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1995 - 2055: The Thirty Years Past and Thirty Years Ahead of the Code of Conduct for Responsible Fisheries

fish nation

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The Thirty Years Past and Thirty Years Ahead of the Code of Conduct for Responsible Fisheries

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Introduction

Over the past thirty years, the FAO's Code of Conduct for Responsible Fisheries (CCRF) has been consolidated as a key normative and technical reference guiding the governance of fisheries and aquaculture worldwide. Adopted in 1995 as a voluntary soft law instrument, the Code has served as both a conceptual and operational framework for gradual transformation in the management of fisheries and marine resources.

In a context marked by overexploitation, the degradation of marine ecosystems, and growing pressure on oceanic commons, the CCPR has provided fundamental principles such as sustainability, precaution, responsibility, and the ecosystem-based approach.

In recent years, **the fisheries sector has been consolidated as one of the sources of protein of highest strategic value for the future**, according to FAO. Its ability to supply a growing global population with relatively low environmental impact, combined with its high nutritional value, positions it as a key resource in a rapidly transforming world. However, the potential of this sector is **threatened by multiple critical factors**, such as **economic crises**, **ocean pollution**, **irregular practices**, and - above all -the effects of **climate change** on marine ecosystems. The transition towards responsible practices, technological innovation, and seafood traceability have thus become central pillars for ensuring environmental, economic, and social sustainability.

Global fishery and aquaculture production increased to 223,2 Mt

human consumption 89%

*Source: ***FAO, The State of World Fisheries and Aquaculture 2024***

Objective

This report aims to provide a critical, thematic, and structured analysis of the **progress**, **gaps**, **good practices**, **institutional barriers**, and **accumulated lessons** in the implementation of the CCRF since its adoption. Through a qualitative approach based on scientific literature, technical reports, and case studies, it seeks to identify both the achievements obtained and the persistent challenges in the application of the Code.

In addition, the report intends to offer useful recommendations to serve as a foundation for the next thirty years of the CCRF and its adaptation to new contexts, such as the climate emergency, new technologies, growing inequalities in access to resources, and the emerging dynamics of ocean governance.

The Course Navigated Over the Last 30 Years of the Code of Conduct for Responsible Fisheries

The Code of Conduct for Responsible Fisheries is an international voluntary instrument and one of the most relevant documents in the global fisheries domain. Adopted in 1995 by 170 countries, it constitutes a set of guidelines designed to promote the conservation, management, and sustainable development of fisheries and aquaculture. Its scope extends across capture, processing, trade, research, and integration into coastal management plans.

From its inception, the Code arose as a response to the need to preserve the stability of marine ecosystems and regulate a fisheries production system that was already highly globalized and at risk of overexploitation. It was conceived as an effective instrument, fully aligned with the United Nations Convention on the Law of the Sea, the United Nations Fish Stocks Agreement on Straddling and Highly Migratory Fish Stocks, and the FAO Compliance Agreement (1993).

The Code establishes science-based standards, grounded in the precautionary principle and in the recognition of the importance of the value chain and biodiversity conservation. Although voluntary by nature, its normative scope, scientific foundation, and adoption by United Nations Member States have made it a central reference for the development of dozens of sustainable fisheries policies, agreements, strategies, guidelines, and action plans over the past three decades

Main international instruments and guidelines related to the Code.

1982 — UNITED NATIONS CONVENTION ON THE LAW OF THE SEA

1993 — FAO COMPLIANCE AGREEMENT

1995 — CODE OF CONDUCT FOR RESPONSIBLE FISHERIES

1995 — UNITED NATIONS FISH STOCKS AGREEMENT

2009 — AGREEMENT ON PORT STATE MEASURES

Prepared on the basis of the Code

- 4 International **Action Plans**
- 9 International **Guidelines**
- 2 **Strategies**
- 33 **Technical Guidelines**

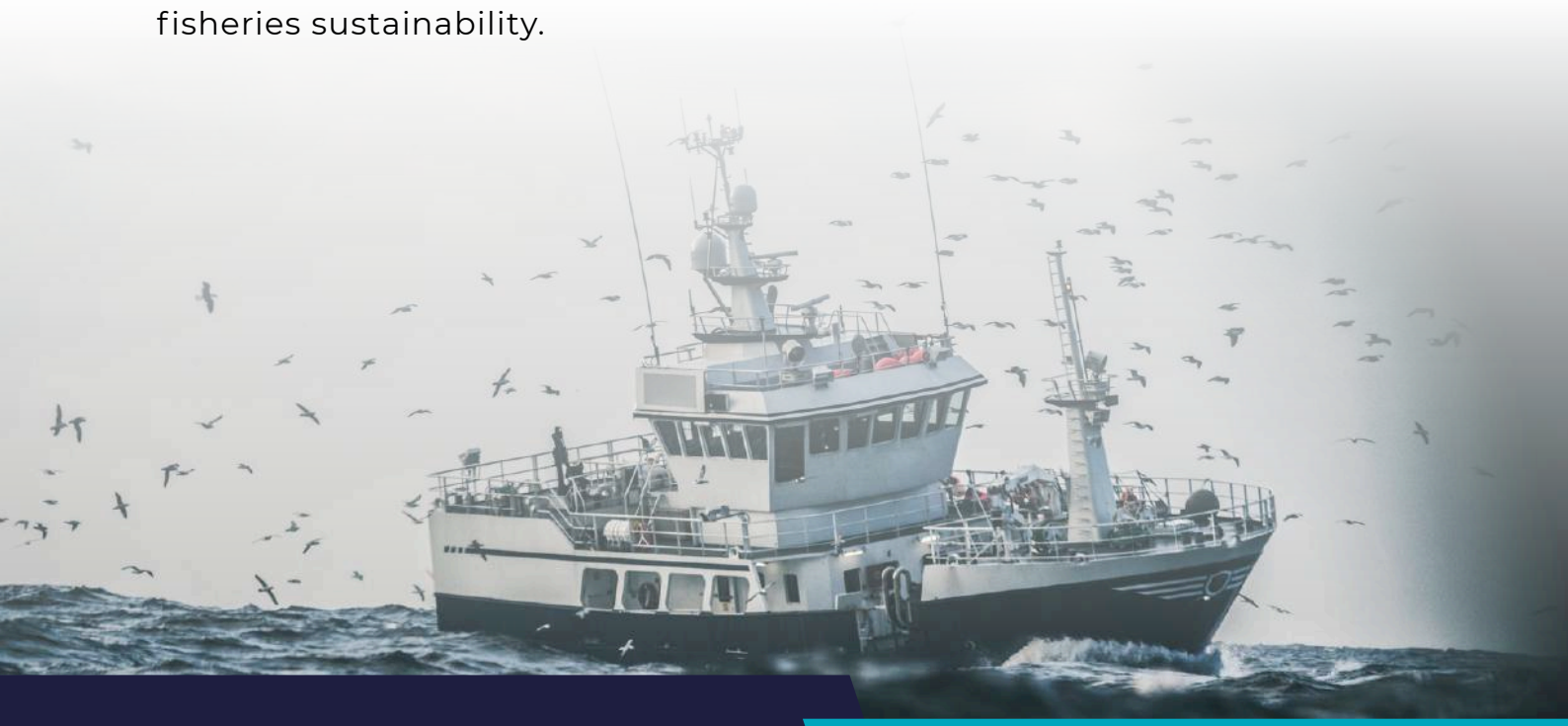
2020

*Source: FAO, ***Application of the Code of Conduct for Responsible Fisheries***

As with international policies, national governments—United Nations Member States—have demonstrated strong adherence to the CCPR and its derived policies. Nearly 90% of countries report full implementation of the Code and have adopted the Ecosystem Approach to Fisheries (EAF), while 100% declare that they have applied at least some measures toward more sustainable fisheries (FAO, 2021).

Thus, the Code serves as a key tool to guide countries and stakeholders in the fisheries and aquaculture sectors toward the adoption of policies that guarantee the sustainable use of fishery resources, ensuring that fish populations are maintained or restored to levels capable of supporting reasonable long-term yields.

Building on these guiding principles, the technical articles (7 through 12) set forth specific recommendations for different segments of the fisheries value chain. Article 7, for instance, addresses fisheries management in detail, including aspects such as resource assessment, the adoption of effective regulatory measures, and the application of the ecosystem approach. Article 8 focuses on fishing operations, proposing guidelines to improve safety at sea, reduce incidental catches (bycatch), and promote selective technologies. Aquaculture, which in 1995 had not yet reached its current level of expansion and complexity, is covered in Article 9, with emphasis on environmentally responsible practices, biosecurity, and integrated management. The subsequent articles broaden the scope of the Code, including coastal area management (Article 10), international trade in fishery products (Article 11), and scientific research (Article 12), thereby completing a systemic vision of fisheries sustainability.



Structure of the Code of Conduct for Responsible Fisheries

GENERAL FRAMEWORK

Defines the context, objectives and scope of the Code:

Art. 1 *– Nature and scope of application*
Art. 2 *– Objectives*
Art. 3 *– Relationship with other international instruments*
Art. 4 *– Implementation, monitoring and updating*
Art. 5 *– Special requirements for developing countries*

GUIDING PRINCIPLES

They establish the ethical, environmental, and social foundation for all fishing activities:

Art. 6 *– General principles*

TECHNICAL ARTICLES

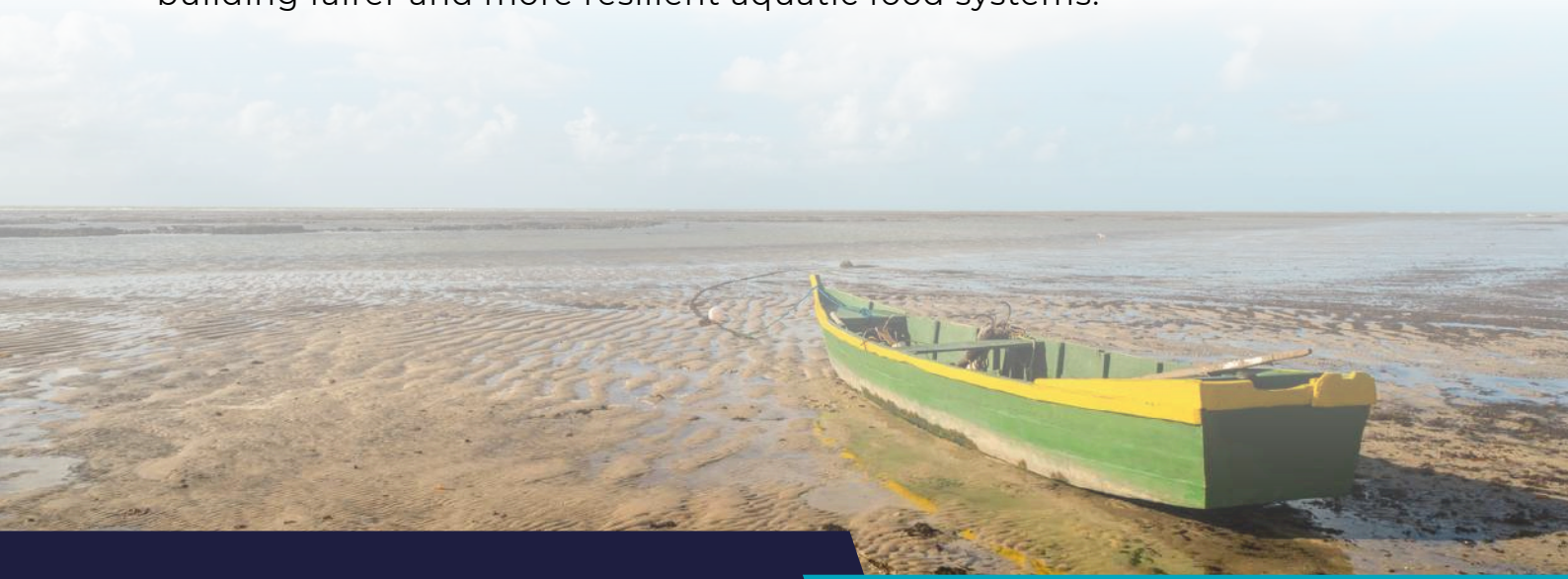
Operational and Management Guidelines:

Art. 7 *– Fisheries management*
Art. 8 *– Fishing operations*
Art. 9 *– Aquaculture*
Art. 10 *– Integration of Fisheries in Coastal Management*
Art. 11 *– Post-Harvest Practices and Trade*
Art. 12 *– Fisheries Research*

One of the key strengths of the CCRF lies precisely in its ability to articulate technical, social, and environmental dimensions within a single guiding framework. In doing so, it goes beyond the mere regulation of fishing activity, moving closer to the concept of an adaptive governance regime. In practical terms, the Code has driven the development of various complementary agreements and derivative instruments—such as the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries (VGSSF) and the Agreement on Port State Measures (PSMA).

