

**Strengthening
Monitoring, Control
and Surveillance in
Areas Beyond National
Jurisdiction**

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Abbreviations

ABMT	Area-based management tool
ABNJ	Areas beyond national jurisdiction
AIS	Automatic identification system
BBNJ	Biodiversity beyond national jurisdiction
CDS	Catch documentation schemes
COP	Conference of Parties
CTA	Cape Town Agreement
ERS	Electronic recording and reporting services
EU	European Union
FAO	United Nations Food and Agriculture Organization
FFA	Pacific Islands Fisheries Forum Agency
FIP	Fisheries improvement project
FOC	Flag of convenience
IGC	Intergovernmental conference
ILBI	International legally binding instrument
ILO	International Labour Organization
IMCS	International Monitoring, Control and Surveillance Network
IMO	International Maritime Organization
INTERPOL	International Criminal Police Organization
IOC	Intergovernmental Oceanographic Commission
IOTC	Indian Ocean Tuna Commission
ISA	International Seabed Authority
ITLOS	International Tribunal for the Law of the Sea
IUU fishing	Illegal, unreported and unregulated fishing
MCS	Monitoring, control and surveillance
MGR	Marine genetic resources
MoU	Memorandum of understanding
MPA	Marine protected area
NEAFC	North East Atlantic Fisheries Commission
NGO	Non-governmental organisation
NPOA	National plan of action
PCA	Permanent Court of Arbitration
PrepCom	Preparatory Committee
PSMA	Port State Measures Agreement
RFB	Regional fishery body
RFMO	Regional fisheries management organisation
RS	Remote sensing
SAR	Synthetic aperture radar
TCN	Tuna compliance network
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNFSA	United Nations Fish Stocks Agreement
UNGA	United Nations General Assembly
VIIRS	Visible infrared imaging radiometer suite
VMS	Vessel monitoring systems
VTR	Vessel trip report

Executive Summary

Monitoring, control and surveillance (MCS) is critical for the success of marine conservation and management, but effective MCS remains challenging. This is especially true for the deep and distant waters of marine areas beyond national jurisdiction (ABNJ), which are characterised by a fragmented governance framework and reliance on flag States to ensure control over vessels.

A range of existing international instruments, institutions and guidelines are relevant to MCS in ABNJ, while traditional approaches to MCS – on board observers, logbooks and surveillance planes – are increasingly being supplemented by a range of innovative new technological tools. States at the United Nations (UN) are currently negotiating an international legally binding instrument (ILBI) for the conservation and sustainable use of the biological diversity of marine areas beyond national jurisdiction (BBNJ) and there is a growing interest in how MCS tools and policies can contribute to the management of this vast global commons.

The negotiations therefore provide an important opportunity to learn from the wealth of experience gained to date and strengthen existing provisions, thereby facilitating harmonised and efficient MCS that can ultimately ensure effective implementation of rules on the conservation and sustainable use of marine biodiversity.

Against this background, this report explores how the BBNJ negotiations can strengthen MCS in ABNJ and highlights how MCS can contribute to the implementation of the new instrument. The report provides an overview of existing legal frameworks, technological tools and MCS initiatives, and highlights some of the challenges to effective MCS. The report provides some suggested pathways for strengthening MCS in ABNJ, as well as three concrete proposals for provisions that could be included in the future international instrument:

- 1) Reinforcing MCS flag State obligations in the text and ensuring the principles and related obligations of cooperation and coordination, transparency and reporting are applied throughout the agreement;
- 2) Specifying that a clearing-house mechanism will serve as a platform to share good MCS practices, exchange data on MCS activities and match capacity-building needs in relation to MCS tools and methods for assessment; and
- 3) Requiring States parties to submit a MCS strategy together with proposals for area based management tools (ABMTs) and marine protected areas (MPAs) that considers the possible technological tools and institutional arrangements available to ensure compliance.

Résumé analytique

Les mécanismes de suivi, contrôle et surveillance (SCS) sont essentiels au succès de la préservation et de la gestion du milieu marin, mais leur mise en œuvre s'avère complexe, en particulier dans les zones marines situées au-delà des juridictions nationales (ZAJN).

Le SCS dans ces zones fait appel à un large éventail d'instruments, d'institutions et de directives internationales, et les approches traditionnelles telles que la mise en place d'observateurs embarqués, le recours à des journaux de bord et l'utilisation d'avions de surveillance sont aujourd'hui complétées par de nouveaux outils technologiques. Les États membres des Nations unies négocient actuellement un instrument international juridiquement contraignant pour la conservation et à l'utilisation durable de la biodiversité marine des zones ne relevant pas de la juridiction nationale. Dans ce contexte, on observe un intérêt croissant sur le rôle que les outils et politiques de SCS pourraient jouer dans la mise en œuvre du futur instrument. Ces négociations constituent donc une opportunité majeure pour tirer des leçons de l'expérience acquise à ce jour en matière de SCS, de renforcer les dispositions existantes, et permettre ainsi d'exercer un SCS harmonisé et efficace.

Ce rapport explore donc les moyens par lesquels les négociations en cours pourraient renforcer le SCS dans les ZAJN et contribuer ainsi à la mise en œuvre du nouvel instrument. Le document propose tout d'abord un aperçu des cadres juridiques existants, des outils technologiques et des initiatives en matière de SCS, et met en lumière les défis essentiels pour assurer un SCS efficace. Il suggère par ailleurs des pistes pour renforcer le suivi, le contrôle et la surveillance dans les ZAJN, et identifie trois propositions concrètes à intégrer dans le futur instrument international :

1) Renforcer les obligations de l'État du pavillon en matière de SCS et veiller à ce que les principes et les obligations connexes de coopération et de coordination, de transparence et d'établissement de rapports soient mis en place ;

2) Préciser que le mécanisme d'échange d'information servira de plate-forme pour partager les bonnes pratiques de SCS, échanger des données sur les activités de suivi et d'évaluation et répondre aux besoins de renforcement des capacités grâce aux outils et méthodes de SCS ; et

3) Exiger des États parties qu'ils soumettent une stratégie de SCS lors de la soumission d'outils de gestion par zone, y compris des aires marines protégées, en tenant compte des outils technologiques et dispositifs institutionnels disponibles pour en assurer le respect.

Resumen

El seguimiento, control y vigilancia (SCV) de las actividades humanas en el océano es fundamental para el éxito de la conservación y gestión marina, pero el SCV eficaz sigue siendo un reto. Esto es especialmente cierto en el caso de las aguas profundas y distantes de las zonas marinas situadas fuera de la jurisdicción nacional (ABNJ, por sus siglas en inglés), que se caracterizan por un marco de gobernanza fragmentado y la dependencia de los Estados de bandera para garantizar el control de los buques.

Existe una serie de instrumentos, instituciones y directrices internacionales que son relevantes para el seguimiento, control y vigilancia en las ABNJ, mientras que los enfoques tradicionales de estas actividades de control —observadores a bordo, cuadernos de bitácora y aviones de vigilancia— se ven complementados cada vez más por una serie de nuevas e innovadoras herramientas tecnológicas. Los Estados miembros de las Naciones Unidas (ONU) están negociando actualmente un instrumento internacional jurídicamente vinculante (ILBI, por sus siglas en inglés) para la conservación y el uso sostenible de la diversidad biológica de las áreas marinas fuera de la jurisdicción nacional (BBNJ, por sus siglas en inglés), y existe un interés creciente en la forma en que las herramientas y políticas de SCV pueden contribuir a la gestión de este vasto patrimonio común mundial.

Por lo tanto, las negociaciones brindan una importante oportunidad de aprender de la rica experiencia adquirida hasta la fecha y de reforzar las disposiciones existentes, facilitando así un sistema armonizado y eficaz de seguimiento, control y vigilancia que, en última instancia, garantice la aplicación efectiva de las normas relativas a la conservación y el uso sostenible de la biodiversidad marina.

En este contexto, el presente informe explora la forma en que las negociaciones de la BBNJ pueden fortalecer el seguimiento, control y vigilancia en las ABNJ y destaca la forma en que el SCV puede contribuir a la aplicación del nuevo instrumento. El informe ofrece una visión general de los marcos jurídicos existentes, las herramientas tecnológicas y las iniciativas de SCV, y destaca algunos de los desafíos a los que se enfrenta un SCV eficaz. El informe ofrece algunas sugerencias para reforzar el seguimiento, control y vigilancia en las ABNJ, así como tres propuestas concretas de disposiciones que podrían incluirse en el futuro instrumento internacional:

1) Reforzar en el texto las obligaciones del Estado de bandera en materia de SCV y garantizar que los principios y las obligaciones correspondientes de cooperación y coordinación, transparencia e información se apliquen a lo largo de todo el acuerdo;

2) Especificar que un mecanismo de intercambio de información servirá como plataforma para compartir buenas prácticas de SCV, intercambiar datos sobre las actividades de SCV y satisfacer las necesidades de creación de capacidad en relación con las herramientas y métodos de evaluación de SCV; y

3) Requerir a los Estados Parte que presenten una estrategia de seguimiento, control y vigilancia junto con propuestas de herramientas de gestión basadas en áreas (ABMT, por sus siglas en inglés) y áreas marinas protegidas (AMP) que consideren las posibles herramientas tecnológicas y los acuerdos institucionales disponibles para garantizar el cumplimiento.

1. Introduction

Effective monitoring, control and surveillance (MCS) is critical for the success of marine conservation and management. Efforts have been made to monitor and regulate human activities at sea since the Middle Ages (Rothwell and Stephens, 2016),¹ but effective MCS remains challenging, especially in the deep and distant waters of the high seas.² Whereas States have the exclusive right to manage marine resources within their national jurisdiction (i.e. in territorial waters and the exclusive economic zone),³ areas beyond national jurisdiction (ABNJ) are subject to a complex patchwork of international rules and regulations (Wright *et al.*, 2018). Compared to national waters, MCS in ABNJ may be more expensive, while a lack of data concerning ecosystems in ABNJ results in a more limited understanding of the impacts of human activities. However, the

recent emergence of innovative and cost-effective technologies has created the transformative potential to solve these MCS challenges.

The international community has become increasingly aware of the growing threats to marine biodiversity in ABNJ – from shipping and fishing to pollution, climate change and ocean acidification – and the legal and implementation gaps in the global governance framework. In 2017, following more than a decade of informal discussions, States at the United Nations (UN) therefore decided to convene an intergovernmental conference (IGC) to negotiate an international legally binding instrument (ILBI) for the conservation and sustainable use of the biological diversity of marine areas beyond national jurisdiction (BBNJ).

Box 1. The Package Deal

The negotiations for an ILBI are based on a “Package Deal” of issues agreed in 2011, namely:⁴

- Marine genetic resources (MGRs), including questions on the sharing of benefits;
- Measures such as area-based management tools (ABMTs), including marine protected areas (MPAs);
- Environmental impact assessments (EIA); and
- Capacity-building and the transfer of marine technology.

In this context, there is growing interest in how MCS tools and policies can be applied to this vast global commons and how they can contribute to the implementation of a new instrument. For example, there is interest in how the

instrument can encourage compliance with any future management measures or protected areas and the potential contribution of emerging technological tools to impact assessments and the monitoring of marine genetic resources.

- 1 “Accordingly, whilst Roman law provided that the sea was free and common to all, by the Middle Ages many seas were subject to various forms of appropriation and control by powerful States.” The freedom of fishing on the high seas was codified for the first time in the 1958 High Seas Convention which provided that it shall be exercised “with reasonable regard to the interests of other States in their exercise of the freedom of the high seas.”
- 2 “High seas” refers to “all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic State” and can also be defined as the areas of the ocean that fall beyond national jurisdiction limits.
- 3 United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 3, Articles 2 & 56.
- 4 Letter dated 30 June 2011 from the Co-Chairs of the Ad Hoc Open-ended Informal Working Group to the President of the General Assembly, Document A/66/119, §I.1(a) and (b), <http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N11/397/64/PDF/N1139764.pdf>

A range of existing international instruments, institutions and guidelines are relevant to MCS in ABNJ and the future ILBI need not completely overhaul existing rules and regulations or create a global MCS system.⁵ There is nonetheless an important two-way relationship between

MCS and the future ILBI: MCS is not only crucial for the implementation and enforcement of the future instrument, but the instrument could also reinforce existing MCS obligations and provide renewed impetus for strengthening compliance with international rules.

Box 2. Defining MCS

Most existing MCS rules were developed in the context of fisheries management. This is reflected in early definitions of MCS, which focus on monitoring of fishing effort and resource yields, controlling fishing activity with regulations, and conducting surveillance to ensure compliance with such regulations.⁶ However, MCS has a range of applications including:

- **Monitoring** of human activities (e.g. in the form of data collection and reporting);
- **Control** of human activities and their impacts on marine biodiversity (e.g. through regulation, licensing, and controls on how, where and when activities in the ocean take place);
- **Surveillance** of vessels (e.g. through observer programmes and electronic surveillance systems);
- Encouraging **compliance** with regulations through transparency, sanctions, and other measures (e.g. sustainability certification schemes); and
- **Enforcement** actions, e.g. to tackle illegal, unreported and unregulated (IUU) fishing and transnational illegal activities, such as human trafficking, forced labour, and trafficking in arms, drugs and wildlife.

MCS can therefore be broadly conceived as encompassing a wide range of tools, technologies and policies that aim to promote compliance and ensure the conservation and sustainable use of marine resources.⁷

This report aims to explore how an ILBI can strengthen MCS in ABNJ and to inform stakeholders involved in the negotiations of the ways MCS could contribute to the implementation of the rules of the future ILBI. Section 2 first reviews existing legal frameworks on MCS applicable to ABNJ while section 3 provides a non-exhaustive overview of MCS tools.

Section 4 highlights some good practices and lessons learned in the context of fisheries and oil pollution. Section 5 identifies current challenges and section 6 identifies ways to strengthen MCS in ABNJ. Section 7 highlights options in relation to the future ILBI and concludes with key recommendations for the ongoing negotiations.

5 In any case, this would likely require reforms that are beyond the mandate of the IGC. For example in the context of fisheries, some States have expressed opposition to the explicit inclusion of fish as a commodity in the ILBI (as distinct from the use of MGRs from fish), pointing to the range of existing treaties and management organisations, while others have highlighted the “lack of global management and oversight of this sector” and that the intention of the ILBI is to cover biodiversity as whole, which necessarily includes fish. (see <http://enb.iisd.org/vol25/enb25218e.html>).

