出國報告(出國類別：其他)

參加「經濟合作暨發展組織(OECD)第121屆漁業委員會(COFI)例會與為永續漁業而改革研討會」報告

服務機關：行政院農委會漁業署

姓名職稱：蔡天享 簡任技正

李俞青 助理

派赴國家：法國(巴黎)

出國期間：中華民國 107 年 5 月 1 日至 5 月 6 日

報告日期：中華民國 107 年 5 月 14 日

摘要

一、經濟合作暨發展組織(OECD)第 121 屆漁業委員會(COFI)例會及為永續漁業而改革研討會於本(107)年 5 月 2 日至 4 日假法國巴黎 OECD 總部會議中心召開，我國由本署遠洋漁業組蔡天享簡任技正與對外漁協李俞青助理代表出席，李俞青亦受邀擔任研討會其中一議程之主席；另，我駐法國台北代表處經濟組梅碧琦副組長亦全程陪同出席提供協助。研討會主軸係討論政府面對社會、經濟、資源、及海洋科學不確定性資訊為佐證時，該如何運用於改革並擬定最佳政策。後兩日例會則討論 2 日研討會內容與永續漁業改革 2019-20 工作計畫及預算、越南漁業及養殖政策、漁業相關貿易談判報告、打擊 IUU 漁業報告、觀察員向 COFI 報告漁業相關漁業活動及觀察員報告等議題。

二、自去年起漁業委員會秘書處開始執行有關永續漁業改革相關議題之探討。今年請各國繳交改革相關問卷，並為該議題召開研討會，邀請不同組織官員擔任會議講者，供 COFI 會員及非會員同講者討論相關議題，並建議政策之預防、目標、工具、過程、評估、改善等，俾便改善現況或未來趨勢方向。

三、多國代表在會中向秘書處表達希望增加養殖漁業、中國相關研究分析及補貼議題之相關計畫、研究、分析、及納入繳交資料中。其中原因包含過去養殖漁業相關研究比例較捕撈少，但養殖漁業占漁產品食用率日漸趨高，爰應及早擬定計畫執行研究；另，因中國養殖漁業為全球前三名，更成為多國自去年例會關心重點之一。

目　　錄

壹、目的

一、經濟合作暨發展組織(Organization for Economic Co-operation and Development，簡稱 OECD)成立於 1961，組織係由理事會為最高權力機構；另設立約 250 個不同專門委員會(Committee)、工作小組(Working Party)及專家小組(Expert Group)，針對實質經濟與社會問題進行討論與研究，相關成果做成報告獲建議案提報理事會裁決(共識決)。OECD 素有 WTO 智庫之稱，強調以政策對話方式達致跨國政府間的經濟合作與發展，並建立會員國強而有力的經濟實力，其功能包括提供對話機制，以分享施政經驗、解決共有問題、確認優良施政措施及調和國內與國際之政策實施，以及辦理論壇，藉由同儕壓力來改善政策，達成國際性協議之政策工具，以進一步參與全球化經濟。

二、「漁業」、「鋼鐵」及「競爭」三個 OECD 委員會為我國得以「一般觀察員」身分參與 OECD 之活動，原須每 2 年更新觀察員身分，2012 年起 OECD 更改非會員國參與規則，改由各委員會研擬「全球關係策略」並制定「參與計畫」逕行邀請非會員國以「參與方(Participant)」身分參與，此計畫送交委員理事會核准後，我方參與資格因新規定更動而自動延長至 2013。而漁業委員會(Committee for Fisheries；COFI)之參與計畫於 2013 年七月正式為理事會通過，我方於 COFI 第 112 屆會議首次以「參與方」身分出席該會議。未來仍秉持以實際參與原則，以「參與方」身份定期出席漁業委員會並積極參與漁業委員會所辦之活動，將有助於強化我國與 OECD 及相關國際組織之互動與合作關係，進而提升我國國際能見度與重要性。

三、漁業委員會(Committee for Fisheries；COFI)係以責任制、永續性、全球化及生態和諧等思維為基礎，匯集跨領域、跨地域專家學者意見，研擬當前國際全方位漁業政策改革，進而影響聯合國糧農組織(FAO)及國家之關注與討論。漁業委員會代表團多為各國參與漁業相關組織代表性人物，建立聯繫管道有利於未來國際漁業合作及交流，爰我國宜持續與 COFI 保持密切聯繫，以共同關切議題促進與他國互動，倘有機會在專案計畫合作進行研究，或合辦研討會，能營造有利於參與國際社會條件，營造有利與參國際會議條件，並增加參與程度。

四、我國歷年來積極參與 COFI 相關活動，並於期限內完成、繳交並針對委員會要求修改相關文件。其中包含國家報告、漁業數據及漁業支持估算等皆為定期繳

交文件，去年繳交我國打擊非法、未報告及不受規範(Illegal, Unreported, and Unregulated；IUU)政策問卷，而今年與會中亦分享我方經驗及表達看法。秘書處在彙整各國漁業相關資訊後將其成為國際漁業重要依據，內容涵蓋全球漁業現況暨發展趨勢，該結果能作為我國漁業政策研擬及產業輔導之方向參考。

貳、會議過程

一、 經濟合作暨發展組織(OECD)漁業委員會(COFI)在法國巴黎 OECD 總部於本(2018)年 5 月 2 日至 4 日召開「第 121 屆漁業委員會會議及為永續漁業而改革研討會」，我方在我駐法國台北代表處經濟組梅碧琦副組長陪同下，由本署遠洋漁業組蔡天享簡任技正與對外漁協李俞青助理與會；另，李助理亦受邀擔任研討會一場議程之主席。

二、 會議代表包含美國、澳洲、英國、歐盟、日本、韓國、聯合國糧農組織（FAO）、、商業與工業諮詢委員會(BIAC)、我國等參與方、研討會講者、及秘書處共約 110 餘人與會(出席明單如附件 1)。會議主席係由荷蘭籍 Mr. Leon Lomans 擔任，貿易與農業處資深農業政策顧問 Rachel Bae、研究員 Roger Martini、Woojin Nam 等人列席與會。

三、 會議開始前我方代表與秘書處、他國代表如阿根廷外交部長(Ms. Reina Sotillo)、智利國際關係局資深官員(Ms. Karin Mundnich)、美國海洋暨大氣總署資深國際貿易專員(Mr. Greg Schneider)、韓國海洋與漁業部官員、聯合國糧農組織海洋與內陸漁業部主任(Mr. Yimin Ye)、國際海洋探測委員會協調官員(Mr. Mark Dickey-Collas)、加州大學教授(Mr. Christopher Costello)等其他國代表寒暄並交換意見，多數國同去年對養殖漁業深感興趣。會後我方向本次會議主席 Mr. Leon Lomans、秘書處 Roger Martini 及 Claire Delpeuch 等人表達感謝之意。

四、 研討會由各場次主席作開場，後由講者接續進行 5 至 10 分鐘演講，結束後開放各國提問及發表意見，三場次皆由主席先行發問後始開始問答及討論。議題主要係政府面對社會、經濟、資源、及海洋科學不確定性資訊為佐證時，該如何運用於改革並擬定最佳政策。

五、 本次例會舉行方式主係由各國代表針對各項議程未來發展方向及其他經費安排給予意見，並由 OECD 專家及 FAO 官員報告近期活動及未來規畫；另，本次會議於第三日為哥斯大黎加追加一項議程，此議程係為討論該國可否成為漁業委員會會員國之一，爰除會員國外，我方與其他參與方皆無法參加。議題主要為工作計畫與預算、漁業改革政策、漁業相關貿易談判報告、特定國家漁業及養殖政策、打擊 IUU 漁業報告、觀察員報告及相關漁業活動等。

六、 本次我團出國開會行程如次:

5 月 1 日(星期二)搭機直飛赴法國巴黎

5 月 2 日(星期三) 參加 OECD-COFI 為永續漁業而改革研討會

5 月 3 日(星期四) 參加 OECD-COFI 第 121 屆漁業委員會第 1 日會議

5 月 4 日(星期五)參加 OECD-COFI 第 121 屆漁業委員會第 2 日會議

參、會議紀要

茲就本(2018)5 月 2 日至 4 日召開「第 121 屆漁業委員會例會與為永續漁業而改革研討會」之會議紀要敘述如下(議程如附件 2)：

5 月 2 日為永續漁業而改革研討會

一、 會議於上午 10 時由荷蘭籍 Leon Lomans 主席開場。

二、 研討會開場

(一)會議主席開場並簡介本日議程，並由秘書處報告本日會議討論議題內容，主係有關漁業部門與經濟、社會及產業之間關係，及目標性漁業管理改革及最佳政策決定。秘書長希望並非討論國家做錯什麼，而是改革該如何真正執行進而達到實際永續結果。

(二) 漁業改革應認知到社會經濟改革對法律管理得推動影響很大，部門的回應重要性，並可探討如何使用漁業部門外佐證(如:飲食市場)。

(三) 管理能力與資源恢復息息相關。

三、 議程建議項目

(一) 改革：社會經濟改革對法律管理推動影響大、管理能力與資源恢復相關、參考成功案例、投入更多政府投資、納入相關利益者參與並賦予話語權、持續性負責任管理、取得更多共識、考量各國發展不同、增加透明度。

(二) 佐證：納入漁業部門外資訊、參考同行資訊、資訊維持在可理解範圍內、納入專家並做最佳預估數據、持續性數據、納入環境、生態及氣候因素、建議最大持續生產量資源評估。

(三) 目標：政府需設定目標標準(例：不該捕撈多少魚)、中央地方共同執行、時間內完成目標、排除政治影響、下至上管理與合作、適應性目標、附有彈性及明確性的目標、持續性磋商與評估。

(四) 議程「改革過程之佐證應用」：由我方擔任會議主席，並就討論內容，概述應重實際執行、預防方法制定、時間內完成任務，以及最佳政策持續性。

5 月 3 日漁業委員會(COFI)例會第一日

一、 本日進行 COFI 會議第 1 天議程，討論工作計畫與預算、漁業改革政策、漁業相關貿易談判報告等議題進行討論，重點如下：

二、 2019-20 年工作計畫及預算

秘書處請各國依照各國優先選擇計畫排列順序，並討論該如何分配經費各項計畫。

(一) 養殖應被加入漁業支持預估(FSE)數據庫，但有些國家沒有被加入。

(二) 歐盟：加入環境相關因素，一定要加入中國，否則無意義。

(三) 秘書處回應：發現各國重視養殖漁業相關之經費議題，會先處理方向及範圍擬定，盡可能含括開發中國家在計畫中。希望透過 WTO 在數據庫的蒐集提升數據的完整性，並讓 WTO 了解 OECD FSE 的狀況。

(四) 也應在藍色經濟成長計畫中加入養殖漁業相關內容，認同加入農業分析對該計畫有其效益。

(五) 歐盟：建議使用管理策略評估(MSE)，優先建議藍色經濟的執行。

(六) 建議訊息及通訊技術，可追溯性及開發證明是可再進一步討論。秘書處：新計畫將與執行中計畫作連結。COFI 的目標將會更準確提供最好的計畫給決策者，爰此無法把所有各國有興趣想法納入。

(七) 多數國家選擇藍色經濟為優先。

三、 漁業改革政策

(一) 仍在等待全部國家繳交問卷，並於下屆會議題提供最後報告。

(二) 加拿大認為應納入更多與危機相關因應之改革分析。

(三) 我國：恭喜秘書處第一天成功會議及具豐厚的結果，並希望再問卷問題可較開放如有關保護區，我國係用海洋保護區(MPA)而非區域性漁業使用權(TURF)。

(四) 秘書處：希望可將研討會內容納入問卷分析結果。

四、 漁業相關貿易談判報告

(一) 討論六月專家會議(Expert Meeting) 的投入內容，工作項目應可多強調打擊 IUU 部分，主係評估政策。

(二) 討論漁業政策評估模型(The Fisheries Policy Evaluation Model, FishPEM)。

(三) 我國發問為何非使用實際數據而是模擬數據?該如何解釋真正結果?秘書處回應模型是要協助了解可能狀況，有些背景資料，缺乏的數據則是提供一個比較的模型(具彈性)，monte carlo 是為討論弱點，但結論不會差太多，我們現在疑慮，但重點是了解狀況不是看現實世界中是什麼問題。

五、 統計與數據蒐集

(一)養殖數據將直接由 FAO 處裡，總容許捕獲量(TAC)和豐度評估(T&T)將再更動也先不要求會員繳交，metadata 也有改變等。

(二)FAO 漁獲資料是以海域五度方格分區，OECD 則為港口卸魚量，有所不同，需進一步研究。

(三)秘書處建議將數據同時寄給 FAO，並在下次蒐集數據想將所有數據都追

朔到 1995。

(四)歐盟：就業相關數據歐盟已有做，可不需重複作業。秘書處感謝並接受

六、 OECD/FAO 農業展望—漁業篇章

(一) FAO 針對漁業產出及貿易相關數據分析。

(二) 對該篇章處裡方式歡迎並開放意見，5 月 25 日前開放意見至最終出版

(三)歐盟：討論和現實狀況有落差，且漁業補貼應被納入。數據是否帶來相關性之效益?秘書處認為模擬假設性研究皆係必要的。

(四)最終版將於下屆例會提供 COFI 參考。

5 月 4 日漁業委員會第二日

本日進行第 2 天議程，續討論工作計畫與預算、特定國家漁業及養殖政策、打擊 IUU 漁業報告、觀察員報告及相關漁業活動等議題進行討論，重點如下：

一、 打擊非法、未報告、不受規範漁業

(一)最終版本在下一屆例會出版 (2018 年 11 月)。

(二)各國感謝秘書處的努力，日本認為問卷應朝各項措施執行效率而非僅討論是否有相關措施。分析中數據也應有所更多分數來打而非 1 或 2。

(三)多國亦表達應增加問卷深度(例如：阿根廷認為應納入打擊非法勞工)。

(四)不同問題有不同做法可再去發揮，例如漁船註冊與權宜船註冊可以由不同管道處裡。

(五)秘書處：11 月將有更詳細分析，不去談效益因係分析是否有相關措施存在。

二、 工作計畫與計算

針對 2019-2020 若經費不足投票決定優先執行哪項計畫，其中包含我國參與之漁業回顧(Review of Fisheries)、擴張 OECD 對支持補貼政策分析的執行能力、及漁業投入藍色經濟。因我國有參與回顧相關報告爰排第一，而因支持補貼相對敏感而排第三。

三、 漁業相關活動報告(議題)：

(一)生物安全工作 ENV/EHS(環境、健康及安全計畫)：風險評估現代生物科技產品，主報告有關大西洋鮭魚(芬蘭、挪威、美國)，目標放養殖而非釋放入海中。(基因編組會議 6/28-29)

(二) 綠化海洋經濟：自然資源、氣候變遷、生物多樣性及環境影響相關會議。(5/30)

(三)海洋經濟團隊：2016 出版之海洋經濟 2030，現階段目標係永續海洋經濟創新。

(四)合作研究計畫—為持續農業系統之生物資源管理：食物生產(CRP 計畫)。

備註：計畫相關資訊會放在會員官網 (delegate’s corner)

四、 會員國及觀察員報告有關 COFI 或漁業活動：

(一)俄羅斯報告國家漁業相關活動，主係討論鼓勵將不合格漁船淘汰換新，並以分配更多配額及補助為鼓勵方式。

(二)阿根廷簡報國家打擊 IUU 漁業相關資訊。

(三)泰國報告打擊 IUU 漁業：漁業改革及勞工權益維護。

(四)我國報告有關世界水產學會亞太區年會辦理情形並感謝相關與會國、海洋委員會之成立、及 FMC 新系統之進展。

肆、心得與建議

- **永續經營漁業改革、貿易談判，及打擊 IUU 漁業將持續成為委員會重點**

永續漁業及改革、中國繳交資料、打擊非法、未報告及不受規範漁業(IUU)、及漁業貿易談判皆為各國及漁業相關組織特別關切之議題，又其中打擊 IUU 犯罪往往與其他重大議題如人口販運、洗錢、走私及毒品交易等息息相關。而非法漁業為聯合國永續發展中受高重視之議題，爰此委員會亦逐年增加相關議題之計畫、研究及分析等，並研擬結果報告與彙整各國所提供之資料及意見交流，提供各國、相關組織及 OECD 合作之組織等政策或管理建議。

而首次召開之永續漁業改革研討會不僅深入探討國家、區域、及組織等合作關係，並結合社會、經濟、資源及海洋科學等因素，討論該如何進行改革及擬定最佳政策，進而達到永續漁業經營及打擊非法漁業等目標。職亦榮幸受邀擔任其中一場議程之主席，同講者與他國代表切磋找尋最佳使用佐證於改革，並綜整建議政策擬訂方向。會議結果將與各國(包含我國)繳交之改革問卷進行分析，可成為重要政策參考依據。另，會中各國不約而同認為若希望提升海洋資源之永續發展，國內外應多合作、加強透明度、將所有利益相關者及專家納入改革計畫中，並實際如期執行計畫。

OECD 多年來與多國合作又與多重要組織成為合作夥伴，爰 OECD 或 COFI 成為國家及組織信任之智庫，提供匯集各專家意見並研擬未來漁業政策改革及漁業管理趨勢。而該委員會提出之資料為我國關注議題提供改革或管理上建議，並能延續專業性及與他國及組織跟上國際趨勢。綜上，我國應積極出席 COFI 一年兩次之會議，而非視會議情形又或我國所關切議題而出席；另，因我國歷年來都如期繳交國家報告、漁業相關數據及預算、我國打擊 IUU 政策及相關措施，今年亦為第一個繳交永續漁業改革問卷國家，秘書處感謝我國所作努力。**建議**我方更應積極並考量我國「參與方」權益之保險，如我國出席 OECD「鋼鐵」及「競爭」委員會代表團與秘書處保持友好關係，以便他日有組織可支持我國所推動之政策、改革或計畫等，並有更多機會參與其他活動增加活躍及曝光度。

承上，駐法國台北代表處經濟組副組長仍向我方表示因專業領域考量、與他國交流聯繫及與秘書處保持密切關係等原因，希望漁業署慎重考量每次會議皆派員出席，能同時確保訊息接收及權益維繫之完整性。

Organisation for Economic Co-operation and Development

TAD/FI/A(2018)1

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6 April 2018

TRADE AND AGRICULTURE DIRECTORATE
FISHERIES COMMITTEE

Cancels & replaces the same document of 21 March 2018

DRAFT AGENDA OF THE 121st SESSION OF THE FISHERIES COMMITTEE

2-4 May 2018
Paris, France

Changes from the previous issue of the Draft Agenda of the 121st session of the COFI are as follows:

- The document cote for Item 5 *Informing fisheries-related trade negotiations* has changed to TAD/FI(2018)2, instead of TAD/FI(2018)1;
- Item 12 *Report from Observers* has merged with Item 13 *Report from Member Countries on activities of relevance to COFI*, and is now Item 12 *Report from Member countries, participants and observers on activities of relevance to COFI*;
- Required action for Item 14 *Country Study of fisheries and aquaculture policy in Viet Nam* has changed to 'for information' instead of 'for discussion'. This item is now Item 13;
- Item 18 *Adoption of the summary record of the 121st session of the Fisheries Committee* is now Item 17.