Despite its considerable impact, the Code continues to face persistent challenges. The asymmetry in institutional and technical capacities among countries limits its full implementation, particularly in developing states. The lack of funding for enforcement, monitoring, and the generation of reliable data remains a significant bottleneck. In addition, new environmental challenges - such as climate change, ocean acidification, and the loss of marine biodiversity - demand conceptual and operational updates that go beyond the scope originally conceived in 1995.

Nevertheless, the very open and flexible nature of the Code creates opportunities for its continuous evolution. Its alignment with the 2030 Agenda—particularly with Sustainable Development Goal 14 (Life Below Water)—allows the CCRF to continue serving as a strategic platform to guide public policies, multilateral negotiations, and private sector commitments. The incorporation of new technologies, such as blockchain, artificial intelligence, and remote monitoring, can expand the possibilities for traceability, transparency, and community participation. Likewise, rights-based approaches and the recognition of local and Indigenous knowledge are consolidating as key elements in building fairer and more resilient aquatic food systems.

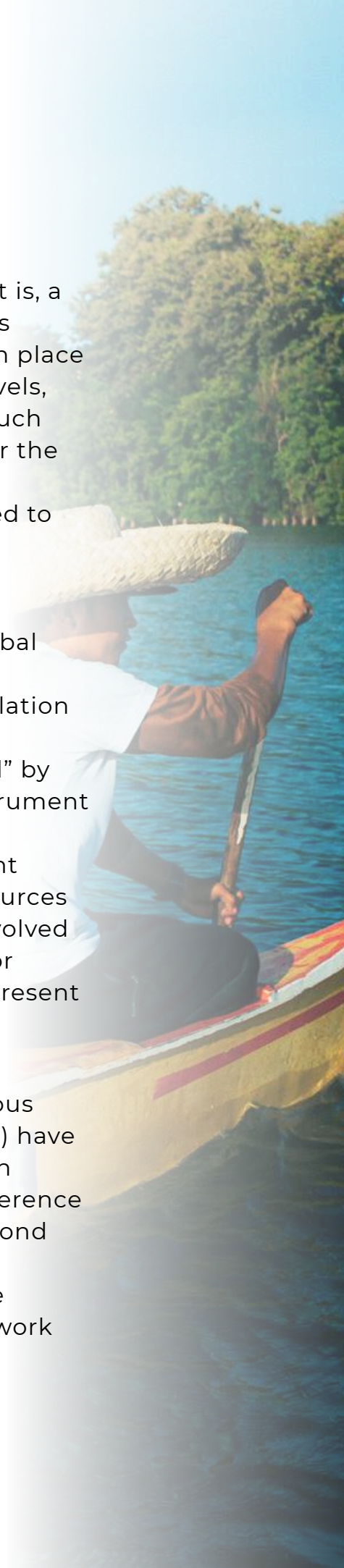


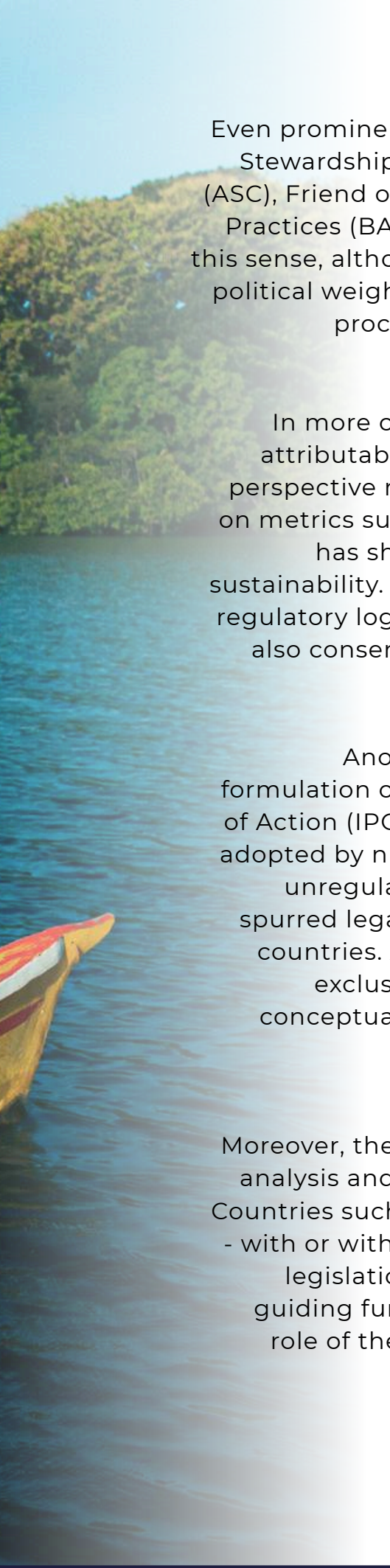
Its Impact and Relevance Over Time

Despite the absence of a “counterfactual baseline” (that is, a parallel scenario without the existence of the Code), it is possible to observe the transformations that have taken place over time at the national, regional, and international levels, and to recognize the role of the Code as a catalyst for such changes. The central question, therefore, is not whether the Code was the sole agent responsible for these transformations, but rather to what extent it contributed to shaping a new paradigm of fisheries and aquaculture governance.

In this regard, the CCRF has been consolidated as a global normative reference on best practices in fisheries and aquaculture. Its principal contribution lies in the formulation and dissemination of its principles within a holistic framework. Although these concepts were not “created” by the CCRF, their integration into a single normative instrument and their subsequent appropriation by states, regional organizations, and non-state actors marked a significant turning point in how the management of fisheries resources is conceived and practiced. In practice, the Code has evolved into a “single platform” and the main reference point for policies, plans, and legal reforms worldwide up to the present day.

The institutional acceptance of the CCRF is broad. Various Regional Fisheries Management Organizations (RFMOs) have incorporated its principles into their mandates, while an increasing number of national legislations explicitly reference the Code in their preambles. Its legitimacy extends beyond the public sector: UN agencies, international NGOs, universities, and even representatives of the large-scale fishing industry recognize its value as a guiding framework for sustainability.





Even prominent sectoral certification schemes - such as the Marine Stewardship Council (MSC), the Aquaculture Stewardship Council (ASC), Friend of the Sea, GlobalG.A.P. Aquaculture, Best Aquaculture Practices (BAP), and Fair Trade USA - are grounded in the CCRF. In this sense, although it is formally a soft law instrument, its moral and political weight is so significant that many experts argue it is in the process of consolidating into customary international law.

In more concrete terms, it is possible to identify direct impacts attributable to the Code. One of the most relevant is the shift in perspective regarding fisheries management. Previously centered on metrics such as growth and production, the dominant narrative has shifted toward criteria of responsible management and sustainability. This semantic change was not trivial: it reflects a new regulatory logic in which resources are not only to be exploited but also conserved, ensuring their availability for future generations.

Another significant impact is the Code's influence on the formulation of related instruments, such as the International Plans of Action (IPOAs). The IPOA-IUU, for instance, has become a model adopted by numerous countries to combat illegal, unreported, and unregulated fishing. Its implementation at national levels has spurred legal and operational changes, particularly in developing countries. Although these transformations cannot be attributed exclusively to the Code, it is undeniable that it provided the conceptual and normative framework that made them possible

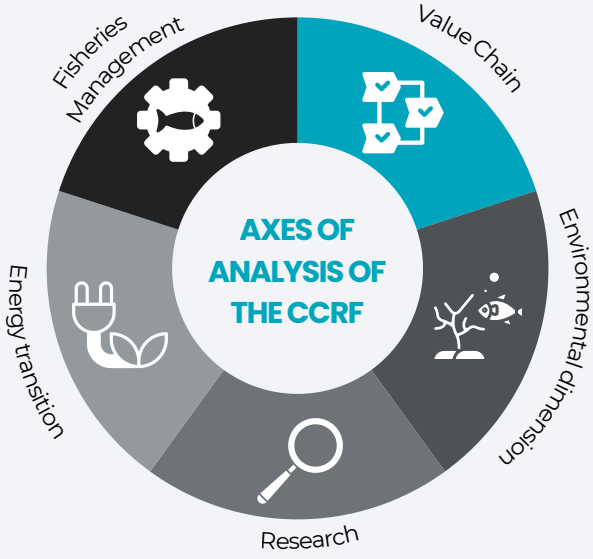
Moreover, the Code has been employed as a diagnostic tool for the analysis and strengthening of legal and institutional frameworks. Countries such as New Zealand, Thailand, and Vietnam have used it - with or without FAO support - as a strategic guide to review their legislation, identify gaps, and build institutional capacity. This guiding function, though not always quantifiable, reinforces the role of the CCRF as a driver of progressive institutional change.

Nevertheless, the limitations and slow pace in the implementation of the Code are evident. The structural transformation it proposes requires time, resources, and governance capacity - elements that are scarce in many developing countries, which host a large share of the world's fisheries. Even among developed countries, only a few have led policy innovations based on the Code. As in other areas of international environmental policy, resistance from economic sectors, lack of political will, and conflicts of interest have hindered the adoption of more ambitious measures.

Even so, the Code remains a strategic tool for inducing gradual change, particularly insofar as it is articulated with market pressures, multilateral agreements, and demands from civil society. Its ability to remain relevant for more than three decades, in an international context of constant transformation, demonstrates its conceptual strength and adaptability. Future challenge lies not only in preserving its founding principles, but also in updating them in light of new threats, such as the climate crisis, ecosystem degradation, and inequalities in access to resources.

The impact of the Code can be characterized as both broad and profound: broad, due to its dissemination among a wide range of institutional and social actors; profound, because it has contributed to a reconfiguration of the paradigms guiding the governance of fisheries and aquaculture. Although results still fall short of expectations in many areas, it is reasonable to affirm that, without the CCRF, the progress achieved in recent decades would have been slower, more fragmented, and more uneven.

