

Advancing Collaborative Fisheries Governance Through Multispecies Stock Assessment in the Gulf of Thailand: A GoTFish-Supported Partnership Mechanism for Sub-regional Fisheries Management

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Small-scale fisheries in the Gulf of Thailand depend heavily on shared pelagic resources-particularly short mackerel and anchovy-characterized by multispecies interactions, seasonal variability, and transboundary distribution. Effective management remains challenging due to fragmented assessment approaches, persistent data limitations, and the need to strengthen collaboration and trust among countries and stakeholders sharing the Gulf of Thailand.

This article introduces a GoTFish-supported partnership mechanism designed to advance collaborative governance through a multispecies stock assessment framework for shared pelagic fisheries. In Thailand, this framework is currently applied at the national level to inform fisheries management decisions, including the setting of effort limits for pelagic species. By explicitly accounting for species interactions and cumulative fishing pressures, the approach provides a more robust and policy-relevant basis for management than conventional single-species assessments.

Within Thai waters, ecosystem-based fisheries management (EBFM) has also been implemented using ecosystem indicators, complementing the multispecies assessment framework with plans to progressively expand EBFM to the sub-regional scale.

Rather than pursuing immediate harmonization of management measures, the GoTFish-supported mechanism prioritized alignment of analytical concepts, transparency of assumptions, and shared interpretation of results as foundations for collaboration and confidence-building. The paper further illustrates how this approach supports sustainable small-scale fisheries while maintaining functional coastal and marine ecosystems, contributing to resilient livelihoods, reduced conflicts, and enhanced ecosystem stability in shared, multispecies, and data-limited fisheries systems.

Introduction

Fisheries in the Gulf of Thailand (GoT) are embedded within a complex socio-ecological system, where biological processes, fishing practices, and governance structures are tightly interconnected. These fisheries are predominantly multispecies/multi-gear (MSMG) systems, where multiple species are harvested simultaneously using diverse gears across overlapping spatial and temporal scales (Sharma, 2026).

Globally, MSMG fisheries dominate tropical regions and are characterized by high biodiversity, non-selective fishing practices, and adaptive fishing behavior (FAO & SEAFDEC, 2026). Traditional single-species management is inadequate in these systems, as it fails to capture ecosystem interactions and mixed catch dynamics.

In response, management has shifted toward ecosystem-based and multispecies approaches that treat fisheries as integrated systems rather than isolated stocks (Garcia & Cochrane, 2005). Building on Thailand's experience, this paper introduces a GoTFish-supported partnership mechanism to strengthen collaborative governance in the Gulf of Thailand and proposes a structured pathway for improving transboundary MSMG fisheries governance.

Socio-Ecological Context of Fisheries in Thailand

Thailand's extensive maritime area, long coastline, and large coastal population contribute to strong dependence on marine resources for livelihoods and food security (**Table 1**). The national fisheries system is characterized by diverse fleets, multiple fishing gears, and a wide range of target species, reflecting both ecological richness and adaptive fishing practices.

Table 1. Geographic and fisheries profile of Thailand

Category	Description / Value
Geographic region	Southeast Asia
Ocean location	Andaman Sea and Gulf of Thailand
Population	~66 million (~21 million in coastal provinces)*
Land area*	513,115 km ²
Maritime area*	323,488 km ²
Coastline*	~3,151 km
Fisheries production**	~2.5 million t
Capture fisheries	~1.5 million t (1.4 million t marine, 0.1 million t freshwater)
Culture fisheries	~1.0 million t (0.5 million t coastal, 0.5 million t freshwater)

* Knowledge Management for Marine Interest Project (2026)

** Department of Fisheries (DOF), Thailand (2025)

Characteristics of MSMG Fisheries in the Gulf of Thailand

MSMG fisheries in the Gulf of Thailand exhibit three interrelated dimensions, consistent with FAO–SEAFDEC conceptualization.

Ecological Complexity

Species within MSMG systems differ significantly in growth rates, reproductive strategies, and vulnerability to fishing. These species are linked through trophic interactions, meaning that fishing pressure on one species can influence the abundance and productivity of others (FAO & SEAFDEC, 2026). This results in non-linear and non-independent stock dynamics, where system-level responses cannot be predicted from single-species models.

