



**Asia-Pacific
Economic Cooperation**

AQUACULTURE GOVERNANCE TOOLKIT

Principles and Guidelines

**APEC Ocean and Fisheries Working Group
June 2026**



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Produced by

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This document presents the results of an initiative developed by the Chilean National Fisheries and Aquaculture Service (SERNAPESCA) in collaboration with The Monterey Bay Aquarium and The Wageningen University, and approved by the Ocean and Fisheries Working Group (OFWG) of the Asia-Pacific Economic Cooperation (APEC).

The initiative aims to strengthen the governance of small-scale aquaculture (SSA) across the APEC region, while supporting the Small-Scale Fisheries and Aquaculture (SSFA) Roadmap through an analysis of the current structure, characteristics, and governance conditions of SSA. The project was supported by the Monterey Bay Aquarium and Wageningen University & Research and focused on: (i) enhancing the regulatory environment and effective governance by identifying strengths and weaknesses to inform targeted interventions; (ii) building capacity within the SSA sector to generate sustainable and positive impacts; and (iii) developing the Small-Scale Aquaculture Governance Toolkit (SSAGOT) as a reference for good governance practices.

This toolkit is based on the outcomes of expert elicitation, workshops, surveys, literature review, and fieldwork, and was developed with a specific focus on APEC economies. It has been created in the anticipation that it will be useful for civil society, academia, policy makers, governmental institutions and the aquaculture industries.

Special acknowledgment is extended to the co sponsoring APEC economies—Canada; China; Indonesia; Peru; the Philippines; Chinese Taipei; and Thailand—as well as to all participating experts and stakeholders.

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INTRODUCTION

The aquaculture sector produced 94.9 million tons in 2022 (excluding seaweed), and for the first time that aquaculture production exceeded fisheries capture (51% of global production). Inland aquaculture contributed to 62.6% of farmed aquatic animals. Asia continues to lead production, producing 70% of the total aquatic production, China being the major producer with 36% of the total world aquatic animal production (FAO, 2022).

SSA in APEC region

Four out of twenty-one APEC member economies are recognized as the top five global aquaculture producers China (52.9 million tons); Indonesia (5.4 million tons); Viet Nam (5.2 million tons); and Chile (1.6 million tons). The production of the top 5 global economies reached 59% of the world's aquatic animal production in 2022 (FAO, 2022). Despite that there is not clear definition of small-scale aquaculture (SSA), the FAO SOFIA reports states that SSA drives a remarkable 90% of Asian production.

While SSA has an immense potential for sustainability, livelihood, and contributes to food security, it also serves as a critical engine for regional economic growth. However, SSA farmers face environmental, social, and sanitary hurdles that often manifest as market access barriers and trade volatility. Effective governance empowers SSA to navigate these complexities, ensuring responsible resource management and disease control, which in turn fosters a stable investments climate and ensures fair stakeholder engagement across the value chain.

Aquaculture under APEC's collaborative framework has brought benefits as the economies work together to improve knowledge, infrastructure, investments, science, and business, among other gains. Although challenges remain, the network component has been a relevant factor for improvements in Asia-Pacific regions often overshadowed by more significant players.

SSA in APEC economies faces critical governance challenges. Conflicts within SSA often stem from resource competition, communication gaps, unfair market practices and market access. Effective governance is needed to address these challenges. Effective governance creates and sustains an enabling environment for SSA, thereby enhancing opportunities to attract investment, promoting collaboration, and fostering sustainable development, ultimately empowering farmers and benefiting communities and the environment. Effective governance for SSA is, however, not easily achieved. In the 2019 Regional Consultative Workshop on Strengthening Aquaculture Governance for Sustainable Development in Asia-Pacific, the participants recognized the lack of effective governance as a key challenge for sustainable aquaculture growth in the APEC region. For SSA governance specifically, the consultative workshop put forward recommendations to address compliance with relevant regulations and voluntary standards. Other governance challenges.

GOVERNANCE TOOLS in support of SSA

The purpose of this toolkit is to support those organizations involved in governance (1) to see and know the challenge that needs to be addressed and who are affected, (2) to organize engagement and participation of affected as well as governing actors, and/or (3) to take action and make decisions, based on the principles suggested by Kloppenburg et al. (2022).

This Toolkit provides practical guidelines to support the selection of governance tools and presents a small set of tools that are directly relevant for addressing governance challenges in SSA in the APEC region. This document thus does not aim to provide an exhaustive list of all possible tools, rather outlines questions, considerations, and steps to be taken for tool application, to ensure that a tool fits well with the governance challenge at hand. That means that governance principles, that is, the underlying assumptions on how governance is expected to establish and maintain an enabling environment for SSA, need to be made (more) explicit.

TOOLKIT approach

This Toolkit offers a comprehensive resource, including problems, methodologies, and guidelines addressing governance challenges, alongside a series of assessment tools and illustrative case studies to enhance public understanding of the issues and their potential solutions. This Toolkit has been developed in co-creation with APEC defining SSA governance, identifying challenges (workshop in person), discussion tool selection (workshop online) and Desk research for examples.

The Governance Toolkit is essential because it addresses the critical need for a structured and systematic approach to understanding, assessing, and responding to complex governance challenges. Users follow a stepwise approach, as shown in Figure 1, to move from a diagnosis to tool creation and evaluation to ensure viable and evidence-based interventions.

The seven steps

The process begins with **establishing key definitions (Step 1)**, that is to create a common understanding of SSA, and what tool users consider to be effective governance of SSA. By defining SSA, there is an empirical baseline for characterizing the socio-technical landscape and the project scope. In defining governance, and clarifying underlying assumptions, the desired outcome of tool application will be made explicit. Following this diagnostic phase, **Step 2** is aimed at **identifying governance challenges** through a structural analysis to identify systemic bottlenecks and institutional failures. In this step, tool users need to make clear what specific issue a tool needs to address. These findings inform **Step 3**, that is, to **identify tools needs and expectations**, where functional requirements and performance criteria for tool

application are established to ensure the proposed solutions align with specific governance objectives.

The framework then transitions to the **mapping of stakeholders and interactions (Step 4)**. The mapping provides tool users with insights into needed collaborations, and how others are affected by tool applications. This is an analytical foundation that enables **Step 5**, which is the **tool selection**, a process involving the comparative evaluation of methodologies—as exemplified in this report—to identify the most robust instruments for the target environment. What follows is **Tool testing and applications (Step 6)**, involving controlled pilot implementations to validate the efficacy of the selected tools in situ. The cycle then concludes with **monitoring, evaluation, and learning (Step 7)**. This is an iterative phase, of longitudinal data collection and performance assessment designed to facilitate adaptive management and continuous framework optimization.