Based on the structure of the Code and the main references drawn from prior scientific studies, our analysis can be organized around five principal thematic axes: fisheries management and governance. the value chain, the environmental dimension, research and knowledge, and the energy transition



Fisheries Management and Governance: Toward More Responsible and Adaptive Governance

Fisheries management and governance represent one of the most structural and strategic pillars of the FAO's Code of Conduct for Responsible Fisheries (CCRF). Since its adoption in 1995, the Code has promoted a gradual transition from models focused on maximizing fishing effort toward more balanced frameworks, based on ecological sustainability, the precautionary approach, and the participation of diverse stakeholders in decision-making processes. In this context, the CCRF has functioned both as a normative roadmap and as a catalyst for institutional reforms and innovations in fisheries governance at the global level.

One of the main advances has been the formal incorporation of the Ecosystem Approach to Fisheries (EAF) into national and regional fisheries policies. This approach has been adopted within the European Union's Common Fisheries Policy, which establishes quotas based on maximum sustainable yield (MSY) and measures linked to marine conservation (European Commission, 2023). At the national level, countries such as Norway have institutionalized the EAF through multispecies management plans, based on periodic scientific assessments and consultative participation mechanisms (FAO, 2020). In Latin America, Chile, for example, incorporated CCRF principles into the reform of its General Law on Fisheries and Aquaculture in 2012, integrating elements of sustainability and access control (SUBPESCA, 2015).

In regions of the Global South, implementation has been more uneven, but not without significant experiences. In Senegal, for example, co-management schemes have been developed in coastal artisanal fisheries with the support of the Sub-Regional Fisheries Commission (SRFC) and the SmartFish program (FAO, 2016). However, these initiatives face major challenges regarding scalability, financial sustainability, and alignment with national policies. Experience shows that regulatory frameworks inspired by the Code require not only political will, but also stable institutional capacities, public funding, and local ownership of the principles.

In this regard, the Global Record of Fishing Vessels, Refrigerated Transport Vessels, and Supply Vessels, promoted by FAO and inspired by the principles of the Code, has become a key tool to strengthen fisheries governance at the global level. This mechanism not only contributes to transparency and traceability of fleets, but is also fundamental to preventing overcapacity, ensuring operational transparency, and improving the management of fishing capacity—thus contributing to the long-term sustainability of the sector.

Despite these advances, structural challenges persist. Fleet overcapacity remains one of the main threats to global fisheries sustainability. FAO's SOFIA report (2022) indicates that more than 35% of assessed marine fish stocks are overexploited. In many regions, efforts to adjust fleet capacity have been postponed for political or economic reasons. Added to this is the persistence of illegal, unreported, and unregulated (IUU) fishing, which represents an estimated annual loss of up to USD 23.5 billion (Popescu, 2022; Agnew et al., 2009). Although instruments such as the IPOA-IUU and the Agreement on Port State Measures (PSMA) have strengthened the international response, their implementation remains limited, particularly in countries with low maritime surveillance capacity.

There are also significant gaps in the production and use of scientific data. The absence of time-series data, regular assessments, and participatory monitoring mechanisms weakens the capacity of many countries to make informed decisions. This technical deficit is compounded by institutional asymmetries among countries, and by the limited participation of historically excluded actors—such as women, youth, and Indigenous peoples—in governance processes.

A key lesson after three decades of implementation is that the effectiveness of fisheries management systems depends not only on the technical design of measures, but also on their social and political legitimacy. Successful experiences of co-management and collaborative governance demonstrate that compliance with regulations increases when there is genuine participation, transparency, and equitable distribution of benefits. The CCRF has helped to promote these principles, but its effective impact varies according to the political, social, and economic context of each country.

In summary, the Code has been fundamental in introducing and expanding the principles of sustainability, responsibility, and participatory governance in global fisheries. Nonetheless, its effective implementation continues to face significant obstacles. The current challenge is to deepen and update management strategies to respond to emerging crises such as climate change, biodiversity loss, and the socio-economic inequalities that persist in many coastal communities. More than a technical instrument, the Code represents an ethical compass for fisheries management aligned with the challenges of the 21st century.

The Fisheries Value Chain: Sustainability Beyond the Catch

The sustainability of fisheries is not limited to what occurs at sea. The way in which fishery products are processed, marketed, and consumed has a profound impact not only on the health of ecosystems but also on the economic and social equity of the actors involved. For this reason, since its inception the Code has emphasized the need to adopt a comprehensive vision of the value chain, one that considers not only production but also post-harvest stages, distribution, traceability, trade, and consumption. This perspective has gained strength in recent decades, in line with the growing recognition of the strategic role that markets, certification schemes, informed consumption, and value addition play in the transformation toward more sustainable aquatic food systems.

One of the most visible achievements has been the consolidation of traceability and labeling systems that allow consumers and institutions to track fishery products from their origin to their final destination. This progress has been particularly notable in the European Union, where Regulations (EC) No. 1005/2008 and 1224/2009 require full documentation regarding the legality and origin of imported fishery products. This regulatory framework has indirectly influenced the improvement of control systems in exporting countries such as Thailand and Indonesia, which have undertaken institutional and technological reforms to meet these requirements (FAO, 2017; EJF, 2019).

In the realm of voluntary certification, the Marine Stewardship Council (MSC), among others, has become a global reference, adopting principles directly inspired by the CCRF. In terms of fair trade and equity, initiatives such as Fair Trade USA have begun applying social and environmental standards in artisanal fisheries, as seen in pilot projects in Mexico (Baja California) and Indonesia, where working conditions, access to differentiated markets, and community participation in decision-making processes have been improved (Pérez-Ramírez et al., 2020).

Nonetheless, the development of truly sustainable value chains faces significant structural challenges. In many regions - particularly in the Global South - fishing communities lack access to basic infrastructure such as ice, cold storage, or collection centers. This limits product quality, reduces income, and generates high post-harvest losses. According to FAO (2022), up to 35% of fish caught in Sub-Saharan Africa is lost or spoiled before reaching the market. This situation perpetuates poverty, vulnerability, and dependence on intermediaries who impose low prices and unequal conditions.

Large distributors (supermarket chains and wholesale buyers) exert significant influence over fishing practices, product presentation formats, required certifications, and pricing margins. As a result, there has been a trend toward the exclusion of small-scale producers who cannot meet technical standards or afford certification costs. At the same time, if such requirements are not accompanied by technical support, they can exacerbate inequalities between countries and regions.

Despite these challenges, there are experiences that demonstrate the transformative potential of inclusive and responsible value chains. In Senegal, the Artisanal Fisheries Modernization Program, supported by the World Bank under the Natural Resources Management project, has helped improve landing sites and strengthen the commercial capacities of fishing cooperatives (World Bank, 2022). In Ecuador, the tuna value chain has undergone multiple reforms to guarantee traceability, legality, and social compliance in response to European market requirements. In Peru, the national program A Comer Pescado (“Let’s Eat Fish”) has promoted domestic consumption of local species, generating fairer marketing circuits for artisanal fishers (FAO, 2022).

A key dimension that has gained attention in recent years is the role of informed consumption. Awareness campaigns, mobile applications, sustainability labels, and food education are empowering consumers to make choices that reward responsible fisheries. In some contexts, this demand-side pressure has had greater impact than public policies, forcing companies and governments to act more swiftly and transparently.

From a regulatory standpoint, the CCRF has provided an ethical and technical foundation for countries to orient their trade policies toward principles of legality, equity, and sustainability. However, its implementation has been most effective when complemented by market incentives, public–private partnerships, and financing directed toward local development. The experience of the last 30 years suggests that reforms in the value chain require a smart combination of regulation, investment, and active participation of local actors.

Ultimately, the value chain is both a space of conflict and of opportunity. It can reproduce inequalities or become a driver of structural change. The Code of Conduct was crucial in placing this issue on the global agenda, but the challenge remains to translate its value proposition to all links in the chain and to ensure that the benefits of fisheries reach them more equitably.

The Environmental Dimension: Pollution and the Conservation of Marine Ecosystems

The environmental dimension of the Code of Conduct for Responsible Fisheries recognizes that the health of the oceans depends not only on fisheries management but also on how extractive practices interact with water quality, biodiversity, and marine habitats. Since 1995, the Code has promoted an integrated vision that encompasses pollution reduction, the protection of vulnerable habitats, and the application of the ecosystem approach. This section critically examines how these principles have been translated into policies, good practices, and where institutional gaps remain.

In many countries, the implementation of marine protected areas (MPAs) that integrate both fisheries and conservation objectives has been a significant step forward. A robust example can be found in FAO studies (2013) on MPAs in Japan, Mauritania, the Philippines, and Samoa, which highlight coastal spatial planning schemes that restrict harmful extractive activities and promote the regeneration of key species.

Nevertheless, marine pollution—particularly plastics, agricultural nutrients, and heavy metals—remains a global challenge that fisheries policies have not systematically addressed. While the Code's instruments promote the need to minimize the indirect impacts of fishing on the environment, they lack explicit guidelines regarding cross-cutting threats such as eutrophication and ocean acidification. In regions such as the Baltic Sea, interactions have been documented between coastal development, chlorophyll levels, chemical pollution, and the loss of essential habitats for fish and seabirds (FAO, 2013).

High seas fishing has revealed cascading effects on food webs and ecosystem integrity, reinforcing the need for management approaches based on ecosystem indicators, as promoted by the Code. This has increasingly resulted in a reorientation of fisheries chains toward environmental indicators of pollution, impact, and conservation of marine resource populations.

Moreover, the impact of IUU fishing (FAO/UNEP, 2009) includes damage to sensitive habitats, mortality of non-target species, and loss of marine biodiversity. Although the Code includes provisions to reduce such practices, effective monitoring and legal enforcement remain weak, especially in international waters and even in regulated coastal zones.

Among the lessons learned, the importance of linking fisheries with broader environmental policies - such as coastal planning, waste management, and climate adaptation strategies - stands out. Likewise, regional frameworks such as the Coral Triangle Initiative (CTI-CFF), led by Southeast Asian countries, have adopted guidelines consistent with the principles of the Code to promote conservation alongside coastal livelihoods.

While the CCRF has fostered global awareness of the need to conserve marine ecosystems within fisheries governance, its implementation has faced structural challenges and a lack of cross-sectoral coordination. The Code provides a solid ethical and normative framework, but its transformative capacity still depends on effective integration into multisectoral institutional structures.

Research, Science, and Knowledge Production

Science and research have been fundamental pillars in the implementation of the Code of Conduct for Responsible Fisheries (CCRF), recognizing from its inception the need to base decisions on rigorous evidence. This section examines how, over the past three decades, the generation, accessibility, and use of scientific knowledge have evolved in the field of fisheries and aquaculture, highlighting significant progress, persistent obstacles, and lessons learned to strengthen data-driven governance.

From its adoption, the Code emphasized the importance of applied research, standardized fisheries data collection, and their use for assessing the state of resources. In countries such as Australia, the CSIRO has led national monitoring programs for commercial stocks for decades, integrating biological, oceanographic, and socioeconomic data to inform national policies. In the European Union, initiatives such as the Data Collection Framework (DCF) have enabled periodic and coordinated assessments of fish stocks among Member States, strengthening collective science-based decision-making (European Commission, 2018). Similarly, in Central America, community collectives in Panama and Costa Rica have worked with NGOs and universities to monitor vulnerable species such as turtles and sharks, integrating local and traditional knowledge into multidisciplinary management plans (FAO & IUCN, 2016).