Operational Diversity

Fishing activities involve multiple fleets and gear types, each with distinct selectivity patterns. However, most fishing gear is not fully selective, and operations capture a wide range of species in varying proportions. Key implications include mixed catches that constrain species-specific management, difficulties in standardizing fishing effort across fleets, and overlapping impacts across fisheries.

Adaptive Fishing Behavior

Fishers respond dynamically to seasonal variability, market demand, and regulatory constraints, continuously adjusting their fishing strategies. This adaptive behavior (**Figure 1**) includes shifts in target species, fishing locations, and gear types, forming a key component of MSMG fisheries systems. While such flexibility supports livelihood resilience, it also increases variability in catch composition and fishing effort. This creates feedback loops between ecological and socioeconomic systems, where changes in

one domain influence the other (FAO & SEAFDEC, 2026). While increasing system resilience, this adaptive behavior complicates management interventions.

Limitations of Single-Species Management

The conventional fisheries paradigm is based on Maximum Sustainable Yield (MSY), which assumes independent stock dynamics. However, in MSMG systems, fishing mortality is applied simultaneously across multiple species, mixed catches prevent species from being managed independently, and ecological interactions modify stock productivity, thereby challenging the assumptions underlying single-species management.

As highlighted in the FAO–SEAFDEC webinar materials (Staples & Leadbitter, 2026), simply aggregating MSY across species systematically overestimates sustainable yield, increasing the risk of overfishing. Furthermore, maintaining all species at their individual MSY simultaneously is impossible; instead, fisheries operate at a system-level equilibrium where trade-offs are unavoidable.

Figure 2 illustrates the limitations of conventional single-species MSY in MSMG fisheries. The upper panel presents the traditional MSY concept, optimizing yield for a single stock and implicitly assuming species independence. In contrast, the lower panel depicts the MSMG system, characterized by mixed catches, multiple fishing gears, and interconnected ecosystem dynamics. Here, fishing effort simultaneously affects multiple species, and ecological interactions—such as predation and competition—further influence stock productivity. As a result, the assumptions underpinning single-species MSY are not met, and management based solely on this approach may lead to biased estimates and suboptimal outcomes. This comparison highlights the need for multispecies and ecosystem-based approaches to better reflect the complexity of real-world fisheries systems.

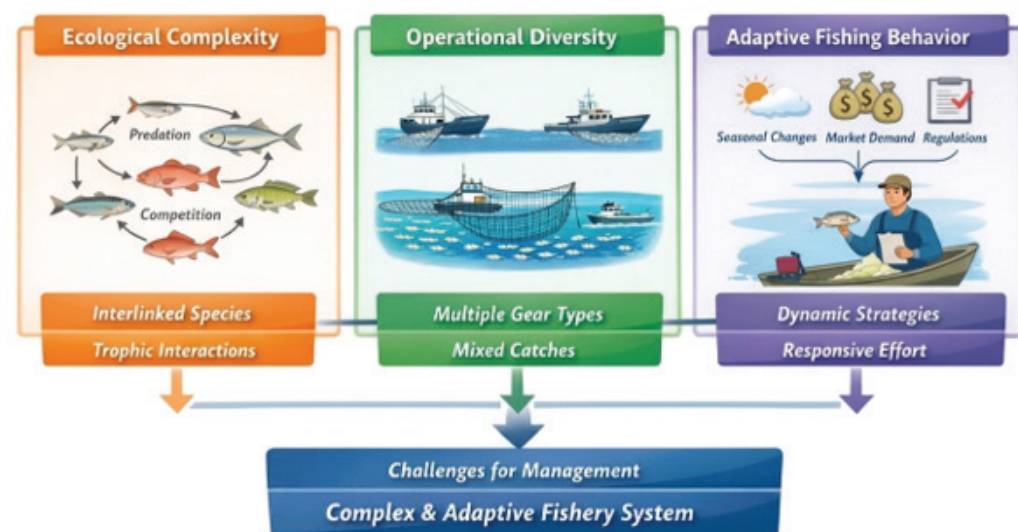


Figure 1. MSMG fisheries in the Gulf of Thailand (Source: FAO & SEAFDEC, 2026)