Woojin Nam, Policy Analyst, woojin.nam@oecd.org, +33 1 45 24 95 39
Franck JESUS, Head of Division, franck.jesus@oecd.org, +33 1 45 24 89 22

JT03429768

DRAFT AGENDA: 121st Session of the Fisheries Committee

	DAY 1: Wednesday 2 May 2018	
	Making Reform Happen for Sustainable Fisheries conference	
	DAY 2: Thursday 3 May 2018	
Item 1 09:30-09:40	**Adoption of the Draft Agenda for the 121st Session**	**For adoption** TAD/FI/A(2018)1
Item 2 09:40-10:00	**Statement by Mr. Ken Ash, Director, Trade and Agriculture Directorate**	**For information**
Item 3 10:00-11:00	**2019-20 Programme of Work and Budget (PWB) for the Fisheries Committee** Following a brief introduction by the Secretariat, the Committee's draft Programme of Work and Budget 2019-20 will be discussed in three parts. First, the agreement of Delegations will be sought on the proposed core Intermediate Outputs that have been developed in response to what is understood to be the widely held (though not necessarily universal) priorities of Committee members. Second, views from Delegations will be sought on the proposed choice of Intermediate Outputs; these proposals have been developed in response to earlier interests expressed by some members. The Committee will be invited to agree on the sub-set of choice proposals that are of common interest, commensurate with available resources. Finally, comments from delegations will be invited on the various elements of the formal budget template material. *Rachel Bae* (rachel.bae@oecd.org)	**For approval** TAD/FI(2018)1
11:00-11:30	***Coffee Break***	
Item 3 11:30-12:30	**2019-20 Programme of Work and Budget (PWB) for the Fisheries Committee (continued)** After these initial discussions, required revisions to the draft PWB will be made for further consideration during the afternoon session. *Rachel Bae* (rachel.bae@oecd.org)	**For approval** TAD/FI(2018)1

Item 4 12:30-13:00	**Identifying reform pathways for sustainable fisheries management** This work is mandated under the 2017-18 PWB of the COFI - Expected Output 3.2.3.3.2 *Identifying reform pathways for sustainable fisheries management*. Delegates are kindly invited to share their views on the *Making Reform Happen for Sustainable Fisheries* conference and the messages they would like to see integrated in the final report that will be presented for declassification during the 122nd meeting of COFI. *Claire Delpeuch* (claire.delpeuch@oecd.org)	**For information**
13:00-14:30	***Lunch***	
Item 5 14:30-16:00	**Informing fisheries-related trade negotiations** This work is mandated under the 2017-18 PWB of the COFI - Expected Output 3.2.3.4.5 *Informing Fisheries-Related Trade Negotiations*. The document presents the structure and first results of a model to investigate the effects of different FSE categories on indicators of interest, as previewed in the May 2017 report "Support to Fisheries: Levels and impacts." Delegates are kindly invited to comment on the model structure and results. Based on comments received, a final version of the model and additional results will be presented at the 122nd Session. *James Innes* (james.innes@oecd.org) *Roger Martini* (roger.martini@oecd.org)	**For discussion** TAD/FI(2018)2
16:00-16:30	***Coffee Break***	
Item 6 16:30-17:00	**Statistics and data collection** This work is mandated under the 2017-18 PWB of the COFI – Expected Output 3.2.3.4.2 *Fisheries and Aquaculture Statistics*. This item will update on the forthcoming data call that will be sent in May 2018. Delegates are invited to comment and discuss the process and any other issues of concern. *Fabiana Cerasa* (Fabiana.cerasa@oecd.org)	**For information** TAD/FI/RD(2018)3
Item 7 17:00-17:30	**OECD/FAO Agricultural Outlook-Fish Chapter** Stefania Vannuccini of the FAO will present the draft chapter describing scenarios for 2018-2028 in fisheries. *James Innes* (james.innes@oecd.org) *Stefania Vannuccini* (stefania.vannuccini@fao.org)	**For information** TAD/CA/APM/GCM(2018)1

Item 8 17:30-18:00	**2019-20 Programme of Work and Budget (PWB) for the Fisheries Committee (continued)** The agreement of delegations will be sought on revised PWB proposals. Delegates also will be invited to rank Intermediate Output Results. This ranking is required to enable any future budget reductions to be made in light of Committee priorities; any such modications, to the extent not made directly by Council, will be made in consultation with Bureau members. *Rachel Bae* (rachel.bae@oecd.org)	**For approval** TAD/FI(2018)1
	DAY 3: Friday 4 May 2018	
Item 9 09:30-10:30	**Combatting illegal, unreported or unregulated fishing** This document is an intermediary input in the work mandated under the 2017-18 PWB of the COFI - Expected Output 3.2.3.3.1 C*ombatting Illegal, Unreported or Unregulated Fishing*. This draft of the report, contains the responses received to the data questionnaire and an analysis of the results. Delegates are kindly invited to provide feedback for a revised version to be presented for declassification at the 122nd session. *Barbara Hutniczak* (barbara.hutniczak@oecd.org)	**For discussion** TAD/FI(2017)16/REV2
Item 10 10:30-11:00	**Update on the Implementation of the 2017-2018 Programme of Work and Budget** The Secretariat will give an update on progress in developing new projects included in the 2017-2018 Programme of Work and Budget. ***Brigitte de Vouge*** (Brigitte.DEVOGUE@oecd.org)	**For information** TAD/FI/RD(2018)4
11:00-11:30	***Coffee Break***	
Item 11 11:30-11:50	**Report on activities related to fisheries** As has been established practice, the Secretariat will inform delegates about projects in other parts of the OECD that have relevance for the work of COFI. Representatives from different parts of the OECD will provide briefings on their work. A representative from the Co-operative Research Programme will also provide a report on its activities.*Woojin Nam* (woojin.nam@oecd.org) *Janet Schofield (*janet.schofield@oecd.org*)* *Mathieu MIRANDA* (mathieu.miranda@oecd.org)	**For information** TAD/FI/RD(2018)1 TAD/FI/RD(2018)2
Item 12	**Report from Member Countries, participants and**	**For information**

11:50-13:00	**observers on activities of relevance to COFI** Oral reports from member countries, participants and observer international organisations are welcome.	
13:00-15:00	***Lunch***	
Item 13 15:00-15:30	**Country study of fisheries and aquaculture policy in Viet Nam** A voluntary contribution has been provided for a study of the fisheries and aquaculture sector in Viet Nam. This item will take stock of the project, update on progress and invite feedback from delegates. *Claire Delpeuch* (claire.delpeuch@oecd.org) *Barbara Hutniczak* (barbara.hutniczak@oecd.org)	**For information**
	15:30 Recess the Fisheries Committee Plenary Session	
	17:00 Resume the Fisheries Committee Plenary Session	
Item 17 17:00-18:00	Adoption of the summary record of the 121st session of the Fisheries Committee	For approval TAD/FI/M(2018)1
	18:00 Close of the Fisheries Committee Plenary Session	

Making reform happen for sustainable fisheries

OECD, Paris, May 2, 2018
10:00 – 17:30

Draft Agenda

	Introductory session Chair: Rachel Bae, Senior Counsellor, OECD
10:00-10:05	**Welcoming remarks** **Leon Lomans**, Chair of the OECD Committee for Fisheries
10:05-10:15	**Introductory remarks** **Ken Ash**, Director of the OECD Trade and Agriculture Directorate
10:15-11:00	**Keynote addresses** **H.E. Susi Pujiastuti**, Minister of Marine Affairs and Fisheries, Republic of Indonesia **Maria Damanaki**, Global Managing Director for Oceans at The Nature Conservancy and former European Union Commissioner for Maritime Affairs and Fisheries
11:00-11:15	**What can we learn from the last decade of fisheries reforms?** **Claire Depleuch**, Policy analyst, OECD
	Building support for reform Chair: Karin Mundnich, COFI Delegate, Chile (tbc)
11:15-11:45	**Sam Rauch**, Deputy Assistant Secretary for International Fisheries, National Oceanic and Atmospheric Administration (NOAA), United States **Javier Garat Pérez**, Secretary General of Cepesca – Spanish Fisheries Confederation **Barbara Pompili**, Member of the Parliament, France (tbc) **Vera Coelho**, Officer, European Marine Programme, The Pew Charitable Trusts
11:45-12:45	**Discussion** - How to build political support for reform? [e.g. coalition building; role for fishing region representatives] - How to find support or deal with disagreement from stakeholders? [e.g. at which stage should they be consulted? With what impact?] - What are the trade-offs between consultation, rapid action and reform effectiveness? - What is the role of international agreements in driving reforms? - Are there contextual windows of opportunities that should be exploited? [crisis vs. normal context; macro context; political cycle]
12:45-14:00	**Networking lunch** *George Marshall room, Chateau*
	Using evidence throughout the reform process Chair: Annie Lee, COFI Delegate, Chinese Taipei
14:00-14:30	**Arni Mathiesen**, Assistant Director-General, Fisheries and Aquaculture Department, Food and Agriculture Organization of the United Nations (FAO) **Christopher Costello**, Professor of Natural Resource Economics, University of California and Research Associate, National Bureau of Economic Research

Mark Dickey-Collas, Ecosystem Approach Coordinator, International Council for the Exploration of the Sea (ICES)

14:30-15:30 **Discussion**

- How to mobilise evidence – both on the status of resources and on the socio-economic characteristics of fisheries – to describe and communicate the challenges that reform must address?
- How to deal with the uncertainty pertaining to marine sciences? [e.g. precautionary principle rather than delaying reforms]
- How to legitimize scientific findings? [particularly among fishers]
- How to implement science-based decision making? How can legislation give a prescriptive role to scientific advice?
- What kind of evidence do policy-makers need? What is missing?

14:30-15:00 **Coffee break**

Designing successful reform packages
Chair: Dave Hogan, COFI Delegate, United States

15:00-15:30

Ernesto Peñas Lado, Principal Advisor – Fisheries Policy, European Commission

George Kailis, Executive Chairman, M.G. Kailis Group and Professor of Management, The University of Notre Dame, Australia (tbc)

Michel Kaiser, Professor of Marine Conservation Ecology at the School of Ocean Sciences, Bangor University and member of the Fisheries Expert Group of the International Union for Conservation of Nature (IUCN)

15:30-16:30 **Discussion**

- Impact analysis: how can it help design reform packages?
- How can flexibilities be designed in reform to anticipate needs for adjustment without compromising objectives?
- How to address trade-offs between conservation and socio-economic objectives?
- How much should stakeholder participate in reform design?
- How can trade-offs between results and acceptability of reform be resolved through transition periods or compensation measures?

Wrap-up and recommendations
Chair: Martha Astrup, COFI Delegate, Norway

16:30-17:00 **Tour de table**

Each speaker to give one take-away recommendation

17:00-17:15 **Closing remarks**

Franck Jesus, Head of Division, Natural Resources Polices, OECD

Close of the conference

Organisation for Economic Co-operation and Development

TAD/FI(2018)2

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TRADE AND AGRICULTURE DIRECTORATE
FISHERIES COMMITTEE

The Fisheries Policy Evaluation Model (FishPEM)

Basic structure and early results

121st COFI, 2-4 May 2018

This report is carried out under PWB item 3.2.3.4.5 Informing fisheries-related trade negotiations. It presents the structure of an early version of the FishPEM model and some simulation results. It is presented for DISCUSSION to the 121st Session of the Fisheries Committee under item 5 of the draft agenda. Delegates are invited to discuss the model and provide advice regarding next steps in development. A new FishPEM version with expanded results will be produced on the basis of these comments.

Contact: Roger Martini (roger.martini@oecd.org) or James Innes (james.innes@oecd.org).

Note by the Secretariat

This report is carried out under PWB item 3.2.3.4.5 Informing fisheries-related trade negotiations. It follows up on the previous report produced under this PWB item, which was declassified in May 2017 and published as *Support to Fisheries: Levels and Impacts*. That report summarised the contents of the FSE database and contained a theoretical analysis of the impacts of different support policies.

This report is based on a numerical model designed to build upon the theoretical analysis of the last report by formally investigating the impacts of support policies in a bioeconomic framework. It presents the structure of an early version of the FishPEM model and some simulation results. Delegates are invited to discuss the model and provide input that will inform the next steps in development. A new FishPEM version with expanded results will be produced on the basis of these comments. It is presented for DISCUSSION to the 121st Session of the Fisheries Committee under item 6 of the Draft Agenda.

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Abbreviations and acronyms

FishPEM	Fisheries Policy Evaluation Model	OECD model of fisheries policy that is the subject of this report.
FSE	Fisheries Support Estimate	OECD Database of policies providing support to fisheries. See oe.cd/FSE
ITQ	Individual Transferrable Quota	A right to harvest a particular amount of resources, that can be transferred, e.g. by sale, lease, or will. A type of quota (a part of a Total Allowable Catch) allocated to individual fishermen or vessel owners and which can be sold to others.
MEY	Maximum Economic Yield	When relating total revenues from fishing to total fishing effort in a surplus production model, the value of the largest positive difference between total revenues and total costs of fishing (including the cost of labour and capital) with all inputs valued at their opportunity costs
PEM	Policy Evaluation Model	OECD model of agricultural policy developed in the late 1990s. https://www.oecd.org/tad/agricultural-policies/39265834.pdf
TAC	Total Allowable Catch	The TAC is the total catch allowed to be taken from a resource in a specified period (usually a year), as defined in the management plan. The TAC may be allocated to the stakeholders in the form of quotas as specific quantities or proportions
OA	Open Access (fishery)	Open access is the condition where access to the fishery (for the purpose of harvesting fish) is unrestricted; i.e., the right to catch fish is free and open to all.

The Fisheries Policy Evaluation Model (FishPEM): Basic Structure and Early Results

1. The FishPEM Framework

1.1. Objective and Motivation of this work

1. Support to fishers and the fisheries sector, including via subsidies, are a common feature of fisheries policies in most countries. These policies have many objectives, such as ensuring the safety of fishers, the health of fishing communities, the efficient and fair exploitation of fisheries resources, and many others. However, in some cases these support policies have had inadvertent negative outcomes such as overcapacity of fishing fleets that has led tooverfishing, and reduced stocks. This in turn can have an impact on trading partners and those sharing common resources.

2. Recognising the adverse impact of certain subsidies on the fisheries sector, the international community has joined efforts to address this issue by negotiating fisheries subsidies disciplines at the World Trade Organisation (WTO) and by setting goals via the United Nations Sustainable Development Goals (UNSDG). UNSDG 14 speaks to improving fisheries management and eliminating support policies that are harmful.

3. The OECD has a key role to play in identifying and promoting practical ways to bring change about to put fisheries and aquaculture on a sustainable footing. The OECD has developed an analytical tool, described in this report, to better identify the effects of different categories of fisheries policies.

4. The objective of this work is to identify those policy characteristics that lead to better outcomes in terms of cost-efficiency in meeting policy goals while avoiding negative effects associated with overcapacity, overfishing, and reduced stocks. It is designed to provide a tool for policy-makers to evaluate the implications of their choices in policy design and identify fruitful new approaches for reform. It does this by providing a structured and quantitative tool for policy analysis in fisheries that has not existed before.

5. This policy tool fills a gap in analytical support to policy makers. The current evidence-base of the impacts of fisheries policies is limited. There have been a relatively small number of empirical studies investigating the impact of supports to fisheries, and these are usually done on a more regional or local basis. The empirical evidence on the impacts of support was previously reviewed in "Support to Fisheries: Levels and Impacts" (OECD, 2017[1]). That review showed that the general consensus is that support can have negative consequences for sustainability, and it is often hard to effectively target chosen beneficiaries and achieve intended outcomes.

6. Modelling tools are different from empirical analysis. They investigate policies based on economic theory combined with data, while empirical analyses are mainly statistical. However, models tend to be specialised in their application. There now exists a substantial number of models designed to investigate the interaction between fishing activity and the productivity of the fish stock (Nielsen et al., 2018[2]). In terms of policies, existing models typically focus on the structure and parameters of the management system and do not disaggregate support policies enough to draw conclusions regarding their effects relative to different policies.

7. The economic aspects of fishing, including the effects of fishing subsidies and other policies, are receiving greater attention in new model development. Nielsen et al. refer to these as Integrated Ecological-Economic Fisheries Models (IEEFMs). The model

described in this report is designed to focus on the economics of fishing and address policy impacts in a level of detail that does not exist in other models.