6 FAO, 1981, *Report on an expert consultation on MCS for fisheries management*, Rome, FAO.

7 This report attempts to provide a state of play of MCS of human activities in ABNJ which should be distinguished from ‘environmental monitoring’. MCS can, for example, play a key role in monitoring ecological indicators through data gathering for stock assessments and environmental baseline information. This data can in turn contribute to the development of MPAs, EIAs and other management tools. At the same time, MCS tools can help keep track of threats such as pollution (e.g. plastics, ghost nets and oil spills), rising sea temperature, deoxygenation and ocean acidification.

2. Legal framework

2.1. High seas fishing

Treaty law

United Nations Convention on the Law of the Sea (1982)

The United Nations Convention on the Law of the Sea (UNCLOS)⁸ places a general obligation on States to “protect and preserve the marine environment”⁹ as well as specific obligations to: take all measures necessary to prevent, reduce and control pollution from any source;¹⁰ monitor the risks or effects of pollution;¹¹ assess the potential effects of planned activities that may cause substantial pollution or significant and harmful changes to the marine environment;¹² and publish reports and communicate the results of such monitoring and assessments.¹³

Within national jurisdiction, States have the “sovereign right to exploit their natural resources (...) in accordance with their duty to protect and preserve the marine environment”.¹⁴ On the high seas, the right to engage in fishing activities is accompanied by duties to cooperate and adopt measures for the conservation of the living resources.¹⁵ A range of other international instruments and norms

complement the provisions of UNCLOS and are discussed below.

Vessels in ABNJ are subject to the exclusive jurisdiction of their flag State and UNCLOS requires them to “effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag” (commonly referred to as “flag State responsibility”).¹⁶ The flag State must ensure compliance with applicable international rules and standards and take appropriate enforcement measures (including investigations, institution of proceedings, exchanging of information on enforcement actions taken and issuing penalties).¹⁷ However, UNCLOS does not provide means to oversee the implementation of these provisions or sanction States that fail to meet their responsibilities (Albers, 2015). The effectiveness of MCS is therefore largely dependent on the ability and willingness of flag States to exercise effective control over vessels flying their flag.

UNCLOS gives coastal States the competence to set conditions for admission to their ports¹⁸ and, in certain circumstances,¹⁹ to investigate and institute proceedings in respect of discharges from a vessel that violates applicable international rules and standards.²⁰

8 United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 3.

9 Ibid, Article 192.

10 Ibid, Article 194. Including “those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life” (Article 194(5)).

11 Ibid, Article 204.

12 Ibid, Article 206.

13 Ibid, Articles 204-6.

14 Ibid, Article 192.

15 According to Article 116, “All States have the right for their nationals to engage in fishing on the high seas subject to: (a) their treaty obligations; (b) the rights and duties as well as the interests of coastal States (...); and (c) the provisions of [Articles 116-120].” These provisions require adoption of conservation measures with respect to nationals (Article 117), cooperation on conservation and management (Article 118) and adopt management measures based on the best scientific evidence available (Article 119). Article 120 notes that these obligations apply also to marine mammals.

16 Ibid, Article 94.

17 Ibid, Article 217.

18 Ibid, Article 25. These conditions may incorporate a broad range of environmental considerations, including for vessel activity outside the coastal State’s jurisdiction (Ryngaert and Ringbom, 2016).

19 I.e. When foreign vessels violate international discharge or seaworthiness standards outside that State’s jurisdiction and are voluntarily within a port or at an offshore terminal of that State’s jurisdiction (Articles 218-219).

20 Ibid, Article 218. For further discussion regarding the scope and extent of port state jurisdiction, including with regard to fisheries, and the concept of the “responsible port State”, see Molenaar (2007).

Box 3. International legal decisions

Many key provisions of UNCLOS have been reaffirmed and reinforced through the judgments, advisory opinions and awards of international judicial bodies such as the International Tribunal for the Law of the Sea (ITLOS) and the Permanent Court of Arbitration (PCA). For example:

- The *Southern Bluefin Tuna case* (1999),²¹ which held that undertaking unilateral experimental fishing for southern Bluefin tuna was in breach of obligations under UNCLOS to cooperate on management of highly migratory species;
- The *MOX Plant case* (2001), which held that “the duty to cooperate is a fundamental principle in the prevention of pollution of the marine environment under Part XII of the Convention and general international law (...)”;²²
- The *Advisory Opinion on Responsibilities and Obligations of States Sponsoring Persons and Entities with respect to Activities in the Area* (2011), which noted that “the obligation to conduct an environmental impact assessment is (...) a general obligation under international customary law”;²³
- The response to a *Request for an Advisory Opinion Submitted by the Sub-Regional Fisheries Commission (SRFC)* (2015),²⁴ which held that a flag State is under a “due diligence” obligation to investigate and take action against vessels engaged in IUU fishing;²⁵ and
- The *South China Sea arbitration* (2016), which upheld allegations that failure to prevent IUU fishing and causing environmental damage through island-building breached UNCLOS obligations to protect and preserve the marine environment and to “take measures necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life”.²⁶

FAO Compliance Agreement (1993)

The FAO Compliance Agreement,²⁷ which aims to strengthen flag State responsibility on the high seas, requires States parties to ensure that fishing vessels entitled to fly

their flag do not engage in any activity that undermines the effectiveness of international conservation and management measures.²⁸ Under the Agreement, high seas fishing is not permitted without prior authorisation of the flag State, which may only be given if there is

21 *Southern Bluefin Tuna* (New Zealand v Japan; Australia v Japan), Provisional Measures, Order of 27 August 1999, ITLOS Reports 1999 at p.295, para 70.

22 *The MOX Plant* (Ireland v. United Kingdom), Provisional Measures, Order of 3 December 2001, ITLOS Reports 2001, p. 95, at p. 110, para. 82.

23 *Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area*, Case No. 17, Advisory Opinion, 50 ILM 458 (2011); see also *Pulp Mills on the River Uruguay* (Argentina v. Uruguay), Judgment, I.C.J. Reports 2010, p.14, para 204: “it may now be considered a requirement under general international law to undertake an environmental impact assessment where there is a risk that the proposed industrial activity may have a significant adverse impact in a trans-boundary context, in particular, on a shared resource.”

24 *Request for an Advisory Opinion Submitted by the Sub-Regional Fisheries Commission* (SRFC Advisory Opinion), Advisory Opinion of Apr. 2, 2015. https://www.itlos.org/fileadmin/itlos/documents/cases/case_no.21/advisory_opinion_published/2015_21-advop-E.pdf

25 This obligation applies when the flag State that has received a report alleging that vessels flying its flag have been engaged in IUU fishing and requires that the flag State take “all necessary and appropriate measures to meet its ‘due diligence’ obligations to ensure that vessels flying its flag do not conduct IUU fishing activities” (para. 148, p. 45). Due diligence requires “not only the adoption of appropriate rules and measures, but also a certain level of vigilance in their enforcement and the exercise of administrative control applicable to public and private operators (...)”. Para. 139, p. 42 (Citing *Pulp Mills* (note 25, above), para. 197, p. 79).

26 *Ibid.*, Articles 192 and 194(5) respectively. PCA Case N° 2013-19, *The South China Sea arbitration* (The Republic of the Philippines v. The People’s Republic of China), para 983, p. 394.

27 The Compliance Agreement entered into force on 24 April 2003 and has 42 State Parties, including the EU as member organization (based on data from July 2018): http://www.fao.org/fileadmin/user_upload/legal/docs/012s-e.pdf

28 *Ibid.*, Article III.

a 'link' between the fishing vessel and the flag State. Flag States are responsible for monitoring the activities of the vessel, ensuring compliance with the terms and conditions of the authorisation, and taking enforcement measures where necessary.

United Nations Fish Stock Agreement (1995)

The United Nations Fish Stock Agreement (UNFSA)²⁹ is an implementing agreement under UNCLOS, aiming to more clearly define the rights and responsibilities of States in relation to fishing for highly migratory and straddling stocks as well as the conservation of marine ecosystems as a whole. It places regional fisheries management organisations (RFMOs) at the heart of international fisheries management, requiring States to either cooperate directly or by establishing or joining an RFMO.³⁰

Coastal States and States fishing on the high seas are required to "implement and enforce conservation and management measures through effective [MCS]"³¹ and to "establish appropriate cooperative mechanisms for effective [MCS] and enforcement" through RFMOs.³² Flag States must take MCS measures in respect of vessels flying their flag, such as inspection schemes and observer programmes.³³ In certain circumstances, the UNFSA allows States other than the flag State to board and inspect fishing vessels on the high seas for the purpose of ensuring compliance with conservation and management rules.³⁴

Port State Measures Agreement (2009)

The Port State Measures Agreement (PSMA) requires port States to play a more active role in addressing IUU fishing.³⁵ The PSMA includes international legally binding obligations and sets global minimum standards for the inspection of foreign vessels that seek to enter the port of another State. Crucially, the PSMA requires State parties to refuse entry to ports where it has "sufficient proof" that a vessel has engaged in IUU fishing or fishing related activities³⁶ in support of such fishing.³⁷ The State must also communicate its decision to the vessel's flag State (and, if appropriate, to relevant coastal States, RFMOs and other international organisations).³⁸ Action taken under the PSMA can prevent illegal catches from entering the market, thereby reducing the profitability of IUU activities, and at the same time ensures that other States, RFMOs and relevant international organisations are notified about the incident.³⁹

State parties must designate ports for the landing of vessels and provide the FAO with a list of ports to which vessels may request entry,⁴⁰ while vessels requesting port entry must provide information meeting an agreed minimum standard.⁴¹ Port States should prioritise the inspection of vessels when these vessels have already been denied entrance into a port under the PSMA, when other relevant parties request an inspection, and when there are "clear grounds" to suspect a vessel has engaged in IUU fishing activities.⁴² Recognising the challenges developing States may face in

29 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (adopted 4 December 1995, entered into force 11 December 2001) 2167 UNTS 3.

30 Part III.

31 Ibid, Article 5.

32 Ibid, Article 10.

33 Ibid, Article 18.

34 Ibid, Articles 21-22; some States have refused to sign/ratify the Agreement due to these provisions, which may be construed as an incursion on the sovereignty of the Flag State (Balton and Koehler, 2006).

35 Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (approved by the FAO Conference 22 November 2009 and entered into force on 5 June 2016), Article 2.

36 The PSMA applies to both fishing and "fishing related activities" such as the landing, packaging and transporting of fish, as well as the provisioning of personnel, fuel and gear at sea.

37 Ibid, Article 9, "in particular the inclusion of a vessel on a list of vessels having engaged in such fishing or fishing related activities adopted by a relevant regional fisheries management organization (...)".

38 Ibid, Article 9.

39 See: <http://www.fao.org/port-state-measures/background/en/>

40 PSMA, Article 7.

41 Ibid, Article 8 and Annex A.

42 Ibid, Article 12.

implementing the Agreement, the PSMA calls for the establishment of appropriate funding mechanisms and the provision of technical and financial assistance.⁴³ The FAO plays an important role in this respect through its capacity-building programme.

Global participation in the implementation of the PSMA is key to ensure that dishonest operators cannot shift IUU fishing activities to other regions and make use of “ports of convenience” with weak inspection systems. RFMOs can contribute to greater harmonisation of port State controls by requiring their members, including non-parties to the PSMA, to have minimum port management measures in place.

Although port States may deny inspected vessels entry into their ports, flag States remain responsible for the enforcement of fisheries laws on the high seas. Under the PSMA, port States may take additional measures “that are in conformity with international law”.⁴⁴ This wording “advocates the fullest possible use of port State jurisdiction under international law” and encourages port States to “examine which exercises of jurisdiction remain underutilized or unexplored” (Molenaar, 2007). However, the PSMA does not specifically provide port States with any further authority or mandate to capture vessels and exercise investigative and enforcement jurisdiction against them (Witbooi, 2014). Whereas port States “can take actions with the consent or upon the request of the flag State,” there is no clear guidance or consensus in international law about the enforcement scope in situations where the flag State fails to act or respond (Witbooi, 2014). This means additional tools will have to be used to encourage flag States into taking responsibility for the actions of their vessels, especially when considering that the PSMA is limited to fishing operations and related activities and the negotiations on the new ILBI do not address the possibility of extending port State measures to other illegal maritime activities, such as dumping.

“Soft law” instruments

FAO Code of Conduct for Responsible Fisheries (1995)

The Code of Conduct for Responsible Fisheries (CCRF) suggests minimum standards for the conservation, management and development of fisheries. States are required to “implement effective fisheries [MCS] and law enforcement measures including, where appropriate, observer programmes, inspection schemes and vessel monitoring systems”.⁴⁵ The Code encourages States to collect data (including on bycatch, discards and waste) and to exchange this data with relevant States and RFMOs.

International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (2001)

The FAO International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA-IUU)⁴⁶ is the first international voluntary instrument formulated to specifically address IUU fishing. It encourages States to undertake comprehensive and effective MCS across the fisheries supply chain,⁴⁷ including by: implementing authorisation schemes, VMS and observer programmes; providing training; establishing and maintaining data systems; and ensuring effective implementation of national and internationally agreed boarding and inspection regimes. Moreover, States are asked to cooperate in MCS, including through international agreements, and have to allow and enable MCS practitioners or enforcement personnel to cooperate in the investigation of IUU fishing.

In contrast with earlier fisheries instruments, which required flag State permission before port States could inspect vessels, the IPOA-IUU gives port States the right to inspect fishing vessels and asks port States to send collected information to flag States.⁴⁸ If the port State has found “reasonable grounds to suspect that a vessel has engaged in or supported

43 Ibid, Article 21.

44 Ibid, Article 18.

45 The Code of Conduct for Responsible Fisheries (adopted by the FAO Conference on 31 October 1995), para 7.7.3.

46 International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (adopted by the FAO Committee on Fisheries on 2 March 2001 and endorsed by the FAO Council on 23 June 2001).

