

Integrating Final Ecosystem Goods & Services



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Innovative Science for a Sustainable Future

WITH STRUCTURED DECISION MAKING

What is Structured Decision Making?

Structured Decision Making (SDM) is a dynamic, step-by-step approach to community decision making that considers stakeholders and their values as an integral part of framing the decision and prioritizing solutions. SDM is different from conventional decision making that may lead to a “lowest common denominator” outcome. Instead, SDM follows a step-by-step approach that has been called “organized common sense.”

What are FECS?

Final ecosystem goods and services (FECS) are the biophysical components of nature directly enjoyed, consumed, or used to yield human well-being (Boyd & Banzhaf 2007). The FECS approach to SDM prioritizes stakeholders and beneficiaries and encourages communication about community values to be sure that key issues for stakeholders are not overlooked. Decisions developed using the FECS framework have a higher likelihood of acceptance and success because they are based on stakeholder priorities.

Integrating SDM and FECS

SDM provides an organizing framework to deliberately integrate FECS concepts, while FECS provides SDM with a process for clarifying “what really matters.” With a simple modification to the SDM step-by-step process, developed by Robin Gregory in 2012, FECS thinking can focus on what stakeholders’ value, leading to more creative and effective outcomes.

The SDM Process

SDM begins by working with stakeholders to define a specific community problem, brainstorm issues, objectives, evaluation criteria, and develop alternatives. Only then are consequences and trade-offs evaluated, so that outcomes can be monitored once decisions are made and executed.

The Steps of Structured Decision Making

- 1 Define Problem.** What question or problem is being addressed? Consider each problem as a decision opportunity. What ecosystem services may be impacted? Who are the beneficiaries?
- 2 Define Issues, Objectives, and Evaluation Criteria.** Which FECS may be affected by the decision? How can we measure, estimate, and report consequences or progress? What are the community values related to the decision opportunity? Taking time to consider FECS can enlighten economic, social, or human well-being objectives that may affect ecosystem conditions.
- 3 Develop Alternatives.** What options do we have for solutions? What choices are available to meet the community objectives? Alternatives focused on ecosystem services may achieve other social, economic, health, or general well-being objectives.
- 4 Estimate Consequences.** What are the potential consequences of each alternative? How could delivery of FECS change under each alternative? How could consequences be measured? Ecosystem services assessments can implement ecological production functions (EPFs) and ecological benefits functions (EBFs) to link decision alternatives to shared objectives.
- 5 Make Trade Offs and Select.** What are the trade-offs? Which alternative that has the best and most acceptable balance across all objectives? The decision process should consider ecosystem services objectives alongside other objectives.
- 6 Implement and Monitor.** Put the selected alternative into action and monitor progress. Did the decision lead to measurable change in ecosystem services? An evaluation of ecosystem impacts from all decisions can provide a learning opportunity to make future decisions better.



Iterate as Required. Go back to review or redefine a previous step. New information may help illustrate community values and ecosystem benefits.

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SDM At Work

Below are three examples of the use of Structured Decision Making in community decision-making.

The Decision Context in Puerto Rico

Coral reefs along the coast of Puerto Rico are dying from the cumulative effect of global and local anthropogenic factors. Along Guánica Bay, Puerto Rico, coral reefs have declined, with dramatic reductions in living colonies of reef-building corals. At the outset of the SDM process, stakeholders were involved in workshops with the initial goal of protecting the coral reefs. During the process, though, the decision context broadened, reflecting stakeholder values in agriculture, water supply, fisheries regulations, habitat restoration, public health, environmental stewardship, and support for ecotourism. Identifying these ecosystem services helped fully define the decision context, so the stakeholders had a much fuller, richer understanding of their own values in driving sustainable solutions.



Coral reefs near Guánica, illustrating their natural beauty. *Photo credit: John McBurney, Lockheed Martin.*

Identify FECS and Objectives in Pennsylvania

At the East Mount Zion Landfill in York County, Pennsylvania, a landfill cap was completed in 1997. Surrounded by a fence, the landfill cap is dominated by non-native weeds and grasses, providing negligible value to the local community. Following the SDM process, EPA scientists, community leaders, and other stakeholders used several tools to help support the community in defining their underlying values and identifying landfill revitalization options to increase the value of the site to the community. Tools like the FECS Scoping Tool and the National Ecosystem Services Classification System (NESCS) Plus can help decision makers clearly identify and prioritize FECS and beneficiaries. The SDM approach identified and prioritized stakeholder perspectives. Open communication gave the community the opportunity to prioritize their values and goals for the site.



Fenced entrance to East Mount Zion landfill restricts access to open space.

Estimating Consequences in Ouachita Parish

In Ouachita Parish, Louisiana, when severe storms and historic flooding events in 2006 caused major damage, leaders knew steps were needed to improve flood mitigation. Through a series of SDM workshops in 2019, community leaders, scientists, and residents gathered to decide on the best flood mitigation options. Their work was framed by the Human Well Being Index (HWBI), which helped them evaluate the specific ecosystem goods and services the river offers their community. By evaluating the proposed alternatives in light of those benefiting from FECS and the HWBI, the community found consensus. The SDM approach helped leaders clearly identify alternatives that met the needs and values of the community. The community as a whole was able to demonstrate the potential value of different flood mitigation options.



River Rat Paddle Challenge Race on the Ouachita River, 2019. *Photo Credit: Ouachita Parish Sheriff's Office.*

For Additional Information

Boyd, J. and Banzhaf, S. "What are ecosystem services?" *Ecological Economics*, 63(2-3): 616-626. 2007. Sharpe, L. *FECS Scoping Tool User Manual*. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-18/288, 2018.

Fulford, R., W. Michaud, J. Stubblefield, J. Harvey, and L. Sharpe. *Deeper Look at the Ouachita River: How investment in Ouachita River infrastructure sustains human well-being in Ouachita Parish, Louisiana*. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-20/146, 2020.

Gregory, Robin. *Structured Decision Making: A Practical Guide to Environmental Management Choices*. Wiley-Blackwell Press, 2012.

To Learn More

Enhancing Flood Resilience along the Ouachita River
www.epa.gov/healthresearch/enhancing-flood-resilience-along-ouachita-river