1.2. General model structure and approach

8. The Fisheries Policy Evaluation Model (FishPEM) is closely derived from the Policy Evaluation Model (PEM) that has been used by the OECD to investigate the impacts of agricultural policies since 2001. A full description of the heritage and economic concepts used in this model is available in (OECD, 2001[3]) and (OECD, 2005[4]). Briefly, it is a partial equilibrium model of the farm sector. The version elaborated in (Gardner, 1987[5]) provided the basic analytical structure for the PEM. First developed by Hicks to study issues in labour economics, the model has been widely applied in general economic policy analysis. An important precedent to its application in agricultural policy analysis was in an analysis of housing and urban land economics by Muth. Its application for the PEM follows most closely applications found in (Atwood and Helmers, 1998[6]), (Gunter, Jeong and White, 1996[7]), and (Hertel, 1989[8]).

9. A more recent application of the PEM model can be found in the country review of Switzerland (OECD, 2015[9]), where it was applied to the environmental impacts of Swiss agricultural policies. That version connected trends in Swiss agricultural policies to a set of environmental indicators based on changes in land use and production methods.

10. FishPEM is designed to simulate the economics of fishing through a representative fishing operation that maximises profits in a competitive market. [1] It contains representations of input markets where the means of production for fishing such as fuel gear and vessels are obtained, and of output markets where fish are traded between fishers and consumers. There is a production function that relates how fishing inputs are transformed into fishing effort. All these obey basic economic principles of market clearing via price adjustment and the properties of production functions.

11. The biological component of the model relates fishing effort into a resulting harvest, using a logistic growth function and the general approach of the Schaefer model (Conrad and Clark, 1987[10]). The Shaefer model shows the steady-state stock, harvest and effort levels for given growth function parameters, costs and price. This approach maintains the biology of the resource in equilibrium—for each level of fishing effort there is a corresponding level of harvest and stock size that can be maintained indefinitely. Levels of effort above that necessary to obtain MSY result in lower harvest levels and stock sizes than are possible.

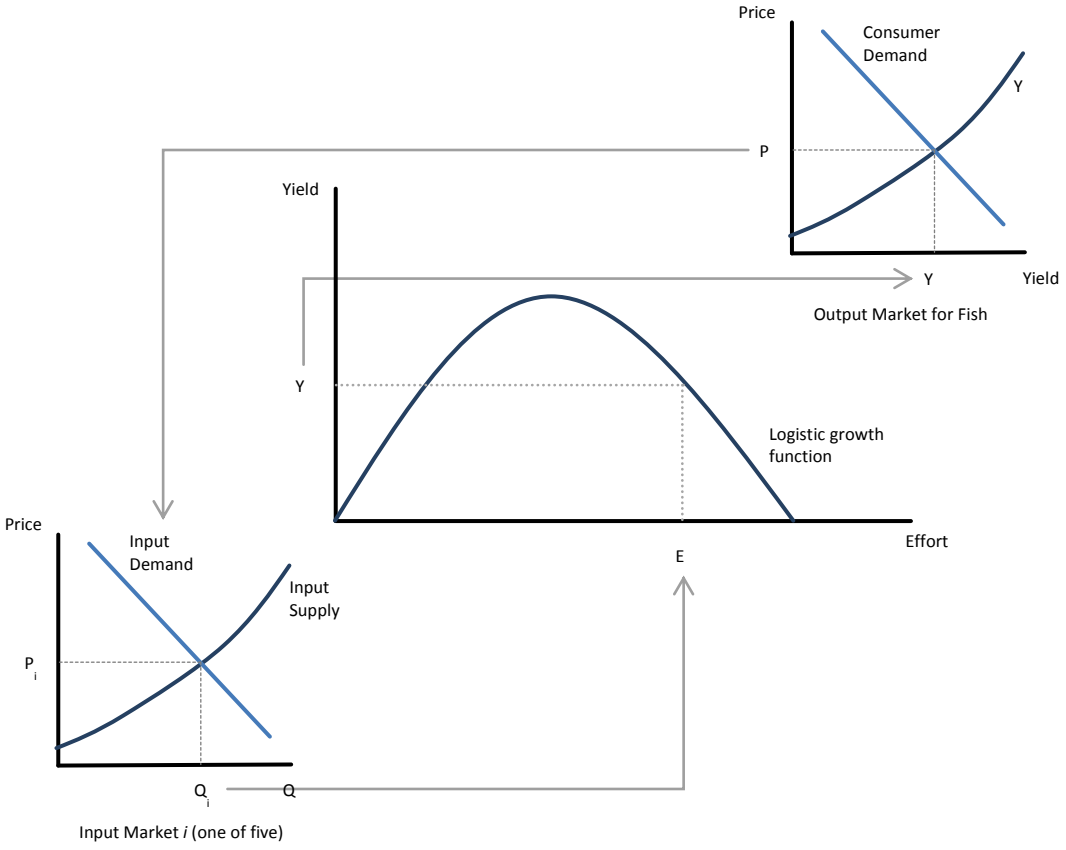
12. The economic and biological components of the model operate as a system of simultaneous equations that are jointly solved to produce model outcomes (Figure 1.1). All prices and quantities are endogenous to this model solution, so changing any one of them will generally result in a change to all others. For example, changing the price of fuel will change the quantities used of all inputs, the amount of effort, stock and harvest, as well as the price of fish and quantity consumed.

[1] The assumption of a competitive market equates to an open access situation. This assumption will be relaxed in versions of the model where the management system has a greater influence, but at all times fishers in the model maximise profits and do not have opportunity to generate economic rents other than those caused by the management system.

13. The management component of the model allows for representing open access, a TAC set at any level, or endogenous MEY where the rent generated by the fishery is maximised (implicitly an ITQ system).[2] Each requires a modification of the equations in the model as these different systems imply different model structures. For this reason, the model cannot simulate a change in management system from one type to another, only policy shocks in the context of a single management system.

14. The primary intent of FishPEM is an investigation of the relative impacts of different support policy categories. These relative impacts will depend on the parameters chosen for the model, but the intent is not to choose the "right" set of parameters and obtain results with reference to them. Rather, the results of the model will be tested for robustness to parameter choice: If the results are the same for a wide set of parameter values, then they can be considered to be broadly true or relevant to different fisheries.

Figure 1.1. Input market, biology, and output market in FishPEM



15. The model is based on the principle of equilibrium displacement (Gardner, 1987[5]). The model is calibrated to be in equilibrium in its initial state, with supply equal to demand in all markets and the biological effort-yield relationship at its long-term equilibrium point. This initial condition is perturbed by a policy shock, which results in a re-adjustment to a

[2] Rent, also called economic profits in some contexts, is the excess of revenue over cost when all costs are taken into account, including depreciation and normal return on investment of assets.

new equilibrium. New prices, quantities, effort and stock levels can be observed after this adjustment, and these changes are the outcome of the policy scenario represented by the policy shock.

16. The calibration of the model to an initial equilibrium means that once some values are chosen, others will be implied and must be calculated. For example, an initial stock level must be chosen, but this will imply a level of effort which results in this stock. Effort is calculated on that basis. This effort level in turn implies the input quantities used. In this way, once basic data are entered into the model the rest is calculated.

17. The FishPEM is a medium-run model, where the short-run concepts of fixed vs. variable costs do not apply. The closest analogue to these concepts in the model is the differentiation between inputs which are inelastic in supply vs. those that are elastic. The main interest in different categorisation of inputs in FishPEM has to do with whether the input is owned by fishers or is purchased from an input supplier. The rationale for this distinction has to do with the sharing of benefits for welfare analysis.

18. In the model, Fishers purchase or use their own assets as inputs that produce fishing effort via an implicit production function that allows different substitution elasticities among all input pairs. They earn revenue from selling fish into a domestic market with downward-sloping consumer demand for fish.[3] Different inputs may have different elasticities of supply depending on their characteristics. For example, fuel is elastically supplied as increased purchases of fuel for fishing are unlikely to change its price, fishers only being a small part of the total market. On the other hand, fisheries-specific capital is inelastically supplied as the price of such capital (expertise, specialised equipment) is sensitive to changes in demand by fishers.

19. The FishPEM model needs data in four domains: Cost of production, various elasticities, parameters of the growth function, and initial conditions (base levels of harvest, stock and effort). It also needs initial policy data such as baseline support levels and management settings, although as will be seen, these are not critical to model results (Table 1.1).

Table 1.1. Data used in FishPEM

	Data Type	Examples	Sources
Policy data	Baseline	Support levels	FSE Database
		TAC	Policy Setting
Market data	Parameters	Input supply elasticities	Academic literature
		Demand elasticity for fish	Academic literature
Cost data	Baseline	Input costs shares for fishing effort	Observed cost data
Production data	Parameters	Elasticities of input substitution	Academic literature
Biological data	Baseline	Carrying capacity, intrinsic growth rate	Fishery data
		Initial effort, harvest, stock level	Fishery data

Note: Parameters do not affect the initial calibration of the model, just how it reacts to shocks. Baseline data defines the initial calibration of the model and its scale. The choice of biological baseline data defines the spatial scale and scope of the model.

[3] This is a first point-of-sale demand, so can be considered to be purchases by a wholesaler or at auction. Whether this demand is intermediate or final has no effect on the model results.

1.3. Sources of data and parameters

20. A major weakness of all modelling work is the quality of data used to parameterise and operationalise them (Steenbeek et al., 2016[11]). As Steenbeek et al. point out, "since eliminating model parameterization uncertainty is not always feasible, the next best possible course of action is to expose it—enabling decisions to be made that are robust to these uncertainties." For this reason, future versions of model results will contain estimates of the effects of parameter uncertainty as was done for the PEM model (OECD, 2001[3]; OECD, 2005[4]).

21. The data used to parameterise the model defines its scope and application. Some models, such as used in the World Bank's *Sunken Billions* report, are parameterised to represent the global fishing industry in a highly aggregate way. Others may represent a single fishery, or even a single métier. These broadly different settings need not imply a fundamentally different model structure, only different parameter choices. The Schaefer model is considered quite general in its structure and has been applied to a wide number of situations. It may in fact be the most widely used aggregate model for population dynamics (Bjørndal, Lane and Weintraub, 2004[12]).

22. Higher levels of aggregation necessarily imply a higher level of abstraction in representation of the fishery. Aggregating diverse fish stocks into a single growth function is biologically dubious, even if practically attractive. For this reason, careful model interpretation becomes crucial in large scale aggregate models. That is, focus must be maintained on the design objective of the model such that some aspects of model results will be more useful and accurate than others. In the case of FishPEM, its purpose is to investigate fundamental principles of economics and management of the fishery and not to provide quantitative assessments or projections about fisheries biology.

23. At this stage in model development, the data and parameters used are purely fictive, so the model has no explicit spatial scale and does not represent any particular fishery. While future versions of the model will improve the parameterisation in order to make it more broadly representative, it will never be an accurate tool for representation of fisheries as such. That said, to achieve its objective of evaluating the relative impacts of different support policies, some degree of parameter accuracy will be required, in particular with respect to the economic determinants of fishing effort.

1.4. Representation of Policies and Policy Shocks in the model

24. FishPEM translates changes in levels of support ("policy shocks") to indicators of outcomes in the fishery, including on effort, harvest, fleet size and income. The set of possible policy shocks mirrors closely the categories in the FSE database (Table 1.2). The set of shocks will be refined over time to take better account of specific details such as contained in the FSE labels.

25. Policies create a difference between the supply and demand price in the market of first incidence of the policy, either input or output (termed a "policy wedge"). Some policy support may already be in place in the initial calibration of the model, and indeed the model will eventually be calibrated to reflect policy levels as reported in the FSE. A policy shock changes the level of support and therefore the size of the policy wedge.

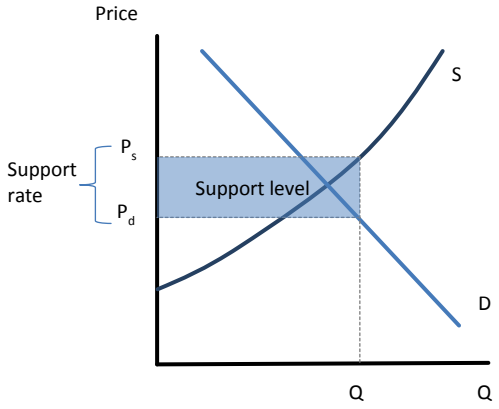
Table 1.2. Support shocks in the model

Type of support	Markets of primary incidence	Implementation
		Supports affecting input markets
To vessel construction or modernisation	Vessels	Ad valorem wedge between vessel supply and demand price
To decommissioning	Other fishers' owned capital, vessels	Proportional wedge between supply and demand price of both inputs, constraint on vessel quantity
To fishers' income	Other fishers' owned capital, vessels, hired crew	Proportional wedge between supply and demand price of these three inputs
To fuel use	Fuel	Ad valorem wedge between fuel supply and demand price
To crew	Hired crew	Ad valorem wedge between crew wage earned and paid
		Supports affecting output markets
To consumption of fish	Output market (fish)	Unit price wedge between consumer and producer price

Note: proportional wedges result in a uniform inflation of the affected input prices such that incentives to reallocate between them are unchanged. Three inputs (vessels, other fishers' owned capital and hired crew) are controlled by fishers and so the returns from these inputs collectively represent fishers' income in the model.

26. Policy wedges may be calculated on a unit basis or an ad-valorem basis. A unit wedge is additive to the price, while an ad-valorem support is multiplicative. Wedges serve to lower the demand price of an input (or fish) below the supply price such that an input (or fish) is less expensive to purchase. The lower purchase price means that, *ceteris paribus*, more will be purchased. More inputs purchased translates to higher effort (Figure 1.2).

Figure 1.2. Support level and rate in a market



27. Suppliers of inputs benefit as more inputs are purchased and their price increases. It is assumed that fishers own some of the inputs used (vessels, hired crew, other capital) and so the change in producer surplus for these inputs indicates the change in fishers' income. Notice for overall income changes, no distinction is made between vessel owners and crew, though this difference may be tracked and reported in the model output.

28. Some policies are assumed to accrue to more than one input. Payments based on fishers' income are a good example. This support is divided among these inputs using a single ad-valorem percentage rate. This is done so that the support payment does not induce any relative price changes between the beneficiary inputs. A uniform inflation of the price of these three inputs as a result of this form of support will change the allocation of these

three inputs with respect to other inputs, but not among themselves.[4] This is an important feature of the model—supports that apply more broadly induce fewer adjustments across input use than supports that target a single input.

1.5. Indicators and model results.

29. FishPEM is a medium-run model that represents a steady state system after all adjustments by economic actors have taken place and the biological system has reached equilibrium. Indicators produced from the model therefore reflect the changes that take place between an initial equilibrium and new equilibrium subsequent to a policy shock. The model is designed to represent an adjustment period of several years, long enough that that no factors are entirely fixed in production and that all inputs are substitutes. Elasticities in the model are more elastic than their short-run counterparts would be.

30. Equilibrium in the model does not imply optimality in the sense of maximising an objective function (though this may in fact be done by definition to find an MEY equilibrium). [5] The model equations enforce the first order conditions for profit maximization and the zero profit condition, as well as the effort-yield-stock relationship defined by the growth function[6].

31. Indicators of interest are calculated as changes in endogenous variables in the model after a policy shock (Table 1.3). Changes in effort, stock, harvest (yield), consumption, use of inputs and welfare of fishers and others are systematically produced as a result of a policy shock, though other indicators may also be possible. It can as well be convenient to calculate some indicators in proportion to the size of the induced policy shock.

[4] Second-order effects in the model means this is not strictly true; changes in the price or harvest level resulting from income support could induce some relative changes in input demand, but these will not come from the initial incidence of the policy itself. Calculating a single ad-valorem subsidy rate applying many inputs that will account for the total subsidy level is not trivial, especially when more than one support type affects a particular input. This must be calculated numerically rather than solved analytically. However, this is only relevant for the initial calibration of the model.

[5] The model solves a set of n simultaneous equations in n unknowns, those unknowns being the endogenous variables in the model. This approach may but need not imply the optimisation of an objective function.

[6] The first order conditions for profit maximisation are implicit in the input demand functions, which are derived from the profit function of the firm by taking its derivative with respect to each input, setting it equal to zero and solving for input quantity demanded. The profit function itself need not appear in the model as it is fully characterised by the input demand functions.

Table 1.3. Indicators produced by FishPEM

	Formula	Interpretation
Effort	$E-E_0$	Change in fishing effort
Stock Size	$X-X_0$	Change in fish stock size
Harvest	$Y-Y_0$	Change in sustainable harvest level
Consumption	$D-D_0$	Change in consumption (identical to change in harvest if no trade)
Fleet size	$ve-ve_0$	Change in quantity demanded of input "vessels"
Fuel efficiency	$(Y/fe)/(Y_0/fe_0)$	Change in ratio of harvest to fuel input
Fishers' income	Sum of $(P_i-P_{i0})*(Q_{i0}+1/2*(Q_i-Q_0)$, i=ve,hc,oc + $(PY-Sum(P_i*Q_i))-(P_0Y_0-Sum(P_{i0}*Q_{i0}))$, i=all inputs	Change in producer surplus of inputs controlled by fishers or crew plus fishing rent
Input suppliers' income	Sum of $(P_i-P_{i0})*(Q_{i0}+1/2*(Q_i-Q_0)$, i=fe, op	Change in producer surplus of others in the fishery supply chain
Transfer efficiency	Change in fishers' income/policy shock	Percentage of support that accrues to fishers as income
Consumer welfare	$(P_d-P_{d0})*(D_0+1/2*(D-D_0)$	Change in consumer surplus
Taxpayer costs	Sum of (SL_j-SL_{j0}), j=all policy supports in model	Change in the cost of support to taxpayers
Total welfare change	Sum of all income changes, consumer surplus and taxpayer costs	Net welfare change of all actors in model

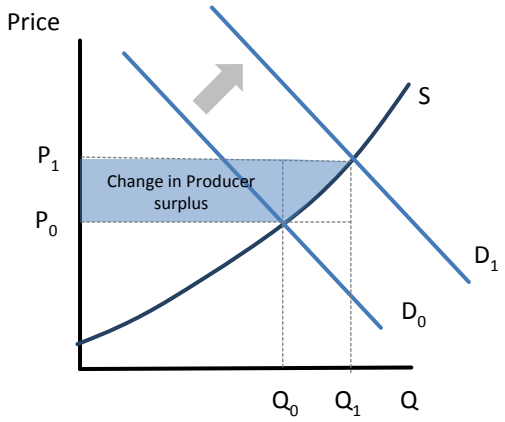
Note: Variables ending in "0" indicate the baseline (initial) value of that variable before the policy shock. Input names are ve=vessels, hc=hired crew, oc=other owned capital, fe=fuel, op=other purchased inputs. Consumer demand D=Harvest Y if there is no trade.