However, not all efforts have been successful or universally replicable. There are clear gaps in the production and use of scientific data in contexts with low technical capacity. Many countries in the Global South rely on temporary consultancies or external donations that do not ensure long-term continuity. The result is a critical fragmentation of data that limits the capacity for longitudinal analysis and continuous adaptive adjustment. Furthermore, the use of traditional and Indigenous knowledge in fisheries research and planning remains marginal, due both to institutional biases and the lack of inclusive protocols.

Even so, there are encouraging lessons. For instance, historical mapping of catches and CPUE (Catch Per Unit Effort) in Seychelles, the Fisheries Transparency Initiative (FiTI), as well as numerous monitoring and management plans currently underway around the world with FAO and multilateral support, have contributed to a diverse generation of data and information on the state of fisheries and marine ecosystems. These networks have strengthened local ownership, improved community-level monitoring, and generated evidence to co-design policies with governments, multilaterals, the private sector, and NGOs.

Another notable advance has been the use of innovative technologies: satellite sensors for vessel tracking, blockchain for traceability, electronic observers and onboard cameras, and participatory mobile applications to record artisanal catches. Examples include Global Fishing Watch, NOAA (United States), Sea Around Us (University of British Columbia), WWF's Blockchain Supply Chain Traceability Project, as well as databases such as FishBase and AquaMaps. These technological advances, often implemented with support from FAO and the World Bank, are beginning to generate more transparent and reliable data (World Bank, 2021).

Nonetheless, these technological outcomes face barriers: unequal access to connectivity, digital literacy gaps, and dependence on third-party platforms. Moreover, ethical and epistemological challenges persist regarding data ownership, community consent, and equitable use of the knowledge generated.

In conclusion, thirty years after the adoption of the CCRF, science and research remain critical pillars for achieving truly responsible fisheries. The current challenge is to close the gaps in production, continuity, and equity of knowledge. To achieve this, the Code must continue evolving as a framework that recognizes and enhances both local knowledge and formal science, articulating networks—from the local to the global—that enable informed, adaptive, and inclusive decisions in the face of climate change, ecosystem transformations, and persistent inequalities.

Energy Transition in Fisheries: A New Axis for Sustainability

In the context of climate change and the urgency of decarbonizing productive sectors, the energy transition has become a new horizon for fisheries policies. Although the FAO's Code of Conduct for Responsible Fisheries (CCRF) does not include a specific chapter on energy, its foundational principles of sustainability, responsibility, and efficiency provide the normative framework for addressing the energy impacts of fishing activities and promoting cleaner and fairer solutions. The dependence on fossil fuels in both industrial and artisanal fisheries has direct effects on the sector's carbon footprint as well as on its economic viability, particularly in contexts of oil price volatility. Therefore, analyzing the energy transition as an axis of the CCRF makes it possible to connect global climate objectives with the local needs of fishing communities.

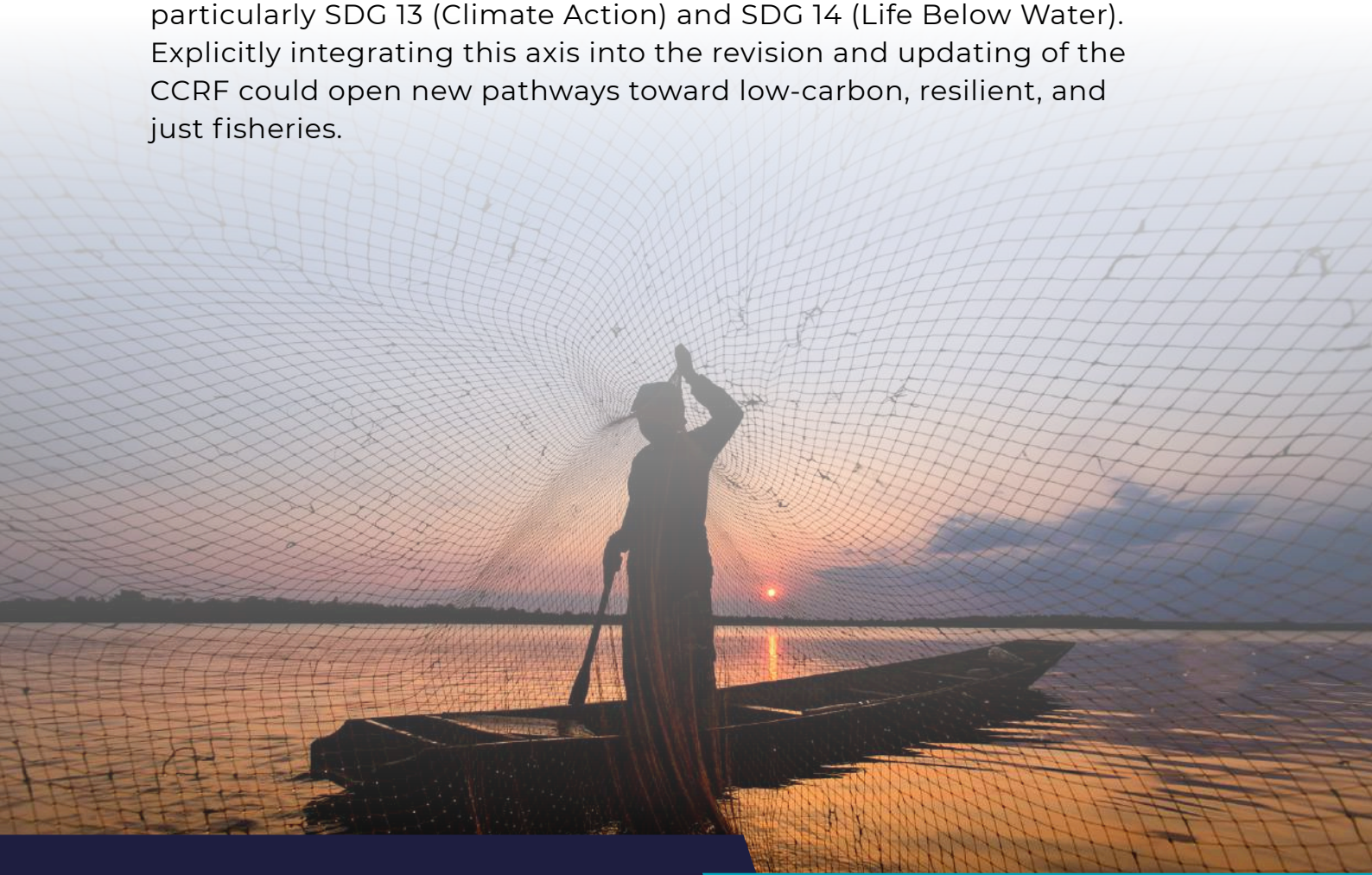
One of the most notable advances in this field has been the introduction of alternative propulsion technologies, such as electric engines, hybrid systems, and biofuels, in artisanal and small-scale vessels. For example, initiatives in Thailand and India have demonstrated that converting engines to more efficient systems can substantially reduce emissions and operating costs (Puri et al., 2023). However, these experiences also reveal structural barriers such as high upfront costs, lack of supporting infrastructure, and limited access to financing for small-scale producers.

At the institutional level, FAO has begun to integrate the climate and energy dimensions into programs such as the Blue Ports Project and the FAO Energy-Smart Food Programme, which promote energy efficiency across the value chain, from capture to commercialization. In addition, FAO's 2022 report on greenhouse gas emissions in fisheries and aquaculture establishes baselines for mitigation, inspiring monitoring and improvement actions in several countries.

The case of Seychelles illustrates a good practice in climate governance of the fisheries sector. There, the national blue economy plan includes decarbonization targets for artisanal fisheries, combining technical support, fiscal incentives, and pilot projects with solar energy and efficient refrigeration (Government of Seychelles, 2020).

Nevertheless, significant gaps remain. The absence of a systemic approach that links energy, fisheries, and community development limits the reach of current strategies. Moreover, most studies and projects focus on specific contexts, without a global energy transition strategy adapted to the diversity of fisheries regions. Scientific knowledge about energy consumption and GHG emissions in the sector is still fragmented, and the integration of clean technologies remains minimal compared to the global scale of fisheries.

Ultimately, the energy transition represents both a challenge and an opportunity to align responsible fisheries with the commitments of the Paris Agreement and the Sustainable Development Goals, particularly SDG 13 (Climate Action) and SDG 14 (Life Below Water). Explicitly integrating this axis into the revision and updating of the CCRF could open new pathways toward low-carbon, resilient, and just fisheries.



30 Years of Implementation and Lessons Learned

Fisheries management

Advances

- Transition towards ecological sustainability and participation.
- Adoption of the Ecosystem Approach (EAF) in Europe, Norway, and Chile.
- Co-management experiences in Senegal and other Global South countries.

Learnings

- Legitimacy and participation improve compliance.
- Challenges remain, such as overcapacity and IUU fishing, climate change, and socio-political impacts.

Value chain

Advances

- Stronger traceability and certification systems.
- Fair trade initiatives in Mexico and Indonesia.
- Inclusive programs in Senegal, Ecuador, and Peru.

Learnings

- Sustainability encompasses the whole chain, not only the capture
- Informed consumption drives positive change.
- Risk of exclusion of small producers without technical support.

Environmental dimension

Advances

- Integration of marine protected areas with fishing objectives.
- Application of an ecosystem approach and indicator-based management.
- Recognition of environmental damage from IUU fishing.

Learnings

- Actions are lacking against pollution and acidification.
- Fisheries must be integrated into comprehensive environmental planning.
- The CCRF requires more cross-cutting approaches.

Research

Advances

- Monitoring systems in Australia, the EU, and Central America.
- Use of technologies such as satellites, blockchain, and apps.
- Emerging recognition of traditional knowledge.

Learnings

- Without data, adaptive management is not possible.
- Major gaps remain in continuity, access, and data equity.
- Inclusive, local, and connected science is needed.

Energy transition

Advances

- Clean technologies in small-scale vessels.
- Climate initiatives in Seychelles and FAO programs.

Learnings

- Decarbonizing fisheries is vital to address the climate crisis.
- A global strategy linking energy and local development is still missing.
- Incorporating this axis into the CCRF is an urgent priority.

The Impact of the Code of Conduct on Aquaculture in the Last 30 Years

Since its adoption in 1995, the Code of Conduct for Responsible Fisheries (CCRF) has played a decisive role in fostering a more sustainable, equitable, and environmentally responsible aquaculture sector. Although aquaculture was at that time an expanding activity, still limited in scale, the CCRF anticipated its potential as a complementary alternative to capture fisheries and dedicated Article 9 specifically to establishing guidelines for its responsible development.

Over the past 30 years, the CCRF has served as a guiding framework for the design of public policies, technical standards, and certification processes in the aquaculture sector. Its principles have driven the development of legal and institutional frameworks that promote biosecurity, the management of environmental impacts, animal welfare, and product traceability. It has also supported the integration of aquaculture into coastal area management and encouraged the participation of local communities in the planning and monitoring of aquaculture activities.

Organizations such as FAO have translated the CCRF's guidelines into more specific operational documents, such as the Technical Guidelines on Aquaculture Certification (FAO, 2011), which have guided both governments and private certifiers. Similarly, associations such as APROMAR in Spain have incorporated CCRF principles into their annual reports and codes of good practices, consolidating internationally recognized sustainability standards.