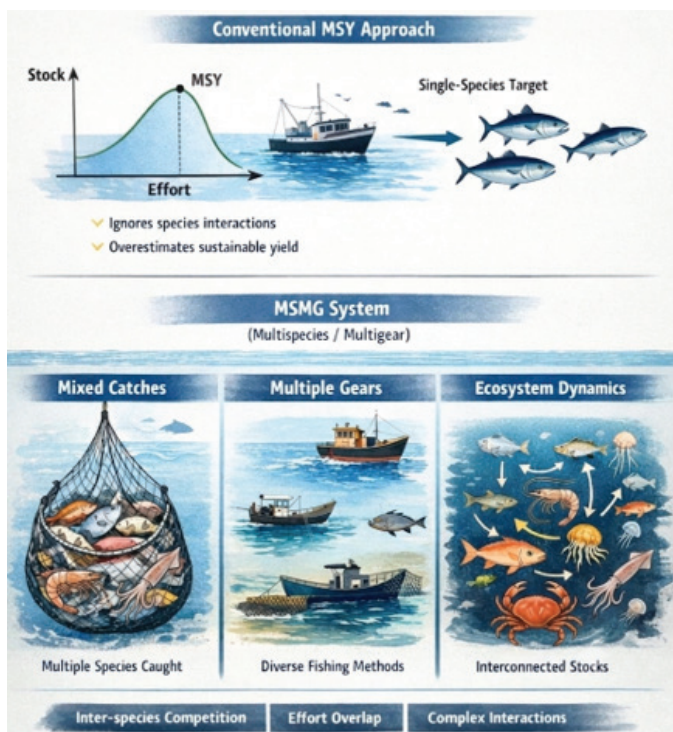


Figure 2. Limitations of single-species fisheries management

Multispecies Stock Assessment and EBFM in Thailand

Thailand has integrated multispecies assessment with Ecosystem-based Fisheries Management (EBFM) to better reflect the realities of MSMG fisheries. Implemented under the national fisheries management framework, this approach supports key decisions such as Total Allowable Catch (TAC), effort control, and resource allocation.

Multispecies MSY (MMSY)

The Multispecies Maximum Sustainable Yield (MMSY) framework extends the conventional MSY concept by estimating sustainable yield at an aggregated system level rather than for individual species. The approach explicitly considers:

- species interactions, including predation and competition
- cumulative fishing pressure across fleets and gears
- overall system productivity and biomass dynamics

In practice, species are often grouped into functional or ecological categories (*e.g.* pelagic, demersal), and indicator species are used to represent broader stock conditions, keeping assessments operational despite data limitations while still capturing key ecosystem dynamics. In the Gulf of Thailand, species are grouped by management objectives into three categories: demersal, pelagic, and anchovy. These are managed through their main fishing gear: trawls, purse seines, and anchovy purse seine/falling nets, respectively.

Unlike single-species MSY, MMSY recognizes maximizing yield for all species simultaneously is not possible. Instead, it identifies a system-level equilibrium balancing trade-offs across species and sectors, aligning with the concept of “Pretty Good Yield.”

The MMSY framework is supported by production models and time-series data on catch and effort and is complemented by ecosystem indicators to track changes in species composition and system structure. These elements are integrated into a broader management cycle, linking assessment results to management measures and adaptive decision-making. Overall, MMSY provides a more realistic and policy-relevant basis for determining TAC and managing fishing capacity in complex MSMG systems compared to conventional single-species approaches (Noranartagoon, 2025).

Indicator Species and Aggregated Groups

The multispecies assessment framework adopts a pragmatic approach by using aggregated species groups and indicator species to represent the dynamics of complex MSMG fisheries systems. In practice, species are first classified into functional or ecological groups—such as pelagic and demersal—based on similarities in habitat, life history characteristics, and exploitation patterns. This aggregation reduces analytical complexity while retaining key system-level signals.

Within each group, selected indicator species represent broader stock conditions and management priorities. These species are typically chosen based on ecological importance, vulnerability, economic value, data availability, and sensitivity to fishing pressure. For example, within the pelagic group, short mackerel may serve as an indicator for small, fast-growing pelagic species, while Spanish mackerel may represent large pelagic and predator species. For the demersal group, red snapper may represent market fish, and sharks may be selected as indicators of vulnerable species. Changes in these indicator species serve as proxies for the condition of the wider species group, supporting timely and cost-effective assessments.

The conceptual process of simplification is illustrated in **Figure 3**, where diverse species assemblages are aggregated into major groups and linked to representative indicator species. This approach translates complex ecosystem dynamics into manageable analytical units, facilitating the application of surplus production models and other data-limited assessment methods while providing a clear structure for management decision-making.