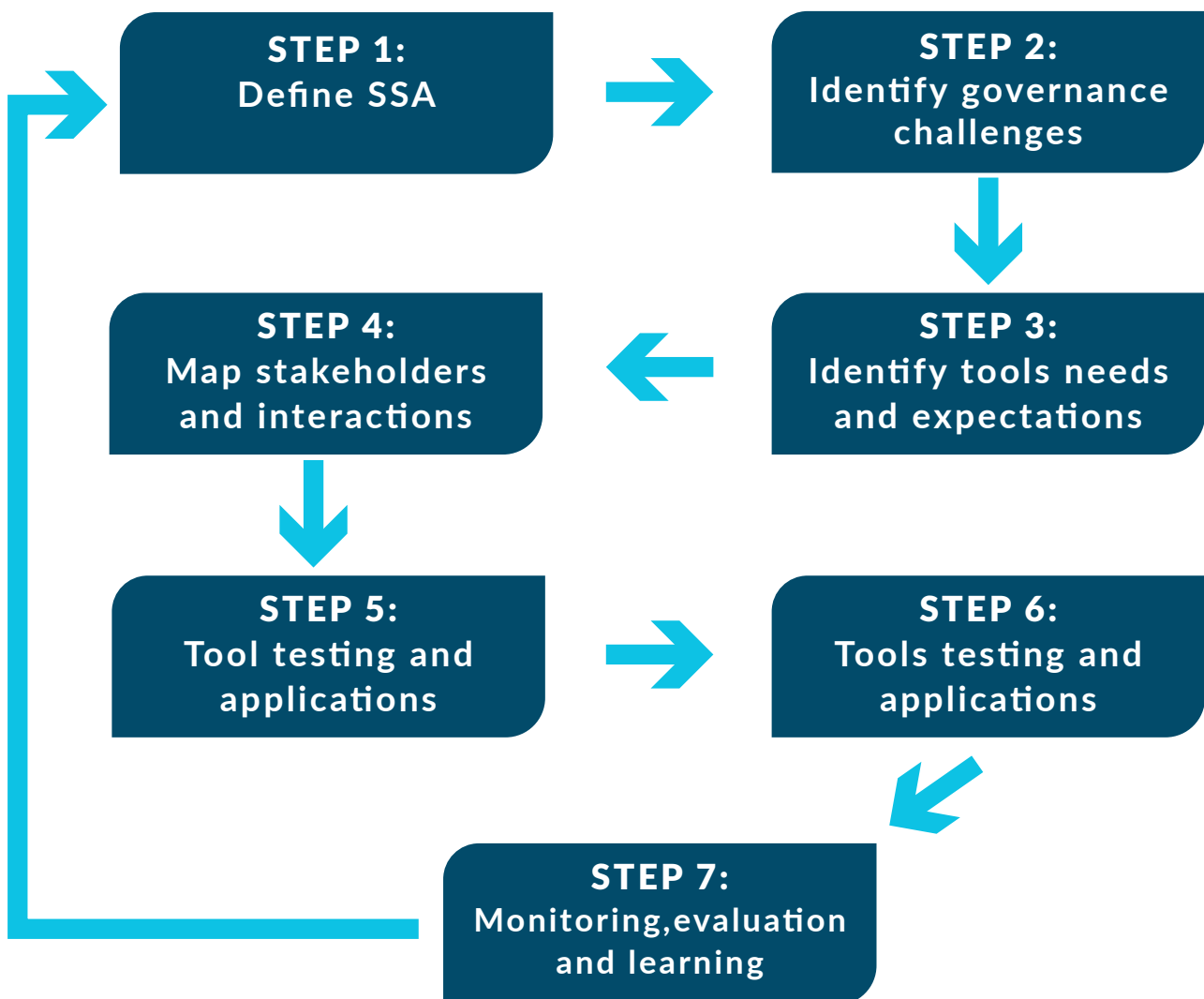


Figure 1. The stepwise approach recommended for Governance Toolkit users.

Governance challenges in SSA

SSA production is characterized by domestic markets and a small part of the production for exportation. The main resources are Tilapia, catfish, carps, a 'niche' higher value fish, crustaceans, and mollusks. Farms usually are between sizes 0.2-10 ha with a wide range of intensity in production systems, mix of formulated and unprocessed feeds, often integrated with other forms of agriculture/livestock and integrated/overlapping with other land or water uses (irrigation, reservoirs, urban, tourism, etc.)

Governance challenges in small-scale aquaculture are related to highly geographically clustered, peri-urban and rural locations, coastal and inland, usually developed in unplanned manner during boom periods – ex-post reorganization is difficult. There exists a high degree of informality/semi-formality (e.g., farm registration, land tenure), diverse farming practices within and across economies, multiple species, unconventional inputs - difficult to establish Best Management Practices (BMPs)/standards, and co-location and interaction with other land uses and economic activities.

There is potential for conflicts, negative externalities among different users, lack of coordination and differing priorities among governing bodies (e.g., fisheries departments, forest departments, irrigation departments, land departments, etc.) But this diversity and adaptability make SSA resilient.

IDENTIFYING CHALLENGES AND OPPORTUNITIES IN THE APEC REGION

Based on the workshop, survey results, and experts' elicitation, the challenges and opportunities in SSA governance have been identified in four main areas:

a) Data and measurement

Agencies lack the reliable, standardized information needed to monitor and regulate the SSA sector effectively.

Challenges	
The Problem	The Public Sector Challenge
Poor Data Quality & Standardization	The data you get is often inaccurate or unreliable because there are no common rules or standardized protocols.
Outdated Methods	Most information is still collected using manual, paper-based methods. Only a tiny fraction uses modern tools like specialized sensors.
Low Producer Reporting	The burden of data collection falls almost entirely on your agencies (inspection/monitoring), while mandatory reporting from producers is low.
Lack of Definition	There is no clear definition of aquaculture, making it hard to map who is operating and whom your policies affect.

Opportunities: Digital transformation → by creating data using technology that will create new jobs, and products' traceability.

b) Policy and Regulatory conflict

The current legal and procedural framework creates barriers rather than pathways for small-scale producers.

Challenges	
The Problem	The Public Sector Challenge
Regulatory Complexity & Bureaucracy	Producers cite regulatory complexity as a main obstacle. Overall, bureaucracy is a major barrier.
Policy Gaps & Inconsistency	Your legal framework is considered only "somewhat useful". There are issues with inconsistent regulatory frameworks and the overall policy gap.
Misaligned Incentives	Producers prioritize profitability and market demand. If regulations don't clearly support these economic priorities, compliance (especially sanitary) is low.

Opportunities: Trade facilitation → Harmonization for regional trade, smoother cross-border trade

c) Resource and capacity gaps

Both public agencies and producers face critical shortages necessary for modernization and compliance.

Challenges	
The Problem	The Public Sector Challenge
Financial and Human Resource Shortages	The primary obstacle is the lack of human or financial resources for crucial tasks like data collection, management, and use.
Limited Access to Financing	Access to financing is consistently cited as a top socioeconomic priority for the public sector and the second most important obstacle for the private sector.
Low Technology Access	Producers face low access to technology. For example, based on a aquaculture governance survey only a small percentage use specialized technology like sensors (9.09%) or online platforms (18%).
Climate Vulnerability	Climate change risks, specifically flooding and droughts, are considered the most urgent environmental issues to address.

Opportunities: Investment opening → technology transference and financial inclusion.

d) Stakeholder alignment and trust

The failure to coordinate internally and align priorities externally is a major systemic weakness.