47 Ibid, para 24.

48 Ibid, para 58.

IUU fishing,” it is asked to notify the flag State and “may take other action with the consent of, or upon the request of, the flag State”.⁴⁹ The IPOA-IUU recommends that not only flagged vessels can be sanctioned, but also “to the greatest extent possible” nationals under a country’s jurisdiction.⁵⁰ It also recommends that States develop and implement a national plan of action (NPOA) to achieve the IPOA-IUU objectives.

FAO Voluntary Guidelines for Flag State Performance (2013)

The FAO Voluntary Guidelines for Flag State Performance⁵¹ provide a tool to strengthen compliance by flag States with their international duties and obligations regarding the flagging and control of fishing vessels and set out general “Performance Assessment Criteria”. Box 1 provides an overview of the criteria relevant for MCS.

Box 4. Selected performance assessment criteria

In relation to MCS, the Performance Assessment Criteria encourage flag States to implement a control regime that includes, as a minimum:

- Legal authority to take control of vessels;
- An up-to-date record of vessels;
- Monitoring tools, e.g. vessel monitoring systems (VMS), logbooks and observers (see Table 1);
- Mandatory reporting requirements;
- An inspection regime at sea and at port.

Moreover, flag States are encouraged to have in place an enforcement regime, which includes:

- Capacity to detect and take enforcement action with respect to violations;
- Authority and capacity to take enforcement action and conduct timely investigations of violations;
- An appropriate system for the acquisition, collection, preservation and maintenance of the integrity of evidence;
- A system of sanctions of sufficient “severity to be effective in securing compliance and to discourage violations, and deprive offenders of benefits accruing from their illegal activities” (including removal of authorisation for a vessel involved in the commission of a serious offence);
- Cooperation with other States;
- Promotion of knowledge and understanding of MCS within national legal and administrative systems.

⁴⁹ Ibid, para 59.

⁵⁰ Ibid, para 21.

⁵¹ FAO, ‘Voluntary Guidelines for Flag State Performance’, adopted on 8 February 2013, <http://www.fao.org/3/a-i4577t.pdf> Even though the Guidelines are voluntary in nature, they may be “used as a basis for setting binding requirements in national law or guiding procedures at national and regional levels” (Swan and Erikstein, 2014). The Guidelines encourage all States to conduct performance assessments. Norway, for instance, has undertaken a self-assessment of flag State performance while using the Guidelines as a basis (see <https://www.regjeringen.no/contentassets/1f9110695539457d99ae5d693a57dcd3/norwegian-flag-state-performace.pdf>).

2.2. Shipping and navigation

Besides the aforementioned fisheries agreements, instruments regarding safety, pollution prevention and personnel⁵² concluded under the auspices of the International Maritime Organisation (IMO) contain provisions relevant to MCS, e.g. requiring port States to inspect ships to ensure that they meet IMO requirements and reporting issues to the flag State. The MARPOL Convention requires States to have a national sanction regime in place to criminalise any violations of the requirements of the Convention⁵³ and obliges States to cooperate in the detection of violations and the enforcement of the Convention.⁵⁴ However, a lack of follow up and consistent underreporting by flag States of violations of IMO instruments makes it challenging to create a good overview of the levels of compliance with pollution controls in ABNJ (Warner, 2009).

The IMO has introduced a ship identification scheme, requiring ships to carry a permanent seven-digit IMO number that cannot be changed, even if a vessel changes owner, flag or name.⁵⁵ The scheme was introduced in 1987 on a voluntary basis with the aim of enhancing maritime safety and preventing pollution and maritime fraud. On 1 January 1996, the scheme became mandatory for cargo and passenger ships, but did not apply to fishing vessels.⁵⁶ In December 2013, the IMO Assembly approved a proposal that

was co-sponsored by the FAO and lifted this exemption, allowing large-scale fishing vessels (of 100 gross tonnes or greater) into the scheme.⁵⁷ In August 2016, the IMO expanded its scheme to include fishing vessels that weigh less than 100 gross tonnes and are as small as 12 metres in length and non-steel hull fishing vessels – such as those made from wood or fiberglass – which weigh 100 gross tonnes or more.⁵⁸ The IMO ship identification scheme is voluntary for fishing vessels and therefore it is up to individual flag States to require vessels flying their flag to sign up for the scheme. Since January 2016, IMO numbers have also become compulsory to carry for all EU vessels of more than 24 metres in length (or 100 gross tonnage and above) fishing in EU waters and for all EU vessels of more than 15 metres in length fishing outside of European waters.⁵⁹

2.3. Seabed minerals

The International Seabed Authority (ISA) is the UN body responsible for monitoring, inspecting and taking measures to ensure compliance of operators engaged in seabed mining and related activities. In particular, the ISA is required to ensure effective protection for the marine environment from harmful effects that may result from mining activities.⁶⁰ Through the ISA, parties have agreed various regulations that set out the responsibilities of contractors, prospectors, sponsoring

52 International Convention for the Safety of Life at Sea - SOLAS; International Convention for the Prevention of Pollution from Ships—MARPOL; International Convention on Standards of Training, Certification and Watchkeeping for Seafarers—STCW; and the International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel - STCW-F. Following long-standing cooperation between the IMO, the International Labour Organization (ILO) and the FAO on improving safety at sea and labour conditions in the fisheries sector, States adopted the Cape Town Agreement (CTA) in 2012 under the auspices of the IMO. The CTA aims to improve the safety and working conditions of commercial fishers and observers. Once the CTA enters into force, it will set up a harmonised regime and set minimum requirements on the design, construction, equipment and inspection of fishing vessels 24 meters or longer that operate on the high seas. The CTA's "no more favourable treatment" provision (Article 4(7)) ensures that all vessels entering a port from a State party to the CTA will be subject to the same inspection standards, thereby enhancing global safety standards.

53 International Convention for the Prevention of Pollution from Ships – MARPOL, Article 4.

54 Ibid, Article 6.

55 IMO Assembly Resolution A.600(15), available at: [http://www.imo.org/en/KnowledgeCentre/IndexofIMOResolutions/Assembly/Documents/A.600\(15\).pdf](http://www.imo.org/en/KnowledgeCentre/IndexofIMOResolutions/Assembly/Documents/A.600(15).pdf)

56 International Convention for the Safety of Life at Sea (SOLAS), regulation XI/3 (adopted in 1994).

57 IMO Assembly Resolution A.1078(28).

58 IMO Circular Letter No. 1886/Rev.6, 8 August 2016.

59 Commission Implementing Regulation (EU) 2015/1962 of 28 October 2015 amending Implementing Regulation (EU) No 404/2011 laying down detailed rules for the implementation of Council Regulation (EC) No 1224/2009 establishing a Community control system for ensuring compliance with the rules of the common fisheries policy.

60 United Nations Convention on the Law of the Sea (adopted 10 December 1982, entered into force 16 November 1994) 1833 UNTS 3, Article 145.

States and the ISA itself with the aim to regulate seabed mineral resources.⁶¹ Prospectors must submit an annual report that contains a general description of the status of prospecting and of the results obtained, as well as information on whether the prospector has complied with the relevant rules, regulations and procedures.⁶² To date, these annual reports have been kept confidential and the ISA has so far not reported on whether contractors have complied with their contractual obligations (Ardron, 2016; Ardron, Ruhl and Jones, 2018).

The ISA has only granted exploration contracts and no exploitation has occurred to date. Therefore, it is unclear how effective the implementation of MCS is likely to be in the context of seabed mining. More knowledge is needed in order to better understand the potential environmental impacts, how they can be mitigated, and what role MCS can play. It has been proposed that “a collaborative mechanism for monitoring and enforcing compliance involving exploration contractors and ISA representatives” be established to facilitate this (Warner, 2014).

61 Decision of the Council of the International Seabed Authority relating to amendments to the Regulations on Prospecting and Exploration for Polymetallic Nodules in the Area and related matters, ISBA/19/C/17, Regulation 32, available at: https://ran-s3.s3.amazonaws.com/isa.org.jm/s3fs-public/files/documents/isba-19c-17_0.pdf Contractors are, for example, required to gather environmental baseline data and to establish environmental baselines to assess the effects of its activities on the marine environment and have to monitor and report on such effects.

62 Ibid, Regulation 6.

3. MCS tools

In the last decade, traditional approaches to MCS – on board observers, logbooks and surveillance planes – have been supplemented by a range of new technological tools.⁶³ While the MCS toolkit is growing rapidly, it is clear that there is no ‘one size fits all’ approach. Rather, there are a range of factors that need to be considered when evaluating the suitability of a particular MCS action, including: purpose, costs, access, reliability, coverage, ease of manipulation and privacy.

Whether or not a technology is considered suitable may also depend on who is making the assessment. For example, fishers may be more concerned with the privacy implications of electronic monitoring systems⁶⁴,

whereas NGOs and non-fishing States may be more inclined to support MCS tools which enhance transparency of fishing activities. Furthermore, innovations in MCS have generated a wealth of new data, but the capacity to process and analyse these data is often limited. It is therefore important to ensure that a MCS system includes the resources and capacity needed to interpret data and integrate data from different sources so as to fill data gaps and identify inconsistencies.

Table 1 provides a non-exhaustive overview of MCS tools that are used in ABNJ. The MCS tools are classified into types of tools: data collection and reporting, surveillance, enforcement and cooperative frameworks.

Table 1. Overview of MCS tools in ABNJ

MCS tool	Characteristics	Advantage(s)	Limitation(s)	Recent developments
Data collection and reporting				
Logbook, vessel trip reports (VTRs)	Paper-based record of fishing activity. Generally includes: vessel identity, date/time/location, gear used, fishing activity (e.g., tow length, number of hooks or trips), catch/bycatch). ⁶⁵	Cheap. Can be used on any vessel and in any language.	Complex/time-consuming Self-reported - risk of misreporting, incomplete/late logs, shifts in reporting dates, non-reporting (Chang and Yuan, 2014). Data often digitised without verification, double entry. Data often considered confidential ⁶⁶ .	On-board logbooks are compulsory for members of some RFMOs.

63 See for example the outcomes of the workshop on digital tools for small-scale fisheries organised by the European Commission on 4-5 December 2018: https://ec.europa.eu/fisheries/press/outcomes-workshop-digital-tools-small-scale-fisheries-brussels-4-5-december-2018_en.

64 Fishing operators have, for example, voiced concerns regarding the implications of electronic monitoring for the privacy of their crew and their fishing operations.

65 National Research Council, Ocean Studies Board (2000), 'Improving the Collection, Management and Use of Marine Fisheries Data', National Academies Press.

66 Ibid.

Table 1. (cont.)

MCS tool	Characteristics	Advantage(s)	Limitation(s)	Recent developments
Electronic recording and reporting services (ERS)	Digital system (computers, tablets or mobile phones) to record, process and send fisheries data. Can also be used for sending prior notification to ports before the landing of catch.	Less time-consuming and easier to use in terms of data entry and data is available sooner compared to paper logbooks. ⁶⁷ Allows for independent verification	Requires training (fishers and inspectors). High purchase and maintenance costs; power and internet costs. In some cases still requires manual data entry, but some applications have automatic catch reporting that uses information from previous fishing trips. “Yes/no” answers limit detailed data collection; still instances of incorrect reporting. ⁶⁸ Infrastructure limitations (e.g. network problems) (Kiruba-Sankar <i>et al.</i> , 2019).	EU has made ERS compulsory for vessels above 15 meters and is planning to expand this requirement to all vessels. ⁶⁹ Pilot projects are testing app-based systems for the EU’s small-scale fishing fleet. ⁷⁰
Automatic Identification Systems (AIS)	Autonomous and continuous vessel identification and monitoring that allows vessels to exchange data with nearby ships and coastal authorities (vessel identification data, position, course, speed) to facilitate traffic management and avoid collisions. ⁷¹	AIS signals are more frequently emitted than VMS signals: AIS has a quasi-continuous monitoring function (Delfour-Samama and Leboeuf, 2014). AIS is publicly broadcast (cf. VMS data which is generally proprietary with access often limited to the flag State) (Natale <i>et al.</i> , 2015; Kroodsmas <i>et al.</i> , 2018). Improves safety and the management of maritime traffic. Can be used to identify ships that pollute (oil spills), tranship, conduct IUU fishing and violate MPA rules. Least expensive vessel monitoring system that can monitor in coastal areas as well as the high sea. ⁷²	Tampering. ⁷³ Confidentiality and safety concerns (e.g. may reveal commercial information or be used by terrorists/pirates). ⁷⁴ Data generally only available to nearby receivers. ⁷⁵ Satellite transmission now possible (so-called S-AIS), but there is no global coverage yet. Use of data for MCS purposes requires relevant software and analytical capacity. ⁷⁶ Flag States often do not sanction non-compliance with AIS obligations or impose low fines. ⁷⁷ RFMOs do not require AIS (partly because they often already have a VMS requirement in place). ⁷⁸	In the EU, all fishing vessels above 15 meters need to be equipped with AIS transmitters. ⁷⁹

67 “More timely access to vessel activity data may improve enforcement efficacy and compliance”. See: NOAA Fisheries Office of Policy & Electronic Monitoring Working Group (2013), Electronic Monitoring White Papers, available at: https://static1.squarespace.com/static/56c65ea3f2b77e3a78d3441e/t/57444ac95b6aa6050dff8f7cb/1464118426824/CCC_2013-02_023_K_NMFS_EM_WhitePapers.pdf

68 See: NOAA Fisheries Office of Policy & Electronic Monitoring Working Group (2013), Electronic Monitoring White Papers, available at: https://static1.squarespace.com/static/56c65ea3f2b77e3a78d3441e/t/57444ac95b6aa6050dff8f7cb/1464118426824/CCC_2013-02_023_K_NMFS_EM_WhitePapers.pdf

69 See: https://ec.europa.eu/fisheries/cfp/control/technologies_en; The European Commission proposed including the following requirement in the revision of the EU Fisheries Control System: “the master of each Union catching vessel shall keep an electronic fishing logbook for the purpose of recording fishing activities”, see Article 14: https://eur-lex.europa.eu/resource.html?uri=cellar:6d8cdc8b-63f7-11e8-ab9c-01aa75ed71a1.0001.02/DOC_1&format=Pdf

70 See: https://ec.europa.eu/fisheries/press/outcomes-workshop-digital-tools-small-scale-fisheries-brussels-4-5-december-2018_en.