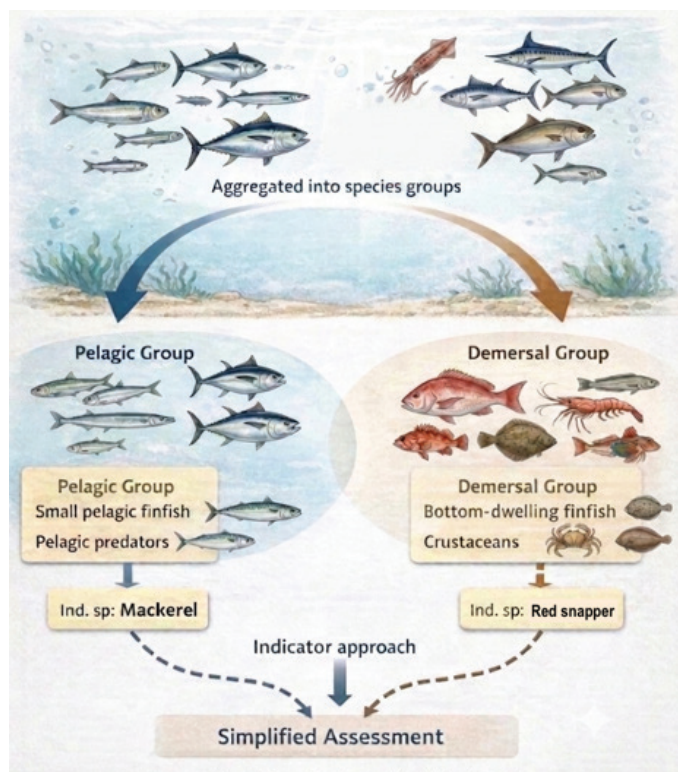


Figure 3. Conceptual framework for simplifying multispecies fisheries into aggregated groups and indicator species, enabling operational assessment under data-limited conditions by linking complex ecosystem structures to manageable analytical units.
Source: Adapted from Staples & Leadbitter (2026)

This approach is particularly suited to data-limited fisheries where comprehensive species-specific assessments are not feasible. By combining aggregated catch and effort data with indicator-based interpretation, the framework maintains operational feasibility while still capturing key ecological patterns. In addition, indicator species simplify complex scientific data into more understandable and policy-relevant signals. However, this approach requires careful consideration of representativeness and uncertainty, as indicator species may not fully capture variability within highly diverse species groups. Therefore, it is important to complement this method with ecosystem indicators and adaptive management processes to ensure that management responses remain robust over time. Overall, aggregated groups and indicator species bridge single-species and fully ecosystem-based approaches, enabling operational management in complex, data-constrained fisheries systems (Staples & Leadbitter, 2026).

Ecosystem Indicators

Ecosystem-based fisheries management (EBFM) in Thailand utilizes ecosystem indicators to capture structural, functional, and productivity changes within the fisheries system. These indicators complement multispecies stock assessment by providing broader insights into ecosystem dynamics not fully captured by catch and effort data alone.

Key ecosystem indicators include:

Biomass trends: Derived from assessment models and survey data to track overall stocks status and system productivity over time. Rather than focusing on individual species, biomass is often evaluated at the group level (e.g. pelagic and demersal), consistent with the multispecies framework.

- **Species composition:** Tracks shifts in the relative abundance of different species within the catch. A decline in high-value or larger-bodied species alongside an increase in smaller or lower-trophic-level species indicates ecosystem stress and fishing pressure. This indicator is particularly important in MSMG fisheries, where mixed catches reflect both ecological conditions and fishing practices.
- **Trophic structure:** Assesses species distribution across different trophic levels to detect ecosystem-level changes such as “fishing down the food web.” Metrics such as mean trophic level of the catch or the relative contribution of predator and prey species are commonly used to evaluate these changes.
- **Structural indicators:** Apply network theory to characterize marine food web organization and function. These include the Hub index, (identifying highly connected, influential species); Gao’s resilience, (quantifying capacity to absorb disturbances and maintain stability); and the Green Band (reflecting anthropogenic fishing pressure on ecosystem structure). These three metrics can be integrated into the Ecosystem Traits Index (ETI), a system level indicator that guides EBFM (Fulton and Sainsbury, 2025).

Together, these indicators support structured monitoring and evaluation within the fisheries management cycle, enabling managers to detect early warning signs of ecosystem change, assess management effectiveness, and adjust strategies. In the context of data-limited fisheries, they incorporate ecosystem considerations into decision-making without requiring highly complex models.