Challenges	
The Problem	The Public Sector Challenge
Conflicting Interests and Trust	The biggest obstacles to public-private collaboration are conflicting interests and priorities and a lack of trust and communication.
Coordination Deficiencies	Coordination between state bodies is low, and the link between central and local government levels is rated as only "regular" or "acceptable".
Low Producer Reporting	Data collection mechanisms rely heavily on agency inspection and monitoring (e.g., 90% for sanitary data), while mandatory reporting by producers is less frequent.
Misaligned Producer Priorities	Producers prioritize profitability and market demand over other criteria, ranking sanitary performance lowest. This creates a major governance challenge in encouraging non-economic compliance.

Opportunities: Market integration → Incentive-based compliance by meeting sanitary standards will grant access to better markets and build trust.

The seven steps to follow

STEP 1: ESTABLISH DEFINITIONS: GOVERNANCE OF SSA

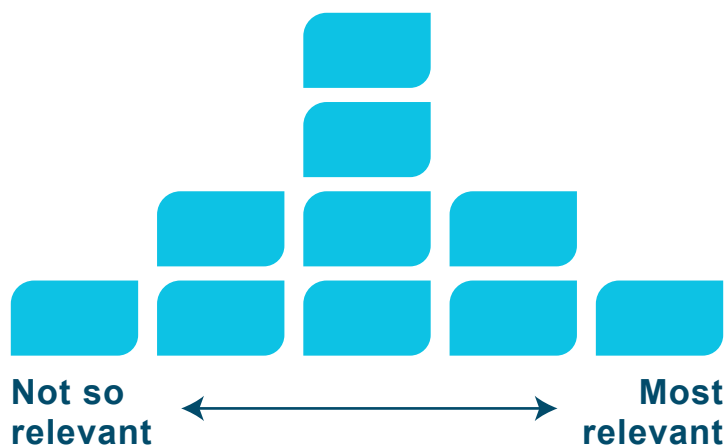
To establish a legitimate and workable definition of governance and of SSA, the following governance tools are recommended to ensure the definition is not imposed unilaterally but is the result of a consensus-based process. These tools were developed for and used in an in-person workshop. In-person workshops often serve well as a space for brainstorming and open exploration.



1.1 Tool used in the project for defining governance: a conceptual definition

For the APEC workshop, AGI-based cards were used to identify conceptual definitions of governance (more details about AGI tools in section 2.2).

<p>Agility Capability</p> <p>An organization needs to be willing to learn. For example, translating long-goals into a concrete and comprehensive action plan, and allocating sufficient/considerable resources to monitoring and evaluation.</p>	<p>Reflexivity Capability</p> <p>An organization needs to be open-minded in order to identify complex problems and develop solutions. For example, having tolerance towards ambiguity and complexity, and seeking collaboration with a broad range of experts, including small-scale producers and communities.</p>
<p>Communication Capability</p> <p>An organization needs to communicate clearly and be responsive. For example, knowing their target audiences, gaining information from a wide variety of media channels and allocating sufficient/considerable resources communication</p>	<p>Innovation drive Capability</p> <p>An organization needs to be daring and open to innovate. For example, participating or even leading in pilot projects, having tolerance to failure, and allocating sufficient/considerable resources to innovation.</p>
<p>Rescaling Capability</p> <p>An organization needs to be able to navigate complex institutional settings. For example, being aware of differences in local settings, and understanding the (nuanced) differences in collaborating with different actors at multiple levels (local to global).</p>	<p>Scope Collaboration</p> <p>In collaborations, there needs to be attention to the most relevant issues for sustainable development of SSA. What is deemed most relevant, is decided or agreed on by the collaborative partners.</p>
<p>Information Collaboration</p> <p>In collaborations, there is a joint recognition of the need for data and information. All collaborative partners find it important that discussions and actions based on accurate and trustworthy information.</p>	<p>Learning Collaboration</p> <p>There is a joint effort by all collaborative partners to support an open, proactive and strategic planning style. Moreover, they are committed to "learning how to learn", including learning how to (better) collaborate.</p>
<p>Inclusion Collaboration</p> <p>Collaborations include full range of affected stakeholders, including small-scale producers, communities or their representatives. Also, collaborative partners treat each other fair and provide each other with equal access to deliberation and decision-making.</p>	<p>Coordination Collaboration</p> <p>There is alignment and communication between different projects. Also, collaborative partners are aware of important regulations and policies, and the need for legal compliance.</p>



1.2 Tool used in the project for defining SSA: expert - and experience - based definition

Because of cultural, expert- and experience-based differences, diverse tools were used in the Aquaculture Governance Workshop such as open discussion sessions, Mentimeter¹, surveys and group activities.



1.3 Examples of other useful tools for establishing a shared definition

The examples provided here are used in the context of this Toolkit. However, the examples provided are useful and applicable for other governance challenges.

1.3.1 Stakeholder Analysis

This process identifies, categorizes, and maps all relevant groups, ranging from small and large-scale farmers to associations, ministries (i.e., Fisheries, Agriculture, Economy), NGOs, and scientists. The objective is to understand their specific interests, power/influence dynamics, and their positioning regarding the definition of the sector.

- **Source:** *Technical Guidelines for Responsible Fisheries - No. 4, Suppl. 2*
- **Relevance:** This guide details how to categorize stakeholders (e.g., historical involvement, socio-economic status) and manage their conflicting interests in resource use.
- **Reference:** FAO (2012b)

¹**Mentimeter:** a web-based platform and presentation tool for real-time, interactive sessions, allowing users to create polls, word clouds, quizzes, and surveys.

Example:

SSA definition: A government agency applies the Power/Interest Grid to identify two key groups: the "National Exporters Association" (High Power/High Interest) and the "Subsistence Farmers Cooperative" (Low Power/High Interest). The analysis reveals that Exporters prefer a broad definition—such as up to 50 tons—to qualify for small-business tax incentives, whereas Subsistence Farmers prefer a narrow one—like less than 2 tons—to protect their exclusive access to local subsidies. This visualization aids in preventing the definition from being hijacked by powerful industrial interests.

1.3.2 Delphi Methodology or Structured Focus Groups

Delphi Methods is an iterative method where a panel of experts responds to questionnaires across multiple rounds. After each round, an anonymous summary of the group's responses is provided, allowing experts to revise their opinions. This facilitates gradual consensus without the bias of face-to-face confrontation.

Focus Groups Description: Guided discussion sessions with small, homogeneous groups (e.g., exclusively aquaculture farmers or exclusively government officials) to explore their perceptions and criteria for "small-scale" in depth.

These tools enable structured, documented agreement on technical criteria (production limits, revenue, surface area) based on direct technical experience.

- **Source:** *The use of Delphi methodology in agrifood policy development or Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (SSF Guidelines)* for participatory consultation methods.
- **Relevance:** The Delphi guide explains how to reach consensus among experts without face-to-face bias, while SSF guidelines provide frameworks for grassroots consultation.
- **References:** Frewer et al. (2011) and FAO (2015)

Example:

Delphi: A panel of 20 experts is sent an anonymous questionnaire asking: "What is the maximum pond surface area for a small-scale farm?" Round 1 response ranges from 0.5 hectares to 10 hectares. A summary is sent back showing the median is 2 hectares. In Round 2, experts revise their answers closer to the media. By Round 3, a technical consensus is reached at <2.5 hectares.