32. Most of the indicators produced by the model are straightforward, being the simple change in an endogenous variable. The most complicated are those for welfare changes. These are calculated as the sums of producer surplus of all relevant inputs (vessels, hired crew and other capital for fishers, fuel and other purchased inputs for input suppliers) (Figure 1.3). Input suppliers can generally be interpreted as other participants in the fisheries sector, those providing gear, dock services or similar. Differentiating between owned and purchased inputs allows these benefits to be allocated to fishers vs. other actors in the fisheries economy, providing a view on the distribution of benefits and the effectiveness of different policies in transferring income to fishers.

33. When economic rent is generated it is added to producer surplus to arrive at fishers' total income change[7]. Such rent is generated when there is an effective control on harvest, such as through a binding TAC, and where there is not an incentive among individual fishers to compete away that rent by racing to fish. This rent is assumed to become capitalised in harvest rights that are possessed by fishers. Harvest rights are not included explicitly in the model, but these are assumed to be owned by vessel owners and other investors, and not by hired crew.

[7] The zero profit condition is a standard assumption of competitive economic markets, but often seems to clash with observed data showing firms earning a gross margin (revenues over costs). This is reconciled here through the "fishers' own capital" input, which implicitly accrues this into its producer surplus. This may be considered as a return on fishers' investment (ROI) and is included in the fishers' income indicator through this input.

Figure 1.3. Change in producer surplus in an input market due to a policy shock



Note: The support policy induces a wedge between supply price (P_1) and demand price (P_0) which acts as a shifter of the demand function. The change in the area under the supply price and above the supply curve is the resulting change in producer surplus for the input owner. For simplicity, this figure is drawn as though there were no initial support to this input, however this is usually not the case.

1.6. Fisheries management in the model

34. The model can represent different management systems such as open access, a binding TAC or a fishery that optimises for MEY. In the case of a fixed TAC, the model can differentiate between a system where fishers rush to fill the TAC (derby fishery) and that where they do not. These management settings require structural changes in the model design and so changes in management are not part of policy scenarios and scenario outcomes are conditional on the management system implemented in the model.

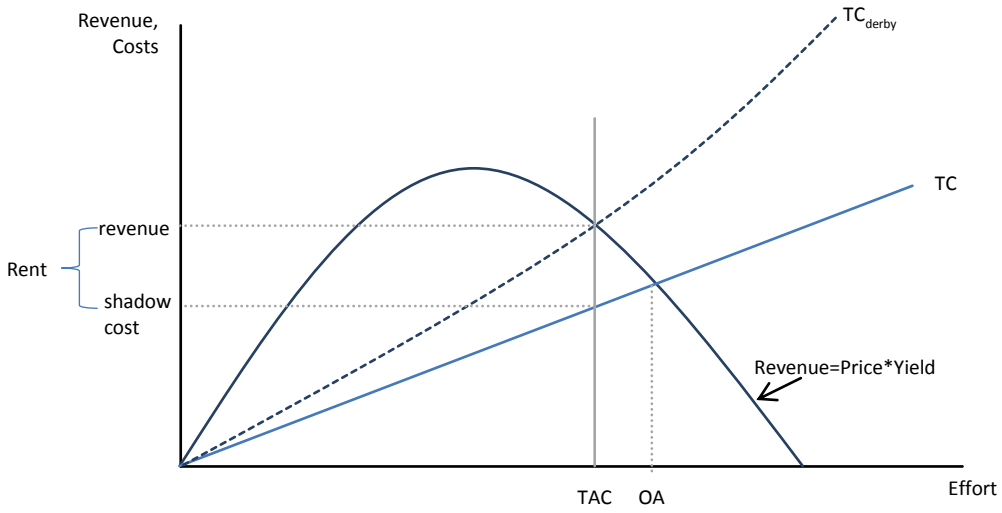
35. Open access is represented as the normal zero profit condition and input markets defining a supply of effort into the fishery, conditioned on output price. This can be considered to be the basic structure of the model with other management systems being variations from this. The model is calibrated to an initial effort level, which locates the cost function and sets initial stock level (X) and yield (Y). At this initial point total revenue equals total cost and the system is in equilibrium, thus defining open access.

36. The operation of the model under open access is as described in the previous sections; the introduction of a policy shock will move the system off of its initial equilibrium, which will be restored by endogenous adjustments of supply and demand until profits are zero and the biological system is again in equilibrium.

37. Consider the application of a TAC in the fishery. This introduces a fixed limit to the quantity harvested, and therefore fishing effort. If the TAC is binding (as is the standard assumption), fishers wish to apply more effort to the fishery than is allowed, implying that the cost of fishing effort is less than the return from increasing it. This requires the introduction of a *shadow price* of fishing effort which identifies the true marginal cost of effort at the TAC level (Figure 1.4). The shadow price is an addition to the set of data that forms the initial calibration of the model. In general the shadow price is only observable in tradable quota systems, where the unit value of quota is equal to the difference between the price and the shadow price. In other cases, the shadow price is not observed and must be estimated or assumed. The value of the shadow price locates the cost curve in the model. The model is initially calibrated to have a nominal amount of rent generated by the TAC,

with the shadow price equal to 90% of the market price. The TAC level may be varied as part of a policy shock.

Figure 1.4. Including a TAC in the fishery



Note: "Shadow cost" is written here because price is not visible on this figure. The shadow cost shown in the figure is the total cost in the model at the TAC level—essentially the same for pedagogical purposes.

38. The TAC is expressed in the model as a simple limit on harvest, which in turn fixes effort. Policy shocks may reduce harvest below the TAC level, or change relative factor shares as the result of a change in input prices, but harvest may not increase above the set TAC.[8]

39. The limit on effort brought about by a TAC usually leads to positive rent generation. For rent to be generated in the fishery two conditions must hold: There must be a constraint on total harvest, and there must be a mechanism to limit the race to fish. Derby fisheries and open access do not generate rent, but controlled-effort TAC and MEY optimised fisheries do.

40. In the case of a TAC derby fishery, all rent is assumed to be competed away in the race to fish.[9] Racing to fish reduces the efficiency of input use, by having vessels that are designed to fish very rapidly and which sit idle much of the season, for example. This is represented in the model by a productivity shifter in the production function that changes the productivity of inputs to ensure zero rents.

41. For MEY management, the profit function will be explicitly introduced and maximised by choice of effort. Unlike simply setting TAC at MEY, explicit profit

[8] Simple TACs can result in derby fishing—where fishers race to catch the TAC as quickly as possible. This race to fish is usually prevented by other management controls such as trip limits, individual catch shares and so on. These are not explicitly specified in the model. However, their intent and result is—the cost of fishing effort is not affected by the TAC level. This will be further elaborated upon when derby fisheries are included in the model.

[9] TAC derby fisheries and MEY management will be implemented in the next version of the model.

maximisation will allow for changes in the optimal effort level resulting from a policy shock changing the slope of the cost function.

Table 1.4. Management targets in the model

Management target	Equilibrium condition defined by	Solution method
Open access	Zero profit condition: P*Y-sum(w_j*i_j)='0,' j='1-n' inputs	Equilibrium displacement (enforce condition in model)
TAC	Y is exogenous policy variable	Equilibrium displacement (enforce condition in model)
TAC (derby fishing)	Y exogenous, zero profit condition holds	Equilibrium displacement (enforce condition in model)
MEY	Maximise rent : P*Y-sum(w_j*i_j) , j='1-n' inputs	Optimisation of rent function

1.7. Model results

42. The implications of alternative forms of support to the fishery were tested by systematically increasing the level of support by 100 to six different policy categories: income, fishers' owned capital, vessels, variable costs, fuel and output.[10] In the current version of the model, only the "open access" and "TAC" management options are available, so results are presented with respect to these.[11] The outcomes of introducing support, assessed in terms of their impact on the indicators, are set out in Table 1.3. The results of all scenarios are shown in Table 1.5 (open access) and Table 1.6 (TAC) and the discussion in each sub-section refers to these.

43. Each of the following sub-sections describes the results for different types of indicators. The results at this stage are simply meant to demonstrate the functioning of the model and the role of different parameters in determining the outcomes it produces. A revised version of the paper will produce results that are more complete and realistic with respect to parameter choices.

1.7.1. Determinants of effort and its implications for the stock and harvest

44. Effort, stock size and harvest are related according to the growth function, which is currently a simple logistic function. The Schaefer model results in a set relationship between these variables given a growth function $F(X) = rX\left(1 - \frac{X}{K}\right)$ and a harvest-effort relationship Y=qEX as follows:

$$Y = qKE\left(1 - \frac{qE}{r}\right), \qquad X = K\left(1 - \frac{qE}{r}\right)$$

Where Y is harvest, q is the catchability coefficient, K is carrying capacity, E is effort, r is intrinsic growth rate and X is stock level.

45. The equations for Y and X shown above are part of the system of equations that defines the model. The initial stock size matters for the results as increased effort will

[10] There is no explicit currency in the model yet, so this 100 can be thought of as some generic currency units. Once the model is parameterised for a specific situation, the currency amounts will also be resolved. Indeed, eventually connecting the model to support levels in the FSE is a key goal.

[11] Detailed information on current model parameters, variables, equations and its calibration is provided in Annex A.

increase harvest when stock is above that which yields MSY, but will reduce harvest if the stock is below that amount. In the open access version of the model, the initial stock size is below the MSY level, as open access is commonly assumed to lead to an overfished condition of stocks. The TAC version of the model restricts harvest level to be below the MSY level, as it is unreasonable for a TAC to result in a stock level below the MSY level.

46. Because the initial stock level under open access is below that which yields MSY, increased fishing effort will reduce both the equilibrium stock level and the equilibrium harvest (Table 1.5). That is, more effort reduces the quantity of fish harvested. All support scenarios lead to increased effort, reduced harvest and lower stocks. This effect is larger when a support is targeted at an input that is elastically supplied (fuel, hired crew, other purchased) and less when it targets inelastically supplied inputs (vessels, fishers' capital). Income payments target a mix of inputs, some of which are elastic (hired crew) and some which are not (vessels and capital). Output support affects overall input demand, and so has an impact on effort somewhere between the two extremes.[12]

Table 1.5. Simulation results in open access version of model

Support increased by 100 for six support categories

	Support based on Fishers' Income	Support based on the use of Fishers' owned capital	Support based on Vessels	Support based on the use of variable inputs	Support based on the use of fuel	Support based on output
Effort	1.80	1.12	1.29	2.40	2.32	2.18
Stock Size	-3.59	-2.24	-2.57	-4.80	-4.64	-4.35
Harvest	-0.93	-0.57	-0.66	-1.26	-1.21	-1.13
Consumption	-0.93	-0.57	-0.66	-1.26	-1.21	-1.13
Fleet size						
Fuel efficiency	0.94	0.96	0.96	0.89	0.87	0.91
Fishers' income	45.11	47.92	51.60	16.98	10.79	29.54
Input suppliers' income	4.45	2.72	3.16	20.13	25.54	15.47
Transfer efficiency	0.45	0.48	0.52	0.17	0.11	0.30
Consumer welfare	-95.48	-58.27	-67.13	-130.22	-125.44	-117.15
Taxpayer costs	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00
Total welfare change	-145.92	-107.62	-112.37	-193.11	-189.11	-172.14

47. When a TAC is put in place, there are no output effects (Table 1.6). All scenarios increase support and so would normally increase effort, but the TAC prevents this. Scenarios that reduce support could lead to the TAC no longer being binding, but these have not yet been explored. The different supports do result in some input choice changes resulting from the relative prices of inputs changing. This can be seen in the producer surplus changes for input suppliers.

[12] An intuitive way to think about this is that output support is similar to a support that targets all inputs. If the input cost shares are such that most input expenditure is for elastically-supplied inputs, it impact will be similar to that of a support to variable inputs. If most expenditure is for inelastically supplied inputs, output support will have an effect closer to that of supports based on capital.

Table 1.6. Simulation results in the version of model with a binding TAC

Support increased by 100 for six support categories

	Support based on Fishers' Income	Support based on the use of Fishers' owned capital	Support based on Vessels	Support based on the use of variable inputs	Support based on the use of fuel	Support based on output
Effort	0.00	0.00	0.00	0.00	0.00	0.00
Stock Size	0.00	0.00	0.00	0.00	0.00	0.00
Harvest	0.00	0.00	0.00	0.00	0.00	0.00
Consumption	0.00	0.00	0.00	0.00	0.00	0.00
Fleet size						
Fuel efficiency	1.02	1.01	1.01	0.99	0.95	1.00
Fishers' income	105.41	83.57	93.80	96.24	86.55	100.00
Input suppliers' income	-8.52	-5.17	-6.00	3.12	9.28	0.00
Transfer efficiency	1.05	0.84	0.94	0.96	0.87	1.00
Consumer welfare	0.00	0.00	0.00	0.00	0.00	0.00
Taxpayer costs	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00
Total welfare change	-3.11	-21.61	-12.20	-0.64	-4.17	0.00

1.7.2. Determinants of income transfer efficiency

48. Transfer efficiency in the model is the share of the total value of support that is converted to increased income for fishers. It is determined by two main factors: the share of the support that benefits inputs owned by fishers, and the amount of deadweight loss introduced by the support. The share that benefits fishers depends on where the initial incidence of support lies, combined with the overall share of inputs owned by fishers in the total. This makes the choice of factor shares important and an area for improvement in the next version of the model. The deadweight loss is linked to the amount of distortion introduced by the support. Generally speaking, the more a support leads to increased fishing effort, the less transfer efficient it will be.

49. Under an open access scenario the results show that most polices are only imperfectly effective at transferring income to fishers (Table 1.5). Recall that fishers' income is defined as producer surplus accruing to vessels, hired labour and owned capital. In the model, these together account for 50% of input expenditures as measured by the sum of their factor shares in the initial calibration of the model. This percentage will have a strong influence on overall transfer efficiency.

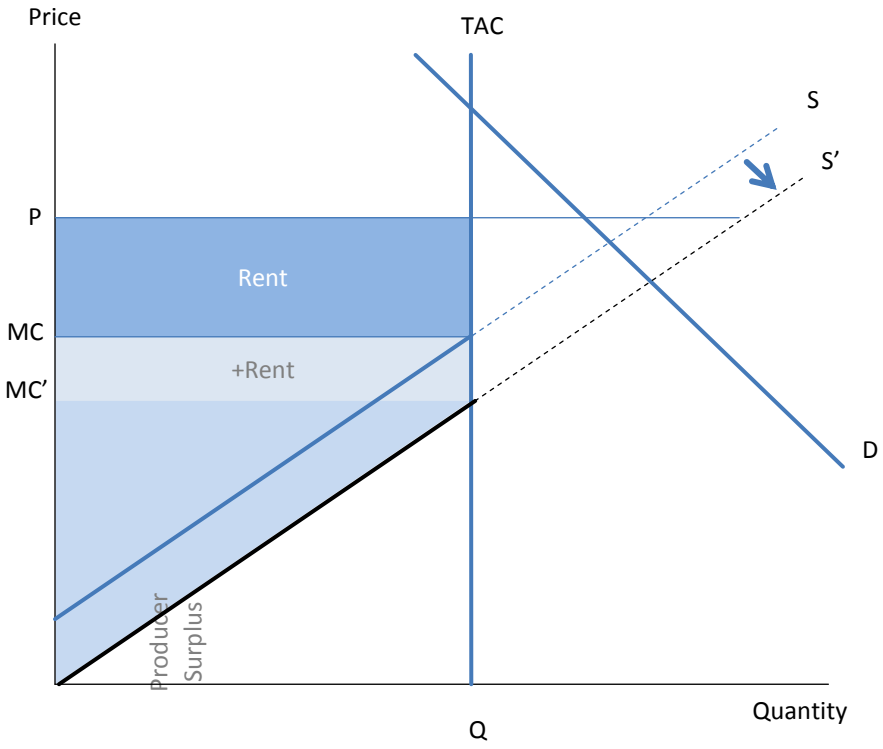
50. Transfers to the use of variable inputs or fuel are the least transfer efficient. This is because this type of policy encourages more intensive use of the subsidised inputs, so relatively less of the inputs that produce fishers' income are used. In general, policies that encourage the use of fishers' own inputs will be more transfer efficient than those that do not. This result is robust to parameter choice.

51. Support to vessels is shown as the most transfer efficient. In the current version of the model, the only difference between this input and fishers' own capital is the factor share—a larger factor share in this case leading to greater transfer efficiency. Income support is less transfer efficient because it supports in part hired crew, a component of fishers' income which is relatively more elastically supplied. The higher supply elasticity brings a greater effort response and a greater deadweight loss. A binding TAC changes the

situation with respect to transfer efficiency significantly (Table 1.6). A TAC prevents harvest from increasing, so also fixes effort by implication. Transfer efficiency is thereby greatly increased as the TAC nearly eliminates the deadweight losses that result from increased production in response to additional support.

52. The value of support is also transferred to fishers mainly as rent under the TAC scenario. Input suppliers do not benefit as producer surplus does not increase (Figure 1.5). The assumption in the model is that these rents accrue to vessel owners and operators and not crew, so while the transfer efficiency of support is much higher, the distribution of benefits is different than under open access where hired crew see greater benefits from support.