71 The IMO requires ships over 300 metric tonnes to install AIS systems. See: <http://www.imo.org/en/OurWork/Safety/Navigation/Pages/AIS.aspx> Some flag and coastal States also require fishing vessels to use AIS and many fishing vessels use AIS voluntarily for navigation and safety purposes. See <https://fish-i-africa.org/wp-content/uploads/2018/01/Potential-Use-of-AIS-as-a-Fisheries-Monitoring-Tool-WEB.pdf>

72 <https://fish-i-africa.org/wp-content/uploads/2018/01/Potential-Use-of-AIS-as-a-Fisheries-Monitoring-Tool-WEB.pdf>

73 E.g. Reporting fake vessel names or identification numbers, or turning off the AIS.

74 <http://www.fao.org/3/a-a0959e.pdf>

75 Ibid.

76 <https://fish-i-africa.org/wp-content/uploads/2018/01/Potential-Use-of-AIS-as-a-Fisheries-Monitoring-Tool-WEB.pdf>

77 Ibid.

78 An exception is the Pacific Islands Forum (PIF) Fisheries Agency (FFA), which requires foreign vessels to have both VMS and AIS.

79 EC Council Regulation 1224/2009, Article 10.

Table 1. (cont.)

MCS tool	Characteristics	Advantage(s)	Limitation(s)	Recent developments
Vessel Monitoring Systems (VMS)	Automatically transmits principally positional (GPS) information by satellite	<p>Required by some flag States and most RFMOs.</p> <p>Provides safety guarantees (Delfour-Samama and Leboeuf, 2014).</p> <p>More difficult to tamper with compared to AIS.</p> <p>VMS data is admissible evidence in several courts.</p>	<p>Lack of a uniform global regulation or standard (Detsis <i>et al.</i>, 2012).</p> <p>Data are often reported every 1-4 hours (depends on gear, data storage and management capacity of the regulatory body).</p> <p>Vessels without VMS equipment cannot be monitored. Provides limited information, so requires integration with other MCS tools to be effective.⁸⁰</p> <p>Costly tool, especially for the small-scale fleet. Capacity for technical maintenance and IT support can be limited in some countries.</p> <p>Not tamper proof.</p> <p>Access to data subject to legal and confidentiality constraints; information received by flag State not always shared with RFMOs or made public (Ewell <i>et al.</i>, 2017).</p>	<p>Used successfully in many fisheries, such as in the Southern Ocean to monitor exploitation of distant stocks of Patagonian toothfish.⁸¹</p> <p>Some flag States voluntarily making VMS data accessible.⁸²</p> <p>EU requires VMS for all vessels >12 m.⁸³</p>
Long-Range Identification and Tracking (LRIT)	Global identification and tracking system introduced by the IMO to collect and disseminate information on vessel positions received from IMO member States ships for maritime safety and search and rescue purposes.	<p>Whereas AIS only requires vessels to turn the receiver on, LRIT requires active participation by the vessel and vessel owner</p> <p>Cargo and passenger vessels are required to report their positions to flag States once every six hours; flag States can raise alarm if they have not received a report.</p> <p>Improves safety, the management of maritime traffic, timely rescues and minimises pollution.</p>	<p>Not applicable to fishing vessels.</p> <p>Data not publicly available. Other States may request flag States to disclose certain information about their vessels.</p> <p>Cost of data storage.</p>	<p>The LRIT system is mandatory for all passenger ships, high speed craft, mobile offshore drilling unites and cargo ships of over 300 gross tonnes.</p> <p>The European Union Cooperative Data Centre (EU CDC) tracks EU flagged vessels worldwide, integrates this information into the wider international LRIT system and exchanges information with other data centres around the world.⁸⁴</p>
Analytical software and algorithms	Used to filter and analyse data resulting from electronic technologies. Examples include block chain, real-time data mining, artificial intelligence (AI), "Big Data", cloud computing, machine learning and Geographic Information Systems (GIS).	<p>"For monitoring large ocean areas it is a cost-effective alternative to manual inspection" (Brekke and Solberg, 2005).</p> <p>Remote sensing images can be combined with VMS and AIS to identify ship size and activity type (Probst, 2019).</p> <p>Can be used as evidence in criminal or administrative proceedings.</p> <p>Increased transparency; possible deterrent effects.</p>	<p>Cost of installing and maintaining infrastructure; human resource requirements.</p> <p>The software and algorithms are not immune to "fraud, error and uncertainty" (Probst, 2019).</p> <p>No common "language" between software, making it difficult to compare different databases.⁸⁵</p>	

80 Though VMS data does not provide any information on whether a vessel is fishing, steaming or inactive (Gerritsen and Lordan, 2011), this can be inferred from the data.

81 See Game *et al.*, 2009.

82 Indonesia, Peru, Panama, Costa Rica, Namibia and Chile have committed to publish their VMS data via Global Fishing Watch. <https://globalfishingwatch.org/press-release/chile-to-publish-vessel-tracking-data-through-gfw/>

83 Position, vessel speed and course are transmitted at least every two hours to the fisheries monitoring centre (FMC). <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32011R0404&from=EN>; Article 22.

84 <http://www.emsa.europa.eu/lrit-main/lrit-home.html>

85 https://www.oecd.org/greengrowth/GGSD_2017_Issue%20Paper_New%20technologies%20in%20Fisheries_WEB.pdf

Table 1. (cont.)

MCS tool	Characteristics	Advantage(s)	Limitation(s)	Recent developments
E-DNA	Biological monitoring tool that uses traces of DNA in the water column to determine what types of organisms are or have been present in the location sampled. Autonomous underwater vehicles can collect samples.	Can be used to monitor impacts of human activities. Can provide baseline data. “eDNA has superior species detectability, requires lower effort, causes no ecosystem disturbance, allows detection without a priori knowledge of species, and can be implemented in areas where traditional surveys are impossible” (Ruppert, Kline and Rahman, 2019).	Training and capacity needs. Further development of technologies and methods required. ⁸⁶	Used to identify illegal trade of threatened shark species in Brazil (Feitosa <i>et al.</i> , 2018) and to identify sharks on the high seas (Truelove, Andruszkiewicz and Block, 2019).
Satellite-based remote sensing (RS) E.g. Synthetic Aperture Radar (SAR); Visible infrared imaging radiometer suite (VIIRS)	“The derivation of information by analysing radiation received by a sensor.” (Kachelriess <i>et al.</i> , 2014)	Wide range of potential applications. ⁸⁷ Can allow for detection of vessels that are not using or transmitting AIS/VMS. ⁸⁸ Can be used during all-weather types.	Can only be used for the upper layer of the ocean (max 27 m depth) (Kachelriess <i>et al.</i> , 2014). Requires significant financial and human resources as well as capacity for data storage and analysis. “May take several days to access the data, there are generally fees associated with the data access and global coverage is not currently available on a daily basis” ⁸⁹	
Catch documentation schemes	“A system that tracks and traces fish from the point of capture through unloading and throughout the supply chain. A CDS records and certifies information that identifies the origin of fish caught and ensures they were harvested in a manner consistent with relevant national, regional and international conservation and management measures.” ⁹⁰	Applies throughout the whole supply chain. “Can be designed to cover a fish stock or fish species across its entire geographical range”. ⁹¹ Improves transparency. Removes incentives to operators to conduct IUU activities by limiting market access.	Limited coverage, especially if outside RFMO management competence. ⁹² Requires significant resources to develop, implement and manage – a challenge for RFMOs with limited staff. Multiplication of schemes with varying rules and requirements; lack of a minimum can lead to design flaws, fraud and non-compliance. ⁹³	CDS currently covers just 0.1 percent of the global marine fisheries catch. ⁹⁴

86 “optimisation of sample collection and extraction; ensuring samples are free of contamination; designing primers to have minimal bias without sacrificing resolution or spread; development of extensive reference databases; using proper bioinformatics pathways; lack of standardisation in classification; and difficulty in estimating DNA degradation rates, thus allowing for the misrepresentation of species presence in areas which they may have vacated” (Ruppert, Kline and Rahman, 2019).

87 Connectivity, the impact of climate change, for the designation, mapping, monitoring and management of MPAs for biodiversity protection, to assess the impacts of anthropogenic threats (e.g. oil spills, marine litter) (Kachelriess *et al.*, 2014).

88 <https://globalfishingwatch.org/research/viirs/>

89 *Ibid.*

90 <http://www.fao.org/3/i5063e/i5063e.pdf>

91 <http://www.fao.org/3/CA2401EN/ca2401en.pdf>

92 *Ibid.* The lack of engagement of non-members of RFMOs could also undermine effectiveness.

93 *Ibid.*

94 <http://www.fao.org/3/a-i8183e.pdf>

Table 1. (cont.)

MCS tool	Characteristics	Advantage(s)	Limitation(s)	Recent developments
Surveillance				
Aerial and patrol vessel manned surveillance		High deterrence factor. Inspectors/compliance officers on board of patrol vessels collect information that is not always reported in logbooks.	Expensive, especially when compared to satellite detection. ⁹⁵ Low rate of detection of infringements. Impractical for large/distant areas Patrol vessels have limited jurisdiction to board and inspect foreign-flagged vessels in ABNJ.	
Observer programmes	Observers record information about the vessel they are on, and this information can be used for compliance purposes.	Can monitor all activities of a vessel.	Only 'viable' on larger vessels. Effectiveness varies dependent upon a range of factors. Observers may be subject to harassment and bribery, especially on the high seas. Observers have no mandate to enforce compliance.	
Electronic monitoring systems (EMS)	Combination of video/photo cameras, GPS and sensor data.	Can identify and record non-compliant behaviour; deterrent. Can complement/replace human observers. Data is anticipated to not be biased and allows for the quality of self-reported data to be checked and quality assured. Running costs are low. Can distinguish very specific vessel behaviour. (James <i>et al.</i> , 2019)	Illegal activities can still occur in areas outside the camera views. Reviewers of data need significant training (e.g. also to apply viewing strategies in case of large volumes of data) and auditing. Installation and maintenance costs. Implementation challenges exist currently for high volume, mixed fisheries. Not tamper proof. Reluctance of ocean users to accept onboard cameras/lack of support from industry. (James <i>et al.</i> , 2019)	Used in North America and Australia; pilot projects worldwide. ⁹⁶ Video review with machine learning and artificial intelligence is advancing.
Drones: unmanned aerial vehicles (UAV); unmanned surface vehicles (USV); unmanned underwater vehicles (UUV)/ remotely operated vehicle (ROV)	Robotic aircraft that can fly without a human pilot or crew and can be controlled remotely.	Can be used for a wide range of functions ⁹⁷ and in remote/inaccessible areas. Lower operational costs and a longer endurance compared to manned aircraft. ⁹⁸	"Only able to give a snapshot of the ocean at any given moment, and provide limited insight on specific behaviours related to non-compliance" (Toonen and Bush, 2018). Requires considerable financial investment and technical expertise. Lack of clarity regarding the legal status. ⁹⁹ Range and coverage in ABNJ remains a substantial challenge.	"To improve the effectiveness of offshore guarding activities, patrol vessels could acquire waterproof rotary-wing or fixed-wing drones with float planes to persuade and record illegal fishing within the boundaries of marine protected areas. These evidences could be considered a reliable proof in court, even when offenders are seized outside the no-take zones" (Jiménez López and Mule-ro-Pázmány, 2019).

95 <http://www.fao.org/3/i2099e/i2099e.pdf> "Satellite observation is both fiscally prudent and delivers a broader scope of temporal and spatial intelligence than patrols alone achieve" (Rowlands *et al.*, 2019).

96 E.g. in South America, the Pacific, the EU (James *et al.*, 2019), the Seychelles (<http://www.fao.org/in-action/commonoceans/news/detail-events/en/c/1034291/>), Ghana and Fiji (<http://www.fao.org/3/ca0513en/CA0513EN.pdf>).

97 E.g. Fish stock assessments, to monitor and control MPAs, to gather evidence of illegal activities, to track pollution at sea, for search and rescue and to detect ships.

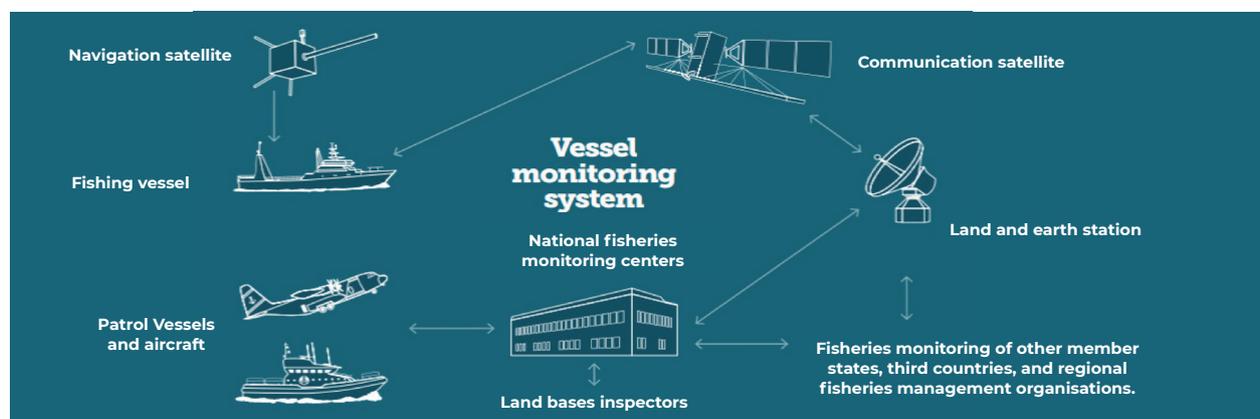
98 Many remote MPAs require at least 15 hours of maritime surveillance and manned patrol aircraft can only achieve about 1-2 hours of active surveillance in remote marine areas (Brooke, Lim and Ardron, 2010).

99 https://www.oecd.org/greengrowth/GGSD_2017_Issue%20Paper_New%20technologies%20in%20Fisheries_WEB.pdf

Table 1. (cont.)