Table 2 summarizes these key ecosystem indicators by category, description, and management relevance. The table highlights how they collectively provide a comprehensive picture of fisheries system dynamics. By combining multiple indicators, managers can better interpret trends, cross-validate signals, and avoid relying on a single metric, improving the robustness of management decisions in complex MSMG systems.

Ecosystem indicators strengthen the link between science and policy by translating complex ecological dynamics into measurable and interpretable signals. When combined with multispecies stock assessment and stakeholder engagement, they enhance the capacity for adaptive management and support more resilient and sustainable fisheries systems.

Table 2. Key ecosystem indicators for EBFM in multispecies fisheries

Indicator Category	Indicator	Description	Management Relevance
Biomass	Total biomass (by group)	Estimated biomass of aggregated species groups (e.g. pelagic, demersal)	Indicates overall stock status and productivity
	Biomass trend over time	Changes in biomass across years	Detects recovery or decline of fish stocks
Species Composition	Catch composition	Proportion of species/groups in total catch	Reflects shifts in resource availability, management change, and fishing pressure
	Size structure	Distribution of fish sizes in catch	Indicates fishing pressure and stock health
Trophic Structure	Mean trophic level of catch	Average trophic level of harvested species	Detects “fishing down the food web”
	Predator-prey balance	Relative abundance of predator vs. prey species	Reflects ecosystem stability
Fishing Pressure	Fishing effort	Number of vessels, gear use, fishing days	Indicates pressure on the ecosystem
	Catch per unit effort (CPUE)	Catch relative to effort	Proxy for stock abundance
Ecosystem State	Biodiversity (species richness)	Number of species in catch or ecosystem	Indicates ecosystem resilience
	Habitat condition (qualitative)	Status of key habitats (e.g. coastal, benthic)	Supports long-term sustainability
Structural Indicators	Hub index	Measures the relative importance of species within the food web based on their connectivity and influence on energy flow and trophic interactions	Identifies key or highly influential species that are critical for maintaining ecosystem structure; supports prioritization for monitoring and conservation
	Gao’s resilience	Quantifies the capacity of the ecosystem network to absorb disturbances and maintain its structural and functional integrity	Provides an early warning of reduced ecosystem stability; supports precautionary management and helps define safe operating limits for fishing pressure
	Green Band	Represents the level of fishing pressure on the ecosystem	Helps evaluate whether fishing pressure is within sustainable limits; supports adjustment of fishing effort and management measures
	ETI	An integrated index combining Hub index, Gao’s resilience, and Green Band to reflect overall ecosystem structure and condition	Provides a system-level indicator to guide EBFM, enabling holistic assessment and adaptive decision-making

Source: Adapted from FAO-SEAFDEC MSMG Webinar Series (2026), Noranarttragoon (2025), and Fulton & Sainsbury (2025)

Management Cycle Integration

The approach aligns with the MSMG management cycle, which provides a structured and iterative framework for decision-making in complex multispecies fisheries systems. This cycle begins by defining a clear vision and long-term objectives that balance ecological integrity, economic viability, and social well-being over the long-term.

These high-level goals are translated into measurable and time-bound operational objectives and indicators (such as biomass trends, species composition, and fishing effort). These are linked to reference points that define target and limit conditions, ensuring management goals are actionable and grounded in measurable outcomes.

Management measures and control rules are then developed to achieve these objectives and may include Total Allowable Catch (TAC), effort controls, spatial and temporal closures,

and gear restrictions. Predefined harvest control rules provide responses to changes in indicator status, improving transparency, predictability, and consistency in decision-making.

Monitoring and evaluation follow, involving the systematic collection and analysis of data to assess whether management measures achieve intended outcomes, detect trends, identify emerging risks, and evaluate management effectiveness in relation to defined objectives.

Finally, adaptive feedback ensures that management strategies are continuously refined. Given the inherent uncertainty in MSMG fisheries—arising from environmental variability, data limitations, and dynamic human behavior—this feedback loop is essential for maintaining system resilience and responsiveness.

The overall process is illustrated in **Figure 4**, which presents the MSMG management cycle as a continuous and interconnected loop. The diagram highlights how each component—from vision setting to adaptive feedback—is linked through iterative feedback mechanisms. It emphasizes that management is not a linear process but a dynamic cycle where monitoring results inform adjustments to objectives, indicators, and management measures. This cyclical structure enables fisheries management systems to respond effectively to uncertainty and evolving conditions.