The European Union, closely aligned with the CCRF, developed the EU Strategy for the Sustainable Development of European Aquaculture, which operates as an integrated framework based on the principles of the Code, reinforcing coherence between both instruments and consolidating a common approach toward sustainable, competitive, and responsible aquaculture.

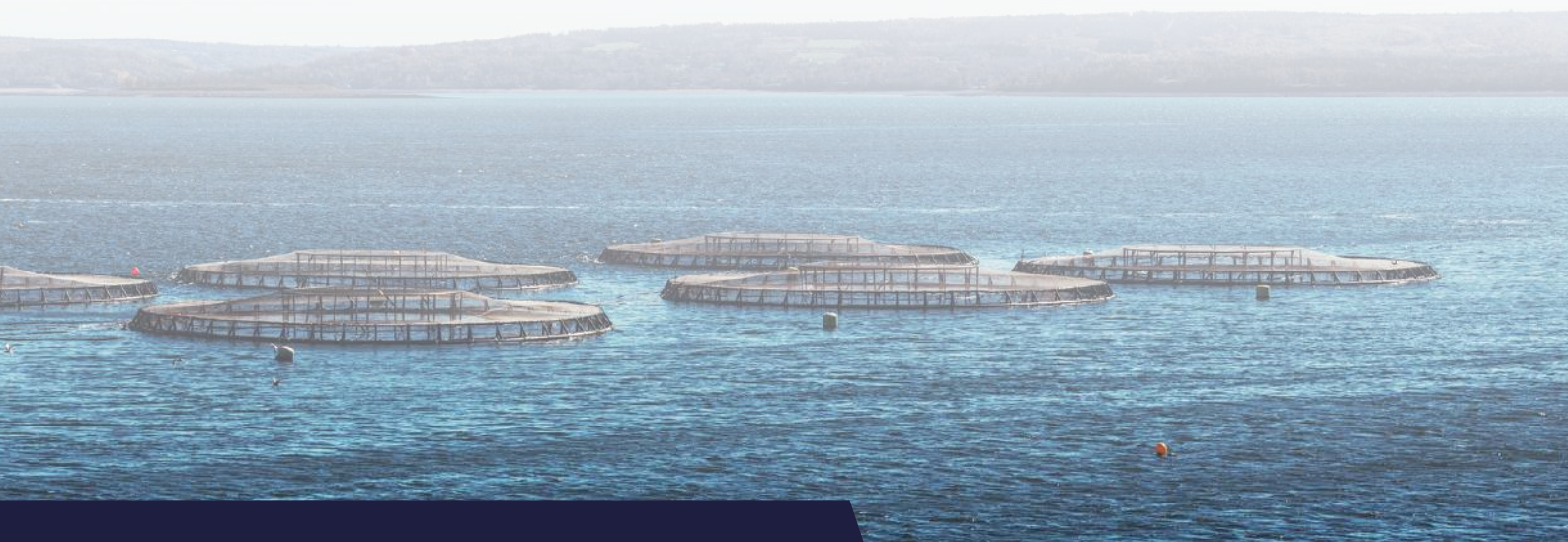
A key structural shift driven by the Code has been the transition from a purely production-oriented model to an ecosystem-based aquaculture approach (EAA), which takes into account interactions with other human activities, surrounding biodiversity, and cumulative impacts. This has contributed to the development of the EAA, promoted by FAO, which applies principles similar to those of sustainable fisheries.

* Strategy for sustainable development of European aquiculture [COM (2002) 511 final. https://eur-lex.europa.eu/legal-content/ES/TXT/?uri=LEGISSUM:l66015

The CCRF has also fostered an enabling regulatory environment for innovation. Its emphasis on sustainability has stimulated investment in more efficient feeds, waste reduction technologies, non-invasive genetic improvements, and integrated multi-trophic aquaculture (IMTA) systems. In addition, the growing consumer demand for sustainability certifications has led initiatives such as the Aquaculture Stewardship Council (ASC) to align their criteria with CCRF principles, thereby extending its influence beyond the public sector.

Nevertheless, significant challenges remain. In many countries—particularly developing ones—the effective implementation of these guidelines faces obstacles such as limited institutional capacity, insufficient environmental monitoring, and weak enforcement of illegal or unsustainable practices. Moreover, new threats such as climate change, disease outbreaks, and competition for coastal space demand dynamic updates of the principles and tools promoted by the Code.

In summary, the CCRF has been an important tool for guiding aquaculture toward becoming a more sustainable, inclusive, and resilient activity. Its ability to integrate environmental sustainability with social responsibility and productive efficiency has contributed to reshaping the role of aquaculture within global food systems and to consolidating a new paradigm of sectoral governance.



Analysis of the Code from the Future Perspective of the Fisheries and Aquaculture Sector

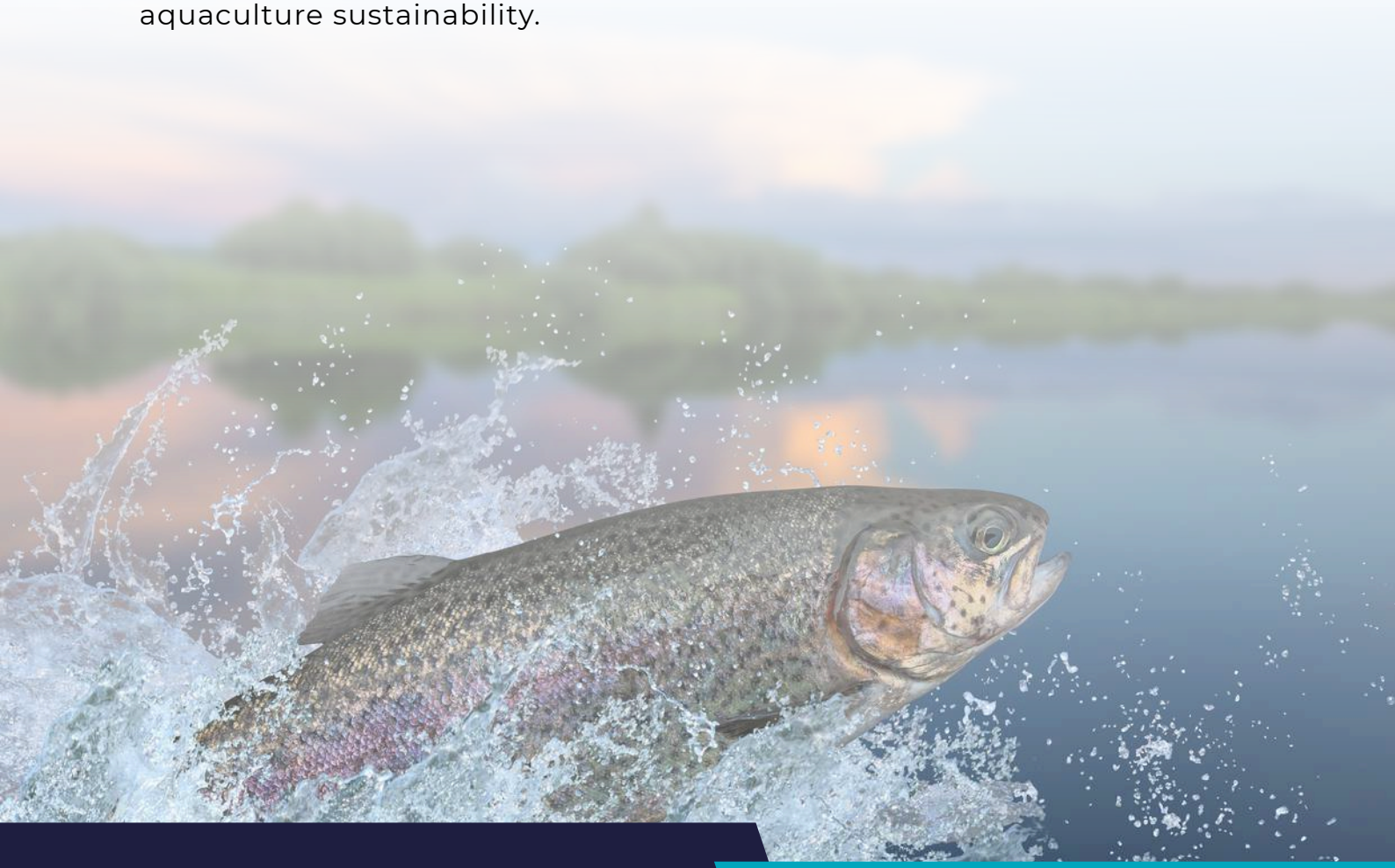
Fisheries and aquaculture represent an important source of livelihoods, being fundamental not only for poverty reduction, socioeconomic development, and employment generation, but also for the preservation of the identity of coastal areas. Equally important is the sector's potential to address food insecurity and malnutrition at the global level. Together, these sectors provide 15% of animal protein and 6% of total protein, supplying more than 3 billion people and generating income for over 60 million workers directly engaged in fishing, farming, processing, and distributing aquatic products, according to FAO's State of World Fisheries and Aquaculture 2024.

However, the future of fisheries and aquaculture faces multiple evolving challenges, shaped by global environmental, social, technological, economic, and political changes. Climate change, biodiversity loss, accelerated coastal urbanization, marine pollution, overexploitation of resources, and the growing global demand for aquatic foods are creating a scenario that highlights the urgent need to reformulate the guiding principles of fisheries and aquaculture governance. In this context, the Code of Conduct for Responsible Fisheries (CCRF), approved by FAO in 1995, serves as a normative reference instrument at the international level. Despite its non-binding nature, it has guided efforts for three decades to promote the sustainability of fisheries and aquaculture and the conservation of living aquatic resources.

In its original formulation, the Code reflected the priorities and concerns of the late 20th century: strengthening legal frameworks, combating marine ecosystem degradation, fighting illegal fishing, controlling overfishing, and advancing international cooperation, among others. However, the global scenario has since changed, giving rise to new concerns and priorities, while some of the earlier ones have either intensified or, conversely, lost relevance.

Ecological pressures have become more acute, new technologies have revealed the need to redefine production systems, and social expectations have expanded toward more equitable models. At the same time, the Code must be aligned with new normative frameworks and other global sustainability strategies, which establish new environmental, social, and economic targets.

In this sense, it is essential to analyze the CCRF from a future-oriented perspective, identifying the existing gaps in relation to the emerging challenges of the fisheries and aquaculture sectors. This section aims, on the one hand, to provide a detailed diagnosis of the challenges facing the sector looking toward 2055 and, on the other, to assess the current capacity of the CCRF to respond to these challenges, ensuring its continued relevance as a global reference instrument for fisheries and aquaculture sustainability.



Challenges of the Fisheries Sector

Overfishing and Stock Depletion

Despite decades of progress in governance and regulatory efforts at both national and international levels, overfishing remains one of the most critical challenges to the sustainability of the fisheries sector. This situation threatens not only marine biodiversity but also food security, the livelihoods of millions of people, and the economic viability of fishing fleets themselves.

Several factors contribute to this problem, including the lack of effective enforcement of existing regulations; the use of advanced technologies that have increased the efficiency and range of vessels, enabling extraction levels that exceed the natural recovery capacity of ecosystems; and the absence of compensatory measures for coastal communities - particularly in developing countries, where fisheries represent the main source of income and employment.