Figure 1.5. Support increases rent under a fixed TAC



Note: Producer surplus, the area above the supply function and below the marginal cost, shifts down along with the change in the supply function, leaving producer surplus unchanged and with rent increasing by the same amount as the shift in MC. This figure shows the overall supply function; the producer surplus for individual inputs may vary when changing support leads to different input shares, but the total surplus will not change.

53. Transfers based on fishers' income are shown to have a transfer efficiency of 105%, indicating that fishers receive $105 for every $100 provided as support. This is a consequence of income support intensifying the use of inputs owned by fishers at the expense of other input suppliers, so some of this transfer is coming from other input suppliers to fishers, and not only from the support itself. Input suppliers are made worse off by support based on fishers' income or to vessels or capital as fishers use more of the supported inputs and less purchased ones.

54. Support based on output price in this version of the model simply increases the difference between the price and the shadow price, and so accrues entirely as rents. This

form of support has a very simple form in the model. The addition of trade in the model would change this result as it would introduce another determinant to the price of fish.

1.7.3. Overall welfare effects

55. Support policies affect the income of all participants in the production chain for fish, from input suppliers to final consumers. The model provides an accounting of these effects, which may be aggregated to find the total welfare change induced by the policy.

56. For fishers and input suppliers, welfare changes are measured using producer surplus, defined as the area below the market price of the input and above its supply function (see Figure 1.3). For consumers, the parallel concept of consumer surplus is used, the area below the demand function but above the price of fish.[13]

57. Taxpayers are those who fund the cost of the policy support, and their welfare is reduced by the cost of the policies which must be raised through taxation. Total welfare is the sum of incomes to fishers and input suppliers, consumer surplus and taxpayer costs. The total welfare change is almost always negative, as any policy causes deadweight losses through introducing distortions in markets.

58. Under open access, total welfare change is significantly negative for all policy scenarios. This is because support actually leads to reduced harvest levels, thus harming consumers of fish who have less fish to consume and pay a higher price for them.

59. Taxpayer costs in this simple set of experiments are equal to the change in policy expenditure induced by the scenario, 100 in each case. Under more complex scenarios where there are a number of pre-existing policies, this amount will in general vary and can be greater or lesser than the introduced policy shock. This is because changing one policy can induce changes in another. For example, when both a fuel subsidy and output payment are in place, increasing the fuel subsidy will increase the required amount of output payments if the amount harvested increases.

1.8. Next Steps

60. The model remains in an early stage of development, and the results presented here are intended to illustrate the structure of the model and some implications of the design choices made. They do not represent at this stage conclusions from an analysis, and they will continue to evolve over time as the model is further developed.

61. The results shown here demonstrate that there are some outcomes that will be sensitive to parameter choice and some that will not. For example, it was shown that transfer efficiency depends on the estimated share of inputs that are owned by fishers, so the input share parameters will be influential on this. However, it was also demonstrated that the average transfer efficiency of a program is much higher when a TAC is in place. This result is unlikely to be greatly affected by parameter choice.

62. Because obtaining quality parameters and data is a common weakness of model exercises like this one, finding results that are robust to parameter choice is a priority in model development. This motivates the use of monte-carlo analysis to quantify this robustness, as well as designing scenarios that are not contingent on poor data. Monte-

[13] The theory and mathematical derivation of producer and consumer surplus can be found in most microeconomic texts. See (Henderson and Quandt, 1980[22]) for a clear discussion.

Carlo analysis is an approach where all parameters are systematically varied in their reasonable ranges. The model is run hundreds or thousands of times with these different parameters and the resulting changes in model results are presented as histograms or frequency distributions. Distributions that are narrow and non-overlapping indicate results that are more robust to parameter choices. This method can also be used to identify which parameters are most influential on model results; so-called *sensitivity elasticities*.

63. Model development will continue with the objective of reaching a level of maturity sufficient for useful results to be produced. The following developments are currently planned for the model:

- Adding a second fleet segment such that the model represents analogues of "large" and "small" fishers. This will allow a greater differentiation of welfare impacts that match policy objectives that target large or small-scale fishing.
- Adding imperfect management control and IUU fishing. IUU fishing is an important issue and adding some capacity in the model to investigate the connections between policy support and IUU fishing will contribute to the international dialogue on this subject.
- Improved parameters and data.
- Monte-Carlo analysis of policy shocks with respect to parameter choice and initial conditions.

64. Delegates are invited to suggest other directions for model development, either for the near-term or developments requiring a longer time span for implementation. All suggestions or comments on the current model structure are welcomed.

65. A revised version of the model and final report will be presented for declassification at the 122nd Session of COFI.

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Annex A. The FishPEM: Parameters, variables, equations and model calibration

66. FishPEM currently provides a stylized representation of effort, harvest and consumption for a single species fish stock that is being exploited by a single fishery. Supply and demand behavioural relationships are combined with the equilibrium requirements that supply must equal demand to simultaneously clear all markets as well as maintain the fish stock in a steady-state. This system of equations is calibrated to replicate a given market situation. A small change in the value of an exogenous policy parameter, such as transfers to variable inputs, output support or transfers based on fuel used can then be introduced and the model used to calculate a new set of equilibrium values for all endogenous prices and quantities. This procedure is termed a policy simulation experiment and the change in support level is the related policy shock.

67. Constructing FishPEM required three main sets of assumptions: (1) those relating to the basic structure of supply and demand response (including the bioeconomic stock, effort, yield component), (2) those relating to the underlying data and the elasticities and (3) those relating to the market of primary incidence of support measures. Economic theory and results of previous studies guided choices about the structure of the model. Data and parameter values are still largely under development. The classification of support measures in the FSE guided choices about their primary incidence. The purpose of developing the model is to ultimately provide a closer connection between measurement of support as done using the Fisheries Support Estimate (FSE) and quantitative analysis of the relative impacts and distribution of such support. As it is still in development the current version of the model does not yet incorporate FSE data explicitly, only representations of some FSE categories.

68. All the variables and parameters used in the model are listed and defined in Table A A.1, the model equations are then set out in Table A A.2. Factor input level data and elasticities, calibration parameters, variables and equations, and other supporting information are provided in Table A A.3 to Table A A.8. The sensitivity of the model results to assumptions about elasticity values or price responsiveness of supply and demand for inputs will be formally tested in the next version of the model.

69. In its current forms FishPEM can represent a fishery under either open access (OA) conditions or one subject to a binding TAC. All differences in the parameters, variables and equations under these two specifications are also highlighted in the tables that follow and discussed in the accompanying text.

Table A A.1. Variables and parameters in FishPEM

Endogenous variables are	*Stands for*	Model specification
P^d, P^s	Demand and supply prices for fish	all
D	Quantity of fish demanded	all
E	Effort	all
Y	Yield (quantity of fish supplied)	all
X	Stock size	all
x_j^d, x_j^s	Input demand and supply quantities *j*=1 to 5 inputs; fuel (fu), vessels (ve), hired crew (hc), fishers' owned capital (oc), other purchased inputs (op)	all
w_j^d, w_j^s	Input demand and supply prices	all
SR_{fs}, SR_{out}	Rate of support by policy variable (*fs*) and output (*out*)	all
SL_{fs}, SL_{out}	Level of support by policy variable (*fs*) and output (*out*)	all
TAC	Total Allowable Catch	binding TAC only
MC	Marginal cost of effort	binding TAC only
Policy variable symbol	*Stands for rate of*	
inc_j	Transfers based on fisher's income (*j* = ve, hc and oc)	all
var_j	Transfers based on variable input use (*j* = fu, hc and op)	all
$fuel$	Transfers based on fuel use	all
cap	Transfers based on fixed capital formation	all
ves	Transfers to vessels	all
out	Transfers based on quantity harvested (output)	all
Exogenous parameters are	*Stands for*	
r	Intrinsic growth rate	all
K	Carrying capacity	all
q	Catchability coefficient	all
η	Demand elasticity for fish	all
c_j	Cost share of input *j* in producing fishing effort	all
σ_{ij}	Input elasticity of substitution between input *i and j*	all
ε_j	Input elasticity of supply for input *j*	all
sk_{fs}, sk_{out}	Support shock to policy variables (*fs*), output (*out*)	all
sk_{TAC}	Support shock when there is a TAC	binding TAC only
$tfi_{j,fs}$,	Transfers mapped to individual inputs	all

Table A A.2. FishPEM model equations

Equations (dot above variable indicates percentage change) are		Model specification
Output market:		
$P^d = P^s - SR_{out}$	Demand (consumer) price for fish in the output market	all
$\dot{D} = \eta \dot{P}^d$	Consumer demand for fish in the output market	all
$D = Y$	Output market equilibrium	all
Input market:		
$\dot{x}_j^s = \varepsilon_j \dot{w}_j$	Input supply	all
$\dot{x}_j^d = \sum_i^n c_i \, \sigma_{ij} \dot{w}_i + \dot{E}$	Input demand	all
$\dot{x}_j^s = \dot{x}_j^d$	Input market equilibrium condition	all
$w_j^d = w_j^s \sum_{fs}^n (SR_{fs} \Leftarrow tfi_{j,fs} = 1)$	Input market demand price ($tfi_{j,fs} = 1$ denotes only the selection of cases where transfers accrue to specific individual inputs)	all
$Y \cdot P^s = \sum_j^n x_j w_j$	Zero profit condition under the **open access specification**	OA only
$Y \cdot MC = \sum_j^n x_j w_j$	Zero profit condition under the **binding TAC specification**	binding TAC only
$P^s > MC \Rightarrow (Y - Y0 - sk_{TAC}) = 0$	Endogenization of a binding TAC	binding TAC only
Biology:		all
$Y = qKE\left(1 - \frac{qE}{r}\right)$	Yield (harvest) function	all
$X = K\left(1 - \frac{qE}{r}\right)$	Stock size	all
Support:		
$sk_{fs} = 0 \Rightarrow \left(\boldsymbol{SL_{fs}} = SR_{fs} \sum_i^n (x_j^s w_j^s \Leftarrow tfi_{j,fs} = 1)\right) \wedge \left(\boldsymbol{SL_{fs}} = SL0_{fs} + sk_{fs}\right)$	Support shock level (at the policy variable level)	all
$sk_{fs} = 0 \Rightarrow \left(\boldsymbol{SR_{fs}} = SR0_{fs}\right) \wedge \left(\boldsymbol{SR_{fs}} = \frac{SL_{fs}}{\sum_i^n (x_j^s w_j^s \Leftarrow tfi_{j,fs} = 1)}\right)$	Support shock rate (at the policy variable level)	all
$sk_{out} = 0 \Rightarrow (\boldsymbol{SL_{out}} = SR_{out} Y) \wedge \left(\boldsymbol{SL_{out}} = SL0_{out} + sk_{out}\right)$	Output support level	all
$SK_{out} = 0 \Rightarrow (\boldsymbol{SR_{out}} = SR0_{out}) \wedge (\boldsymbol{SR_{out}} = SL_{out}/Y)$	Output support rate	all

Note: Variables ending in "0" indicate the baseline (initial) value of that variable, before any policy shock. Consumer demand $D = Y$ (harvest) if there is no trade. For equations where the form may depend upon the value of another parameter or variable, e.g. in the equation for support shock level, logic notation is used to indicate that if a given condition is met 'then' (⇒), and where an alternative is relevant 'otherwise' (⋀).

Model equations

70. All model equations are set out in detail in Table A A.2. The model comprises a set of equations and endogenous variables solved simultaneously, subject to exogenous

parameters. There is an output market for fish, separate markets for inputs each with supply and demand, a logistic growth function representing the fishery resource, and a set of equations representing individual policies. Most policies relate to inputs and produce wedges between the supply and demand price for specific inputs or groups of inputs. Support based on output results in a wedge between the demand and supply price of fish. The indicators produced by the model (Table 1.3) are either directly observed from the endogenous model variables or calculated ex post after a model run and are not represented as endogenous model equations or variables. The following paragraphs provide some more detail on the specific equations in the model.

71. In the output market for fish, equilibrium is imposed by setting consumer demand (*D*) equal to production (*Y*). The demand price of fish (P^d) is equal to the supply price (P^s) less any output support, with these prices endogenously determined. The demand for fish is represented by a downward sloping demand function with elasticity η.

72. Fishery yield (*Y*), also commonly termed "harvest", is determined directly through the yield function, on the basis of effort (*E*) and a set of exogenous fishery-specific parameters (*q*, *K* and *r*). In the input market to produce fishing effort, a system of input demand (x_j^d, w_j^d) and input supply (x_j^s, w_j^s) equations represent demand and supply responses for five categories of inputs used in the fishing process. These input demand equations reflect the usual assumptions of profit maximisation constrained by the production relationship. The supply of fishing effort (*E*) is embedded in the equations that determine equilibria in these input markets.

73. No fishery inputs are entirely fixed in production and all inputs are substitutes, the input elasticities of supply reflect the assumption that vessels and fishers' own capital are relatively more fixed than hired crew and the purchased inputs fuel and other purchased inputs – so have been assigned lower input elasticities of supply (Table A A.5). A supply response corresponding to a medium term adjustment horizon of three to five years is reflected in the values assumed for the price elasticities of input supplies and the parameters measuring the substitutability of inputs in production as well as the input shares. As previously discussed, the elasticities and other parameter values used in the current version of FishPEM will be revised as the model is developed.

74. For the equations relating to fishery support, the relationship between quantities, levels and rates of support follow the basic relationship of *level=rate*quantity*. The way that levels of support *(SL*) are calculated differs slightly depending on how it accrues in the fishery but the basic principle remains. In the absence of a shock to a policy category, its rate of support is fixed and the level is found by multiplying that by quantity. In the case of a policy shock, the level of support is fixed and the rate is found by dividing the level by quantity.

Model calibration

75. Before the model can be run and the impacts of any policy shocks tested initial starting values for the main parameters and variables must be either assigned or calculated. All variables or parameters ending in "0" indicate that it is the baseline (initial) value of that variable or parameter. These represent conditions in the fishery in its initial equilibrium state, before any policy shocks have been introduced (the baseline), and may consequently change as a result of shocks being introduced. Changes between the baseline model values and those that result from introducing policy shocks are then used to calculate the set of indicators set out in Table 1.3.

Table A A.3. FishPEM calibration variables, parameters

Endogenous variables are	*Stands for*	Model specification
$SR0_{fs}$	Subsidy rate for each policy in the base period	all
$w0_j^d$	Input demand price in the base period	all
$x0_j^d$	Input demand quantity in the base period	all
Exogenous parameters are	***Stands for***	
$r = 0.5$	Intrinsic growth rate	all
$K = 200$	Carrying capacity	all
$q = 0.005$	Catchability coefficient	all
$X0 = 50$	Benchmark stock size **in the open access specification**	OA only
$X0 = 150$	Benchmark stock size **in the binding TAC specification**	binding TAC only
$P0^s = 100$	Benchmark supply price	all
$P0^d = P0^s - SR0_{out}$	Benchmark demand (consumer) price for fish	all
$Q0^{ex} = 0$	Benchmark quantity of fish exported	all
$D0 \quad = Y0 - Q0^{ex}$	Benchmark consumer demand for fish in the output market, equals supply minus exports	all
$SL0_{fs}, SL0_{out}$ = please refer to Table A A.8	Benchmark support level to policy variables (*fs*) and output (*out*)	all
$SR0_{out} = \frac{SL0_{out}}{Y0}$	Benchmark output support rate, equals level of support divided by yield	all
$w0_j^s$ = please refer to Table A A.5	Benchmark input supply prices	all
$\eta = -1$	Demand elasticity for fish	all
$c_j =$ please refer to Table A A.5	Cost share of input *j* in producing fishing effort	all
$\sigma_{ij} = 0.5$ $\sigma_{jj} = -1/c_j \sum_j^n c_j \sigma_{ij}$ please refer to Table A A.6 for the values	Input elasticity of substitution between input *i and j*	all
ε_j = please refer to Table A A.5	Input elasticity of supply for input *j*	all
$tfi_{j,fs}$ = please refer to Table A A.7	Transfers mapped to individual inputs	all
$tfi_{j,fs} = 1 \Rightarrow$ $\boldsymbol{sh\_s_{j,fs}} = \frac{c_j}{\sum_j^n (c_j \Leftarrow tfi_{j,fs} = 1)}$	Share of each support category that accrues to a particular input: $sh\_s_{j,fs}$ (*j* * *fs* matrix)	all
$X0 > \frac{K}{2} \Rightarrow$ $\left(\boldsymbol{E0} = \frac{-qK + \sqrt{q^2K^2 - (4q^2KY0)/r)}}{-2q^2K} \right)$ $\wedge \left(\boldsymbol{E0} = \frac{-qK - \sqrt{q^2K^2 - (4q^2KY0)/r)}}{-2q^2K} \right)$	Effort in the base period	all
$Y0 = r\mathrm{X0}(1 - \frac{\mathrm{X0}}{K})$	Yield in the base period	all
$TAC0 = Y0$	TAC in the base period	binding TAC only
$MC0 = 0.9P0^s$	Benchmark marginal cost (shadow price) of fishing effort	binding TAC only

Note: Variables ending in "0" indicate the baseline (initial) value of that variable, before any policy shock. For equations where the form may depend upon the value of another parameter or variable, e.g. in the equation for effort in the base period, logic notation is used to indicate that if a given condition is met 'then' (⇒), and where an alternative is relevant 'otherwise' (⋀).

Table A A.4. FishPEM calibration equations

Equations are	*Stands for*	Model specification
$SR0_{fs} = \frac{SL0_{fs}}{\sum_j^n (x0_j^d w0_j^s \Leftarrow tfi_{j,fs} = 1)}$	Rate of support in the base period by policy where: $tfi_{j,fs} = 1$ denotes only the selection of cases where transfers accrue to specific individual inputs	all
$w0_j^d = w0_j^s (1 - \sum_{fs}^{n} (SR0_{fs} \Leftarrow tfi_{j,fs} = 1)$	Input demand price	all
$x0_j^d = \frac{Y0P0^s c_j}{w0_j^d}$	Input demand under the **open access specification**	OA only
$x0_j^d = \frac{Y0MC0c_j}{w0_j^d}$	Input demand under the **binding TAC specification**	binding TAC only

Note: Variables ending in "0" indicate the baseline (initial) value of that variable, before any policy shock. For equations where the form may depend upon the value of another parameter or variable, e.g. in the equation for rate of support in the base period, logic notation is used to indicate that if a given condition is met 'then' (⇒).

