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CORE METRICS FOR INTEGRATING SOCIAL AND ECONOMIC OUTCOMES INTO PROJECT FUNDING, PROGRAM DESIGN, AND MONITORING

A Standard Set of Social and Economic Metrics

"The RESTORE Act envisions a regional approach to restoring the long-term health of the valuable natural ecosystems and economy of the Gulf Coast region."

—RESTORE COMPREHENSIVE PLAN UPDATE 2016

Billions of dollars are being spent on restoration of Gulf of Mexico ecosystems with the intent to bolster the environment and revitalize coastal communities and economies.

While it is clear that many restoration funders aim to create environmental and human benefits, **most projects do not report on social and economic outcomes.** The few exceptions use inconsistent metrics that complicate comparing project successes or rolling up Gulf-wide impacts.

This is understandable. Across the wide range of restoration types implemented in the Gulf, there is an even wider range of possible social and economic outcomes. Filtering through which outcomes are relevant for a given restoration project or investment can be overwhelming, especially for the majority of restoration implementers who often focus on the environmental aspects of their work more than the social and economic elements.

Without a consistent approach for identifying and measuring restoration impacts on communities and the economy, funders run the risk of using funds inefficiently or failing to meet goals for community resilience and economic recovery. The GEMS project aimed to help overcome these challenges by (1) **developing logic models that enable the selection of restoration projects likely to achieve target economic and social goals and** (2) **identifying a set of core metrics that enable consistent measurement of social and economic outcomes** from Gulf restoration.

The GEMS approach meets funders and implementers where they start—with the type of project that is planned (e.g., oyster reef or boat ramp). For each **type of project**, we traced the logic to show how the project can cause social and economic changes in estuaries and coastal zones across the Gulf. These **ecosystem service logic models (ESLMs)** allow anyone to quickly see which social and economic **outcomes** might be relevant to their project or investment. For each of these outcomes, we reviewed the literature, examined monitoring manuals, and gathered expert and stakeholder input to identify **metrics** that are robust and likely to be practical to measure. We clarify which metrics will require simpler or more complex methods to measure and note which can be measured best at a project or regional scale. Finally, for all metrics with established methodologies, we developed **protocols** to provide a practical entry point for those implementing restoration in the Gulf to report on a core list of relevant social and economic metrics. These protocols include methods for considering issues around access, distribution, and equity of benefits.

THE GEMS PROJECT

GEMS: Gulf of Mexico Ecosystem Services Logic Models & Socio-Economic Indicators

With support from the National Academies of Sciences, Engineering, and Medicine – Gulf Research Program, Duke University's Nicholas Institute for Environmental Policy Solutions, The Harte Research Institute at Texas A&M University-Corpus Christi, the Bridge Collaborative, and The Nature Conservancy have developed a standard set of conceptual models linking restoration investments to social and economic outcomes and identified related metrics that can be used to track restoration success. The metrics and models serve as a starting point and should be tailored to each project.

Restoration actions, outcomes, and metrics were collaboratively developed through workshops with state representatives, restoration funders, regional decision makers, and local experts from specific estuaries to ensure applicability of the outcomes and metrics across scales. The conceptual models and metrics were further informed by literature reviews, expert interviews, and feedback from a distinguished advisory council.

nicholasinstitute.duke.edu/project/gems

The GEMS project identified a list of core social and economic metrics that can be used to consistently and practically monitor common restoration outcomes.

This guide outlines how the GEMS tools can:

1. Help design restoration programs to achieve socioeconomic goals (page 2),
2. Help identify social and economic outcomes influenced by existing programs (page 3), and
3. Help guide monitoring of common social and economic outcomes (page 4).