Focus Group: A facilitator meets with a group of women processors. They reveal that "production volume" is irrelevant to them; they define "small-scale" by "family labor" (not hired staff). This qualitative criterion is added to the definition of options.

1.3.3 Multi-Criteria Analysis (MCA)

This tool helps objectively weight and compare different definition criteria. It involves identifying specific metrics—such as annual production in tons, net income, number of employees, technology used, or land/water tenure—and assigning weights based on domestic priorities (e.g., weighing social impact against production volume). Value: MCA transforms qualitative discussion into a quantitative framework, enabling policymakers to compare the impact of different thresholds and to make data-driven decisions aligned with explicit policy objectives.

- **Source:** *Multi-criteria analysis: a manual for making government policy.*
- **Relevance:** This is the standard government manual for weighing non-monetary criteria (social vs. economic) in policy decision-making.
- **References:** OECD (2009)

SSA Definition Example:

A policy team evaluates three potential definitions of SSA: Option A (<2 tons), Option B (<5 employees), and Option C (<USD 10k revenue). They assign weights to domestic goals: Poverty Alleviation (50%), Tax Generation (30%), and Ease of Enforcement (20%).

- **Option B (Employees)** scores highest on Poverty Alleviation but lowest on Enforcement (hard to verify).
- **Option A (Volume)** scores moderate on all. The weighted calculation reveals **Option A** is the most balanced definition for current policy goals.

1.3.4 Data Analysis and Benchmarking

The data collection use of existing information sources (aquaculture censuses, license data, household surveys, tax records) to understand the sector's reality and identify natural cutoff points for production and income.

Benchmarking: Reviewing definitions of "small-scale" used by international organizations (e.g., FAO) or economies with similar aquaculture sectors to leverage established approaches. Value: This governance tool ensures the definition is grounded in the economy's actual economic structure rather than assumptions.

- **Source:** Guidelines on the collection of structural aquaculture statistics (Supplement to the World Census of Agriculture 2000).
- **Relevance:** Provides the exact statistical standards for measuring farm size, water use, and employment, which are necessary to set realistic quantitative thresholds.
- **References:** Rana (1997)

Example:

SSA Governance

Data Collection: The Ministry analyzes the National Aquaculture Registry. The data histogram shows a "natural break" in the distribution: 85% of farms produce less than 10 tons per year, after which production jumps to industrial levels (50+ tons). This data point (10 tons) becomes the proposed cutoff. **Benchmarking:** The team reviews the definitions used by neighboring economies (e.g., Thailand or Viet Nam) and finds they utilize a <1.6-hectare limit. They adopt this land-based metric to ensure their definition is regionally comparable for APEC trade reporting.

1.3.5 Participatory Consensus Workshops

These meetings gather key stakeholders to utilize a Decision Matrix. Participants review proposed definitions (e.g., Option A: <5 tons; Option B: <10 tons and <5 employees) and vote or rate them based on pre-established criteria, forcing a convergence toward a preferred option. **Value:** Provides a forum for direct dialogue, negotiation, and formalization of agreements.

Recommended Criteria for Definition: Implementation should combine at least two of the following:

- **Production (Volume):** Upper limit on weight (tons) per cycle or year.
 - **Economic (Revenue):** Upper limit on annual turnover or net income, linking the definition to fiscal policies.
 - **Social (Labor/Family):** Number of employees (e.g., <5) or family-based management status.
 - **Technology (Intensity/Scale):** Cultivation area (e.g., <0.5 hectares) or technology type (extensive vs. semi-intensive).
- **Source:** Negotiation and mediation techniques for natural resource management or A handbook for trainers on participatory local development.
 - **Relevance:** Offers specific tools like decision matrices and voting techniques to manage conflict and finalize agreements in group settings.
 - **References:** Engel and Korf (2005)

Example:

SSA Definition

In a town hall meeting, 50 stakeholders (farmers, NGOs, officials) are presented with a Decision Matrix displaying the top two definitions derived from previous steps.

- **Definition 1:** Strict volume limit (<5 tons).
- **Definition 2:** Composite limit (<10 tons AND family management). Using a "dot-voting" technique, stakeholders place sticky dots on their preferred option. Definition 2 wins the majority vote because it allows slightly larger farms to participate provided, they remain family-run, securing the final "social license" for the policy.

STEP 2: IDENTIFYING GOVERNANCE CHALLENGES

To accurately diagnose the barriers in SSA, the following analytical frameworks are applied. This step is exemplified by two workshop activities developed during the project.

2.1 Survey tool used for identifying governance challengers

Prior to the workshop, a 15-question survey was distributed to economies to identify the specific barriers within each economy. The survey featured a dual focus, targeting both farmers and the public sector. The questions evaluated the impacts of various factors including economic, cultural and social challenges, environmental issues and sanitary aspects, gender perspective, regulatory frameworks, among other.

2.2 Participant presentations as tool used for identifying governance challenges

During the workshops, representatives from each attending economy delivered a brief presentation providing an overview of their respective sectors, the status of SSA. These sessions highlighted specific governance-related obstacles and their perspective of how governance can help to improve SSA industry.

STEP 3: IDENTIFYING TOOLS NEEDS - EXAMPLES OF USEFUL TOOLS

3.1 Institutional Analysis and Development (IAD) Framework

Developed by Elinor Ostrom, this tool breaks down institutional complexity by focusing on the "Action Arena" where actors make decisions influenced by formal/informal rules, the

biophysical nature of the resource, and community attributes. For SSA, IAD helps identify conflicts, such as water access rules clashing with land use rules, or weak sanctioning mechanisms leading to regulatory non-compliance. It diagnoses failures in the design of the rules themselves.

- **Source:** *Understanding Institutional Diversity (Ostrom, 2005) or Background on the Institutional Analysis and Development Framework.*
- **Relevance:** Provides the theoretical "map" to analyze how "institutions-in-form" (laws) differ from "institutions-in-use" (what actually happens on the water).
- **Reference:** McGinnis (2020)

Example:

SSA Diagnosis:

The Challenge: Small-scale tilapia farmers in a shared reservoir are overstocking, causing fish kills. **IAD Diagnosis:** The analysis reveals a conflict in the "Rules-in-Use". While the Formal Rule (Ministry Law) limits cages to 10 per family, the Informal Rule (Community Norm) allows "first comers" unlimited expansion. The Biophysical Attribute (low water turnover) cannot support this. The diagnosis identifies that the failure is not a lack of law, but a lack of local monitoring (sanctioning) mechanisms to enforce the formal limit against the local norm.

3.2 Governance Diagnostic Toolkit (AGI)

A practical, structured approach for rapid assessment. It utilizes standardized indicators grouped under key themes: Transparency (public licensing lists), Accountability, Participation (smallholder voice in policy), and Institutional Capacity (enforcement resources). This allows governance to be scored on a spectrum, highlighting critical areas requiring urgent reform.

- **Source:** *Aquaculture Governance Indicators: A diagnostic framework for steering towards sustainability.*
- **Relevance:** Offers a specific set of indicators to assess the "interactive performance" of public regulations and private standards in aquaculture.
- **References:** Toonen et al. (2025) and AGI (2025)

Example:

SSA Diagnosis:

The Challenge: The government wants to know why small farms aren't exporting.