76. In FishPEM initial values are assigned to sets of economic parameters and variables:

- input cost shares (c_j),
- elasticities of supply (ε_j),
- demand elasticity for fish (η),
- initial supply price of fish ($P0^s$),
- initial input supply prices ($w0_j^s$),
- initial levels of support ($SL0_{fs}$, $SL0_{out}$) and
- initial levels of exports ($Q0^{ex}$).

and biological parameters and variables:

- carrying capacity (K),
- intrinsic growth rate (r),
- catchability coefficient (q) and
- initial stock size ($X0$)

77. The above listed parameters and variables with assigned values are then used to calculate all remaining required parameters and variables, whose values are implied by them. These include:

- share of each support category accruing to each particular input ($sh\_s_{j,fs}$),
- initial rates of support by policy variable ($SR0_{fs}$) and output ($SR0_{out}$),
- quantity of fish demanded ($D0$) and the associated price ($P0^d$),
- effort ($E0$),
- yield ($Y0$) and
- input demand prices ($w0_j^d$) and quantities ($x0_j^d$)

78. Both the specific assigned start values (e.g. K = 200) and the calculations undertaken to arrive at the remaining parameter and variable values are provided in the tables below (Table A A.3, Table A A.4, Table A A.7 and Table A A.8).

79. Baseline yield ($Y0$) is calculated using the classic Shaefer logistic surplus production function, where equilibrium surplus production is determined by the intrinsic growth rate of the stock (r), the size of the stock ($X0$) and its natural carrying capacity (K). This surplus, defined as the difference between production and natural mortality, i.e. recruitment and growth, is the equilibrium yield (Y) available to the fishery. A rearranged growth function, assigning effort to the left hand side (rather than yield), that accounts for catchability (q, in addition to K, r and $Y0$) is then solved using the quadratic formula to determine the exact level of effort ($E0$) required to harvest the yield determined by the Shaefer function in the previous step. When calculating ($E0$) the initial stock size ($X0$) is used to establish which root of the quadratic formula is appropriate for the calibration, on the basis that in one case increased effort will in result in yield increasing whereas in the other it will result in yield falling. When the stock size is on the left hand side of the yield curve (i.e. $X0>0.5K$) the negative root is applied (resulting in yield increasing with effort) while if on the right hand side of the yield curve (i.e. $X0<0.5K$) the positive root is selected (Table A A.3).

80. Support is currently introduced to the fishery through a set of specific policy variables (*fs*, *out*). Output support (*out*) acts as a wedge between supply and demand price while other support types accrue to individual inputs in specific ways, e.g. the policy 'transfers based on fisher's income' (*inc*) accrues to vessels, hired crew and fishers' own capital, whereas 'transfers to fuel' (*fuel*) only accrues to the input fuel (Table A A.7).

81. The level of support provided by a policy must be distributed across the inputs to which it accrues in order to determine the ad-valorem rate of support implied. This is done by allocating the support to a given input ($sh\_s_{j,fs}$) according to the proportional contribution of its initial cost share (c_j) relative to the sum of the cost shares of all inputs to which the given policy (*fs*) accrues. This produces a rate of support that is equal for all relevant inputs such that the relative input prices stay the same. That is, the policy does not induce re-allocations among the factors to which it directed, only between those inputs receiving support and those that do not.

82. The rate of support to output ($SR0_{out}$) is calculated as the ratio of support to output in the base period ($SL0_{out}$) and baseline yield ($Y0$). As the level of support to output in the calibration is set to zero the rate of support is consequently also zero.

83. The baseline demand price ($P0^d$) and quantity ($D0$) for fish are then calculated. Demand price is calculated as the initial supply price of fish ($P0^s$, which currently has its start value assigned for calibration) less the rate of support to output (SR_{out})). In this version of the model, initial levels (and therefore rates) of support are zero but this need not be the case. The initial quantity of fish demanded is set to equal yield ($Y0$) less exports ($Q0^{ex}$), which are also currently set to zero as trade is not currently represented.

84. Once all of the above values have been calculated a set of three equations are simultaneously solved to determine baseline values for the rate of support by policy variable and factor demand prices and quantities.

85. The rate of support for each policy variable ($SR0_{fs}$) is calculated by taking the level of support it introduces ($SL0_{fs}$) and dividing this by the total value of all the inputs (j) it accrues to (defined as sum of all relevant input quantities demanded multiplied by their supply price).

86. The quantity of each factor input demanded ($x0_j^d$) is determined by dividing the share of revenue associated with each input ($Y0*P0^s*c_j$) by the baseline demand price for that input. This formulation is implied by the zero-profit condition which says that input

expenditures should exhaust revenue. The demand price for each input ($w0_j^d$) is determined by taking its baseline supply price (which are assigned starting values in the calibration), and adjusting it to account for the presence of any support in the base period.

Binding TAC vs open access

87. The model currently has two versions, one representing a fishery under open access conditions and another that represents a fishery with a binding TAC. The discussion so far has been in relation to the open access specification; the following paragraphs detail how the binding TAC specification differs to this.

88. A binding TAC requires two additional baseline parameter values; the baseline TAC (*TAC*0) and the marginal cost of effort (*MC*0). *TAC*0 is set equal to baseline yield (*Y*0). *MC*0, the shadow price of fishing effort, is set to equal 90% of the baseline supply price of fish, an arbitrary amount that will be revisited in later versions. *MC*0 is then used in place of $P0^s$ when quantifying initial levels of demand for factor inputs ($x0_j^d$). The difference between marginal cost and price is the unit rent, or marginal excess profit, generated by the imposition of the TAC.

89. When running this version of the model, the marginal cost of fishing (*MC*) locates the supply function. The relationship between MC and the supply price of fish (P^s) determines how equilibrium is found in the model. When price exceeds marginal cost the TAC is binding and determines yield, whereas once $MC=P^s$ the TAC is no longer binding and yield is determined by the zero-profit condition as under open access. Changes to the TAC can be introduced using the parameter sk_{TAC} (Table A A.2).

Table A A.5. Input level data and elasticities

	Inputs	Elasticity of supply (ε_j)	Initial cost share (c_j)	Benchmark supply price ($w0_j^s$)
Fisher owned inputs:	Vessels	0.5	0.20	100
	Hired crew	2.0	0.20	100
	Fishers' owned capital	0.5	0.10	100
Purchased inputs:	Fuel	2.0	0.30	100
	Other purchased inputs	2.0	0.20	100

Table A A.6. Input elasticities of substitution (σ_{ij})

Inputs (*j*)	Fuel (fu)	Vessels (ve)	Hired crew (hc)	Fishers' owned capital (oc)	Other purchased inputs (op)
Fuel	-1.17	0.50	0.50	0.50	0.50
Vessels	0.50	-2.00	0.50	0.50	0.50
Hired crew	0.50	0.50	-2.00	0.50	0.50
Fishers' owned capital	0.50	0.50	0.50	-4.50	0.50
Other purchased inputs	0.50	0.50	0.50	0.50	-2.00

Note: Please refer to Table A A.3 to see how these values are calculated.

Table A A.7. Transfers mapped to individual inputs ($tfi_{j,fs}$)

Inputs (*j*)	Transfers based on: Fisher's income (inc)	Vessels (ves)	Fixed capital formation (cap)	Variable input use (var)	Fuel use (fuel)
Fuel	0	0	0	1	1
Vessels	1	1	0	0	0
Hired crew	1	0	0	1	0
Fishers' owned capital	1	0	1	0	0
Other purchased inputs	0	0	0	1	0

Table A A.8. Levels of support introduced in the baseline and simulations

In relation to the simulations reported in Table 1.5 and Table 1.6

Scenario	Level of support introduced: Fisher's income (inc)	Vessels (ves)	Fixed capital formation (cap)	Variable input use (var)	Fuel use (fuel)	Output (out)
Baseline	0	0	0	0	0	0
Support based on Fishers' Income	100	0	0	0	0	0
Support based on Vessels	0	100	0	0	0	0
Support based on the use of Fishers' owned capital	0	0	100	0	0	0
Support based on the use of variable inputs	0	0	0	100	0	0
Support based on the use of fuel	0	0	0	0	100	0
Support based on output	0	0	0	0	0	100

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TRADE AND AGRICULTURE DIRECTORATE
FISHERIES COMMITTEE

Combatting Illegal, Unreported and Unregulated Fishing

The document is the second draft of the report Combatting Illegal, Unreported and Unregulated Fishing, to be presented for Discussion to the 121st Session of COFI under item 6 of the draft agenda. The work is carried out under the PWB item 3.2.3.3.1.

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Note by the Secretariat

The document is the second draft of the report *Combatting Illegal, Unreported and Unregulated Fishing*. The work is carried out under the PWB item 3.2.3.3.1: Combatting illegal, unreported or unregulated fishing.

The draft report focuses on the analysis of the data received from countries through the survey questionnaire. It identifies progress achieved in implementing good policies and practices against IUU fishing since 2005, and points to remaining gaps, suggesting where additional effort should be concentrated. The draft also describes in detail the analysis method.

The country level data used to prepare the draft will be bilaterally validated with participating countries before the report is presented at the November 2018 COFI meeting for declassification. Additional countries may be added in the final report if their submissions are received by the end of June 2018. The final report will also contain a section on best practices in RFMOs, for which information is currently being collected from RFMOs secretariats.

This report is presented for DISCUSSION to the 121st Session of COFI under item 6 of the draft agenda. Delegates are kindly asked to provide comments on the content of the report and make suggestions for a revised version to be presented at the 122nd COFI.

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Abbreviations and acronyms

ABNJ	areas beyond national jurisdictions
AIS	automatic identification system
BO	beneficial owner
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CDS	catch documentation schemes
CMM	conservation and management measures
CNCP	co-operating non-contracting party
COFI	Committee for Fisheries
CP	contracting party
DWFN	distant water dishing nation
EEZ	exclusive economic zone
EJF	Environmental Justice Foundation
EMFF	European Maritime and Fisheries Fund
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FATF	Financial Action Task Force
FOC	flag of convenience
GFCM	General Fisheries Commission for the Mediterranean
GT	gross tonnage
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
IMO	International Maritime Organization
IOTC	Indian Ocean Tuna Commission
IPOA-IUU	International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported and Unregulated Fishing
IUU	illegal, unreported and unregulated
MCS	monitoring, control and surveillance
MPA	Marine Protected Area
NAFIG	North Atlantic fisheries intelligence group
NAFO	Northwest Atlantic Fisheries Organization
NEAFC	North East Atlantic Fisheries Commission

NGO Non-governmental organization

NGR Negotiating Group on Rules

NPFC	North Pacific Fisheries Commission
PSMA	Port State Measures Agreement
RFMO	regional fisheries management organisations
SDG	sustainable development goal
SEAFO	South East Atlantic Fisheries Organisation
SIOFA	Southern Indian Ocean Fisheries Agreement
SOLAS	(Convention for the) Safety of Life at Sea
SPRFMO	South Pacific Regional Fisheries Management Organisation
UNCLOS	United Nations Convention on the Law of the Sea
UNDC	United Nations Office on Drugs and Crime
UNFSA	United Nations Fish Stocks Agreement
UNGA	United Nations General Assembly
UVI	unique vessel identifier
VMS	vessel monitoring systems
WCPFC	Western and Central Pacific Fisheries Commission
WTO	World Trade Organization

Executive summary

Illegal, unreported and unregulated (IUU) fishing is a serious threat to fishing communities, marine ecosystems and societies at large. Public and political awareness of the issue has increased and consensus has emerged on the need for countries to join in efforts to combat IUU fishing. The issue now features prominently on the international political agenda, in particular following the adoption of the sustainable development goal (SDG) target 14.4, which sets the objective to end IUU fishing by 2020.

This report aims to inform policy makers on the progress made in implementing measures against IUU fishing over the period from 2005 to 2017, while identifying regulatory loopholes and policy gaps which undermine efforts in the fight against IUU fishing. It does so through a mechanism of objective and transparent monitoring of the adoption of recognised best policies and practices to deter IUU fishing, building on the results of a survey sent to all countries participating in COFI activities. Hence, the report contributes to measuring progress towards the achievement of SDG 14.4 and other international commitments on the matter of sustainable fishing.

The preliminary results of the survey find considerable improvement over the last decade among OECD countries. There has been notable progress on the cooperation front, both among countries at bilateral and international levels and between different authorities within countries, suggesting that reducing IUU fishing is a broadly accepted goal and resulting efforts are streamlined for effective conservation of marine resources. The use of measures targeting fish product markets and better aligned economic incentives is on the rise. For instance, catch documentation and certification schemes preventing IUU fishing products from entering the market are now common requirements among OECD countries. It is also increasingly common to investigate the financial transactions related to seafood trade for fraudulent sourcing. States are becoming better in assuming responsibilities in their roles as flag, coastal and port states. Reforms undertaken are giving rise to comprehensive laws preventing IUU fishing, which build a strong foundation for effective enforcement.

However, the results also highlight the fact that some areas need further attention in order to resolve the issue of IUU fishing. Among OECD countries, regulations applicable to fishing-related activities, such as transhipment, remain more permissive than those governing fishing. The lack of transparency in granting fishing authorisations identified in many countries results in a cumbersome detection of illegal activities. OECD countries could also better involve tax and criminal authorities in the fight against IUU to facilitate pursuing related crimes such as money laundering. Additional gaps are identified, in this report, for specific countries participating in the survey.

In the coming months, the OECD Secretariat will further review the survey results, identify options available to governments, and formulate recommendations addressing the regulatory gaps identified across surveyed countries. The recommended way forward in addressing the identified challenges will be presented in the revised version of this report in November 2018.

Combatting Illegal, Unreported and Unregulated Fishing: where do we stand?

1. Understanding the progress in the fight against IUU fishing since 2005

1.1. Persistence of IUU fishing is a key impediment to the development of a sustainable ocean economy

1. Illegal, unreported and unregulated (IUU) fishing is a serious threat to fishing communities, marine ecosystems and societies at large (Box 1.1). IUU fishing reduces the resources available to legal fishers, creating unfair competition that reduces profitability of legitimate fishing, potentially harming the social cohesion of fishing communities and weakening food security in countries that depend on fishery resources. IUU fishing undermines governments' capacity to manage fish stocks sustainably, adding pressure on resources that is not accounted for in management plans, while making use of fishing techniques that are detrimental to resources and ecosystems, and targeting species that need to be protected. IUU fishing often leads to damaged coral reefs and destructive bycatch of endangered species (Liddick, 2014[1]).

2. IUU fishing has economic consequences that go beyond the fisheries sector. Apart from the forgone revenue from the marine resources that are illegally removed, other costs of IUU fishing include the loss of local economic activities related to fisheries and lost opportunities to collect fees and other tax liabilities that reduce countries abilities to fight poverty, fund public investment and support development activities. Agnew et al. (2009[2]) estimate that illegal and unreported fishing cost the global economy as much as USD 23.5 billion annually, excluding the cost of unregulated fishing and other related economic losses.

3. IUU fishing is inherently a global activity. Operators engaged in IUU fishing, in search for higher profits, move from one jurisdiction to another, targeting areas where regulations and enforcement capacities are weaker. The countries most vulnerable in the face of IUU fishing are those with weak governance and insufficient capacity to police their waters (Liddick, 2014[1]). Poor socio-economic conditions can also make fishers and others in fishing communities vulnerable to recruitment into criminal activities (UNODC, 2011[3]). Moreover, globalisation has enabled criminal networks to expand the scope and scale of IUU fishing operations to related crimes such as tax evasion, money laundering, drug trafficking, human abuse, or financing terrorism (UNODC, 2011[3]). With international trade, products deriving from IUU fishing can fraudulently end up on consumers' plates in any country.

Box 1.1. What is IUU fishing?

Following International Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported and Unregulated Fishing (IPOA-IUU) (FAO, 2001[4]), IUU fishing elements are defined as follows:

- Illegal fishing refers to activities conducted in a State's EEZ in contravention of its laws and regulations as well as to fishing in international waters in violation of that country's flag state law and regulations related to its obligations under the international treaties and regional fisheries management organisations (RFMO) convention arrangements to which it is party.
- Unreported fishing refers to fishing activities that have not been reported, or have been misreported, to the relevant national authority or RFMO, in contravention of the laws, regulations and reporting procedures of that country or organisation. This can occur both within EEZs and on the high seas.
- Unregulated fishing refers to fishing activities in areas or of fish stocks where there are no national, regional or international conservation or management measures applicable to a particular fishery or fishing vessel. Unregulated fishing can occur in an unmanaged fishery within an EEZ or on the high seas by vessels without nationality, or by those flying the flag of a State not party to international conventions or a relevant RFMO.

1.2. Increased acknowledgement of the need to tackle IUU fishing

4. Over the past decade, a more detailed picture of the threat posed by IUU fishing operations has emerged. Public and political awareness of the issue has increased and consensus has emerged on the need for countries to join in efforts to combat IUU fishing. The issue now features prominently on the international political agenda, in particular following the adoption of the sustainable development goal (SDG) target 14.4, which sets the objective to end IUU fishing by 2020[1] (Box 1.2). Calls for tougher sanctions on operators involved in IUU fishing became a focal point for discussion, e.g. at high profile meetings like the recent *Our Ocean Conference* organised by the European Commission in Malta (Our Ocean, 2017[5]). In 2017, members of the World Trade Organization (WTO) continued discussing disciplines on subsidies related to IUU fishing (WTO, 2017[6]).