Project Types

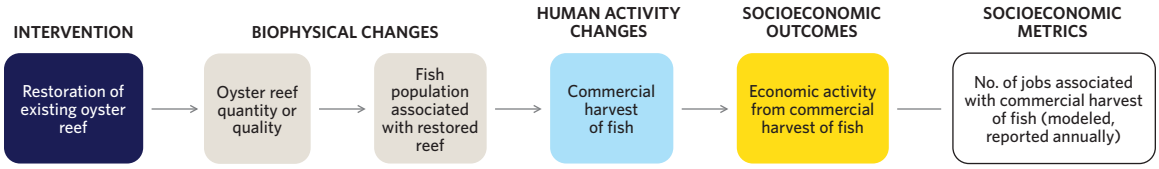
There are a handful of **project types** that dominate restoration activities in the Gulf. We grouped these into four categories:

PROJECT CATEGORY	HABITAT RESTORATION	OYSTER REEF RESTORATION*	RECREATIONAL ENHANCEMENT	WATER QUALITY IMPROVEMENT
Project Type	• Salt marsh • Seagrass • Mangrove • Living shorelines • Beaches and dunes • Hydrologic connectivity • Oyster reef*	• Simple subtidal harvested • Complex subtidal harvested • Complex subtidal • Complex intertidal • Protection or enhancement of existing reef • Aquaculture	• Boat ramps • Fishing piers • Trails and boardwalks	• Sewage system improvements • Wastewater treatment plant upgrades • Treatment wetlands • Stormwater management improvements – gray infrastructure • Stormwater management improvements – green infrastructure • Stormwater outflow treatment (baffle boxes) • Agricultural best management practices

**Oyster Reef Restoration is one type of Habitat Restoration. Given the diversity of oyster restoration approaches taken and the dominance of this type of activity in the Gulf, we treated it as a separate category of restoration practices.*

Logic Models Can Help Design Restoration Programs to Achieve Socioeconomic Goals

The GEMS project created an ESLM for each project type to capture the logic of **how the restoration action is likely to change biophysical conditions and human activities, resulting in changes to social or economic outcomes.** The flow chart below gives a simplified example of how a project type—salt marsh restoration—might increase fish populations, leading to more commercial fishing that could support more jobs in the commercial harvest sector. This pathway is one part of a larger model showing all of the likely changes resulting from salt marsh restoration. These logic models can be used to **identify which interventions could be funded to optimally support outcomes of interest.**



FUNDERS CAN USE LOGIC MODELS TO DESIGN PROGRAMS BY SELECTING RESTORATION PROJECT TYPES TO INCLUDE

Imagine a funding organization plans to start a new restoration fund aimed at supporting the recreational fishing sector in Mississippi. Using the logic models created by GEMS, they can identify which project types are likely to increase economic activity related to recreational fishing. In this example, they would see that salt marsh restoration, seagrass restoration, mangrove restoration, oyster reef restoration, boat ramp improvements, and fishing pier improvements all have potential to increase economic activity related to recreational fishing. A secondary objective of the program is to reduce property damage caused by shoreline erosion. The logic models show that three restoration project types—salt marsh restoration, seagrass restoration, and mangrove restoration—are likely to support both objectives. Therefore, the funding organization decides to request proposals for those three types of projects. The funder also provides the logic models for these three restoration

activities to teams developing proposals so they can adapt them to illustrate how their proposed project will achieve the target objectives and any other relevant ecological and socioeconomic goals.

To use the GEMS website to select project types that achieve your goals:

- Use the search by project type tool
- Filter by outcomes of interest to see lists of project types that include those outcomes
- Expand (+) the outcomes list for each project type to view strongly-linked outcomes, which are most likely to be significant

Logic Models Can Help Identify Social and Economic Outcomes Influenced by Existing Programs

The logic models can also identify the suite of socioeconomic outcomes relevant to specific project types funded by a program. This will help programs **understand which social and economic outcomes their projects are likely to impact** and help them **select metrics for monitoring and evaluation.**

Looking across all of the project types we considered, habitat restoration, oyster reef restoration, recreational enhancement, and water quality improvement projects have the potential to impact social and economic outcomes related to economic activity (e.g., direct job creation, income), cultural values (e.g., knowledge, livelihood options), shoreline protection (e.g., avoided property damage, flooding), human health (mental health, nutrition, public safety), social cost of carbon, and social disruption (number and duration of facilities closed and services disrupted).