AGI Diagnosis: The assessment scores the sector across four dimensions.

Legislation: High Score (Laws exist).

Capabilities: Low Score (Inspectors lack boats).

Participation: Very Low Score (Smallholders have no seat on the export council). The scorecard reveals that the critical bottleneck is Institutional Capacity and Participation, not a lack of laws. Reform must focus on giving farmers a voice, not writing more rules.

3.3 Political Economy Analysis (PEA)

PEA focuses on non-technical barriers to reform, examining how power, incentives, and political relationships influence decisions. In SSA, it reveals challenges such as regulatory capture by large actors, political resistance to registering small farmers, or informal corruption networks. It answers why existing rules fail or why good policies are not implemented.

- **Source:** *Political Economy Analysis 'How to Note' or Sustainable Fisheries and Responsible Aquaculture: A Guide to USAID Staff.*
- **Relevance:** Guides the analyst to ask, "Why isn't the problem being fixed?" by looking at winners, losers, and hidden incentives.
- **References:** DFID (2009)

Example:

SSA Diagnosis:

The Challenge: A project to register small shrimp farms has failed for 10 years despite free software. PEA Diagnosis: The analysis uncovers that local mayors (who control registration) implicitly discourage it. Why? Because registered farms become subject to central taxes, removing the mayors' ability to collect informal "protection fees". The barrier is not technical (software) but political incentive: the local elite benefits from the sector remaining informal and "illegible" to the central state.

3.4 Problem Tree Analysis (Root Cause Analysis)

A visual tool that transforms a general problem (e.g., "Low SSA Incomes") into a structured diagnosis. It distinguishes between Effects (e.g., "Youth migration") and Root Causes (e.g., "Marketing rules favoring large intermediaries"). Focusing on root causes ensures solutions target systemic governance failures rather than symptoms.

- **Source:** *Project Cycle Management Technical Guide (Section on Problem Analysis) or PRCA Situation Analysis Framework Guide.*
- **Relevance:** Standard tool in FAO project cycles to ensure interventions target the "roots" rather than pruning the "branches" (symptoms).
- **References:** FAO (2001) and FAO (2025)

Example:

SSA Diagnosis:

- **Core Problem:** "Low profitability of SSA seaweed farms"
- **Visual Mapping.**
- **Roots (Causes):**
 - **Level 1:** Poor product quality.
 - **Level 2: (Governance Root):** Lack of extension services teaching proper drying techniques.
 - **Level 2: (Governance Root):** Monopoly of buyers (middlemen) fixed by local power structures.
- **Branches (Effects):** Youth leaving the village, debt cycles. **Diagnosis:** Fixing "quality" is useless unless the governance root (breaking the buyer monopoly) is addressed first.

3.5 Stakeholder Conflict Mapping

Crucial for SSA where producers compete for limited resources. These map which actors (small farmers, large firms, artisanal fishers) are in conflict, the sources of conflict (e.g., shared bay use), and intensity. It visualizes power dynamics to suggest mediation strategies or regulatory reforms.

The "gold standard" manual for this specific methodology was developed by the FAO to address natural resource competition.

- **Source:** *Negotiation and Mediation Techniques for Natural Resource Management* (Engel & Korf, 2005).
- **Relevance:** This manual provides the specific Conflict Mapping Tool (see Section 4) used to visualize the "geometry" of a dispute. It distinguishes between Positions (what they say they want), Interests (why they want it), and Needs (what they must have to survive).
- **Direct Access:** [FAO Training Manual \(PDF\)](#)

Example:

SSA Diagnosis:

In a real-world "Shared Watershed" scenario, conflict mapping reveals that friction between Small-Scale Aquaculture (SSA), industrial firms, and artisanal fishers stems from structural governance gaps rather than simple scarcity.

By mapping Power Dynamics, analysts identify "Regulatory Capture" where laws favor industrial scales. Spatial Hotspot Mapping exposes physical overlaps, such as industrial

intakes located downstream from smallholder discharges. This diagnostic approach proves that "treating symptoms" (e.g., providing free vaccines) fails. Instead, it justifies "fixing the roots" through Aquaculture Management Areas (AMAs) and tiered licensing, aligning formal "Rules-in-Form" with local "Rules-in-Use."

STEP 4: STAKEHOLDER MAPPING AND INTERACTIONS

4.1 Power/Interest Grid

This fundamental tool classifies actors into four quadrants based on Power (ability to enforce/block policy) and Interest (degree of impact). It guides engagement strategies, such as "Keep Satisfied" for High Power/Low Interest actors (Fig. 1), and "Manage Closely" for High Power/High Interest actors.

- **Source:** *Ecosystem Approach to Fisheries (EAF) Toolbox: Stakeholder Analysis or PMBOK Guide (Stakeholder Management).*
- **Relevance:** Provides the standard matrix template and engagement strategies (Inform, Consult, Collaborate, Empower) based on the quadrant position.
- **References:** FAO (2008) and FAO (2012a)

Example:

SSA Mapping:

- **The Scenario:** New regulations for shrimp antibiotic use are being drafted.
- **The Grid:**
 - High Power / High Interest (Manage Closely):** *Industrial Exporters Association.* They can block the law if it affects their supply chain. Strategy: Direct negotiation.
 - High Power / Low Interest (Keep Satisfied):** *Ministry of Finance.* They control the enforcement budget but don't care about shrimp details. Strategy: Show them the potential tax revenue.
 - Low Power / High Interest (Keep Informed/Empower):** *SSA Cooperatives.* They are most affected but lack political voice. Strategy: Capacity building to move them to the "High Power" quadrant.

EXAMPLE:

A stakeholder mapping matrix is a vital tool for SSA. It systematically identifies, categorizes, and analyzes the interests, influence, and importance of all individuals and groups (stakeholders) who can affect or be affected by the project. By using a matrix, like the common

Power-Interest Matrix (Fig. 1), a project can visualize who its stakeholders are and determine the best strategy for engagement, which is critical in community-based and SSA operations.

The matrix offers several specific benefits for SSA:

- **Conflict prevention and mitigation:** By identifying conflicting interests (e.g., between aquaculture farmers and local fishers, or between a community and a new regulation) early on, the project can develop strategies to find common ground or compromise, preventing costly delays or outright failure.
- **Effective resource allocation:** It helps to prioritize which stakeholders require the most attention, resources, and communication. High-importance/high-influence groups (like local government regulators or influential community leaders) need to be managed closely, while high-importance/low-influence groups (like individual SSA farmers) may need targeted support to keep them informed.
- **Building consensus and buy-in:** Understanding stakeholder perspectives allows project planners to design an aquaculture initiative that aligns with local needs, existing practices, and values, leading to greater community ownership and commitment to the project's long-term sustainability.
- **Transparency and trust:** The process of mapping and engaging stakeholders promotes open communication, which is the foundation for building transparency and trust, a crucial factor for successful community development projects.
- **Informed decision-making:** The matrix ensures that decisions consider all relevant social, economic, and environmental factors, integrating local and indigenous knowledge alongside scientific data. This is essential for selecting appropriate species, technology, and site locations.

In the example:

Economy: Chilean SSA at regional level, Los Lagos, south of Chile.