5. Concrete progress has been made with the adoption and implementation of a number of international treaties and voluntary agreements intended to support the fight against IUU fishing (Box 1.3). Fishing nations, including within the OECD, have been taking action to address IUU fishing through new regulations and improved monitoring and enforcement practices. However, despite these efforts, IUU is still believed to account for more than 15% of global capture fisheries production annually (FAO, 2016[7]).

1 The fight against IUU fishing can also contribute to attaining the SDG 1 'No poverty', SDG 2 'No hunger' and SDG16 'Peace, justice and strong institutions' by 2020.

Box 1.2. Sustainable Development Goal (SDG) 14

The global indicator framework was developed by the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs) and agreed to, as a practical starting point at the 47th session of the UN Statistical Commission held in March 2016. The report of the Commission, which included the global indicator framework, was then taken note of by United Nations Economic and Social Council at its 70th session in June 2016.

More information can be found at: https://sustainabledevelopment.un.org/.

Sustainable Development Goal 14:

"Conserve and sustainably use the oceans, seas and marine resources for sustainable development"

SDG Target 14.4:

"By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics"

SDG Indicator 14.4.1:

"Proportion of fish stocks within biologically sustainable levels"

Box 1.3. International treaties and voluntary agreements on IUU fishing

Since 2005, a number of countries committed to improved measures against IUU fishing. The major documents include:

- 2014 Voluntary Guidelines for Flag State Performance (FAO, 2014[8])
- 2015 Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (FAO, 2015[9])
- 2016 Agreement on Port State Measures to Prevent, Deter, and Eliminate Illegal, Unreported and Unregulated fishing in force since 2016 (FAO, 2016[10])
- 2017 Voluntary Guidelines for Catch Documentation Schemes (FAO, 2017[11])

1.3. Monitoring progress in the implementation of recognized best policies and practices against IUU fishing

6. This report aims to inform policy makers on the progress made in implementing measures against IUU fishing over the period from 2005 to 2017, while identifying regulatory loopholes and policy gaps which undermine efforts in the fight against IUU fishing. It does so through a mechanism of objective and transparent monitoring of the adoption of recognised best policies and practices to deter IUU fishing. Hence, the report contributes to measuring progress towards achieving SDG 14.4 and other international commitments on sustainable fishing.

7. The monitoring framework presented is based on an up-to-date inventory of policies (regulations and instruments) and practices (decision-making processes and institutional arrangements) internationally recognized as having potential to reduce IUU

fishing (hereafter "recognized best policies and practices"). The inventory is constructed on the basis of recommendations from international legal instruments, scientific literature and consultations with stakeholders. It updates and expands the inventory presented in 2005 in the report *Why Fish Piracy Persists* (OECD, 2005[12]).

8. The recognized best policies and practices are classified in four main categories focusing on the important areas of intervention (Table 1.1). Consequently, a questionnaire inquiring about the adoption and implementation of the recognised best policies and practices was developed to collect relevant information.

Table 1.1. Classification of recognized best policies and practices

Category	Section
State responsibilities	Flag state responsibilities
	Coastal state responsibilities
	Port state responsibilities
Economic incentives	Market measures
	Economic measures
Co-operation	National (interagency) co-operation
	International co-operation
Enforcement	Monitoring, control and surveillance (MCS) tools and infrastructure
	Sanctions for infringements

9. The answers to the questionnaire form the basis for developing indicators which represent in quantitative terms the extent to which the recognized best policies and practices have been implemented in several key policy and practices areas. The questionnaire, related literature and the scoring methodology used can be found in Annex A.

10. The results at this stage represent information from 25 countries or economies that completed the questionnaire, consisting of 21 OECD Members, 1 accession country and 3 non-OECD members.[2] In 2015, these countries represented about 21% of the global wild fisheries production volume (FAO, 2017[13]) and 84% of the OECD wild production value (OECD, 2017[14]).[3]

11. Section 1.4 will provide a broad overview of the results. It serves as a general indication of progress made in implementing the recognised best policies and practices in combatting IUU fishing by OECD countries. Sections 2 to 5 explain in detail each indicator and data underlying these measures.

1.4. Progress in fighting IUU fishing is consistent with economic growth but some areas need further attention

12. The preliminary results of the survey find considerable improvement over the last decade (Figure 1.1). There has been notable progress on the cooperation front, both among countries at bilateral and international levels and between different authorities within

[2] OECD: Australia, Belgium, Canada, Denmark, Estonia, Germany, Greece, Iceland, Ireland, Italy, Japan, Korea, Latvia, the Netherlands, New Zealand, Norway, Slovenia, Sweden, Turkey, the United Kingdom, the United States; accession: Colombia; non-OECD: Lebanon, Libya and Chinese Taipei.

[3] OECD coverage based on an estimate – for countries with missing production value, value was estimated based on production volume sourced from FAO (FAO, 2017[13]) and average price calculated based on OECD countries that provided data for 2015 (OECD, 2017[14]).

countries, suggesting that reducing IUU fishing is a broadly accepted goal and resulting efforts are streamlined for effective conservation of marine resources. The use of market measures and better aligned economic incentives is also on the rise. For instance, catch

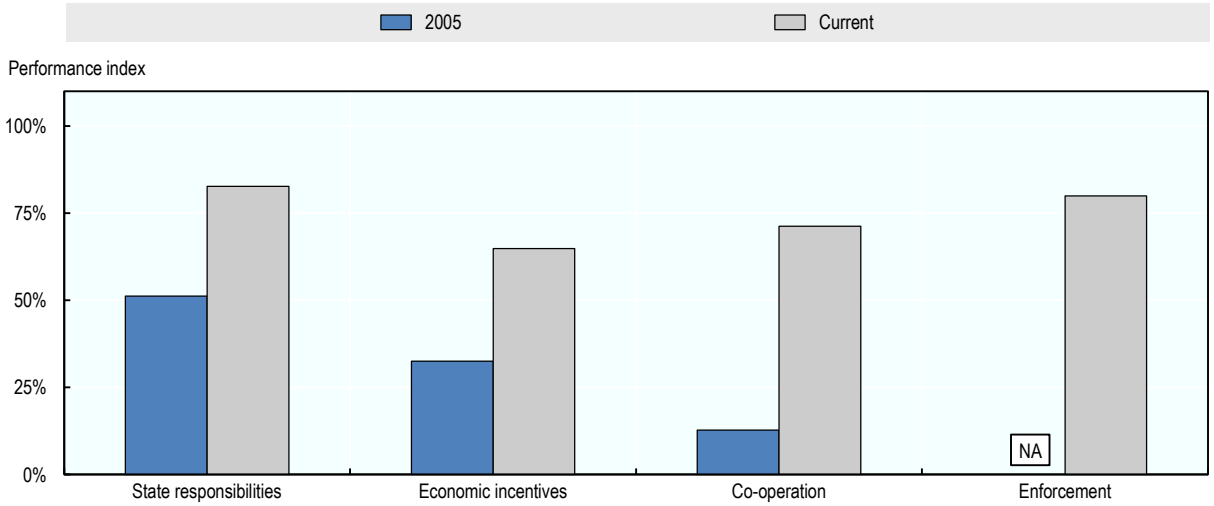
documentation requirements and certification schemes prevent IUU fishing products from entering the market. It is also increasingly common to investigate the financial transactions related to seafood trade for fraudulent sources. States are also becoming better in assuming responsibilities in their roles as flag, coastal and port states. Undertaken reforms are giving rise to comprehensive laws on preventing IUU fishing, which build a strong foundation for effective enforcement. A variety of enforcement tools is available and many are in use by the surveyed countries to police waters and deter IUU fishing.[4]

13. However, the results also highlight the fact that some areas need further attention in order to resolve the issue of IUU fishing. Among OECD countries, regulations applicable to fishing-related activities, such as transhipment, remain more permissive than those governing fishing. The lack of transparency in granting fishing authorisations identified in many countries results in a cumbersome detection of illegal activities. OECD countries could also better involve tax and criminal authorities in the fight against IUU to facilitate pursuing related crimes such as money laundering. Additional gaps are identified for specific countries participating in the survey.

14. It is also worth noting that the extent of the undertaken actions against IUU fishing often comes along the economic growth of countries (Figure 1.2). The overall performance index for implementation of measures against IUU fishing developed using the survey results (for details on aggregation of results, refer to Annex A) correlates well with the GDP per capita.

15. A detailed description of the factors behind progress in each category, as well as an account of developments in enforcement, is presented in Sections 2 to 5.

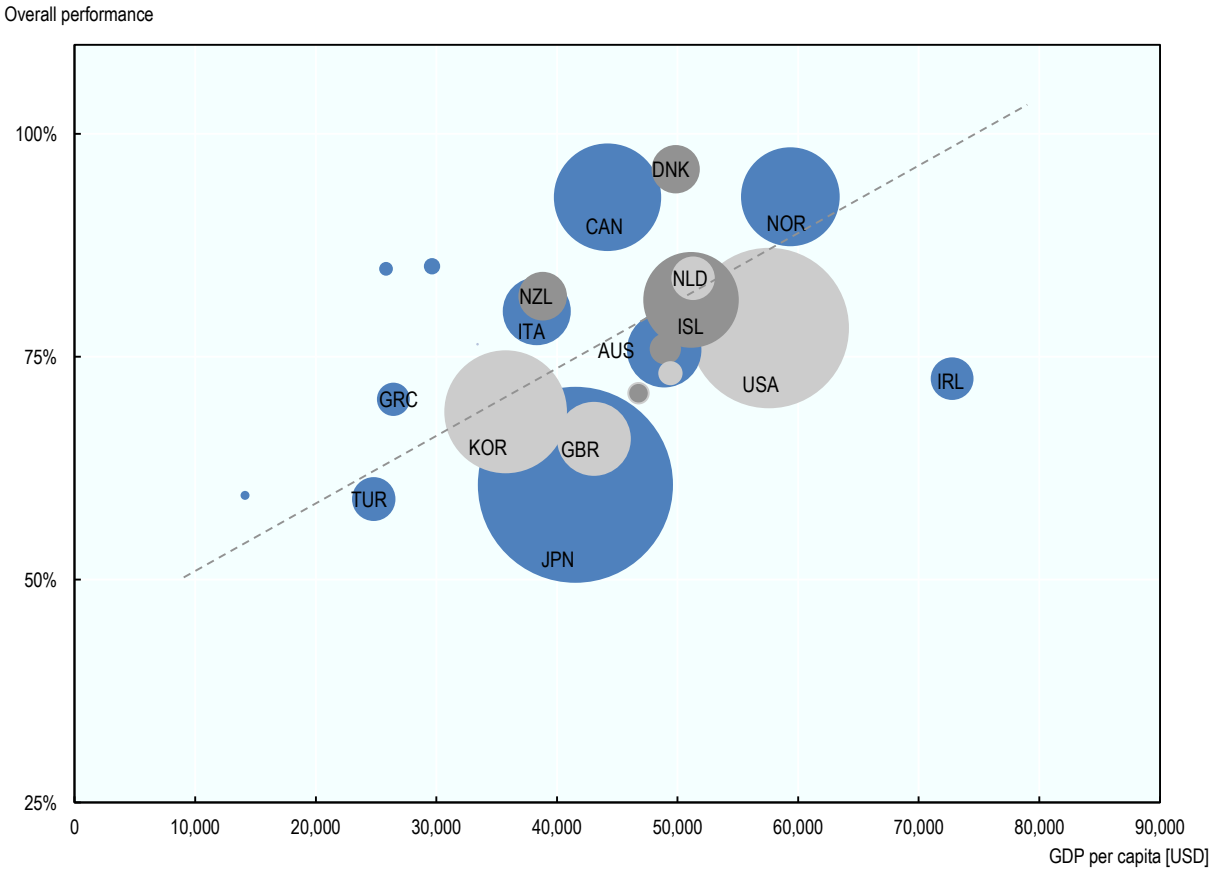
Figure 1.1. How things compare between 2005 and 2016



Note: Performance index based on weighted average of responses to the OECD questionnaire on measures against IUU fishing Results limited to the subset of questions where data were available for both 2005 and 2017, except for results on enforcement. Data on enforcement not collected in 2005. Results include OECD Members and OECD accession countries participating in the data survey. For details on methodology, refer to Annex A.
Source: OECD 2017 data collection on measures against IUU fishing.

[4] Data on enforcement was not collected in 2005 and thus no comparison is presented.

Figure 1.2. Overall performance in terms of fight against IUU fishing in relation to GDP per capita



Note: GDP per capita sourced from OECD database (OECD, 2018[15]). Size of bubble based on estimated production value (FAO, 2017[16]; OECD, 2017[14]); details in footnote 3). Trend line based on weighted regression using analytical weights constructed based on production value. Note that OECD observer points out that Ireland GDP per head might not "accurately reflects Ireland's actual wealth" (OECD Observer, 2005[17]).
Source: OECD 2017 data collection on measures against IUU fishing.

2. State responsibilities in the fight against IUU fishing

2.1. Countries have responsibilities in many roles

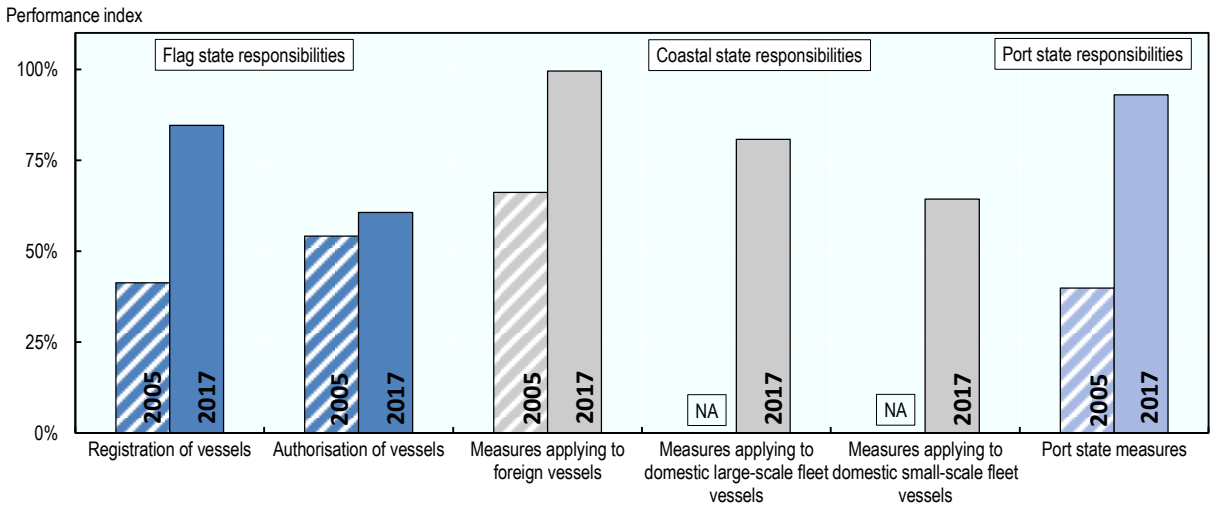
16. States have responsibility to establish well-functioning systems of governance in their roles as flag, coastal and port states (Table 2.1).The lack of effective state control over vessels remains one of the main causes of IUU fishing (Kao, 2015[18]; Erceg, 2006[19]; Englender et al., 2014[20]; Churchill, 2012[21]). Problems in domestic legal systems were identified as key underlying causes for IUU fishing in 2005 (OECD, 2005[12]).

Table 2.1. State responsibilities - classification

Section	Subsection
Flag state responsibilities	Registration of vessels
	Authorisation of vessels
Coastal state responsibilities	Measures applying to foreign vessels
	Measures applying to domestic large scale fleet vessels
	Measures applying to domestic small fleet vessels
Port state responsibilities	Port state measures

17. Progress in adapting domestic regulations to assume responsibilities arising from international commitments has been widespread following the elevated profile of sustainability and sustainable fisheries on the international agenda (Figure 2.1). However, the evidence suggests that ensuring compliance with international standards and agreements on the use of marine resources remains challenging. Regulations governing marine areas, in particular areas beyond national jurisdictions (ABNJ), are at risk of not being obeyed due to legal and political obstacles. Weak regulations on transhipment and other fishery-related activities open seafood supply chains to IUU fishing operators. The following sections describe how the experience of the past ten years shaped understanding of the states' role in limiting IUU fishing activities, and progress made in that regard.

Figure 2.1. State responsibilities – progress since 2005



Note: Performance index based on weighted average of responses to the OECD questionnaire on measures against IUU fishing Results limited to the subset of questions where data were available for both 2005 and 2017, except for results on measures applying to large scale and small scale fleet vessels, which include only results for 2017. Results include OECD Members and OECD accession countries participating in the data survey. For details on methodology, refer to Annex A.

Source: OECD 2017 data collection on measures against IUU fishing.

2.2. Flags of convenience accommodate profit-driven IUU fishing

18. The flag state is responsible for exercising jurisdiction over vessels flying its flag, irrespective of the vessel's geographical location.[5] However, effectiveness of control varies between countries (Miller and Sumaila, 2014[22]). A common practice in the fishing industry is to take on a flag of convenience (FOC). Operators do this by registering a vessel in a country other than that of the vessel's owner in pursuit of commercial interests and practicality (NAFIG and INTERPOL, 2017[23]). The procedure allows to circumvent national law and benefit from weaker regulations (Liddick, 2014[1]). This is used to lower costs by exploiting loopholes in compliance with environmental or labour regulations, or by avoiding taxes (OECD, 2013[24]).

19. The flexibility of the FOC systems, which accommodate reflagging of the vessel without thorough examination, undermines efforts to efficiently track vessel's activity. Some countries advertise "open registers" and facilitate reflagging on the high seas (Birnie, 1993[25]). In many cases, administration of FOCs is contracted out to private profit-oriented companies (NAFIG and INTERPOL, 2017[23]). Resulting anonymity lowers the risk of illegal activity being detected. Once the illicit activity is acted upon, for example by placing a vessel on an IUU vessel list of an RFMO, FOCs facilitate business as usual after shifting to another jurisdiction.