The logic models include the set of outcomes that existing evidence, experts, and stakeholders agree are likely to be affected by a given project type. Many outcomes depend on the specifics of the project (e.g., location, access), so each specific project may only affect a subset of the outcomes included in the general logic model provided. These logic models serve as a starting point that can be refined to a particular project's context.

FUNDERS CAN USE LOGIC MODELS TO IDENTIFY SOCIAL AND ECONOMIC OUTCOMES LIKELY AFFECTED BY THEIR PROGRAMS

Imagine a program that primarily funds green infrastructure for stormwater management and treatment wetlands for wastewater management. In the past, the funder has mainly focused on the biophysical and ecological effects of their projects, such as the quality of treated effluent, but they are interested in understanding what social and economic outcomes their projects are causing. Using the logic models for green infrastructure and treatment wetlands, the funder can see that the outcomes strongly affected by both of these project types are property value, economic activity from the restoration project, cultural values related to knowledge, and wastewater treatment costs. These outcomes would be useful to measure for all projects funded by this program. Additional outcomes likely to be influenced by just one of the project types, such as mental health from green infrastructure projects, and freshwater costs for treatment wetland projects, could be added if they are of particular importance to the program or the communities they reach.

To use the GEMS website to identify social and economic outcomes of your project types:

- Use the search by project type tool
- Filter by project types to see the types of projects relevant to your work (e.g., habitat restoration)
- Expand (+) the outcomes list for each project type to view strongly-linked outcomes, which are most likely to be significant

Social and Economic Metrics for Monitoring and Assessment

With substantial input from practitioners and researchers and review of existing literature and guidance documents, **we identified at least one metric for each of the socioeconomic outcomes that are likely to be influenced by restoration projects.**

Some metrics are **most appropriately measured at the project scale** (e.g., property with shoreline protection from erosion). Others are **not practically observable at the project scale but may be observed at a program scale.** For example, changes in economic activity (e.g., revenue, jobs) from changes in commercial fish or shellfish harvest are unlikely to be observed around a single project unless it is very large; thus, a focus on cumulative effects in areas with many projects is more likely to be detectable relative to other drivers of economic activity and harvest. These program-scale metrics will require regional scale measurement and modeling. We identified which metrics are best suited for monitoring at the project scale, and which are only likely to be informative when monitored at a program scale. In addition, we differentiated those metrics that are **simpler to measure** (**tier 1**), those that are **more complex** (**tier 2**), and those that are **still under development** (**R&D**), giving an initial indication of which might require more resources or capacity to monitor. **Measurement protocols** were developed for project-scale metrics that have established methods, providing restoration programs a template and examples for development of their own measurement approaches.

FUNDERS CAN USE SOCIAL AND ECONOMIC METRICS TO ASSESS PROGRAM-SCALE IMPACTS

Imagine that the funding organization from the first example starts a new program to support the recreational fishing sector in Mississippi and wants to make sure they can capture the program-wide impacts that they are having. To enable the information collected at the project level to be rolled up to estimate program-scale effects, the funder requires all of their funded projects to monitor the number of jobs supported through recreational fishing at each project site. Standard reporting across projects allows the funder to directly compare each project's success in this area and estimate the total impact of the program.

After the program has been in place for several years, the funder would like to get a broader view of how their work, as well as work funded by other organizations, has impacted the overall economic activity from recreational fishing in the Gulf. Using the metrics search tool, they identify an economic impact analysis based on angler survey data as the optimal method for estimating the program-scale economic activity from recreational fishing. They decide to hire a consultant to conduct this modeling every five years.

To use the GEMS website to identify project- and program-scale metrics for your key outcomes:

- Use the full metrics list search tool
- Filter by outcome to find metrics for your key outcomes (e.g., economic activity – recreation and tourism). You can also filter by scale (project or program) and tier (level of effort).
- Save the resulting metrics list as a pdf file using the button at the bottom of the page or open the protocol for an individual project-scale metric for more detail on how to measure it

[1] NRDA Monitoring and Adaptive Management Manual, page B-1.