Together, these components form an integrated framework that links science, policy, and implementation. By explicitly incorporating uncertainty, trade-offs, and stakeholder participation, the MSMG management cycle provides a practical foundation for ecosystem-based and multispecies fisheries management (FAO & SEAFDEC, 2026).



Figure 4. The MSMG management cycle, illustrating the iterative process linking objectives, indicators, management measures, monitoring, and adaptive feedback in multispecies fisheries management (Source: FAO & SEAFDEC, 2026)

GoTFish-Supported Partnership Mechanism

Conceptual Foundation

The Gulf of Thailand is a highly interconnected marine ecosystem where key fish stocks, particularly small pelagic species, are distributed across national jurisdictions and exploited by multiple countries. This transboundary nature requires coordinated management to ensure sustainability, avoid resource depletion, and mitigate conflicts. In practice, however, achieving full harmonization of fisheries management measures remains challenging due to differences in national governance structures, legal frameworks, data systems, technical capacity, and management priorities.

In this context, the GoTFish-supported partnership mechanism adopts a process-oriented, adaptive approach emphasizing alignment rather than uniformity. Rather than

requiring identical regulations or management measures, the mechanism builds a shared understanding by aligning analytical frameworks, assessment methodologies, and key concepts. This includes promoting common approaches to multispecies stock assessments, ecosystem indicators, and management reference points.

Trust and cooperation are developed progressively through technical collaboration. By fostering transparency in data, assumptions, and analytical processes, the mechanism helps reduce uncertainty and build confidence among participating countries. Joint technical discussions, knowledge exchange, and capacity development support the gradual convergence of scientific understanding to inform future policy-level coordination.

This conceptual foundation reflects a pragmatic pathway toward sub-regional governance in complex, data-limited MSMG fisheries systems. By prioritizing process alignment and shared learning, the GoTFish mechanism creates conditions necessary for more effective collaboration, while allowing flexibility for countries to adapt management measures to their specific national contexts. Over time, this approach can support the development of compatible management strategies and contribute to a more coherent and resilient fisheries governance.

Key Principles

The GoTFish-supported partnership mechanism relies on three technical and analytical principles to enable effective collaboration in transboundary, data-limited multispecies fisheries systems.

The alignment of analytical frameworks involves adopting comparable approaches to multispecies stock assessment, ecosystem indicators, and reference points across participating countries. This does not require identical models or datasets, but rather a shared structure and logic in how fisheries systems are analyzed and interpreted. Such alignment facilitates comparability of results and supports more coherent regional understanding of stock status and fishing impacts.

The transparency of assumptions (including those related to data sources, model structure, parameter selection, and uncertainty) allows countries to better understand the differences in assessment outcomes and reduce potential misunderstandings. Transparency also enhances the credibility of scientific advice and supports more informed decision-making.

The shared interpretation of results through joint technical discussions and collaborative review processes allows stakeholders to develop a common understanding of key indicators, trends, and management implications to inform coordinated action.

Together, these principles build trust and confidence among participating countries. In complex MSMG fisheries systems, where uncertainty is high and interests may differ, such trust is a critical prerequisite for sustained cooperation. By focusing on process, transparency, and shared learning, the mechanism creates a stable foundation upon which more formal coordination and policy alignment can be built over time.

Operational Components

The GoTFish-supported partnership mechanism translates its guiding principles into coordinated action and is designed to function within existing national systems while progressively strengthening sub-regional collaboration.

A central element is the establishment of joint technical platforms, which provide regular forums for scientists, managers, and technical experts to exchange information, discuss methodologies, and review assessment results. These platforms may take the form of regional workshops, technical working groups, or virtual coordination meetings.

The mechanism also promotes the use of shared datasets and models, where feasible, to improve consistency and comparability of assessments. This includes harmonizing key data inputs—such as catch, effort, and biological parameters—as well as encouraging the use of comparable modeling frameworks for multispecies stock assessment. While full data integration may not always be possible, even partial standardization enhances transparency and facilitates cross-country analysis.

Capacity development through training programs, technical exchanges, and collaborative analyses are used to strengthen national capacities in areas such as stock assessment, ecosystem indicators, and data management. By reducing disparities in technical capability, the mechanism supports more equitable participation and improves the overall quality of regional assessments.