MCS tool	Characteristics	Advantage(s)	Limitation(s)	Recent developments
Cooperative frameworks				
Listing	E.g. Consolidated List of Authorised Vessels (CLAV); RFMO lists of IUU vessels.	Enhances regional cooperation between enforcement officers and flag States. Gives third parties access to information about the rights that flag States have given to their vessels. Helps inspectors identify vessels to be examined. Listing on IUU list “implies a clear obligation” for flag State to act and report to RFMO. ¹⁰⁰	Lists do not always include the IMO numbers of ships; flags and names of ships can be easily changed. Limited harmonisation of RFMO listing processes. ¹⁰¹ Lack of sanctions in case flag States fail to act. ¹⁰²	Several RFMOs have a special procedure for cross-listing IUU vessels from other organisation. ¹⁰³
Intelligence sharing and joint inspection schemes	At a regional level, there are various initiatives through which enforcement and control authorities share intelligence and conduct joint inspections.	By sharing MCS activities, States can minimise costs and improve coverage, e.g. through joint sea patrols. Can increase trust between enforcement authorities at a regional level.	Entails additional responsibilities for States. Security of sensitive data. Challenges of agreeing a unified regional position, e.g. taking into account differences in economic situations of member States. ¹⁰⁴	
Regional/global vessel record, fleet register	Database or registry of vessels authorised to conduct certain activities. ¹⁰⁵	Increases transparency, which can in turn help enforcement authorities worldwide to identify vessels that conduct illegal activities. Can establish a more global MCS network.	Requires human capacity and capital to update the record/register.	FAO launched first working version of the Information System of the Global Record for Fishing Vessels, Refrigerated Transport Vessels and Supply Vessels (the ‘Global Record’) to serve as a single access point for vessel information. ¹⁰⁶

Examples of technological tools that can be used for MCS



A vessel monitoring system (VMS) uses satellite-based technology to help locate and identify vessels at sea. Source: The Pew Charitable Trusts.

100 [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=TAD/FI\(2017\)16/FINAL&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=TAD/FI(2017)16/FINAL&docLanguage=En).

101 Ibid.

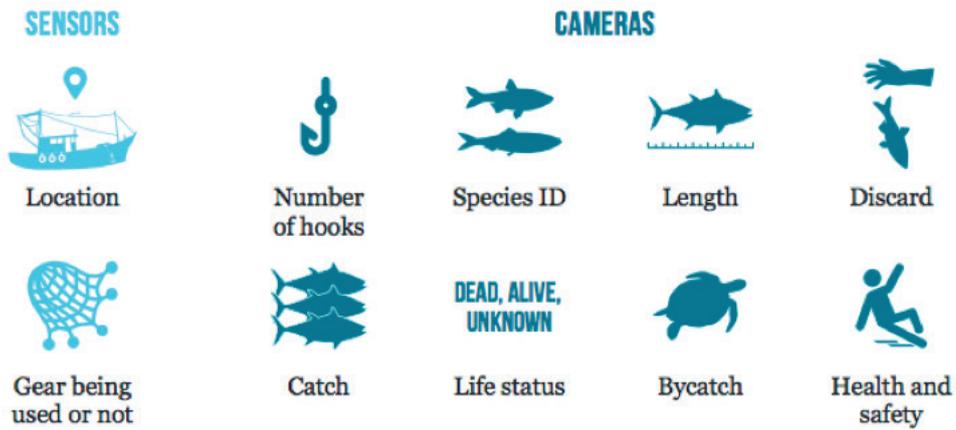
102 Ibid.

103 For example: SIOFA: <https://www.apsoi.org/mcs/iuu-vessels>, IATTC: [https://www.iattc.org/Meetings/Meetings2019/IATTC-94/Prop_English/IATTC-94-PROP-C-1A_EUR%20IUU%20fishing%20\(Amendment%20C-15-01\).pdf](https://www.iattc.org/Meetings/Meetings2019/IATTC-94/Prop_English/IATTC-94-PROP-C-1A_EUR%20IUU%20fishing%20(Amendment%20C-15-01).pdf) and ICCAT: <https://www.iccat.int/en/IUUIlist.html>

104 AU-IBAR 2016. Status of Monitoring, Control and Surveillance Systems in Southern Africa - Strengthening National and Regional Capacities for Combating Illegal, Unreported and Unregulated Fishing. AU-IBAR Reports.

105 Although this tool is often mentioned in the context of fisheries, this can also be used in case operators want to access other marine resources (e.g., MGRs).

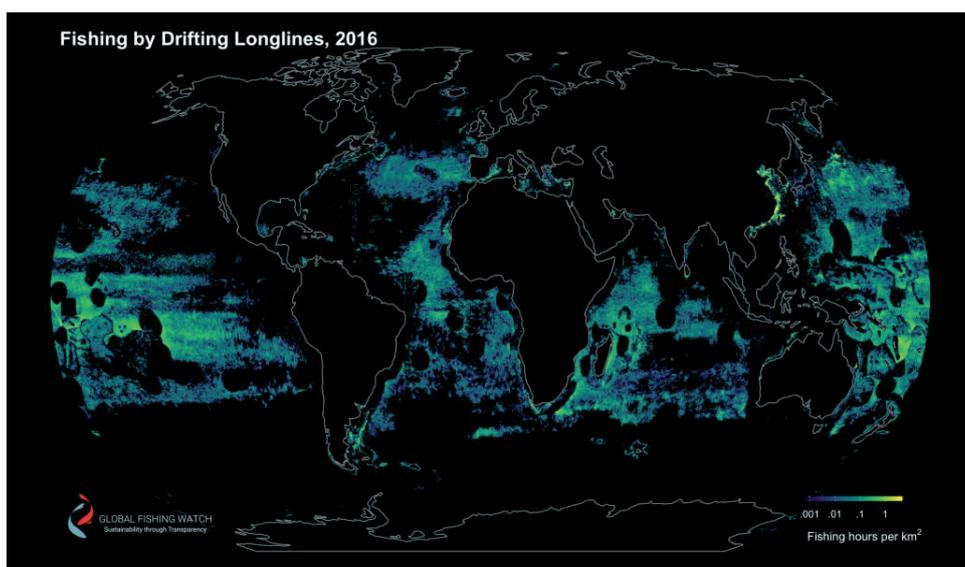
106 To achieve maximum participation, the FAO decided to use a three-phased approach based on vessel size with the first phase targeted at fishing vessels of 100 gross tonnage or 24 metres in length and above.



E-monitoring in the fisheries context can take the form of gear sensors or cameras. Source: WWF.



A view of the Deepwater Horizon oil spill from NASA's Terra Satellites on May 24, 2010. Source: NASA.



Vessels fishing by drifting longlines in 2016 across the globe. Source: Global Fishing Watch

4. State of play and ongoing initiatives

4.1. Fisheries

RFMOs

MCS has been strengthened at a regional level through RFMOs, which are in a unique position to develop MCS standards, guide the development of efficient and effective MCS systems, and facilitate coordinated efforts to ensure effective implementation of conservation and management measures (Hutniczak, Delpeuch and Leroy, 2019). RFMOs have developed various measures to enhance MCS efforts of their members and to encourage compliance with their rules, e.g.:

- The implementation of mandatory VMS, observer programmes, electronic reporting and monitoring systems;
- The adoption of regional MCS schemes for port State measures;
- The development of vessel lists for authorised fishing vessels as well as those reported as engaging in IUU fishing activities. Several RFMOs have a special procedure for cross-listing IUU vessels from other organisations;¹⁰⁷
- Requiring members to meet minimum standards (see Table 2).¹⁰⁸

By requiring member States to introduce mandatory MCS measures, RFMOs can strengthen the effective exercise of flag State responsibility for fishing vessels flying their flag. Some RFMOs have established procedures for following up on violations detected through MCS which, for example, cover standards of investigation, reporting procedures,

notification of proceedings and sanctions and other enforcement actions.¹⁰⁹ The black-listing of member vessels and the introduction of quota reductions are arguably the most severe sanctions currently imposed by RFMO members.¹¹⁰

While States cooperating through RFMOs have made significant progress on the conservation and management of target species, there remains limited progress concerning non-target species (Gilman, Passfield and Nakamura, 2014; Crespo *et al.*, 2019), vulnerable marine ecosystems (Wright *et al.*, 2015; Gianni *et al.*, 2016) and ecosystem-based management (Juan-Jordá *et al.*, 2018). RFMO decision making procedures may also hamper conservation outcomes. Many RFMOs adopt decisions by consensus, which “favours the ‘law of least ambitious program’, where policy reform will only progress to the level deemed acceptable by those least interested in reform” (Pentz and Klenk, 2017); other RFMOs provide for majority voting on conservation measures, but allow members to opt-out if they do not agree (McDorman, 2005).

RFMOs also continue to face many significant challenges in ensuring the implementation and enforcement of conservation and management measures. Significant capacity issues remain, including a lack of staff members with expertise in MCS and compliance and a lack of resources to analyse the data captured through MCS measures.¹¹¹ Non-compliance by some members (or non-members) can undermine the effectiveness of conservation and management measures, but members of RFMOs have generally been reluctant to censure other members.

107 For example: SIOFA: <https://www.apsoi.org/mcs/iuu-vessels>, IATTC: [https://www.iattc.org/Meetings/Meetings2019/IATTC-94/Prop_English/IATTC-94-PROP-C-1A_EUR%20IUU%20fishing%20\(Amendment%20C-15-01\).pdf](https://www.iattc.org/Meetings/Meetings2019/IATTC-94/Prop_English/IATTC-94-PROP-C-1A_EUR%20IUU%20fishing%20(Amendment%20C-15-01).pdf) and ICCAT: <https://www.iccat.int/en/IUUIlist.html>

108 <https://www.oecd-ilibrary.org/docserver/b7b9f17d-en.pdf?expires=1558953274&id=id&accname=guest&checksum=82D6B4790FF15E2C5E68150DC2ACB510>.

109 <https://www.oecd.org/sd-roundtable/papersandpublications/39374297.pdf>

110 Ibid.

111 <http://www.sprfmo.int/assets/Basic-Documents/Convention-and-Final-Act/2018-SPRFMO-Performance-Review/2018-12-01-REPORT-SPRFMO-PERFORMANCE-REVIEW-FINAL.pdf>

Table 2. Standards established by RFMOs (Hutniczak et al., 2019)¹¹²

RFMO	List of authorised vessels	Catch reporting	VMS	Inspection at sea	Observer programmes for fishing	Transshipment monitoring	Inspections in ports	Designation of landing ports
CCSBT	x	x	x		x	x	x	x
GFCM	x	#	x**	x**		x	x	x
IATTC	x	x ²	x		x	x		
ICCAT	x	x ³	x	x	x	x	x	x
IOTC	x	x ⁴	x		x	x	x	x
NAFO	x	x	x	x	x	x	x	x
NEAFC	x	#	x	x		x	x	x
NPFC	x		x	***	x	x		
SEAFO	x	#	x	x	x	x	x	x
SIOFA	x	#	x	***	*	x	x	x
SPRFMO	x	#	x	x		x	x	x
WCPFC	x	#	x	x	x	x	x	
CCAMLR	x	x	x	x	x	x	x	

Note: · Observer programme limited to scientific purpose; *, spatially limited; *** measure implementation in progress (proposal or implementation plan available); # limited to standards on catch reporting. 1. List of authorised vessels not publicly available; 2. limited to bigeye statistical documentation programme with some elements of CDS (Res. C-03-01); 3. limited to Atlantic bluefm tuna, for bigeye tuna and swordfish, there are statistical document programmes in place (ICCAT, 2016[7]); 4. limited to statistical document programme for bigeye tuna with some elements of a CDS (communication with the IOTC Secretariat). Source: Based on the review of relevant documents and communication with relevant RFMOs.

International MCS platforms and networks

Over the last two decades, several international MCS platforms and networks have been established that aim to strengthen cooperation and coordination on MCS at a global, regional or sectoral level. These platforms and networks provide MCS experts with the opportunity to exchange best practices and enhance their capacity to conduct MCS activities while at the same time increasing trust amongst compliance and law enforcement agents through networking events.

The International Monitoring, Control and Surveillance (IMCS) Network was created in 2001 as an informal voluntary network of States, RFMOs and regional economic integration organisations committed to improving the efficiency and effectiveness of

fisheries-related MCS activities, the IMCS Network aims to: encourage international cooperation; facilitate increased information exchange and collaborative activities; and strengthen capacity.¹¹³ The Network has been especially active with organising capacity-building activities, organising six Global Fisheries Enforcement Training Workshops¹¹⁴ that have “enabled port inspectors, lawyers, coast guard personnel, scientists, and law enforcement agents from around the world to network with peers and to learn about relevant technologies (mapping software, satellite data, and forensic genetics) for addressing fisheries crime” (Österblom, 2014).

The Tuna Compliance Network (TCN) was established in cooperation with the IMCS Network to facilitate communication and cooperation between officers responsible for compliance and MCS experts to share best

¹¹² Note that CCAMLR is not a RFMO, but has a mandate covering fisheries management and creates binding measures for member States' fishing vessels operating within its geographical purview, and so is listed below separated by a line to indicate its distinctive status.

¹¹³ <https://imcsnet.org/about-us/who-we-are/>

¹¹⁴ <http://imcsnet.org/6th-gfetw-conclusion/>

practice compliance processes associated with mainly tuna RFMOs.¹¹⁵ The TCN has organised three workshops that provided MCS practitioners the opportunity to exchange experiences and discuss joint activities.¹¹⁶

The International Criminal Police Organization (INTERPOL) established a Global Fisheries Enforcement programme,¹¹⁷ through which it has issued notices, deployed investigative support teams, organised Regional Investigative and Analytical Case Meetings and published a guide for law enforcement practitioners on international law enforcement cooperation in the fisheries sector.¹¹⁸ Through its Global Fisheries Enforcement programme, INTERPOL has contributed to the investigation and apprehension of vessels suspected of transnational fisheries-related crime.¹¹⁹

The Niue Treaty on Cooperation in Fisheries Surveillance and Law Enforcement was adopted by members of the Pacific Islands Fisheries Forum Agency (FFA).¹²⁰ This legal framework aims to promote effectiveness in regional surveillance and enforcement through cooperation between member States, such as the exchange of information. The Treaty, for example, allows Parties to “cooperate in the provision of personnel and the use of vessels, aircraft or other items of equipment for fisheries surveillance and law enforcement purposes” (Article VI). Moreover, it provides a mechanism for surveillance officers to exercise enforcement powers on behalf of another party. One could argue that the FFA plays a key regional role in the South Pacific.¹²¹

Fisheries improvement projects

Fisheries improvement projects (FIPs) are multi-stakeholder initiatives that aim to

improve the sustainability of a fishery.¹²² Such initiatives have resulted in collaborative efforts between fishing businesses and NGOs to develop their own, private MCS systems in an effort to meet standards for ecolabel certification schemes. For example, a FIP could include installation of EMS and other technologies on board fishing vessels, with operators agreeing to give NGO collaborators access to the information derived from these systems or provide third party verification that the data is accurate. There are currently over 30 FIPs relating to tuna species, encompassing four of the five tuna RFMO regions.¹²³

The Marine Stewardship Council advocates that a credible FIP should include:¹²⁴

- An initial gap analysis;
- An action plan that is linked to performance indicators and identifies activities, budgets, roles and responsibilities;
- Regular reporting;
- A verification mechanism to “provide assurance about the robustness of the process and progress being made” (i.e. pre-assessment and progress reports prepared or reviewed by an independent assessor or technical consultant);
- A limit to the length of time spent as a FIP, generally no longer than five years; and
- A commitment to meeting a certification standard through a transparent, third party process.

