the following four tools that are particularly relevant to ERA.

- The National Ecosystem Services Classification System Plus (NESCS Plus) classifies nature's benefits to people and the environment using clearly defined classes and codes.
- The Final Ecosystem Goods and Services Scoping Tool (FEGS Scoping Tool) provides a transparent, repeatable, and defendable approach for identifying and prioritizing stakeholders, the ways they use the

environment, and the most relevant environmental attributes needed to realize those uses.

- EnviroAtlas a data-rich, web-based platform, provides geospatial data, easy-to-use tools, and other resources on EGS and their chemical and non-chemical stressors. It identifies linkages between EGS and human health and allows users to assess equity in the provisioning of EGS.
- The EcoService Models Library (ESML) is a web-based database of more than 270 ecological models for estimating production of EGS.

What are EGS and ERA?

Ecosystem Goods and Services (EGS)
Naturally derived necessities essential to human well-being are generally referred to as Ecosystem Goods and Services (EGS). Some examples include clean air, clean water, and food, as well as flood control, erosion control, recreation, and spiritual renewal. EGS are important for environmental decision-making because they highlight the direct connection between the environment and human health.

Ecological Risk Assessment (ERA)
As part of contaminated site cleanups, an Ecological Risk Assessment (ERA) examines the extent of potential contamination and evaluates environmental risks. In a Superfund context, an ERA is a qualitative or quantitative appraisal of the actual or potential impacts of contaminants from a hazardous waste site on plants and animals other than humans and domesticated species.

EGS tool identification → Understanding ERA steps → Cross-walking EGS tools and ERA steps → Hosting a workshop to explore → Identifying next steps for action

Steps 2-3: Understanding ERA Steps & Cross-Walking EGS Tools

The STLR project team mapped the tools identified in step one to the ERA phases, as shown in the following table:

ERA Phase	EGS Tool	Activity
Planning & Scoping	EnviroAtlas	Map EGS and biodiversity
Planning & Scoping	FEGS Scoping Tool	Identify and prioritize stakeholders and EGS
Planning & Scoping	NESCS Plus	Identify potential EGS using clearly defined terms and a comprehensive list
Problem Formulation	EnviroAtlas	Map EGS and biodiversity
Problem Formulation	FEGS Scoping Tool	Identify and prioritize stakeholders and EGS
Problem Formulation	NESCS Plus	Identify potential EGS using clearly defined terms and a comprehensive list
Analysis	EnviroAtlas	Map EGS and biodiversity
Analysis	ESML	Find models for estimating EGS
Risk Characterization	EnviroAtlas	Map EGS and biodiversity
Risk Characterization	ESML	Find models for estimating EGS
Risk Communication	FEGS Scoping Tool	Framework for identifying priority EGS for stakeholders
Risk Communication	NESCS Plus	Identify potential EGS using clearly defined terms and a comprehensive list

Step 4: Hosting a Workshop to Explore EGS and ERA

The STLR project team hosted a workshop for more than 40 EPA risk assessors and EPA Office of Research and Development (ORD) EGS researchers. The workshop:

1. Described how the workshop fit within a larger effort to incorporate EGS into efforts across the remedial programs.
2. Stated the value of incorporating EGS into ERA and cross-walked the ideas between EGS and ERA steps, sharing possible EGS endpoints for human well-being.
3. Brought risk assessors and EGS tool experts together to explore how the four EGS tools might be applied to steps in the ERA process.
4. Investigated how a single tool might be useful in ERAs by having risk assessors interact with EGS tool experts.
5. Worked through a hypothetical urban, contaminated sediment site with minimal human health risks but significant ecological risks.

Following the workshop, the STLR project team held post-workshop mini sessions that applied the four chosen EGS tools to highlight practicalities and challenges.

Step 5: Identifying Next Steps

Finally, the STLR project team identified key elements needed to advance the use of EGS tools in ERA:

- Site-specific examples using EGS tools.
- Deeper understanding of the added value of EGS.
- Training in EGS for remedial project managers (RPMs) and risk assessors.
- Raising awareness of EGS tools.
- Building buy-in from RPMs.

Contacts

- Leah Sharpe (EPA ORD) Sharpe.Leah@epa.gov
- Matt Harwell (EPA ORD) Harwell.Matthew@epa.gov
- Tammy Newcomer-Johnson (EPA ORD) Newcomer-Johnson.Tammy@epa.gov
- Stephanie Kim (EPA Region 2) Kim.Stephanie@epa.gov
- Gina Ferreira (EPA Region 2) Ferreira.Gina@epa.gov

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