In addition, the mechanism supports the gradual development of common reference points, such as shared indicators, thresholds, and target ranges for key variables (*e.g.* biomass, fishing effort, or catch composition). These reference points do not need to be identical across countries but should be conceptually aligned to enable coordinated interpretation and decision-making. Over time, this process can facilitate convergence toward more harmonized management approaches.

These operational components enable incremental progress while respecting national contexts and governance structures. By allowing flexibility in implementation and emphasizing voluntary collaboration, the mechanism fosters sustained engagement and reduces barriers to participation. Collectively,

these elements provide a practical pathway for strengthening sub-regional cooperation and advancing ecosystem-based, multispecies fisheries management in the Gulf of Thailand.

Trade-offs in MSMG Fisheries Management

Trade-offs are inherent in MSMG fisheries systems due to competing management objectives, including maximizing yield, maintaining ecosystem integrity, and supporting livelihoods. As illustrated in **Figure 5**, these objectives cannot be simultaneously maximized; instead, improving performance in one dimension often leads to trade-offs in others. For example, increasing fishing effort to maximize yield may reduce ecosystem resilience, while stricter conservation measures may constrain short-term economic returns and fishing opportunities.

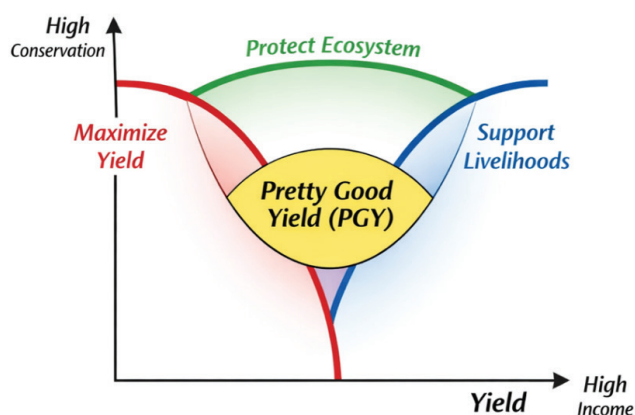


Figure 5. Trade-offs in multispecies/multi-gear (MSMG) fisheries illustrating the concept of “Pretty Good Yield (PGY)” as a balance among maximizing yield, maintaining ecosystem integrity, and supporting livelihoods. Source: Adapted from Hilborn (2010, 2011) and FAO-SEAFDEC (2026)

Rather than seeking an optimal solution for a single objective, fisheries management increasingly adopts the concept of “**Pretty Good Yield**” (PGY), which recognizes that a range of outcomes can provide acceptable performance across multiple objectives without maximizing any single one (Hilborn, 2010). The goal is to identify a balanced operating space (represented in the figure as the central overlap) where yield, ecosystem health, and livelihoods are jointly sustained at satisfactory levels.

As emphasized in the FAO–SEAFDEC webinar in 2026, these trade-offs are unavoidable and must be explicitly recognized and managed rather than avoided (FAO & SEAFDEC, 2026). This requires transparent decision-making processes in which priorities are clearly defined and the implications of alternative strategies are understood by stakeholders. Analytical tools such as multispecies stock assessment, ecosystem indicators, and Management Strategy Evaluation (MSE) provide a structured means to evaluate these trade-offs and support the selection of robust and balanced management strategies.

Management Strategy Evaluation (MSE) and Uncertainty

Fisheries management in MSMG systems operates under multiple sources of uncertainty that affect both scientific assessments and management outcomes. These include observation uncertainty arising from data limitations and measurement errors; process uncertainty associated with environmental variability and natural fluctuations in stock dynamics; model uncertainty related to assumptions and structural choices in assessment models; and implementation uncertainty resulting from imperfect compliance, enforcement, and variability in human behavior.

In MSMG fisheries, these uncertainties are amplified by mixed catches, complex species interactions, and dynamic fishing practices. As a result, relying on a single “best estimate” of stock status or management outcome can be misleading and may lead to ineffective or overly risky decisions.

Management Strategy Evaluation (MSE) provides a structured, simulation-based framework to address these challenges. Rather than identifying a single optimal solution, MSE evaluates how alternative management strategies perform under a range of plausible conditions by simulating the full fisheries system—including stock dynamics, fishing behavior, data collection processes, and management responses.