Resources: Two of the most important SSA resources

- Bivalves (Mussels, *Mytilus chilensis*) – production 387,484.55 tons.
- Macroalgae (*Gracillaria chilensis*) – production 14,350.06 tons.

Stakeholders:

- **Primary stakeholders:** Farmers, owners, operators, coastal communities.
- **Secondary stakeholders:** Undersecretariat of Fisheries and Aquaculture (SUBPESCA), National Fisheries and Aquaculture Service (SERNAPESCA), National Institute for the Sustainable Development of Artisanal Fishing and SSA (INDESPA), Directorate General of Maritime Territory and Merchant Marine (DIRECTEMAR), Environmental Assessment Service (SEA), Chilean Mussel Farmers Association G.A. (AMICHILE).
- **Market and Value of chain:** seeds providers, processing and exporting companies, consumers, transport and logistic business.
- **Specific interest:** research institutions, NGO.



STAKEHOLDER MAPPING MATRIX EXAMPLE
Chilean SSA-Mytilids and Seaweeds

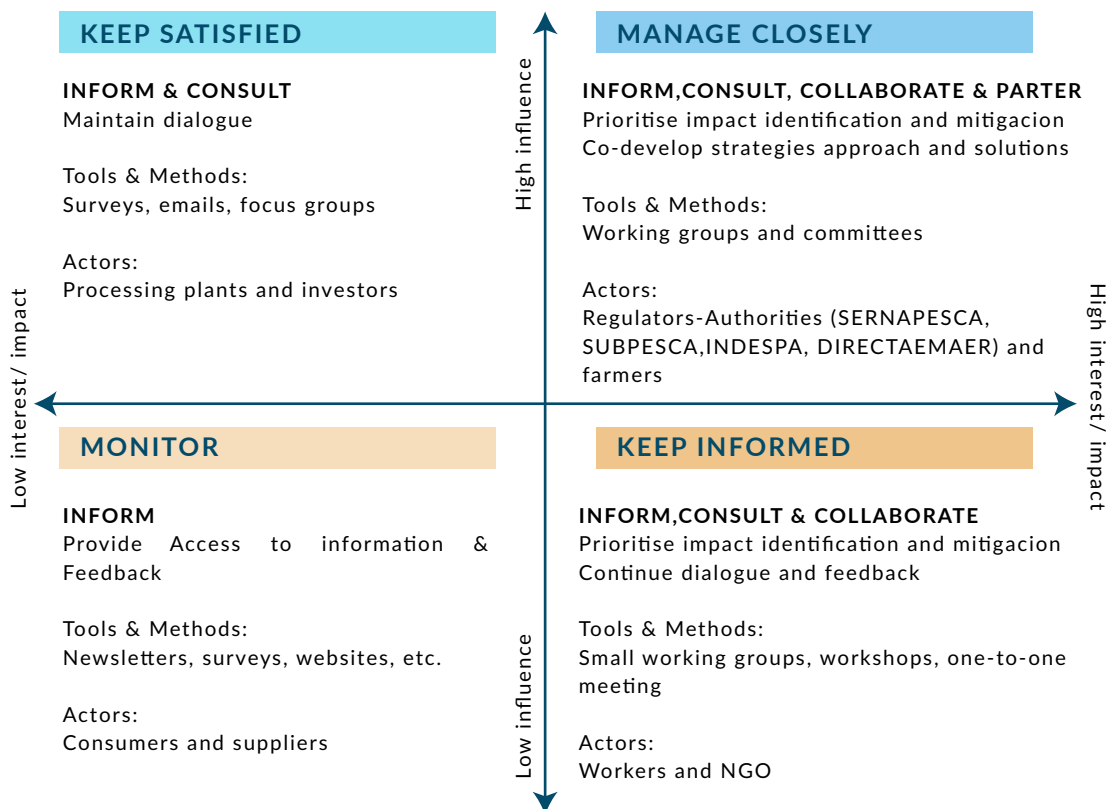


Figure 1. Stakeholder mapping matrix example applied in Chilean Small-Scale Aquaculture farming.

4.2 Social Network Analysis (SNA)

SNA visualizes interconnections—who speak to whom, dependency on credit or information. It identifies central actors (hubs), brokers (bridges between groups), and isolated actors. In SSA, this is vital for uncovering informal governance, such as knowledge flowing through community leaders rather than official channels.

- **Source:** *Social Network Analysis: A Handbook (Scott, 2017) or Participatory Network Mapping for Agriculture.*
- **Relevance:** Explains how to calculate "centrality" and visualize "cliques" to understand how information actually flows in a rural community.
- **References:** Borgatti et al. (2018) and Netmap (2007)

Example:

SSA Mapping:

The Scenario: The government uses extension officers to warn farmers about disease outbreaks, but the warnings arrive too late. **SNA Map:** The network diagram reveals that the Extension Officer is on the periphery of the network (an "isolate"). The true Central Hub is the Local Feed Trader. Every farmer visits the trader weekly for credit. **Governance Fix:** Instead of hiring more officers, the government officially partners with the Feed Trader to disseminate disease alerts via WhatsApp, leveraging the existing central node.

4.3 RAPID Framework

Used to clarify decision-making roles: Recommend, Agree, Perform, Input, and Decide. Applying RAPID to aquaculture processes identifies bottlenecks or accountability gaps, such as having too many actors with veto power ("Agree" role).

- **Source:** *RAPID®: A Tool for Decision Making or Organization and Governance Guide.*
- **Organization:** Bain & Company / Organizational Development Institutes.
- **Relevance:** Provides a diagnostic table to assign clear accountability, preventing the "paralysis by committee" often seen in public sector licensing.

Example:

SSA Mapping:

- **The Scenario:** It takes 12 months for a small farmer to get a water use permit.
- **RAPID Diagnosis:**
 - **Recommendation:** Local Fisheries Office.
 - **Agree (Veto Power):** *Environmental Agency AND Water Authority AND Land Bureau AND Tourism Board.*
 - **Decide:** Regional Governor. Bottleneck: There are too many "Agree" roles. If one says no, the process will stop. The Fix: Change the "Agree" roles to "Input" roles (consultative only) for the Tourism Board and Land Bureau, leaving only the Water Authority with veto power.
 - **References:** Bain (2025)

4.4 Venn Diagram (Three-Circle Analysis)

A visual tool for identifying intersections of roles. Overlapping circles (e.g., Farmers, Local Gov, Environment Ministry) reveal shared interests or jurisdictional conflicts. It highlights where agency mandates overlap, often creating regulatory confusion for small producers.

- **Source:** *Participatory Rural Appraisal (PRA) Toolbox or Institutional Mapping Guide.*
- **Relevance:** Offers visual techniques for communities to draw how they perceive the relationship and distance between institutions.
- **References:** FAO (2013) and Worldbank

Example:

SSA Mapping:

- **The Scenario:** Farmers in a mangrove zone are fined by forestry rangers for cutting trees but encouraged by fisheries officers to expand ponds.
- **Venn Diagram:**
 - **Circle A:** *Ministry of Fisheries* (Mandate: Increase production).
 - **Circle B:** *Ministry of Forestry* (Mandate: Protect mangroves).
 - **Intersection:** The diagram shows a massive overlap in the "Intertidal Zone" where SSA farms are located.
 - **Insight:** The conflict is structural. The governance solution requires a "Joint Memorandum of Understanding" (MoU) between the two ministries to clarify rules specifically for the intersection zone.