In response to this situation, effective control of fishing activity is required through catch limits and closed seasons supported by scientific evidence, as well as recovery plans for overexploited stocks. Strengthening governance, enhancing international cooperation, ensuring transparency in decision-making, and fostering the active participation of all stakeholders—including local communities—are essential to reversing current trends and safeguarding the long-term sustainability of fisheries.

Illegal, Unreported, and Unregulated (IUU) Fishing

IUU fishing continues to be one of the greatest threats to the sustainability of global fisheries, generating estimated annual losses ranging from USD 10 to 23 billion (FAO, 2024). Beyond its economic impact, it undermines the competitiveness of legitimate operators, distorts markets, and exacerbates social injustices, including forced labor and other human rights violations.

From an environmental perspective, IUU fishing intensifies pressure on species and hinders the collection of reliable data, thereby undermining the capacity to manage resources effectively. From an economic standpoint, it generates market distortions by introducing lower-cost products that compete unfairly with legally sourced fish. At the social level, it has a direct impact on working conditions, often exposing fishers to exploitation, insecurity, and labor rights violations.

It is essential to strengthen monitoring, control, and surveillance systems; enhance international cooperation through multilateral agreements and information-sharing among States; and move toward more transparent markets that require certification and traceability, involving the entire value chain.

Pressure on the Environment

Healthy marine ecosystems—such as coral reefs, seagrass meadows, mangroves, and seabeds—not only harbor high biological diversity but also provide feeding grounds and shelter for numerous commercially important species. However, these habitats are increasingly under threat.

Non-selective fishing practices accelerate the erosion of marine biodiversity, compromising not only the sustainability of fisheries but also reducing essential ecosystem services such as coastal protection, carbon sequestration, and the maintenance of water quality.

For this reason, the fisheries sector must take into account the pressure exerted on the environment and ecosystems in its operations. It is necessary to establish scientifically grounded and community-supported marine protected areas, as well as to promote responsible, selective, and low-impact fishing practices.

Climate Change

Climate change is one of the most urgent challenges that the fisheries sector will face in the coming decades, with profound impacts on marine ecosystems, species distribution, fisheries productivity, coastal communities, and their infrastructure. Rising ocean temperatures, acidification, deoxygenation, sea level rise, and the increasing frequency of extreme events are significantly altering the ecological balance of seas and oceans.

Climate change also has a direct impact on the most vulnerable coastal communities, particularly those with limited adaptive capacity, which face the loss of livelihoods, coastal erosion, and forced displacement.

The lack of climate data applied to fisheries, low investment in research and development, and the limited incorporation of climate risk into fisheries governance further exacerbate the sector's vulnerability.

To address this challenge, it is urgent to improve environmental monitoring, diversify income sources in coastal communities, redesign fisheries policies to be flexible and science-based, and invest in climate-resilient infrastructure.

Equally important is the role of the sector in mitigating climate change through the reduction of its carbon footprint, the energy transition, the promotion of sustainable practices, and the protection of marine ecosystems that act as carbon sinks.

Marine and Land-Based Pollution

Marine and terrestrial pollution represents a growing challenge for the fisheries sector, with increasingly visible impacts on the health of aquatic ecosystems, food security, and the quality of fishery products. Oceans and freshwater bodies receive a wide range of contaminants originating from land-based sources - such as agricultural runoff, untreated wastewater, plastic waste, heavy metals, and industrial chemicals - as well as from maritime activities, including shipping traffic, fishing operations, and hydrocarbon extraction. This pollution affects marine biodiversity, alters the habitats of numerous commercially important species, and poses risks to the health of populations that depend on seafood consumption.

Pollution also carries significant social and economic implications. It can lead to temporary or permanent closures of fisheries, sanitary restrictions on seafood exports, loss of consumer confidence, and negative impacts on coastal tourism.

To address this challenge, it is essential to reduce land-based sources of pollution through improvements in wastewater treatment, stricter regulation of agrochemicals, proper solid waste management, and the restoration of degraded coastal areas. At sea, efforts must focus on preventing spills, controlling pollution generated by vessels, and promoting responsible fishing practices that prevent gear loss and marine litter.

Public awareness, responsible consumption, and cooperation across sectors and institutions are also key aspects in addressing this challenge.

Energy Transition

The energy transition represents one of the most significant and complex challenges for the fisheries sector in the coming decades, within the framework of global commitments to mitigate climate change and move toward a low-carbon economy. At present, fisheries depend almost exclusively on fossil fuels, making the sector a considerable emitter of greenhouse gases. This dependence also exposes fishing operators to oil price volatility, directly affecting economic profitability - particularly in artisanal and small-scale fleets.

The energy challenge faced by the sector is not only environmental, but also economic and social. Many developing countries lack access to clean technologies or adequate infrastructure to enable an orderly energy transition. Moreover, profit margins in fisheries are generally low, making it difficult to invest in cleaner technologies.

At the same time, the shift toward renewable energy sources - such as electric batteries, biofuels, or green hydrogen - poses technical challenges, including vessel autonomy, operational safety, adaptation of port infrastructure, and specialized maintenance. At the political level, both the lack of financing and the absence of clear regulatory frameworks further hinder progress toward a just energy transition.

To address this challenge, a comprehensive strategy is needed that combines technological innovation, adequate financing schemes, and updated regulatory frameworks.

Management and Governance

Proper management is essential to ensure the environmental, economic, and social sustainability of fisheries, enabling the responsible use of marine resources and guaranteeing their long-term availability. However, many regions still lack updated regulatory frameworks, suffer from insufficient scientific data, and show limited coordination between public administrations and the sector.

Moreover, current management systems must adapt to emerging challenges such as climate change, the energy transition, the growth of aquaculture, and the expansion of new marine industries.

Addressing this challenge requires strengthening the technical and financial capacities of fisheries management institutions, developing comprehensive management plans, fostering the participation of local communities in governance, ensuring equitable access to resources, and integrating fisheries into broader marine spatial planning processes.

Value Chain and Production

Despite its importance for food security and the socioeconomic development of many regions, the fisheries value chain faces deep inequalities, low value addition, and structural deficiencies in infrastructure, technology, and marketing.

Most of the economic value tends to concentrate in the final links of the chain, while primary producers - especially artisanal fishers - receive reduced incomes, often below fair levels.

Working conditions along the value chain remain a persistent problem, as does the limited participation of women, despite their fundamental role in fisheries activities. In addition, infrastructure in ports, processing plants, transport, and cold storage is insufficient or inadequate in many regions, increasing post-harvest losses and reducing both the quality and traceability of fishery products.

Another major challenge is dependence on unstable global markets, which can affect both prices and the viability of certain fisheries, particularly in the context of economic crises, trade restrictions, or logistical disruptions.

Addressing this challenge requires a comprehensive transformation toward more inclusive, sustainable, and resilient value chains. This entails improving infrastructure, reducing post-harvest losses, promoting labor formalization, ensuring decent working conditions, and increasing value addition through certifications, product diversification, and traceability.

Furthermore, it is necessary to foster innovation and digitalization, promote gender equity, and strengthen the role of local communities throughout the entire chain.

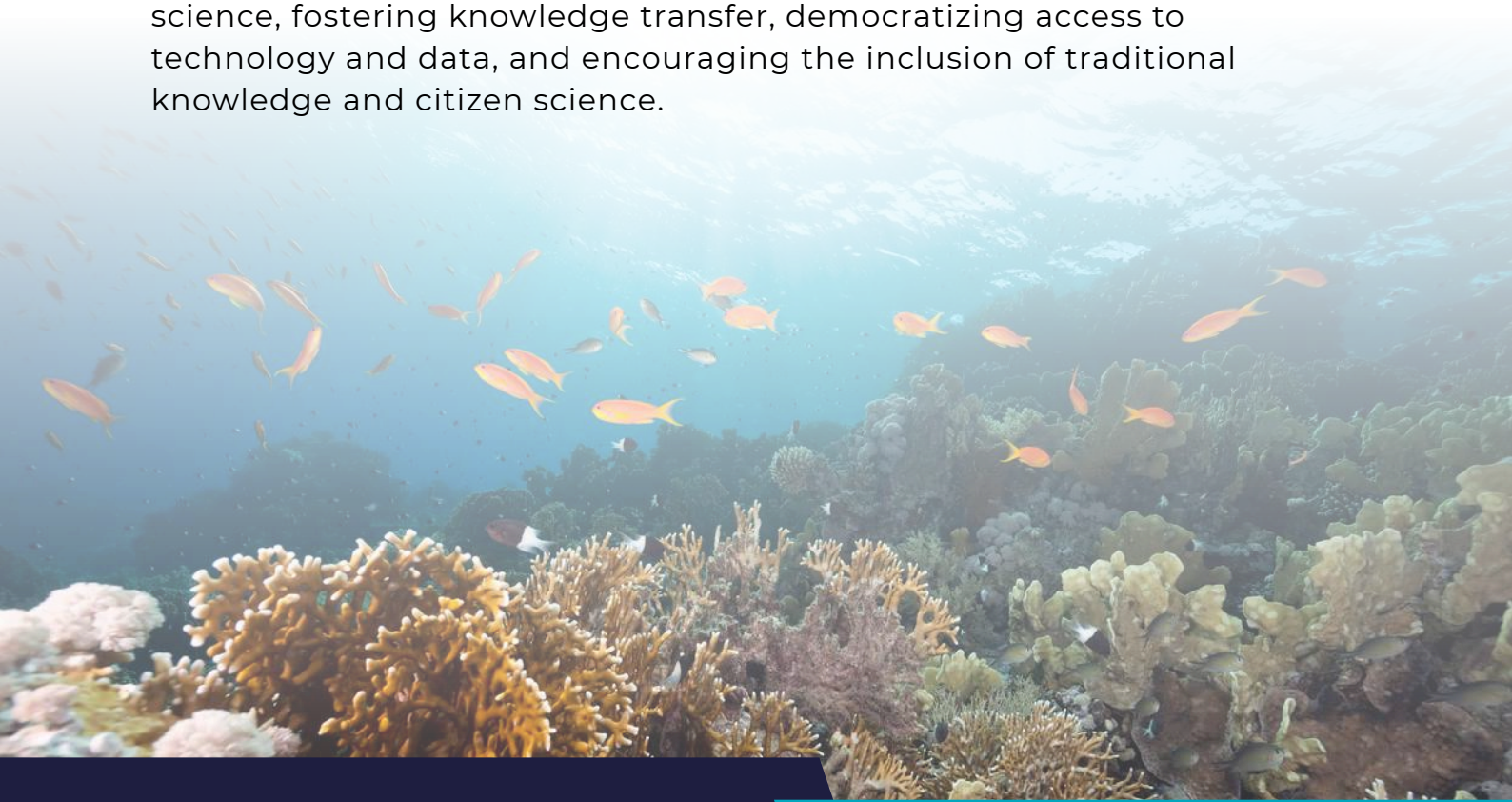
Research

A large share of the world's fisheries operates with limited or outdated environmental, economic, and social information, making evidence-based management difficult. Without accurate and accessible data on the status of resources, ecosystems, fishing activity, socioeconomic impacts, or climate change, it is impossible to establish appropriate catch limits, design effective recovery plans, or maintain reliable monitoring systems.

Technological advances - such as artificial intelligence, big data analytics, satellite monitoring, and remote sensors—offer new opportunities to improve fisheries monitoring, traceability, and efficiency. However, their adoption remains uneven and, in many cases, inaccessible to countries or communities with fewer resources.

A significant gap also persists between scientific production and decision-making, due to the limited linkage between academic, governmental, and fisheries sectors.