Core Metrics

A metric was identified for every outcome in our logic models. The comprehensive list includes 44 metrics (Appendix), many of which are only relevant for certain project types. From the full list, we created a set of core metrics **for both project and program scales.** Similar to NRDA's core parameters[1] for measuring biophysical and ecological outcomes, core metrics provide a short list that can be used across project types to allow for consistency, comparison, and rolling up results. Metrics that are not fully established or for which required data are not readily available, called "R&D" metrics, are not included as core metrics here because their measurement is less feasible under current conditions. They are included in the full metrics list in the appendix and provide ready areas for research and testing. More details on all GEMS metrics are available on the GEMS website. Core metrics are identified in the metrics list.

CORE METRICS – PROJECT SCALE

Two core metrics are applicable across all project types: restoration jobs supported by the project and restoration expenditures. These metrics relate to the direct investment in any restoration activity, so it is not surprising that they are relevant to all project types. Three additional core metrics, **recreational expenditures, human cognitive function, and subjective well-being, are expected to respond to at least half of the project types in each category.** There are additional core metrics within each specific project category (Table 1). For example, 85% of habitat restoration project types are likely to affect education-related knowledge and environmental awareness. All recreational enhancement project types are likely to affect a cultural value, food security, and property values. Table 1 can be used to identify a set of core social and economic metrics useful for tracking impacts from the types of projects regularly funded.

WHAT ARE "STRONGLY LINKED" METRICS?

"Strongly linked" metrics measure outcomes that are tightly linked to the intervention for a particular project type (for example, salt marsh restoration), so that the metric is likely to show a significant change in response to the project, based on information from scientific literature, experts, and stakeholders.

WHAT IS A CORE METRIC?

Core metrics are defined as: (1) strongly linked to at least half of the project types in a category and (2) having established methods that people could follow today to measure their change.

Core metrics are those metrics that appear most commonly across all restoration project types, are most likely to respond to restoration investments, and are measurable with available methods.

TABLE 1: PROJECT-SCALE CORE METRICS.
Numbers in the right-hand columns are the number of project types within each category to which the metric is strongly linked. Colored right-hand columns indicate that the metric is strongly linked to at least half of the project types within the category and is considered a core metric for that project category.

OUTCOME	METRIC	HABITAT RESTORATION (7 PROJECT TYPES)	OYSTER RESTORATION (6 PROJECT TYPES)	RECREATIONAL ENHANCEMENT (3 PROJECT TYPES)	WATER QUALITY IMPROVEMENT (7 PROJECT TYPES)
Core metrics common across all categories and project types					
Economic activity: Restoration/intervention	Number of restoration jobs supported by project	7	6	3	7
	Restoration expenditures by project	7	6	3	7
Core metrics common across all project categories					
Economic activity: Recreation and tourism	Change in recreational activity expenditures associated with project site visitation	5	3	2	4
Human health: Mental health & psychological well-being	Change in cognitive function	5	3	3	4
	Change in subjective well-being	5	3	3	4
Additional core metrics for specific project categories					
Cultural values: Knowledge	Education-related knowledge: Number of people with additional knowledge of habitat effects and other project outcomes	6	3	2	3
	Awareness: Number of people with additional knowledge of habitat effects and other project outcomes based on project site	6	3	2	3
Cultural values: Other	Change in project identified cultural value	5	6	3	2
Economic activity: Recreation and tourism	Number of jobs supported through recreational fishing at project site	5	3	2	2
	Change in recreational fishing expenditures associated with project site visitation	5	3	2	2
Human health: Food security for communities	Proportion of surveyed harvesters who say that food caught/harvested at the site is important for feeding their household	4	4	3	1
Property protection	Amount of property adjacent to shoreline with reduced erosion after project	5	3	0	0
Property value	Change in property value across affected properties	3	0	3	3

CORE METRICS – PROGRAM-SCALE

For program scale metrics—those not practically observable at the project scale—one core metric is relevant to all project types: **economic activity from restoration spending** (Table 2). This metric does not reflect the funds spent directly on restoration (see project scale metric above for that impact), but rather how restoration spending affects the rest of the economy through additional spending by project workers and indirect impacts on the supply chain for materials used by the project. There are additional core metrics applicable within each project category. Monitoring of program-scale metrics will likely require additional investment beyond project-scale data collection. These core metrics are more generally applicable and will measure changes common across most restoration project types in the Gulf.