115 <http://www.fao.org/3/a-i8146e.pdf>

116 https://www.iattc.org/Meetings/Meetings2019/IATTC-94/PRES/CAP-21-PRES_Tuna%20Compliance%20Network%20IATTC%202019.pdf

117 <https://www.interpol.int/en/News-and-Events/News/2019/Fighting-illegal-unreported-and-unregulated-fishing>.

118 The most recent case being in the Southern Ocean near Antarctica where a vessel was apprehended that was registered as a general cargo ship under the flag of Panama and was suspected of engaging in illegal fishing activities. <https://www.interpol.int/en/News-and-Events/News/2019/Fighting-illegal-unreported-and-unregulated-fishing>.

119 <https://www.interpol.int/en/News-and-Events/News/2019/INTERPOL-supports-apprehension-of-vessel-suspected-of-illegal-fishing>.

120 https://www.ffa.int/system/files/Niue%20Treaty_0.pdf

121 <http://www.franciscoblaha.info/blog/2015/9/19/908pw6eg97vb0jumedlmz8rlkbyjmk>.

122 Marine Stewardship Council, <https://www.msc.org/for-business/fisheries/developing-world-and-small-scale-fisheries/fips>. A directory of FIPs is available at <https://fisheryprogress.org/directory>.

123 See <https://iss-foundation.org/what-we-do/fisheries-improvement/fishery-improvement-projects/>

124 See <https://www.msc.org/docs/default-source/default-document-library/for-business/fishery-improvement-tools/msc-definition-of-a-credible-fip.pdf>

Civil society initiatives

A number of recent civil society initiatives aim to increase transparency in fisheries globally. They are taking innovative approaches to using AIS data and creating a “common platform for sharing information between RFMOs and/or States that can improve both regional and global goals for the conservation and sustainable use of marine resources and biodiversity in ABNJ” (Dunn *et al.*, 2018). These initiatives can also serve as tools for capacity building and technology transfer as they provide direct access to easily interpreted information on the distribution of fishing effort and thereby help developing countries to implement MCS on the high seas (Dunn *et al.*, 2018). Some examples of these efforts are highlighted below.

The Project Eyes on the Seas, a partnership between The Pew Charitable Trusts and the UK Government’s Satellite Applications Catapult, aimed to help governments detect suspicious fishing activity through a system based on four sources of information: 1) AIS and VMS data; 2) satellite imagery, such as SAR and VIIRS; 3) vessel databases with information of a vessel’s history and current activity; and 4) automated analysis based on computer algorithms.¹²⁵ The UK government has successfully used this approach to designate and monitor a large and remote MPA around the Pitcairn Islands in the South Pacific Ocean.¹²⁶ The system is now called *Oversea Ocean Monitor* and is managed by the British not-for profit organisation OceanMind.

Global Fishing Watch (GFW), a partnership founded by Oceana, Google and SkyTruth in September 2016, is now an independent NGO that aims to make global commercial fishing activity publicly available.¹²⁷ GFW derives information from AIS data and other sources and has been used by various stakeholders

to tackle IUU fishing and manage MPAs. For example, the Mexican government recently expanded the proposed Revillagigedo Archipelago Protected Area in the Eastern Tropical Pacific, in part based on GFW data on fishing effort.¹²⁸ The GFW platform has also been used to monitor fishing activity within the large and remote Phoenix Islands Protected Area in Kiribati and to demonstrate the effectiveness of the MPA.¹²⁹ Aside from AIS data, GFW uses VMS data, VIIRS, SAR and is working on incorporating other technologies. While VMS data is proprietary and access is generally tightly controlled, the governments of Indonesia, Peru, Panama, Costa Rica, Namibia and Chile have committed to publish redacted VMS data on the GFW platform.¹³⁰ It is important to highlight that GFW can provide key data, but it is still up to the port, coastal and flag States to enforce the law in ABNJ.

The **FISH-i Africa Task Force** also uses AIS data to address illegal fishing and associated crimes on a regional level. The Task Force is composed of eight members from Southeast African coastal States.¹³¹ The efforts of the Task Force have catalysed a range of enforcement actions against numerous IUU fishing operators, resulting in prison sentences and millions of dollars of fines (Stop Illegal Fishing, 2016). The Task Force has also resulted in a cost effective and efficient MCS framework through more inter-agency cooperation (e.g. with navy, police, port authorities, immigration), joint and targeted MCS operations including port State measures and research into the identification of gaps in MCS operations (Stop Illegal Fishing, 2016).

4.2. Oil pollution

Pollution at sea is another serious threat to BBNJ. The International Oil Tankers Federation

¹²⁵ https://www.pewtrusts.org/-/media/assets/2015/03/eyes-on-the-seas-brief_web.pdf

¹²⁶ <https://www.pewtrusts.org/-/media/assets/2016/09/effectivesurveillanceinthewatersofthepitcairnislandsmarinereserve.pdf>

¹²⁷ <https://globalfishingwatch.org/about-us/>

¹²⁸ <https://globalfishingwatch.org/impacts/policy-compliance/where-tourism-and-tuna-overlap-how-global-fishing-watch-is-informing-policy-discussions/>

¹²⁹ <https://globalfishingwatch.org/initiatives/marine-protected-areas/> Kiribati has made use of GFW data to prove that a Marshall Islands flagged purse seiner was fishing illegally in the MPA and the owners of the ship eventually paid a \$1 million fine and an additional \$1 million grant to Kiribati.

¹³⁰ <https://globalfishingwatch.org/press-release/chile-to-publish-vessel-tracking-data-through-gfw/>

¹³¹ Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia and the United Republic of Tanzania. <https://fish-i-africa.org/about/our-task-force/>; This initiative is supported by Stop Illegal Fishing, the Pew Charitable Trusts, Nordenfjeldske Development Services, Trygg Mat Tracking and NEPAD. Moreover, it receives expert advice from the Indian Ocean Commission as well as the Indian Ocean Tuna Commission.

(IOTF) maintains a database of accidental oil spills from tank vessels and its 2019 report indicates that there has been a significant decrease in the number of large spills over the last few decades with an average of 1.9 large oil spills per year since 2010.¹³² However, recent scientific research suggests that oil companies systematically underreport the magnitude of small oil spills and that there has been no proper assessment of the cumulative effects of many small oil spills.¹³³ Moreover, intentional discharges of oil and other pollutants are more common than accidental spills. These “controlled regular oil spills can be a much greater threat to the marine environment and the ecosystem than larger oil spill accidents” (Brekke and Solberg, 2005).

UNCLOS permits port States to take enforcement measures against foreign ships for violations of international discharge standards in ABNJ in certain limited circumstances,¹³⁴ but this provision has rarely been used in practice (Ringbom and Henriksen, 2017). Before being able to take enforcement actions, port States would need to have data to better understand where the oil spill comes from and who is responsible. States that take enforcement measures under MARPOL generally rely on three types of MCS tools: on board inspections of ships at ports, at-sea surveillance using aircraft; and satellites (Serra-Sogas *et al.*, 2008). Monitoring of discharges, especially small-scale discharges, can be challenging because of the spatial scale at which ships operate and because vessel operators may seek to avoid identification (Serra-Sogas *et al.*, 2008). The remoteness of ABNJ also makes it more expensive and challenging to use MCS tools for small oil spills.

Synthetic aperture radar (SAR) technology is currently the most important satellite tool used to detect the presence of oil at sea, because it provides wide area coverage and can be used in all weather conditions and during both day and night (Brekke and Solberg, 2005). However, it is not always possible to distinguish real oil spills from visually similar

features with SAR (Brekke and Solberg, 2005). SAR technology can also not be used to detect oil spills if the sea surface is too rough or too smooth and cannot identify the ship responsible for the pollution (Ferraro *et al.*, 2009).

Whereas accidental pollution at sea can be reduced but not completely eradicated, deliberate illegal discharges from ships can be reduced by strict enforcement of existing rules and MCS of maritime traffic (Ferraro *et al.*, 2009). The future ILBI could help by centralising, standardising and supporting MCS of illegal pollution activities in ABNJ and by establishing a mechanism to share information with port States for follow-up to avoid duplication and to strengthen the MCS capacities of coastal States. Regional memoranda of understanding for port State control for merchant shipping predate the PSMA by several decades and could also serve as a useful precedent for cooperation.

Various private companies with SAR expertise are offering their services to governments and the oil industry to monitor, detect and react to oil spills.¹³⁵ SkyTruth is closely monitoring oil pollution around the world and has reported on oil spills in the Timor Sea, Brazil, Nigeria and the Caspian Sea based on data from satellite imagery.¹³⁶ The European Space Agency has also regularly provided radar data to environmental organisations and industry to demonstrate the location, shape and size of oil spills.¹³⁷

132 https://www.itopf.org/fileadmin/data/Documents/Company_Lit/Oil_Spill_Stats_2019.pdf

133 <https://www.nature.com/news/minor-oil-spills-are-often-bigger-than-reported-1.12307>
<https://www.fastcompany.com/40406093/how-satellite-data-caught-gulf-oil-companies-hiding-enormous-oil-spills>

134 UNCLOS, Article 218.

135 <https://www.iceye.com/applications/sea/oil-spill-monitoring>

136 <https://skytruth.org/what-we-do/projects/>

137 https://www.esa.int/Our_Activities/Preparing_for_the_Future/Space_for_Earth/Oceans/Monitoring_oil_spills_from_space

5. Challenges for effective MCS in ABNJ

Due to the vastness and remoteness of ABNJ, States have encountered various difficulties when monitoring activities and enforcing rules. This section highlights some key challenges related to flag State responsibility, governance and lack of capacity that make MCS in ABNJ particularly challenging.

5.1. Flag State responsibility

In ABNJ, flag States are responsible for the control of vessels flying their flag. However, commitment to the effective exercise of flag State responsibility varies considerably based on a range of factors.¹³⁸ Ineffective exercise of flag State responsibility can allow 'free riders' to exercise their right to fish on the high seas without investing in the due diligence required to ensure compliance with international rules (Barrett, 2011, pp. 47 & 127). In some cases, vessels with no genuine link to the flag State are registered in exchange for a fee and the flag State subsequently exercises limited control or oversight (Witbooi, 2014; Ford and Wilcox, 2019). These so-called 'flags of convenience' are attractive to vessel operators as they reduce vessel operating costs by applying lax requirements related to MCS, safety, insurance and training (Liddick, 2014). In the fisheries context, vessels may be flagged by States that are not members of a RFMO, making it difficult to ensure compliance (Ringbom and Henriksen, 2017).

Moreover, UNCLOS only has limited provisions for enforcement measures against States that fail to meet their flag State obligations. In recent years, international tribunals have more actively developed the concept of flag State responsibility, for example, in relation to their due diligence obligation in conserving and managing living resources within national jurisdiction (Pazartzis and Merkouris, 2019).¹³⁹ However, there have been limited developments to date concerning flag State responsibility in ABNJ.

These challenges impact most activities in ABNJ that involve ships (Ringbom and Henriksen, 2017). Recent developments, such as the adoption of the PSMA and the expansion of innovative MCS technologies and tools, have opened up opportunities for actors other than flag States to conduct MCS activities in ABNJ.

5.2. Governance

The high seas is characterised by a fragmented governance framework with a great variety of sector-based international organisations and conventions that often manage the same area (Ban *et al.*, 2014; Wright *et al.*, 2018). This results in ineffective enforcement mechanisms, because of a lack of cooperation and opposing interests. There are also gaps in coverage of the high seas: "not all human activities in ABNJ are adequately regulated; not all regions are covered; and some organisations exercise their mandate with limited reference to modern governance principles, such as the ecosystem approach, the precautionary principle, or the need for transparent and open decision-making processes" (Wright *et al.*, 2018).

For example, transparency varies (Ardron *et al.*, 2014; Clark, Ardron and Pendleton, 2015; Ardron, 2016) and fisheries management is largely focussed on a small number of target species (Crespo *et al.*, 2019), with limited implementation of bycatch measures (Dulvy *et al.*, 2008; Gilman, Passfield and Nakamura, 2014) and ecosystem-based management (Juan-Jordá *et al.*, 2018). MCS rules and standards vary widely and procedures are often not implemented in a uniform manner. Such discrepancies in how MCS is applied across States and RFMOs can undermine efforts to sustainably manage high seas resources (Dunn *et al.*, 2018; Pitcher *et al.*, 2009).

¹³⁸ I.e. A flag State may register vessels in exchange for a fee, without exercising effective control over the vessel. This is desirable to the vessel operator as it reduces the costs associated with, e.g. MCS equipment, safety, insurance and training.

¹³⁹ See *Request for an Advisory Opinion Submitted by the Sub-Regional Fisheries Commission* (SRFC Advisory Opinion), Advisory Opinion of Apr. 2, 2015; PCA Case N° 2013-19, *The South China Sea arbitration* (The Republic of the Philippines v. The People's Republic of China), para 983.

5.3. Lack of capacity

The lack of uniform and equal implementation of MCS rules can partly be explained due to differences between States in terms of available capacity and capital for investment and varying levels of willingness of governments to eliminate non-compliance (Hutniczak, Leroy and Delpuch, 2018). MCS and enforcement can be costly to implement, especially on the high seas, which may present challenges for developing States in particular to strengthen their MCS systems.