Addressing this challenge requires strengthening public and private investment in research, promoting international cooperation in marine science, fostering knowledge transfer, democratizing access to technology and data, and encouraging the inclusion of traditional knowledge and citizen science.



Challenges of the Aquaculture Sector

Environmental Pressure

Although aquaculture is the livestock activity with the lowest carbon footprint per unit of protein produced, its rapid expansion poses significant environmental challenges. The main concerns include water pollution from excess nutrients and organic waste, the improper use of antibiotics, the introduction of exotic or genetically modified species, and the conversion of sensitive habitats such as mangroves or wetlands for productive purposes. These practices can disrupt local ecological balances, reduce biodiversity, and generate conflicts with other uses of water or coastal space.

In light of these risks, it is essential to advance toward low-impact aquaculture, grounded in principles of sustainability, efficient use of natural resources, and respect for surrounding ecosystems. This requires the adoption of more responsible practices, such as recirculating aquaculture systems (RAS), integrated multi-trophic aquaculture (IMTA), the use of sustainable feeds, and strict control of biosecurity and escapes. Greater spatial planning and stronger environmental regulation are also needed to avoid the excessive concentration of facilities in vulnerable areas.

Climate Change

Climate change is directly impacting the viability of the aquaculture sector, both in marine and inland systems. Rising water temperatures, ocean acidification, declining dissolved oxygen levels, prolonged droughts, and extreme events such as storms and floods affect the health of aquatic ecosystems and alter production conditions. These environmental variations influence the growth, reproduction, and survival of farmed species, as well as water quality and the incidence of diseases.

In inland systems, such as aquaculture in rivers or reservoirs, reduced water flows and rising temperatures have already led to farm closures, loss of local biodiversity, and conflicts over water use. In the case of marine aquaculture, warmer conditions have favored the proliferation of pathogens and other health risks that affect both productivity and food security.

To address these challenges, it is necessary to adopt a climate change adaptation strategy that includes species diversification, genetic selection for greater resilience, improved biosecurity, and the redesign of climate-resilient infrastructure. The integration of climate risk into public policies, continuous environmental monitoring, and investment in nature-based solutions will be key to strengthening the sector's resilience and reducing its long-term vulnerability.

Marine and Land-Based Pollution

Pollution represents a dual challenge for aquaculture: both as a potential generator and as a victim of environmental degradation. On the one hand, the discharge of nutrients, pharmaceuticals, organic waste, or chemicals from aquaculture facilities can affect water quality and disrupt local ecosystems, particularly in the absence of adequate treatment, regulation, and monitoring mechanisms. On the other hand, aquaculture is vulnerable to external pollution, such as industrial discharges, agricultural runoff, or plastic waste, which can compromise the health of farmed species, increase sanitary risks, and undermine product quality.

Eutrophication, the proliferation of harmful algal blooms, the accumulation of microplastics, and the presence of persistent contaminants all affect the productivity and sustainability of the sector. These conditions may lead to sanitary closures, trade restrictions, economic losses, and reputational damage to aquaculture products.

Facing this challenge requires a twofold strategy: first, strengthening the environmental regulation of the aquaculture sector by promoting good management practices, recirculating systems, waste management, and stricter control of chemical and pharmaceutical use; and second, improving the protection of aquatic ecosystems through integrated policies on sanitation, territorial management, and the control of land-based sources of pollution.

Energy Transition

Although less energy-intensive than capture fisheries, aquaculture also faces significant challenges in its transition toward more sustainable production models from an energy perspective. The use of electricity for water pumps, oxygenation systems, climate control, lighting, and transport represents a substantial share of operating costs, particularly in intensive systems. In many rural or coastal areas, the lack of access to clean energy or adequate infrastructure increases dependence on fossil fuels, undermining both the economic and environmental viability of operations.

Moreover, climate change is intensifying the need for refrigeration, aeration, and environmental control systems, further raising energy demand. This creates a dual challenge: reducing the sector's carbon footprint while ensuring energy efficiency and production resilience.

Advancing the energy transition in aquaculture requires promoting the use of renewable energy sources (such as solar, wind, or biogas), improving efficiency in production systems, fostering technological innovation in equipment, and adapting infrastructure to energy-sustainable models. Economic incentives, access to green financing, and technical training will be essential to facilitate this process, particularly for small- and medium-scale producers.

Management and Governance

The governance of the aquaculture sector faces multiple structural challenges that limit its sustainable development, particularly in developing regions. In many countries, the absence of clear regulatory frameworks, overlapping administrative responsibilities, and weak interinstitutional coordination hinder the sector's strategic planning. This situation is further aggravated by limited public and private investment, the lack of targeted support policies, and insufficient reliable data on production, markets, and environmental impacts.

Added to this is inequality in access to productive resources, infrastructure, financing, and markets, which particularly affects small-scale producers and cooperatives - who make up a significant portion of the sector. Informality, weak levels of association, and limited technical capacity also reduce the sector's ability to adapt and innovate in response to economic or environmental changes.

Overcoming these challenges requires a more inclusive, transparent, and evidence-based governance framework that incorporates territorial planning instruments, aquaculture zoning, efficient licensing systems, and mechanisms for local participation. Co-management with community stakeholders, stronger institutions, access to quality technical services, and capacity development are fundamental to improving the sector's governance and its contribution to food security, employment, and socioeconomic development.

Value Chain and Production

Strengthening the aquaculture value chain represents a fundamental challenge for achieving equitable, sustainable, and competitive sectoral development. Despite its growth, significant gaps remain in infrastructure, technology, market access, processing, and value addition - particularly in developing countries and among small-scale producers.

Many aquaculture operations face difficulties in accessing quality inputs, adequate technical services, efficient cold chains, and formal marketing channels. As a result, they experience significant post-harvest losses, low value addition, labor informality, and limited traceability. Furthermore, dependence on external markets and vulnerable supply chains increases the sector's exposure to economic, sanitary, and logistical shocks.

Addressing these challenges requires investment in infrastructure (such as collection centers, processing plants, laboratories, and cold chain systems), the promotion of labor formalization, the advancement of gender equity, and improved access to financing and technological innovation. The development of sustainable certifications, product and market diversification, and the digitalization of processes can also contribute to building more resilient and competitive value chains.

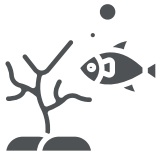
Research

Research and technological innovation are fundamental for the sustainable growth of the aquaculture sector, yet in many contexts they remain limited or poorly coordinated. Significant knowledge gaps persist in areas such as aquatic animal health, species nutrition, controlled reproduction, animal welfare, genetics, environmental monitoring, and climate change adaptation. The lack of investment in R&D, specialized centers, and advanced technical training constrains the sector's capacity to improve productivity, reduce environmental impacts, and adapt to emerging challenges.

Moreover, the weak linkage between the scientific community, the productive sector, and public administration hinders knowledge transfer and the design of evidence-based policies. The integration of local and traditional knowledge - particularly in community-based or Indigenous systems - has also not been sufficiently promoted.

It is therefore necessary to increase public and private investment in research, foster partnerships between scientific institutions, enterprises, and producer communities, and promote collaborative innovation platforms. It is also important to ensure access to new technologies - such as smart sensors, artificial intelligence, remote monitoring systems, and biotechnology - which can enhance the efficiency and sustainability of aquaculture operations.

		Fisheries sector	Aquaculture sector
Fisheries management	**Governance and equity**	• Update regulations • Promote coordination between the administration and the sector • Integrate fisheries into marine spatial planning processes • Ensure local community participation in management	• Establish a management framework that incorporates territorial planning tools, aquaculture zoning, efficient licensing systems, and local participation mechanisms • Facilitate access to financing • Strengthen infrastructure
	Overfishing and stock reduction	• Establish resource management systems based on scientific evidence • Ensure effective compliance with fisheries regulations • Implement support measures for vulnerable coastal communities • Strengthen international cooperation and transparency in decision-making	• Does not apply directly
	IUU fishing	• Strengthen governance at all levels. • Eliminate unfair competition through controls and international agreements • mplement effective monitoring, control, and surveillance systems • Reinforce international cooperation	• Does not apply directly



Evironmental pressure

	Fisheries sector	Aquaculture sector
Environmental pressure	• Promote the conservation of marine biodiversity and the restoration of habitats through sustainable management plans • Establish marine protected areas based on scientific evidence • Promote responsible and sustainable fishing practices	• Promote more responsible practices: recirculating aquaculture systems (RAS), integrated multi-trophic aquaculture (IMTA), the use of sustainable feeds, and escape control • Strengthen spatial planning and environmental regulation
Climate change	• Incorporate climate risk into fisheries governance and planning • Adapt fisheries management to climate change impacts • Invest in resilient infrastructure against extreme events	• Adoptar una estrategia de adaptación al cambio climático • Integrar el riesgo climático en las políticas públicas • Realizar un monitoreo ambiental constante • Invertir en en Soluciones basadas en la Naturaleza (SbN)
Land/Marine Pollution	• Reduce land-based and marine sources of pollution • Foster cooperation between sectors and institutions • Promote citizen awareness	• Strengthen environmental regulation by promoting good management practices, recirculation systems, waste management, and control of chemical and pharmaceutical use • Improve the protection of aquatic ecosystems through integrated policies on sanitation, land-use management, and control sources of pollution.

	Fisheries sector	Aquaculture sector
Value chain	• Ensure decent working conditions • Promote gender equity and strengthen the role of local communities • Boost innovation and digitalization • Improve infraestructures	• Improve productive and logistical infrastructure • Promote the inclusion of small-scale producers, reduce informality, and increase added value
Research	• Strengthen investment in research • Promote international cooperation and foster knowledge transfer • Democratize access to technology • Encourage the inclusion of traditional knowledge and citizen science	• Increase R&D investment in areas such as health, genetics, and aquaculture nutrition • Foster knowledge transfer (government–sector–scientific community) • Integrate local and scientific knowledge to improve sustainability and innovation in the sector • Ensure access to new technologies
Energy transition	• Reduce dependence on fossil fuels • Develop renewable energy infrastructure in the fisheries sector • Establish financing mechanisms and incentives for the energy transition • Overcome technical challenges through innovation and specialized training • Create regulatory frameworks that support the decarbonization of the sector	• Promote the use of renewable energy and improve energy efficiency in aquaculture systems • Foster technological innovation to reduce the sector's environmental footprint • Facilitate access to financing and incentives

Gaps in the Code in Relation to Current Challenges in the Fisheries and Aquaculture Sectors

Among the most relevant gaps is the absence of specific references to climate change. The Code does not account for the effects of ocean acidification, rising water temperatures, ecosystem variability, or extreme events, all of which directly affect species distribution, catches, and food security. Nor does it address the energy transition - a central issue for current sustainability - where both the fisheries and aquaculture sectors face significant challenges in reducing their dependence on fossil fuels and adopting clean technologies.

However, the global context in which the fisheries and aquaculture sectors operate has changed radically. Environmental threats have intensified; the climate and energy crises have acquired an urgent character; new technologies have transformed management and traceability; and social expectations demand higher standards of equity, transparency, and resilience. In this new scenario, the Code reveals a series of thematic and operational gaps that limit its relevance and response capacity.