TABLE 2: PROGRAM-SCALE CORE METRICS.
Numbers in the right-hand columns are the number of project types within each category to which the metric is strongly linked. Colored right-hand columns indicate that the metric is strongly linked to at least half of the project types within the category and is considered a core metric for that project category.

OUTCOME	METRIC	HABITAT RESTORATION (7 PROJECT TYPES)	OYSTER RESTORATION (6 PROJECT TYPES)	RECREATIONAL ENHANCEMENT (3 PROJECT TYPES)	WATER QUALITY IMPROVEMENT (7 PROJECT TYPES)
Common across all project types and categories					
Economic activity: Restoration/intervention	Change in economic activity from restoration spending	7	6	3	7
Additional metrics for specific project categories					
Cultural values: Knowledge	Awareness: Number of people with additional knowledge of habitat effects and other project outcomes on broader scale.	6	3	2	3
Cultural values: Other	Change in program-identified cultural value	5	6	3	2
Economic activity: Recreation and tourism	Change in economic activity from recreational fishing	5	3	2	2
Economic activity: Finfish/shellfish harvest	Change in economic activity from project-associated commercial fish harvest	4	3	0	2

Community Resilience

One of the goals of coastal projects and programs in the Gulf is to **build coastal and community resilience.** Resilience refers to the ability to "bounce back" or recover after some kind of emergency or hazardous event. These events can include hurricanes and other coastal storms, sea level rise, flooding, and chemical or oil spills. A community can be resilient in many ways, including economically, socially, or structurally. **Many of the restoration outcomes and associated metrics addressed in the GEMS project are facets of** resilience**.** Resilience-relevant outcomes such as economic activity for local businesses, food security for communities, and property protection do not fully capture all aspects of community resilience, but we indicate on the GEMS website which of our outcomes (and their associated metrics) might be used to examine certain elements of resilience.

Measurement Protocols for Project Scale Metrics

In order to make GEMS metrics actionable, we have developed measurement protocols **for each tier 1 and tier 2** ***project-scale*** **metric.** Protocols include descriptions of and links to measurement procedures used in other studies that may be a template for Gulf programs or projects. The protocols can be useful for creating monitoring plans, including developing a scope of work with contractors.

Each protocol has two components that answer different questions: (1) **how much did the outcome change due to the project** and (2) **who has access to and is affected by the change.** The second component measures who is affected and how, providing information about the equitability of the change caused by the project. There are several specific questions that can be answered using the "who" methods, including what local stakeholders may have an interest in the outcome, whether the outcome is accessible to all interested groups, how the outcome is distributed among different populations within the project area, and whether the outcome distribution has changed due to the project.

Equity, Inclusion, and Access

Across the Gulf of Mexico, **communities are not equally impacted by natural disasters and human-caused stressors** that damage Gulf ecosystems, and **restoration efforts do not always consider who is likely to benefit and who may be harmed or left out** by restoration projects. For example, a fishing pier project located where there are already high levels of recreational fishing access may disproportionately benefit wealthier or tourist areas, while leaving communities that lack access behind. In addition, some projects, especially those with a large, distributed footprint like green infrastructure for stormwater, may disrupt local residents and businesses during construction, while key water quality benefits are only experienced farther downstream. Tracking the outcomes and metrics identified by GEMS, in particular including the measures of who is impacted and how, can show both positive and negative effects. This can help project planners and funders recognize and avoid where possible the adverse impacts of a project and enhance positive impacts for underserved communities. The **measurement protocols support the identification of vulnerable groups and historically underrepresented stakeholders** in the project service area and help identify the **access to and distribution of the projects' positive and negative outcomes.**

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For more information, visit nicholasinstitute.duke.edu/project/gems