In terms of data collection and analysis, the most likely problem is not a lack of data, but the lack of capacity to store, process and analyse it (e.g. what kind of strategy would be appropriate to use). Further capacity development may therefore be needed and spatial and/or temporal targeting of observations may be helpful.¹⁴⁰ The information collected must be sufficient for effective governance, but not exceed interpretation capabilities. There are also challenges in relation to the lack of coherence of data. Moreover, there should be sufficient human resources with an expertise to interpret MCS data. In the end, data only has an impact if it is effectively gathered, delivered and used by decision-makers to support strong compliance provisions.

States that do not have proper fisheries management systems struggle to fully implement international fisheries law. Most developing countries, for example, “lack not only financial resources, but also the technical know-how, human resources, and infrastructure necessary to conduct proper stock assessments, develop and implement management measures, monitor fisheries for compliance, and impose penalties on violators” (Balton and Koehler, 2006).¹⁴¹ Distant water fishing nations sometimes take advantage of this “lax monitoring capacity” by conducting IUU fishing activities in their waters (Endangered Seas Campaign, 1998; Sumaila and Vasconcellos, 2000; Belhabib *et al.*, 2015; Daniels *et al.*, 2016; Okafor-Yarwood, 2019).

Off the coast of West Africa, one of the regions most affected by IUU fishing,¹⁴² significant support is provided from international funders in combatting illegal fishing in the region which adds transparency, increases surveillance activities and builds capacity for the MCS network both ashore and afloat, but also makes MCS efforts dependent on the availability of funding from external parties (Doubouya *et al.*, 2017b). Development assistance should therefore focus on creating a sustainable MCS framework that strengthens the legal system of Western African States, because this likely corresponds with higher sanctions and increased resources for MCS, thereby reducing incentives for IUU fishing and leading to a higher chance to catch offenders (Doubouya *et al.*, 2017b; Belhabib, Sumaila and Le Billon, 2019). The combination of increased capacity and a higher deterrence rate could, in turn, also make MCS in ABNJ more cost-effective.

¹⁴⁰ <https://www.prog-ocean.org/wp-content/uploads/2018/08/MCS-Workshop-I-summary-final.pdf>

¹⁴¹ For example, even though most States from the Gulf of Guinea have either signed or ratified the PSMA, their lack of advanced MCS systems and their struggle to effectively manage the activities of vessels flying their flag will make it unlikely that they will be in a position to fully implement the PSMA without further support from the international community (Okafor-Yarwood, 2019).

¹⁴² A recent study on the effectiveness of enforcement in countries in West Africa, where coastal fisheries can contribute approximately 38% of their GDP, shows that illegal fishing is responsible for losses of more than US\$2.3 billion a year in the period between 2010 and 2016, of which only US\$13.8 million a year are recovered through MCS (Doubouya *et al.*, 2017a).

6. Approaches to strengthening MCS in ABNJ

6.1. The transformative potential of innovative technologies

New technological tools, such as satellite monitoring and inference of vessel behaviour using “big data” techniques, are making it possible to monitor vessel activity from afar and identify potentially non-compliant behaviour. The increasing availability and declining cost of these technologies is likely to significantly change the MCS landscape in the coming years by allowing a wider range of actors to access relevant information. This could allow for greater oversight of flag State behaviour and activities, increase transparency, and, ultimately, “re-structure political and socio-spatial relations governing the world’s oceans by defining new roles and responsibilities, as well as draw new boundaries around who is included and excluded in ocean governance” (Toonen and Bush, 2018).

While such developments have to date been focussed largely on fisheries, there is considerable potential for further applications, such as improving the monitoring of oil spills, further technological developments, and further cost reductions that can drastically increase the availability of MCS options.

6.2. Co-creating effective MCS systems

In order to increase coherence and compliance, future rules and projects concerning ABNJ should be co-created with stakeholders to ensure appropriate design and early buy-in amongst different sectors. There may be, for example, resistance to MCS tools by the fisheries sector who might be concerned about control over the industry, while some fishers may also view MCS as a way to prove that their fish

was sustainably caught and provide them with a market advantage. By taking a collaborative approach, there is a higher chance that ocean users, such as fishers, will take ownership in the process of collecting data, will perceive the management system as legitimate and will be more compliant (Battista *et al.*, 2018).

6.3. Strengthening policy responses

MCS can be strengthened in ABNJ through a variety of policy options:

- Making IMO vessel registration numbers compulsory for all fishing vessels operating in ABNJ.¹⁴³
- Encouraging flag States to require VMS and to proactively share this data with RFMOs, coastal States and the public.¹⁴⁴ This would make it easier to track vessel activities (e.g. in or around ABMTs/MPAs).
- The lack of agreed standards for VMS means that there are many different approaches and requirements. Flag States and RFMO members could therefore cooperate to harmonise different systems and increase the interoperability of VMS data.
- MCS tools that are used for enforcement purposes are sometimes only useful “provided the legal requirements and pathways for prosecution are clear” (De Santo, 2018). States could therefore seek to ensure that they have an appropriate and effective penalty system in place with sanctions of sufficient severity to deter illegal activities.¹⁴⁵
- Improving accountability and transparency, e.g. through obligatory flag State performance assessments.

¹⁴³ The IMO ship identification number scheme is only mandatory for passenger and cargo ships, but the scheme is voluntary for fishing vessels of 100 gross tonnes and above. The IMO scheme does not apply to: ships without mechanical means of propulsion, pleasure yachts, ships engaged on special service (e.g. lightships, SAR vessels), hopper barges, hydrofoils and air cushion vehicles, floating docks and structures classified in a similar manner, ships of war and troopships and wooden ships. See: <http://www.imo.org/en/OurWork/MSAS/Pages/IMO-identification-number-scheme.aspx>

¹⁴⁴ Flag States are currently not obliged to share this data and RFMOs only share this data with their members.

¹⁴⁵ In the context of IUU fishing, for example, strengthening the legal system and increasing sanctions against repeat offenders and foreign illegal fishing can significantly enhance MCS efforts (Doubouya *et al.*, 2017b).

- Strengthening cooperation and collaboration on mutual assistance and joint MCS and enforcement.
- Encouraging greater sharing of data and improving the capacity of States to collect, share and analyse data.

6.4. Leveraging the power of the market

Market- or trade-related measures can take the form of a restriction on imports of goods/services or restrictions on the rights of others to export goods/services (Leroy, Galletti and Chaboud, 2016), but also subsidies and tax exemptions. In order to make trade measures legitimate and effective, they must: 1) be designed to be in accordance with international obligations, including WTO rules; and 2) not constitute unjustifiable and unnecessary barriers to trade and favour multilateral processes as far as possible (Le Gallic, 2008). In relation to MCS, “emerging data technologies may help to overcome some aspects of the trust crisis by consumers into management authorities and the industry by improving the transparency for controlling agents such as end-consumers, NGOs and management authorities” (Probst, 2019).

Market measures are especially relevant in the fisheries context, because access to the market is essential for fishing operators. Several market measures have gained traction, such as catch documentation schemes and eco-labelling that can enhance traceability and transparency.¹⁴⁶ The EU tackles IUU fishing through market measures via the EU IUU Regulation through which EU operators who fish illegally can receive substantial penalties which can deprive them of any profit. Exporting States are subject to a carding system which incentivises them to take action to reduce IUU fishing. The EU issues warnings (yellow cards) in case exporting States are not combatting IUU fishing effectively and can also ban the export of fish to the EU through issuing a red card.¹⁴⁷ However, the role of market measures to influence or strengthen MCS of other human activities is limited, because there is no market or trade that can be influenced.¹⁴⁸

¹⁴⁶ <http://www.fao.org/3/a-i8183e.pdf>

¹⁴⁷ https://ec.europa.eu/fisheries/cfp/illegal_fishing_en

¹⁴⁸ With regards to MGRs, for example, the activity is non-extractive, does not necessarily deplete the resources and the value is created exclusively on land with a limited market. <http://www.ecoast.nl/nl/news/content/documents/Aberdeen%20BBNJ%20Workshop%20Report%20FINAL%20FOR%20CIRCULATION.pdf>

7. Strengthening MCS through an international instrument

MCS will be crucial to ensuring compliance with any management measures developed under a future international agreement on BBNJ. There is therefore an opportunity to use the future agreement to strengthen existing MCS frameworks. This section explores how a new ILBI could advance MCS in relation to the general obligations of the agreement, the package deal components, institutional arrangements and the clearing-house mechanism.

7.1. General obligations

Three key general obligations could be included in the ILBI to strengthen MCS systems at a regional, sectoral or global level: 1) cooperation and coordination; 2) transparency; and 3) reporting.

Cooperation and coordination

Cooperation and coordination on MCS may take place at all levels:

- Global (e.g. through the International MCS Network);
- Regional (e.g. through RFMO/As);
- Sectoral (e.g. through the IMO);
- National (e.g. between relevant government ministries and authorities).

Cooperation between these levels and between sectors is limited, with barriers including: 1) different geographical mandates and membership compositions of intergovernmental institutions; 2) limited capacity of institutions to engage in cross-sectoral collaborative activity; 3) limited understanding of ecological connectivity between areas within

and beyond national jurisdiction; and 4) lack of appropriate domestic coordination leading to inconsistent national positions in global or regional governance forums.¹⁴⁹

Even though enhanced cooperation and coordination among different organisations with a mandate to regulate activities in ABNJ will likely not be sufficient to overcome existing governance gaps (Dunn *et al.*, 2018), cooperation and coordination could nonetheless strengthen MCS in ABNJ by sharing knowledge, intelligence, data, capacity and best practices. Cooperation between flag States and port States can lead to better “regional compliance and enforcement of measures to control nationals” (Erceg, 2006).

Initiatives to improve communication and cooperation are often valued by participating compliance officers and MCS experts because they provide an opportunity to share information and build trust – this has been noted, for example, by participants in the Tuna Compliance Network and Fish-i Africa Task Force.¹⁵⁰ Therefore, it would be useful to ensure that the future ILBI includes a general obligation for coordination and cooperation that takes into account MCS.

Transparency

Transparency is widely recognised as a prerequisite to good governance and is increasingly incorporated into codes of conduct and guidelines (Ardron, Ruhl and Jones, 2018), as well as into international law and negotiations (Peters, 2015). Moreover, transparency is an obligation under the UNFSA.¹⁵¹ The term ‘transparency’ often refers to the following three components of the decision-making process in the context of multilateral environmental agreements:

149 https://www.unep-wcmc.org/system/dataset_file_fields/files/000/000/446/original/ABNJ_Institutional_Arrangements_final_for_publication_300517.pdf?1496144106

150 UNFAO, Report of the Fifth Global Fisheries Enforcement Training Workshop in Auckland, New Zealand, from 7-11 March 2016. For example, the Chair of the FISH-i Africa Task Force has stated that: “the cheapest tool in fighting IUU fishing is the sharing of information and intelligence through cooperation among all MCS practitioners”.

151 *Ibid.*, Article 12.

1. Timely availability to members and the public of information used as inputs to decision-making;
2. Ability of the public to observe or participate in meetings and to review materials produced during the progression of decision-making processes;
3. Access to outputs of decision-making, including findings on compliance via compliance reviews and performance assessments (Ardron *et al.*, 2014).

Transparency has long been associated with improved accountability, enforceability, compliance, sustainability and more equitable outcomes (Ardron, Ruhl and Jones, 2018).¹⁵² For example, transparency obligations in RFMOs can increase trust among States and assurances that others are fulfilling their commitments, thereby incentivising them to do so as well (Deprez, Colombier and Spencer, 2015). On the other hand, when stakeholders benefitting from marine resources are expected to be transparent about their activities, the burden is reversed.¹⁵³ It also means “good behaviour is rewarded, monitoring is cheaper and more effective, and bad actors stand out more clearly and can be penalised appropriately”.¹⁵⁴ Ultimately, only when activities are visible will they be amenable to management and regulation.

Reporting

Reporting, which is closely linked to transparency, “constitutes a pre-condition for informed and advanced decision-making and serves the purpose of understanding whether and if so, to what extent, States are fulfilling their obligations” (Englander *et al.*, 2014). There is currently a lack of specific monitoring and reporting requirements concerning ABNJ. Such reporting will be crucial because it can: 1. Enhance transparency and increase understanding of the nature of activities relating to ABNJ; 2. Help measure the impact

of these activities on marine biodiversity; and 3. Be used for enforcement purposes. This is likely of particular interest to States not conducting activities in ABNJ, as they may be affected by the impacts of other States’ activities on biodiversity and ecosystem services.

Reporting and information exchange provisions in the new ILBI in relation to EIAs, for instance, are a welcome incremental step towards more effective compliance and enforcement of the new agreement. It is important, however, to ensure that reporting obligations are not onerous or overly burdensome for States and therefore it would be useful to streamline and consolidate reporting obligations to avoid multiple reporting of the same information.

Table 3 illustrates that the draft text (November 2019) has already to some extent incorporated the general obligations of cooperation and coordination, reporting and transparency. The draft text, for example, introduces novel global MCS requirements for the utilisation of MGRs, addresses the implementation of ABMTs, including MPAs, and provides options for collaboration in data monitoring and reporting.

7.2. Package deal components

MCS can play a role in all four elements of the ‘Package Deal’ under discussion,¹⁵⁵ and may in turn be strengthened through provisions that place obligations on States to facilitate cooperation and coordination, reporting and transparency. From the outset, it is important to note that MCS plays a role at different stages of ABNJ activities (from MPA designation phase to post-EIA monitoring) and can be used for both monitoring activities (enforcement of regulations) and monitoring impacts (assessing policy). This section examines the different roles that MCS can play in four package deal components and how MCS can be strengthened through the clearing-house mechanism as well as institutional arrangements.

¹⁵² A distinction can be made in this context between internal transparency, i.e. between ministries within a government or parties within an international organisation, and external transparency, i.e. between such organisations and non-members/the public. This is especially relevant regarding access to information, because some data sharing arrangements between States do not necessarily increase transparency from the perspective of the public.

¹⁵³ <https://globalfishingwatch.org/data/data-sharing-key-to-building-the-transparency-needed-to-assess-and-respond-to-ocean-risk/>
¹⁵⁴ *Ibid.*

¹⁵⁵ Negotiations will cover the ‘Package Deal’ of issues agreed in 2011, namely: marine genetic resources (MGRs), including questions on the sharing of benefits; area-based management tools (ABMTs), including marine protected areas (MPAs); environmental impact assessments (EIAs); and capacity-building and the transfer of marine technology.