4.5 Net-Map Tool

A participatory workshop tool where stakeholders draw their own networks, using tokens to indicate perceived influence. It captures the local perception of power dynamics, which often dictates the actual functioning of governance.

- **Source:** *Net-Map Manual: Influence Mapping of Social Networks.*
- **Organization:** IFPRI (Eva Schiffer).
- **Relevance:** Specifically designed to map "Influence" separately from "Authority," which is critical for understanding informal power structures in developing economies.
- **References:** Netmap (2007)

Example:

SSA Mapping:

- **The Scenario:** A new zoning law is passed, but no one follows it. **Net-Map Workshop:** Farmers draw links between actors and stack "influence towers" (tokens) on the actors they fear/respect most.
- **The mayor:** Assigned a small influence tower.
- **The "Middleman/Loan Shark":** Assigned the tallest influence tower. Insight: Even though the mayor has legal authority, the Middleman controls the farmers' livelihoods through debt. The governance strategy must shift to offer Formal Micro-credit to break the Middleman's influence tower, allowing the farmers to follow the zoning law without fear of financial retaliation.

STEP 5: TOOL SELECTION

At this stage, you will be able to select a tool presented in Step 4 to be implemented. It is recommended to evaluate its cost-effectiveness, suitability, relevance, and functionality. Now you are able to continue with Step 6.

STEP 6: TOOL TESTING AND APPLICATIONS (VALIDATION)

Before full transfer, governance tools must be validated to ensure functionality and relevance.

6.1 Pilot Programs

Description: The most effective methods for validation. It involves deploying the governance tool (e.g., a data reporting app) with a limited, representative group of SSA producers.

Objective: To technically validate the tool in field conditions, measure its cost-effectiveness and relevance to the producer's business, and mitigate risks of complexity or low adoption.

Key to Success: Providing incentives for participation is recommended to overcome the resource constraints of small farmers.

- **Source:** *Leveraging Pilot Frameworks for the Sustainable and Diverse Development of the Marine Aquaculture Industry or Guidelines for the design and implementation of pilot projects* (FAO).

- **Relevance:** Explains how to create "experimental" legal spaces where new rules or tools apply to a small group for a limited time (e.g., 1-3 years) to test viability without changing the entire local law.
- **References:** Ruff (2024) and FAO (2018)

Example:

SSA Testing:

The Tool: A new "Simplified Environmental License" for small farms.

The Pilot: Instead of rolling it out regionally, the government launches a 12-month pilot in Region X with 50 volunteer farmers.

Validation: The pilot reveals that while the license is simple, the application fee (USD 100) is still too high for the smallest producers, leading to low adoption.

Adjustment: Based on this pilot data, the government lowers the fee to USD 25 for the domestic rollout, preventing an economy-wide policy failure.

6.2 Iterative Cycle (Develop, Trial, Improve, Implement)

Description: Testing is not a single event but a continuous phase.

Objective: To ensure the tool is handled based on practical experience and adapted (translated/simplified) so that it is understandable by all actors.

Key to Success: Always conduct a "test run and improve prior to full implementation." The process must be "Guided by the final users."

- **Source:** *Adaptive management of fisheries in response to climate change* (FAO Technical Paper No. 667) or *The Fisheries Governance Tool: Testing, external review and revision*.
- **Relevance:** Describes the "Adaptive Management Cycle," which explicitly adds feedback loops to standard management to allow for corrections as new information (or user feedback) becomes available.
- **Reference:** Swasey et al. (2021) and Bahri et al. (2021)

Example:

SSA Testing:

- **The Tool:** A paper-based "Daily Feed Logbook" for farmers.
- **Develop:** Draft a logbook in English with technical terms like "Biomass" and "FCR".
- **Trial:** Distribute to 10 farmers.
- **Improve:** Feedback shows farmers don't understand "Biomass" and speak a local dialect. The team renames it to "Total Fish Weight" and translates the text.

- **Implement:** The revised, simplified logbook is printed for the whole cooperative.

6.3 Train-the-Trainer / Coaching

Description: Training a core group of implementers who will transfer knowledge.

Objective: To test the usability of the tool (if trainers cannot teach it, the design fails) and to build sustainable local capacity.

Key to Success: Identifying a "Leader who explains how to use the toolkit" to act as a focal point for feedback.

- **Source:** *Training Manual for Trainers: Sustainable Aquaculture or FAO Aquaculture Training Manuals.*
- **Relevance:** Provides methodologies for "cascade training," ensuring that the "Master Trainers" (extension officers) fully grasp the material before they attempt to teach it to farmers.
- **Reference:** Menezes et al. (2022)

Example:

SSA Testing:

- **The Tool:** A new mobile app for disease reporting.
- **The Test:** The Ministry gathers 20 Regional Extension Officers for a "Master Class."
- **Validation:** During the session, the Officers struggle to explain the "geo-tagging" feature to each other.
- **Conclusion:** If the experts (Officers) find it hard to explain, the farmers will find it impossible to use. The app developers remove the manual geo-tagging requirement and make it automatic, ensuring the tool is "teachable" before the officers go to the field.
- **Reference:** FAO

Examples of Case studies

Case 1: The "Local Service Provider" (LSP) Model in Bangladesh (WorldFish)

- **Context:** In Bangladesh, government extension services were understaffed and could not reach millions of small-scale carp farmers. WorldFish introduced a governance tool based on "Local Service Providers" (LSPs) essentially entrepreneurial farmers trained to offer advice and sell input.
- **The Validation Test:** During the training of these LSPs, researchers realized that the LSPs refused to promote certain "high-tech" feed tables because they were too complicated to explain to their illiterate customers.
- **Outcome:** The "training" phase acted as a filter. The feed tables were simplified into visual posters (pictograms) that the LSPs felt confident explaining. This ensured high adoption rates because the "trainers" believed in the tool.

Case 2: Farmer Field Schools (FFS) for Shrimp in Indonesia/Viet Nam (FAO)

- **Context:** To combat white spot disease, the FAO implemented Farmer Field Schools. The "Governance Tool" was a set of Best Management Practices (BMPs) (e.g., water exchange rules).
- **The Validation Test:** Instead of just lecturing, the "Master Trainers" (facilitators) ran season-long schools where they tested the BMPs alongside farmers in a study plot.
- **Outcome:** The facilitators realized that strict "scientific" water testing was too expensive for small farmers. Through the FFS process, they validated a simplified protocol using visual watercolor checks (green vs. brown water), which was scientifically less precise but operationally much more effective because farmers actually did it. The "Trainers" learned from the "Students," refining the BMPs for the local curriculum.

STEP 7: TRANSFER STRATEGY AND MONITORING, EVALUATION, AND LEARNING (MEL)

7.1 Transfer Methods

Tools are selected based on effectiveness and their ability to mitigate risks like digital divide or low capacity.