Through this process, MSE enables:

- the simulation of system dynamics under uncertainty
- the testing of alternative management strategies (*e.g.* TAC rules, effort controls, harvest control rules)
- the evaluation of performance against multiple objectives, such as yield, ecosystem health, and socioeconomic outcomes

Performance is typically assessed using predefined indicators and reference points, allowing managers to compare trade-offs among different strategies in a transparent and quantitative manner. Furthermore, MSE shifts the focus from finding the “best” assessment to identifying robust strategies that perform consistently well across a wide range of uncertain scenarios (Amoroso & Pons, 2026).

By explicitly incorporating uncertainty and trade-offs into the decision-making process, MSE complements multispecies stock assessment and ecosystem indicators and strengthens the overall MSMG management cycle. It provides a practical tool for supporting adaptive management, improving resilience, and enhancing confidence in fisheries governance in complex and data-limited systems.

Implications for Sub-regional Governance

The integration of multispecies stock assessment, EBFM, and collaborative mechanisms such as the GoTFish-supported partnership has important implications for strengthening sub-regional fisheries governance in the Gulf of Thailand. By linking scientific approaches with cooperative processes, this integrated framework supports more coherent, adaptive, and resilient management of shared marine resources.

Governance

At the governance level, this approach enhances transparency, coordination, and evidence-based decision-making. Aligning analytical frameworks and sharing data and methodologies improve the comparability of assessment results and reduce interpretive uncertainty, facilitating informed dialogue and building trust. Crucially, this process-oriented mechanism allows countries to coordinate without requiring immediate policy harmonization, lowering institutional barriers to cooperation while strengthening the scientific basis for joint decision-making.

Livelihoods

From a socioeconomic perspective, the approach supports small-scale fisheries by promoting sustainable resource use and reducing competition over shared stocks. By incorporating ecosystem indicators and multispecies dynamics, management measures can be better tailored to reflect the realities of mixed fisheries, helping to avoid unintended impacts on fishing communities. In addition, improved transparency and stakeholder engagement contribute to more inclusive decision-making processes, enhancing legitimacy and compliance. Over time, this can reduce conflicts among user groups and contribute to more stable and resilient coastal livelihoods.

Ecosystem Sustainability

In terms of ecological outcomes, the integrated framework strengthens the capacity to maintain ecosystem structure and function. By moving beyond single-species management and incorporating multispecies interactions and ecosystem indicators, the approach supports more holistic assessments of fishing impacts. This helps prevent the overexploitation of vulnerable species, mitigates ecosystem imbalances, and promotes long-term productivity of marine resources. Furthermore, the incorporation of adaptive management and tools such as MSE enables management strategies to respond to uncertainty and environmental variability.

Conclusion and Way Forward

MSMG fisheries represent the dominant and most complex fisheries systems in the Gulf of Thailand, where high biodiversity and mixed catches challenge conventional single-species management approaches. This analysis demonstrates that multispecies approaches provide a more realistic basis for stock assessment by accounting for species interactions, cumulative fishing pressure, and system-level dynamics. When combined with EBFM, these approaches enhance understanding of broader ecosystem processes, enabling managers to better interpret changes in biomass, species composition, and trophic structure.

At the governance level, the GoTFish-supported partnership mechanism illustrates how collaborative approaches can strengthen coordination in transboundary fisheries systems. By emphasizing alignment of analytical frameworks, transparency of assumptions, and shared interpretation of results, the mechanism builds trust and supports gradual convergence in management practices without requiring immediate harmonization of national policies.

Notably, the authors emphasize that uncertainty and trade-offs are inherent in MSMG fisheries and must be explicitly addressed through structured processes such as the MSMG management cycle and Management Strategy Evaluation (MSE). These tools enable the identification of robust management strategies that perform well across multiple objectives, consistent with the concept of “Pretty Good Yield” (PGY).

Overall, a focus on analytical alignment, transparency, and adaptive learning offers a practical and scalable pathway toward sustainable, cooperative, and resilient fisheries management in the Gulf of Thailand. Through practical, operational components such as joint technical platforms, shared datasets, and targeted capacity development, this mechanism allows neighboring countries to progressively build trust and align their scientific methodologies without requiring immediate policy harmonization. Because MSMG fisheries dominate tropical regions like Southeast Asia, this approach serves as a highly adaptable model for other transboundary and data-limited systems in the region. It offers a concrete roadmap for regional bodies seeking to collaboratively balance ecological sustainability, economic viability, and social well-being while respecting diverse national governance structures.

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