Table 3. Reflection of MCS general obligations in the draft treaty (November 2019)

General obligation	Relevant provisions in the draft treaty*	
Cooperation & Coordination	<p>One of the objectives of the treaty is to “further international cooperation and coordination”.</p> <p>“States Parties shall cooperate (...) for the conservation and sustainable use of marine biological diversity”, “promote international cooperation in marine scientific research”, and “cooperate to establish new global, regional and sectoral bodies, where necessary”.</p> <p>Establishment of coordination and collaboration mechanisms and/or consultation processes to enhance cooperation and coordination among different instruments and among conservation and management measures.</p> <p>The clearing-house mechanism shall “facilitate international cooperation and collaboration, including scientific and technical cooperation and collaboration”.</p>	Articles 2, 6, 12, 14, 15, 20, 23 43, 48, 51, 52, Annex.
Reporting	<p>States Parties shall report on research findings, including data collected and all associated documentation; their utilisation of MGRs and on the implementation of ABMTs.</p> <p>Environmental impact assessment reports shall be submitted to the Scientific and Technical Body for review.</p> <p>Each State Party shall monitor and report to the Conference of the Parties on measures that it has taken to implement this Agreement.</p> <p>Capacity-building activities include “technical support for the implementation of the provisions of this Agreement, including for data monitoring and reporting”.</p>	Articles 13, 21, 21bis, 34-38, 40, 41, 45, 47, 50, 51, 53, Annex.
Transparency	<p>Data related to MGRs shall be published and used taking into account current international practice in the field.</p> <p>ABMT/MPA consultations “shall be inclusive, transparent and open to all relevant stakeholders”. The secretariat shall make that proposal publicly available, shall facilitate consultations and shall make any contributions received publicly available.</p> <p>Decisions of the Conference of the Parties shall be made publicly available and shall be transmitted to all States Parties in a timely manner as well as to relevant legal instruments/bodies.</p> <p>Reports of State Parties on the implementation of ABMTs/MPAs shall be made publicly available by the secretariat.</p> <p>States Parties shall make public the comments received and the descriptions of how they were addressed during consultation processes regarding planned activities under their jurisdiction or control.</p> <p>The clearing-house mechanism shall “facilitate enhanced transparency, including by providing baseline data and information”.</p>	Articles 11, 18, 21, 34, 36, 38, 41, 44, 47, 48, 51 and 52.

*https://www.un.org/bbnj/sites/www.un.org.bbnj/files/revised_draft_text_a.conf_.232.2020.11_advance_unedited_version.pdf

Marine genetic resources

MCS can play a role in relation to marine genetic resources (MGRs) in case rules will be established to monitor the utilisation of MGRs in ABNJ. The monitoring of MGR activities, such as ‘bioprospecting’, could be useful to measure any impact of MGR activities on the marine environment in ABNJ and for reporting on who is conducting what kind of MGR activities, where and for what purpose. The draft text includes provisions obliging States Parties to monitor and report on when marine genetic resources (MGRs) are accessed in ABNJ (Article 13). This could in turn increase the accessibility to MGRs and help with establishing any future benefit sharing arrangements.

Area based management tools

MCS could play a role in the development of ABMT proposals, their implementation and the monitoring of whether ABMTs perform in accordance with the objectives identified in their designation process (Dunn *et al.*, 2018). This is especially relevant in relation to very large MPAs (VLMPA), because their vastness and remoteness can make surveillance tools impractical or expensive to implement (Singleton and Roberts, 2014; Rowlands *et al.*, 2019). However, with the emergence of new MCS tools (e.g. satellite technology) and their decreasing costs as well as international monitoring and enforcement partnerships, monitoring and enforcement of VLMPAs can become increasingly cost-effective and improve remote MCS and compliance (Ceccarell and Fernandes, 2017; O’Leary *et al.*, 2018). The effectiveness of MCS can be the deciding factor for whether MPAs will realise their conservation and management objectives (Rowlands *et al.*, 2019). Vessel monitoring and enforcement capacities will therefore need to be reinforced and the ILBI could help catalyse the provision of “adequate resources for follow-up, through patrols, and correspondence with flag States and fisheries management organisations” (Rowlands *et al.*, 2019).

The draft text on ABMTs includes provisions on international cooperation and coordination (Article 15), implementation (Article 20) as well as monitoring and review (Article 21). MCS could play a role in the development of ABMT proposals, implementation of any management measures ultimately adopted, and monitoring their outcomes.

Environmental impact assessments

The new instrument could strengthen MCS by establishing minimum standards or reporting mechanisms for Environmental Impact Assessments (EIAs) and Strategic Environmental Assessments (SEAs)¹⁵⁶ (UNCLOS does not provide guidance or minimum standards, nor a reporting mechanism). Various intergovernmental organisations have developed specific requirements to conduct EIAs for certain human activities in ABNJ,¹⁵⁷ but many activities are not subject to any specific EIA requirements (Wright *et al.*, 2018).¹⁵⁸

The new ILBI could serve as a “best practice model for EIA and SEA processes for ABNJ” and provide for a default mechanism where activities are not covered by existing frameworks (Warner, 2012). It is also important that the ILBI provides for monitoring and follow-up in cases where an activity has greater environmental impacts than initially envisioned.

The draft text includes obligations for States Parties to conduct public notification and consultation, publish and communicate the results of assessments, and ensure that the environmental impacts of the authorised activities are reviewed (Articles 34-41). Reporting and information exchange provisions in relation to EIAs could be an important incremental step towards more effective compliance and enforcement overall.

¹⁵⁶ EIAs are tools which can be used to determine whether planned activities of States under their jurisdiction or control cause significant harmful changes to the marine environment. SEAs are related to plans, programmes and policies relevant to a particular region or sector of activity in ABNJ rather than activities.

¹⁵⁷ Such as deep-sea bottom fishing, seabed mining in the area and dumping of wastes and ocean fertilisation.

¹⁵⁸ Including: “seabed activities other than mining, (e.g. cable and pipelines, seabed installations, marine scientific research, bioprospecting, sea-based tourism); high seas activities other than dumping and some fishing (e.g. shipping, marine scientific research, floating installations (e.g. wave, nuclear, CO2 mixers)); impacts of high seas fishing activities on outer continental shelves of coastal nations (e.g. deep sea fishing impacts on sedentary species and resources, vulnerable benthic ecosystems); impacts of outer continental shelf activities on high seas (e.g. seismic testing noise); military activities; new or emerging uses of the seas” (Gjerde *et al.*, 2008).

Capacity building and transfer of technology

Capacity differences between States is one of the biggest MCS challenges and many States have prioritised capacity building and the transfer of technology during the negotiations, in particular developing countries who argue that the new instrument should include: “establishment or strengthening the capacity of relevant organizations/institutions in developing countries to deal with conservation of marine biological diversity in ABNJ; access and acquisition of necessary knowledge and materials, information, data in order to inform decision making of the developing countries” (Dunn *et al.*, 2018). The draft text includes a non-exhaustive overview of types of capacity-building and technology transfer activities, many of which could provide a basis for enhancing MCS capacity.¹⁵⁹

There is significant support from States to include a centralised information repository through a clearing-house mechanism. The draft treaty text (Article 51) suggests that an open-access platform could enable States Parties to access and publicise information on capacity building and technology transfer opportunities, as well as facilitate enhanced transparency and international cooperation and collaboration. In relation to MCS, this mechanism could, for example: encourage States Parties to share best practices; increase capacity for the design and implementation of MCS technologies and policies; and highlight opportunities to collaboratively monitor activities at sea. The clearing-house mechanism can also “develop capacity for the preparation and review by existing sectoral and regional bodies of EIAs of activities in ABNJ that may pose a risk to biodiversity” (FAO, 2018).

7.3. Institutional arrangements and the clearing-house mechanism

The effective implementation of the provisions of a new instrument will necessitate the establishment of some institutional structure through which parties can take decisions, undertake coordination and integrate efforts, and perform reviews and assessments of implementation (Mace *et al.*, 2006; Wright *et al.*, 2018). Though the creation of a global enforcement agency is beyond the scope of the negotiations, there has been significant support for “a hybrid model, in which regional and sectoral mandates are reinforced, with global governance and guidance, possibly including mechanisms for global oversight and review” (Wright *et al.*, 2018).¹⁶⁰

159 Including: “Technical support... including for data monitoring and reporting”; “Increasing cooperative links between regional institutions”; “The development and strengthening of human resources and technical expertise through exchanges, research collaboration, technical support, education and training and the transfer of technology”; and “Collaboration and cooperation in marine science”.

160 However, the current climate of negotiations, in which States seem reluctant to create new institutions, does not make it likely that the treaty will include a global enforcement agency. This consideration is especially relevant in the context of ABMTs and MPAs in particular, because there is currently no institution responsible for monitoring ABMTs/MPAs in ABNJ. If there will be no institution created that will monitor compliance of flag States, then it is likely that this responsibility will remain disaggregated and diffuse. In that case, cooperation and coordination between the different institutions responsible for setting up, monitoring and taking enforcement measures for MPAs will be key.

8. Conclusion: three proposals to strengthen MCS through a new instrument

The future ILBI could reinforce existing obligations and build on existing procedures to help ensure transparency, cooperation and coordination, and reporting. Many of the key provisions in the draft text remain in brackets,

so negotiators may wish to keep in mind the need to include strong MCS provisions when further debating and refining the text. In addition, three potential pathways for strengthening MCS provisions are outlined below.

Table 4. Proposals to strengthen MCS through a new instrument

1. Reinforce MCS flag State obligations in the text and ensure the principles and related obligations of cooperation and coordination, transparency and reporting are applied throughout the agreement.
2. Specify that a clearing-house mechanism will serve as a platform to share good MCS practices, exchange data on MCS activities and match capacity-building needs in relation to MCS tools and methods for assessment.
3. Require States parties to submit a MCS strategy together with ABMT/MPA proposals that considers the possible technological tools and institutional capacity available to ensure compliance with any proposed measures or management plan.

Reinforcing MCS obligations and principles

The ILBI could reinforce existing general obligations relevant to MCS, such as those regarding cooperation and reporting.¹⁶¹ Key MCS principles, such as transparency and cooperation, could be explicitly included in Article 5 on general principles and approaches, which would help ensure that such principles are applied consistently throughout the agreement.¹⁶² The treaty could also apply the ABMT implementation provisions in Article 20 of the draft text to the entire agreement, so that States Parties are required to “ensure compliance by vessels flying their flags and enforcement” in all aspects of the treaty. Finally, the treaty could urge flag States, port States and coastal States to ensure compliance (as in the preamble of UNFSA) and call for sub-regional and regional cooperation in enforcement (as in UNFSA Article 21).

Developing a strong role for the clearing-house mechanism

The ILBI could define a strong MCS role for the clearing-house mechanism by specifying that it shall serve as a platform to share best MCS practices, exchange data on MCS activities, and match capacity-building needs in relation to MCS tools and methods for assessment (Article 51). The treaty could include specific references to building MCS capacity in order to reduce the burden of reporting requirements on developing States and assist them in meeting their obligations. The treaty could specify the types of MCS information States Parties are obliged to share through the clearing-house mechanism. For example, flag States can be obliged to report on accessed MGR from ABNJ to the clearing-house mechanism after the material has been deposited.

¹⁶¹ See for example Articles 117, 118 and 205 of UNCLOS.

¹⁶² See for example Article 5 of the UNFSA.

Incorporating a MCS strategy for ABMT proposals

The draft treaty text suggests that States Parties could be required to submit a “monitoring, research and review plan” as part of proposals for ABMTs and MPAs (Article 17(4)). The treaty could further require submission of a MCS strategy that considers the possible technological tools and institutional frameworks available to ensure compliance. Incorporating a MCS strategy for ABMT proposals could provide an initial indication of the resources required to ensure effective MCS of the proposed

measure¹⁶³ and encourage States Parties to consider the kinds of MCS tools they have at their disposal for different kinds of ABMTs. For example, this could include consideration of innovative technological tools, such as satellite monitoring, for large MPAs; and consideration of potential partnerships and capacity-building activities in relation to MPAs adjacent to coastal States or seeking to manage a particular marine feature or human activity. To this end, the treaty could also invite relevant bodies, such as RFMOs, to provide information regarding their MCS activities and possible role in enforcing ABMTs.

¹⁶³ Regulatory bodies often fail to map the full costs of MCS programmes, even though some costs (e.g. for satellite data) are relatively easy to plan for (Rowlands *et al.*, 2019).

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About the STRONG High Seas Project

The STRONG High Seas project is a five-year project that aims to strengthen regional ocean governance for the conservation and sustainable use of marine biodiversity in areas beyond national jurisdiction. Working with the Secretariat of the Comisión Permanente del Pacífico Sur (CPPS; Permanent Commission for the South Pacific) and the Secretariat of the West and Central Africa Regional Seas Programme (Abidjan Convention), the project will develop and propose targeted measures to support the coordinated development of integrated and ecosystem-based management approaches for ocean governance in areas beyond national jurisdiction (ABNJ). In this project, we carry out transdisciplinary scientific assessments to provide decision-makers, both in the target regions and globally, with improved knowledge and understanding on

high seas biodiversity. We engage with stakeholders from governments, private sector, scientists and civil society to support the design of integrated, cross-sectoral approaches for the conservation and sustainable use of biodiversity in the Southeast Atlantic and Southeast Pacific. We then facilitate the timely delivery of these proposed approaches for potential adoption into the relevant regional policy processes. To enable an interregional exchange, we further ensure dialogue with relevant stakeholders in other marine regions. To this end, we set up a regional stakeholder platform to facilitate joint learning and develop a community of practice. Finally, we explore links and opportunities for regional governance in a new international and legally-binding instrument on marine biodiversity in the high seas.

Project duration: June 2017 – May 2022

Coordinator: Institute for Advanced Sustainability Studies (IASS)

Implementing partners: BirdLife International, Institute for Sustainable Development and International Relations (IDDRI), International Ocean Institute (IOI), Universidad Católica del Norte, WWF Colombia, WWF Germany

Regional partners: Secretariat of the Comisión Permanente del Pacífico Sur (CPPS), Secretariat of the Abidjan Convention

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