1. **Web Portal / Knowledge Hub:** Ideal for mass dissemination of standardized information to Government Agencies and Academia.
2. **Interactive Workshop Series:** Critical for practical training and building trust with Producers and Local Government.
3. **"Train-the-Trainer" Programs:** Essential for scaling transfer by empowering Extension Services and NGOs to act as local instructors.
4. **Context-Specific Mobile Applications:** Used for simplified mandatory reporting and technical assistance, directly targeting Producers.

7.2 Web Portal / Knowledge Hub

Definition: Ideal for mass dissemination of standardized information to Government Agencies and Academia.

- **Real-Life Example: NACA (Network of Aquaculture Centres in Asia-Pacific)**
- **The Context:** Disease management is a major governance challenge that requires standardized reporting across borders. One economy cannot manage a pandemic alone.
- **Application:** NACA operates on a regional **Knowledge Hub** that aggregates the "Quarterly Aquatic Animal Disease Report." 19 member governments submit their data to this central portal.
- **Why it Works:** It serves as a **"Single Source of Truth."** Instead of scattered emails, government agencies and scientists' access one standardized web portal to track disease trends (e.g., Tilapia-Lake Virus). It bridges the gap between scientific academia and government policy.

7.3 Interactive Workshop Series

Definition: Critical for practical training and building trust with Producers and Local Government.

- **Real-Life Example: FAO Farmer Field Schools (FFS) in Vietnam (Rice-Fish Culture)**
- **The Context:** Small-scale farmers in the Mekong Delta were skeptical of new government regulations regarding pesticide use in rice-fish systems. They feared losing their crops.

- **Application:** Instead of lecturing farmers in a classroom, the FAO implemented **Interactive Workshop Series** directly in the paddy fields. These ran over a full cropping season. Farmers and local officers meet weekly to observe the "study plot" versus the "control plot."
- **Why it Works:** It built **Trust**. Farmers did not have to believe the "government experts"; they saw the results with their own eyes. The interactive nature allowed local government officers to understand the farmers' constraints, leading to better compliance with environmental rules.

7.4 "Train-the-Trainer" Programs

Definition: Essential for scaling transfer by empowering Extension Services and NGOs to act as local instructors.

- **Real-Life Example: WorldFish "Local Service Provider" (LSP) Model in Bangladesh**
- **The Context:** The Department of Fisheries in Bangladesh had limited staff and could not physically reach millions of small rural ponds to transfer new governance/management toolkits.
- **Application:** The project adopted a **Train-the-Trainer** approach. They identified local entrepreneurs (hatchery owners, feed sellers) and trained them as "Local Service Providers" (LSPs). These LSPs, who were trusted community members, then trained thousands of small farmers in their villages.
- **Why it Works:** It achieved **Scale**. By training 100 LSPs, the project effectively transferred knowledge to 10,000+ farmers, bypassing the bottleneck of limited government staff. It empowered local actors to be instructors.

7.5 Context-Specific Mobile Applications

Definition: Used for simplified mandatory reporting and technical assistance, directly targeting Producers.

- **Real-Life Example: "Matsya Setu" App (India) or "Jala" (Indonesia)**
- **The Context (India):** Government research institutes (CIFA) had vital scientific data and Best Management Practices (BMPs), but the information wasn't reaching the simplified, daily level of the farmer.
- **Application (Matsya Setu):** The government launched a **Mobile App** organized by species (modules on carp, catfish, etc.). It uses video lessons and quizzes. Crucially, it allows farmers to ask questions directly to scientists.
- **The Context (Indonesia - Jala):** Small farmers struggled to record water quality data.
- **Application (Jala):** A private-sector app (often used in partnerships) that allows farmers to input water data simply. It translates complex chemical data into "Green/Red" indicators (Context-Specific Technical Assistance).

- **Why it Works:** It mitigates the **Digital Divide** by simplifying complex governance/science into a user-friendly interface on a smartphone, which most farmers now possess. It turns "reporting" into a tool that actually helps the farmer.

7.6 Transfer Strategy by Stakeholder

The combination of governance tools must be adapted to the specific needs of each stakeholder group to ensure effective adoption.

Stakeholder	Transfer Need	Recommended Transfer Methods
SSA Producers	Practical adoption, demonstration of economic value, and simplified data reporting.	<ol style="list-style-type: none"> 1. Mobile App (For daily use/reporting) 2. Interactive Workshop Series (For practical training)
Government (Central Agencies)	Standardization, coordination, regulatory capacity, and decision-making.	<ol style="list-style-type: none"> 1. Web Portal/Knowledge Hub (For access to data/policies) 2. Train-the-Trainer (To implement new regulations)
Intermediaries (Academia, Extension, NGOs)	Deep technical knowledge, teaching capacity, and validation.	<ol style="list-style-type: none"> 1. Train-the-Trainer (To become certified instructors) 2. Web Portal (For research and support material)

7.7 Monitoring, Evaluation, and Learning (MEL)

a. Monitoring (Tracking Implementation)

- **Accountability:** Measure the reach and frequency of activities reported by Coaches and Extension Services.
- **Digital Usage:** Track metrics from the Web Portal and Mobile Apps (downloads, active users, data volume).
- **Standardization:** Monitor the transition rate from manual (paper) methods to standardized digital reporting.

b. Evaluation (Measuring Impact)

- **Adoption:** Assess usability and relevance via surveys to identify if low adoption is due to complexity.
- **Outcomes:** Measure changes in the initial governance deficiencies (e.g., has regulatory complexity perception decreased?).

- **Capacity:** Evaluate if Extension Services and local leaders have acquired autonomy to sustain the toolkit without external support.

c. Learning (Feedback Loops)

- **Feedback Mechanisms:** Utilize the "Develop, trial, improvement, implementation" cycle to refine tools post-transfer. Use Interactive Workshops as structured feedback forums.
- **Validation:** Confirm that the tool demonstrates economic value to the producer ("important for their business").
- **Application:** Use lessons learned to improve local language translation and communication strategies.

7.8 Evaluation: Measuring Impact and Effectiveness

Evaluation measures the degree to which the governance tool is achieving its initial objectives, such as improving coordination or increasing regulatory capacity.

Evaluation Phases		
Phase	Key Question	Evaluation Tools / Data Required
Adoption Evaluation	Are the tools and protocols being used by producers?	Measure Low Adoption, Irrelevance, or Complexity through surveys of producers to determine the tool's usability and relevance.
Outcome Evaluation	Did the tool address the initial governance deficiency?	Measure changes in coordination, policy, and resource deficiencies . Example: If the tool targeted regulatory complexity, evaluate the producers' perception regarding the simplicity of the new regulation.
Capacity Evaluation	Did the transfer process build sustainable capacity?	Evaluate whether Extension Services and leaders have the capacity to continue using and teaching the toolkit without initial project support.



CONCLUSIONS AND RECOMMENDATIONS

This toolkit has been developed to provide guidelines and recommendations of the recommended actions for be applied in SSA governance. The core finding of this toolkit is that effective governance is the primary bridge between current challenges and future sustainability. While collaborative frameworks within APEC have improved infrastructure and knowledge sharing, significant gaps remain in addressing the specific needs of small-scale farmers. The development of a structured Governance Toolkit marks a critical shift from reactive problem-solving to a systematic, evidence-based approach. By moving through the seven-step diagnostic and application process, APEC economies can move beyond solutions to create an enabling environment that attracts investment and empowers local communities.

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