In this regard, the CCRF must explicitly integrate new technologies and innovation for energy efficiency as strategic pillars to advance toward more sustainable fisheries. This includes both fisheries management - through the promotion of more efficient, selective, and low-carbon fishing gears - and the value chain, by improving logistics, transport, and processing aimed at reducing emissions and making more efficient use of resources. In this sense, FAO could play a key role as a promoter of clean energy technology platforms and as a leader in providing guidance and incentives on good energy practices, encouraging the dissemination of innovative and replicable solutions among Member States.

Illegal, unreported, and unregulated (IUU) fishing is recognized in the Code, but without clear reference to modern monitoring and control mechanisms such as digital traceability, electronic monitoring, or the use of big data. Similarly, although scientific research is encouraged, the document does not incorporate the value of traditional knowledge, citizen science, or new technological tools for real-time decision-making.

While the CCRF has placed significant emphasis on the environmental dimension of sustainability, it is timely to propose that, in the coming years, it incorporate more explicitly the social and economic dimensions. These elements are essential to guarantee the continuity of fisheries activities, strengthen equity in the sector, and consolidate a model that combines economic viability, social responsibility, and long-term environmental sustainability.

Building on the lessons of the past 30 years and the challenges identified, there is now an opportunity to take a step forward and position the CCRF as the foundation of an operational framework with priorities that reinforce sectoral resilience and social legitimacy. Updating the Code should more explicitly incorporate key future-oriented dimensions such as:
(i) people and labor, ensuring safety at sea, decent working conditions, and generational renewal capable of attracting and retaining talent;
(ii) territory and social cohesion, with coastal communities acting as co-producers of conservation and beneficiaries of shared value; and
(iii) energy and technological transition, promoting low-emission engines, more selective fishing gears, and platforms that strengthen efficiency, traceability, and agile decision-making. Together, these vectors reduce risks, improve competitiveness, and secure the continuity of fisheries in a context of climate crisis and growing social demands.

In this process, FAO can play a decisive role as a guiding and supporting body by articulating technical standards, good practice guidelines, and peer-learning platforms; promoting pilot projects and their scaling-up; harmonizing metrics and indicators; and fostering catalytic financing mechanisms and multi-stakeholder cooperation. Such action, coordinated with existing instruments and regional initiatives, would enable the Code to become a clear implementation roadmap for the next 30 years, connecting environmental objectives with tangible social and economic outcomes.

Finally, international cooperation emerges as an indispensable condition for reducing asymmetries among countries and overcoming the lack of technical and financial resources that limit the implementation of effective measures. Through FAO, concrete cooperation actions could be defined, and access to international financing mechanisms (World Bank, IDB, and other multilateral funds) could be facilitated to strengthen fisheries control, combat overfishing, and eradicate IUU fishing. Likewise, the update of the Code should place greater emphasis on governance and human capital. The CCRF can serve as the basis for shared global governance, with common principles that prevent overexploitation, protect marine ecosystems, and reduce pollution from fleets and along the value chain.

In terms of governance and equity, the Code establishes principles of participation and responsibility but lacks a gender equity perspective. It does not include clear provisions recognizing the role of women in the sector or the specific recognition of vulnerable groups. Similarly, ensuring decent working conditions, promoting professionalization, and securing generational renewal are indispensable steps to link environmental sustainability with the social and economic viability of fisheries activities.

The following pages present a summary table that compiles the main gaps identified in the application of the CCRF. This analysis seeks to provide a clear overview of the areas where deeper progress is required.

Fisheries management

	COVERED IN THE CODE	IDENTIFIED GAP
Governance and equity	The Code promotes the participation of fishers in management, but it does not develop specific co-management approaches nor recognize community rights.	Lack of focus on equitable access rights, robust participatory governance, or specific recognition of vulnerable groups (women, Indigenous peoples, youth).
Overfishing and stock reduction	Addressed in multiple sections. It promotes the precautionary approach, capture limits, and control of fishing effort.	The Code doesn't consider modern real-time monitoring tools nor measures linked to automated control and new technologies.
IUU fishing	Identified as a problem, and international cooperation is recommended to combat it.	Although the Code acknowledges the issue, it does not include concrete mechanisms such as digital traceability, VMS, blockchain, or the use of electronic monitoring systems.

Environmental Dimension

	COVERED IN THE CODE	IDENTIFIED GAP
Environmental pressure	There are references to the protection of ecosystems and sensitive habitats.	It doen't incorporate the modern ecosystem approach, marine spatial planning or update mechanisms for biodiversity conservation and habitat restoration (e.g. Nature-based Solutions).
Climate change	Implicitly mentioned in relation to ecological sustainability, but not explicitly addressed in its principles or guidelines.	The Code doesn't directly address climate change adaptation, resilience of the fisheries and aquaculture sectors, or the impacts of extreme events and ocean acidification.
Land/Marine Pollution	A generic reference is made to the need to avoid pollution derived from fishing activities.	It doesn't address the issue of marine plastics, ghost gear, microplastics, or cross-contamination with other industrial or urban activities.

	COVERED IN THE CODE	IDENTIFIED GAP
Value chain	Reference is made to post-harvest responsibility, food safety, and distribution.	It doesn't address labor informality, gender inequality in the value chain, nor the level of traceability required by current international markets.
Research	The Code promotes research and the use of scientific knowledge as a basis for management.	It doesn't explicitly recognize the importance of local knowledge, citizen science, or the use of technologies such as big data, AI, or advanced sensors. Furthermore, research approaches need to be adapted to new challenges.
Energy transition	Not present in the originial text.	The aren't references to decarbonization, energy efficiency, clean fleets or incentives for sustainable technologies.
Social and Economic Dimension	General reference to sustainable development and the need to consider socioeconomic aspects. It acknowledges the importance of equity and the role of fishers in management.	Lack of emphasis on onboard safety and decent working conditions. Limited incorporation of the role of coastal communities in fisheries conservation and continuity. The economic dimension is underdeveloped in relation to the viability and resilience of fishing activities.

Final Considerations

Three decades after its adoption, the Code of Conduct for Responsible Fisheries has proven to be a robust, flexible, and progressive instrument, capable of guiding the transformation of the fisheries sector toward more sustainable, inclusive, and science-based practices. Its impact has been broad, having influenced national legislative frameworks, Regional Fisheries Management Organizations (RFMOs), multilateral organizations, and voluntary certification mechanisms. Its effect has also been profound, by introducing a paradigm shift in fisheries governance- moving away from a purely productivist logic toward approaches centered on sustainability, ecosystem resilience, and intergenerational justice.

However, significant challenges remain. The effective implementation of the Code has been uneven, particularly in developing countries, where technical, financial, and institutional capacities remain limited. The lack of binding mechanisms, the absence of structured incentives for its adoption, and the limited integration of dimensions such as gender equity or the energy transition represent critical barriers to its universalization.

In light of these findings, it is essential to reinforce international cooperation, strengthen national governance frameworks, and promote more integrative and adaptive approaches. Likewise, there is an urgent need to update the CCRF to respond to new global challenges, without losing its essence as an ethical and technical tool in the service of responsible fisheries. Over the next 30 years, it will be necessary not only to review the principles established three decades ago - many of which remain timeless - but also to incorporate contemporary demands, while prioritizing and simplifying, in order to make the Code even more effective for diverse stakeholders. The sustainability of marine ecosystems and the well-being of coastal communities will depend, to a great extent, on our collective capacity to make the Code not just a reference, but a tangible reality in the governance of the oceans.

References

Agnew, D. J., Pearce, J., Pramod, G., Peatman, T., Watson, R., Beddington, J. R., & Pitcher, T. J. (2009). Estimating the worldwide extent of illegal fishing. PLoS ONE, 4(2), e4570. https://doi.org/10.1371/journal.pone.0004570

APROMAR. (2024). Annual Aquaculture Report in Spain 2024. Spanish Aquaculture Business Association.
Coral Triangle Initiative (CTI-CFF). (2009–present). Regional Action Plan on Conservation, Fisheries, and Food Security. https://www.coraltriangleinitiative.org/

EJF – Environmental Justice Foundation. (2019). *Thailand's Progress in Combating IUU Fishing*. https://ejfoundation.org

European Commission. (2018). Data Collection Framework (DCF) for Fisheries. Brussels: European Comission.
European Commission. (2023). Common Fisheries Policy – Implementation and Reform. https://oceans-and-fisheries.ec.europa.eu

FAO. (1995). Code of Conduct for Responsible Fisheries. Food and Agriculture Organization of the United Nations. https://www.fao.org/4/v9878s/v9878s00.htm

FAO/UNEP. (2009). Report of the Expert Meeting on Impacts of Destructive Fishing Practices, Unsustainable Fishing, and IUU Fishing on Marine Biodiversity and Habitats (Fisheries Report No. 932). Roma: FAO/UNEP

FAO. (2010). *Aquaculture development 4. Ecosystem approach to aquaculture*. FAO Technical Guidelines for Responsible Fisheries, No. 5, Suppl. 4. Rome.

FAO. (2011). *Technical guidelines on aquaculture certification*. Rome: FAO

FAO. (2013). Marine protected areas: Country case studies on policy, governance and institutional issues (Técnical Paper No. 556/2). Rome: FAO

FAO. (2016). SmartFish Programme – West Africa. Rome: FAO.

FAO and IUCN (2016b). *Regional Report on Participatory Research in the Central American Pacific. FAO-IUCN*.

FAO. (2017). *Fishery Value Chains and Social Sustainability*. Rome: FAO.

FAO. (2020). Implementing the Ecosystem Approach to Fisheries in Norway. Technical Report.

FAO. (2021). Implementation of the Code of Conduct for Responsible Fisheries: Trends over the last 25 years. FAO. https://openknowledge.fao.org/items/9e23f5c9-e9e5-46ab-91ed-91fd242afcb7

FAO. (2022). The State of World Fisheries and Aquaculture 2022 (SOFIA). https://www.fao.org/publications/sofia/2022

Government of Seychelles (2020). Seychelles Blue Economy Strategic Framework and Roadmap. Ministry of Finance, Trade and Economic Planning.

Pérez-Ramírez, M., Ponce-Díaz, G., Lluch-Cota, S., & Cisneros-Mata, M. Á. (2020). *Fair Trade and Small-Scale Fisheries: The Case of Baja California's Artisanal Sector. Marine Policy, 115, 103871.*

Popescu, I. (2022). Illegal, unreported and unregulated (IUU) fishing. European Parliamentary Research Service. PE 614.598 –October 2022. https://www.europarl.europa.eu/RegData/etudes/BRIE/2017/614598/EPRS_BRI(2017)614598_EN.pdf

Puri, M., Kojakovic, A., Rincon, L., Gallego, J., Vaskalis, I. & Maltsoglou, I. 2023. The small-scale fisheries and energy nexus – Opportunities for renewable energy interventions. Rome, FAO. https://doi.org/10.4060/cc4903en

UBPESCA (Chile). (2015). Fisheries Law Reform: Towards Sustainable and Transparent Fishing. Ministry of Economy, Development and Tourism. World Bank. (2022). Senegal: Natural Resources Management Project (P175915).

FAO. (2020). Implementation of the Code of Conduct for Responsible Fisheries. https://www.congreso.es/docu/docum/ddocum/dosieres/sleg/legislatura_14/spl_51/pdfs/36.pdf

FAO. (2024). The State of World Fisheries and Aquaculture (SOFIA). https://openknowledge.fao.org/server/api/core/bitstreams/51cd4687-66bf-402e-94b8-eb963d6a8b00/content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