20. Granting a flag to a vessel establishes a commitment by the country granting it to enforce international obligations such as administering an effective control over its vessels in ABNJ. The widespread use of FOCs must be addressed by finding a balance between allowing commercial advantages and opening doors to circumvent the law (ICS, 2017[26]). Various bodies, including the OECD, have been calling for more transparency in registering vessels and granting fishing authorisations (OECD, 2013[24]; McCauley et al., 2016[27]; Merten et al., 2016[28]; Lövin, 2011[29]).

21. Following the 2005 guidelines provided by the OECD (2005[12]),[6] and in line with the 2014 FAO voluntary guidelines for flag state performance (FAO, 2014[8]; Erikstein and Swan, 2014[30]), two main areas of responsibility for flag states to effectively monitor their vessels were identified. The first is to monitor registries of national fishing vessels and vessels engaged in fishing-related activities in ABNJ or in the EEZs of other countries. The second is to authorise national vessels to engage in fishing and fishing-related activities in the ABNJ or in the EEZs of other countries.[7]

2.2.1. Vessel registration requirements vary between countries

22. Misuse of vessel registration systems accommodates IUU fishing within other countries' national jurisdictions and on the high sea (Englender et al., 2014[20]; Churchill, 2012[21]; Erceg, 2006[19]; Kao, 2015[18]). Understanding how national registries are

[5] Exercising jurisdiction means that the flag states is not necessarily implementing the physical control of the vessel at sea but that it is responsible for the enforcement of the regulations that apply to the vessel using its flag.

[6] "flag States should ensure that fishing vessels entitled to fly their flag do not fish on the high seas or under the jurisdiction of other States unless they have obtained both a Certificate of Registry and an authorisation to fish. Flag States are required to maintain records of these fishing vessels, indicating details of the vessels, their ownership and the authorisation to fish. Fishing vessels should be marked in accordance with internationally recognizable vessel marking systems such as the FAO Standard Specifications and Guidelines for Marking and Identification of Fishing Vessels provided by the Code of Conduct" (OECD, 2005[12]).

[7] Here it should be noted that the authorisation procedure is understood as issuing a licence or permit to engage in fishing or fishing related activities from the relevant national authority.

maintained and the accessibility of their content is essential to maintain efficient co-operation between nations, as well as agencies within national government (Erceg, 2006[19]). The 2005 report pointed out many flaws in vessel registration processes (OECD,

2005[12]). Apart from New Zealand, Norway and Australia, few countries took into account the previous history of the vessels seeking registration and the registration process played a limited role in preventing IUU fishing activities or the practice of vessels "hopping" from one registry to another.

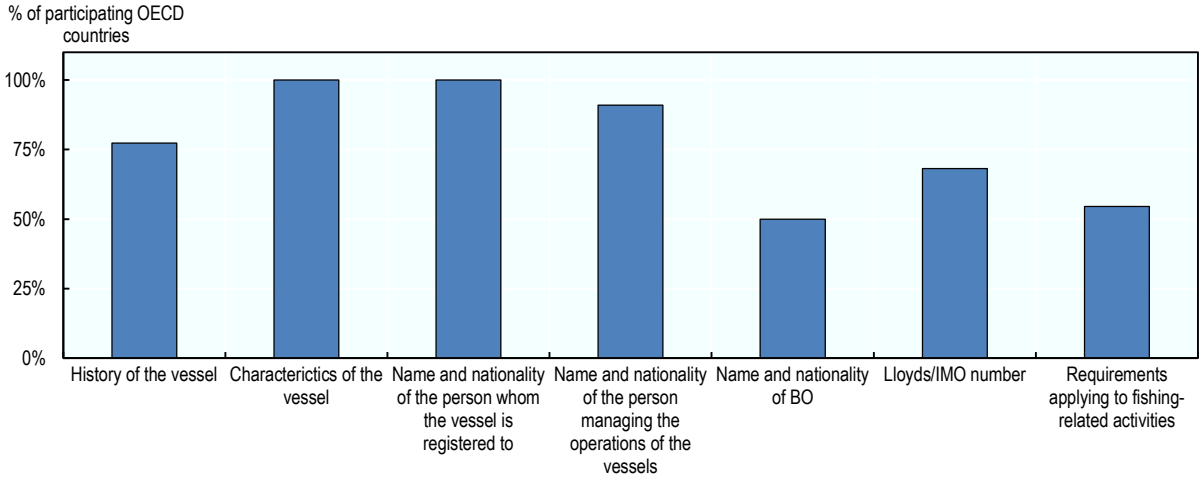
23. In 2017, all the OECD member or accession countries participating in the review (hereafter participating OECD countries) reported implementation of record-keeping of registered national vessels conducting both fishing and fishing related activities in other jurisdictions or in ABNJ. However, registration requirements varied from comprehensive to limited in scope. Most countries limit requirements to standard vessel characteristics (length, tonnage, power, etc.) and details on the legal or natural person to whom the vessel was registered are uniformly required. However, only about half of participating OECD countries require the name and nationality of the beneficial owner (BO)[8] of the vessel, suggesting shortcoming to efficient use of economic measures against IUU fishing (see section 3).

24. Most participating OECD countries (82%) reported regular updating of their registries, but nearly 20% do not make these publicly available, disregarding the benefits of transparency (Figure 2.2). Moreover, only 55% of participating OECD countries have equivalent registration requirements for vessels involved in fishing-related activities as for fishing vessels. Loose laws on transhipment allow IUU fishing operators to launder the illegal harvest and deliver the product to the market under the paperwork of a vessel not directly associated with illegal activities, making control at port potentially overdue.

25. Since 2005, progress among participating OECD countries has been made in closing certain loopholes related to vessel registration. The share of participating OECD countries which prohibit registration of vessels with a history of IUU fishing increased from 37% to 77%, the share that prohibit registration of vessels already registered by another state (except on temporary basis) increased from 27% to 86%. The number of countries requiring mandatory repayment of penalties before vessel can be deregistered increased from 20% in 2005 to 80%.

[8] "Beneficial owner refers to the natural person(s) who ultimately* owns or controls a customer** and/or the natural person on whose behalf a transaction is being conducted. It also includes those persons who exercise ultimate effective control over a legal person or arrangement. *Reference to "ultimately owns or controls" and "ultimate effective control" refer to situations in which ownership/control is exercised through a chain of ownership or by means of control other than direct control. **This definition should also apply to beneficial owner or a beneficiary under a life or other investment linked insurance policy (FATF/OECD, 2014[57]).

Figure 2.2. Registration requirements for national fishing vessels in other countries national jurisdictions and in ABNJ



Source: OECD 2017 data collection on measures against IUU fishing.

2.2.2. Authorisation regimes support implementation of various management measures

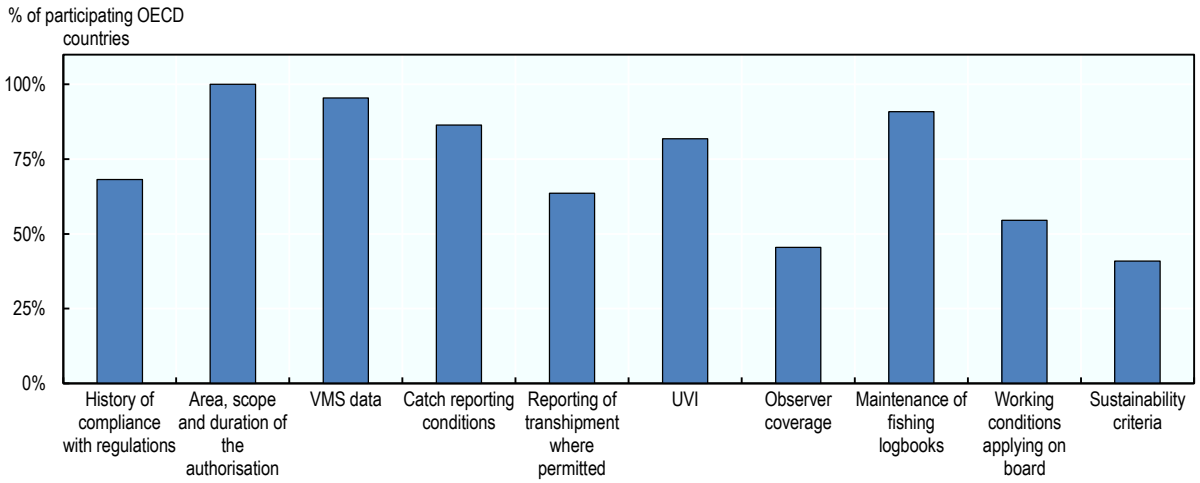
26. Authorisation regimes for fishing and fishing related activities ensure that national vessels fishing in ABNJ or in the EEZs of other countries comply with national conservation and management measures, and those specified in binding international agreements. For instance, a vessel has to demonstrate that working conditions on-board comply with national legislation. This way, the authorisation regime serves as a tool to prevent human right abuse, of which many cases have been documented these last years (Surtees, 2013[31]; EJF, 2015[32]). In addition, authorisation schemes limit abusive reflagging practices by giving an authorisation under specific conditions, such as a history of compliance, having vessel markings that comply with internationally recognised standards or installed monitoring systems. Two factors are central to well-designed fishing authorisation regime. The first one is well functioning verification of petitioners requesting a licence. The second factor is transparency of the licencing systems which reduces incidences of corruption and smooths enforcement (Hanich and Tsamenyi, 2009[33]).

27. In terms of fishing authorisation, information about area, scope and duration of authorisation are universally required (Figure 2.3). The majority of participating countries (with the exception of the Netherlands and the United States), require maintenance of fishing logbooks, whereas reporting of fishing-related activities is required less widely (64%). History of compliance with regulations is considered by 68% of participating OECD countries, but only 45% reported observer coverage requirement. Progress has been made in adoption of unified vessel markings and currently 82% of participating countries require unique vessel identifier (UVI) for its fishing vessels over certain size (Box 2.1).

Sustainability criteria[9] or verification of working conditions are rarely requested (41% and 55%, respectively). In terms of transparency, 50% of participating countries publish full

lists of vessels allowed to fish and 85% make lists of bilateral agreements on access to fishing grounds of third countries available to the public.

Figure 2.3. Information required for the issuance of an authorisation



Source: OECD 2017 data collection on measures against IUU fishing.

[9] Introducing sustainability as eligibility criteria for an authorisation contribute to the protection of marine resources, particularly in the high seas (Havice, 2010[126]). The FAO Voluntary Guidelines (FAO, 2014[8]) specifically recommend that the flag states authorise their vessels to fish in third country waters only when these activities do not undermine the sustainability of the fish stocks, both in the case of a bilateral agreement with the third country or outside such agreements. This could be important challenges in the future, especially with the climate change and the development of new fisheries. This could include, for example, marine Arctic (Kaiser, Fernandez and Vestergaard, 2016[118]), where currently not RFMO has a mandate to manage stocks. Fishing authorisation should be delivered in line with international commitments regarding sustainable fisheries management (Garcia and Staples, 2000[117]) as mentioned in the SDG 14.

Box 2.1. Unique vessel identifier (UVI)

The International Maritime Organization (IMO) ship identification number scheme was introduced in 1987 through adoption of resolution A.600(15) under the International Convention for the Safety of Life at Sea (SOLAS). The implementation of the scheme became mandatory as of 1 January 1996, but applied only to passenger ships of 100 GT and above and to cargo ships of 300 GT and above. The unique seven-digit vessel number (UVI), preceded by the letters IMO, identifies vessel and traces its activity over time, irrespective of change of name, ownership, or flag, until it is scrapped.

Following adoption of the Rome Declaration on Illegal, Unreported and Unregulated Fishing by FAO Ministerial Meeting in 2005 calling for a comprehensive record of fishing vessels, the FAO Committee on Fisheries conducted a feasibility study on setting-up a Global Record of Fishing Vessels, Refrigerated Transport Vessels and Supply Vessels (Global Record). The Committee concluded in 2012 that the most feasible tracking method is to add fishing vessels to the IMO ship identification number scheme.

Progress has been made in 2013 when the IMO approved a cosponsored by FAO proposal and adopted resolution A.1078(28) allowing the voluntary application of the IMO ship identification number scheme to fishing vessels of 100 GT and above. Consequently, the preconditions of using the IMO number as the UVI for vessels – remaining unchanged, regardless of name, flag and ownership changes – can be applied to fishing vessels. This initiative is voluntary and provides reliable information on vessel identification in a timely manner. Major RFMOs and states have required for vessels above a certain size or tonnage to carry an IMO numbers. It allows to cross-check data with other sources, improves MCS, transparency, as well as makes it more difficult for vessels to operate outside the law. The UVI can also help to deter related crimes such as human trafficking especially when vessels use multiple identities, change flags, names and radio call-signs to avoid detection and sanctions (EJF, 2013[34]; ILO, 2013[35]).

More on Global Record can be found at: www.fao.org/global-record.

2.3. Coastal states gained new responsibilities with the ratification of the UNCLOS

28. Following the historic United Nations Convention on the Law of the Sea (UNCLOS), in 1994 coastal and island states assumed control of up to 200 nautical miles of their coastal waters as the exclusive economic zone (EEZ). This includes assignment of exclusive rights to vast natural resources these waters convey. These new rights also created new management responsibilities requiring countries to monitor and control fishing and fishing related activities in the acquired areas. In many cases, coastal countries did not have well developed record-keeping practices and lacked the capacity to undertake surveillance of their EEZ (Mwikya, 2006[36]).

29. A license authorisation framework, apart from its usefulness in managing vessels in the ABNJ and foreign EEZs, is a convenient tool to define the size and structure of fishing activity in the country's own EEZ. Authorisations are used to ensure a balance between the fishing opportunities and resources available in the given area. Effective implementation of fishing licences gives the state the ability to gain adequate economic returns from resources under its jurisdiction. However, badly-designed fishing authorisation regimes lead to overcrowded waters, fishing above sustainable rates, exhaustion of the resource and difficulties in enforcement of regulations (INTERPOL, 2014[37]; Hanich and Tsamenyi, 2009[33]). Good understanding of who the licences are

issued to assures fine estimate of fishing capacity and potential impacts on national waters, including environmental damages, effects on non-target species, health hazards, etc. Lack of transparency in listing licenced vessels impedes detection of unauthorised transgressions

and prevents denouncing of illegal activities by fishers committed to legal fishing (Cavalcanti and Leibbrandt, 2017[38]).

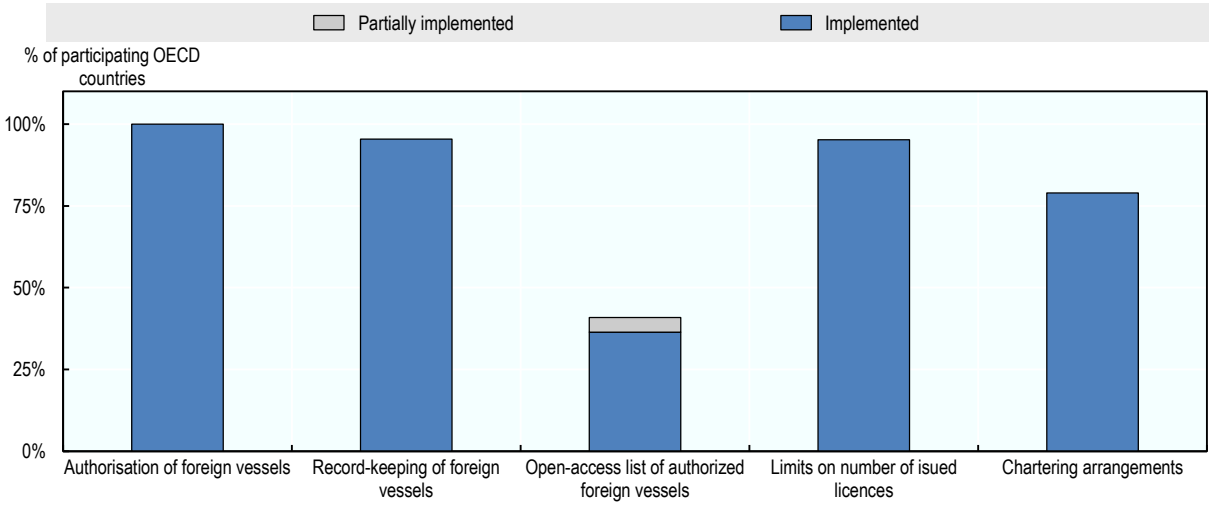
30. Considering common differentiation in licencing requirements between different types of vessels, the data collection on the implementation of measures related to the coastal state responsibilities was centred on three main fleets: foreign, large-scale and small-scale (Table 2.1). The analysis of the factors identified as the most relevant to assess the adequateness of the policy framework for each of the abovementioned subsets of vessels follows.

2.3.1. Introduction of EEZs came with new trade opportunities

31. The introduction of EEZs in 1994 opened new trade opportunities for coastal and island states. Surplus of fishing opportunities in the area under jurisdiction became available to trade with distant water fishing nations (DWFN) with capacity to fish in the high seas (Mwikya, 2006[36]). The agreements, either bilateral or involving multiple signing parties, became important tools in coordination of fishing activities, especially those focused on straddling and migratory species. Following international agreement between DWFN and coastal or island state, foreign vessels fall under coastal state authority of the host country.

32. All participating countries reported the need for authorisation of foreign vessel to operate in their EEZs, closing-up the gap still noticed in 2005 (80%). The majority of participants (95%) keeps record of foreign vessels authorised to fish in their EEZ and limits the number of the issued fishing licences (90%). However, the transparency of fishing agreements with foreign countries is still an issue; only 41% of participants did ensure easy access to the list of foreign vessels licenced to fish in domestic waters (Figure 2.4).

Figure 2.4. Measures applying to foreign vessels



Source: OECD 2017 data collection on measures against IUU fishing.

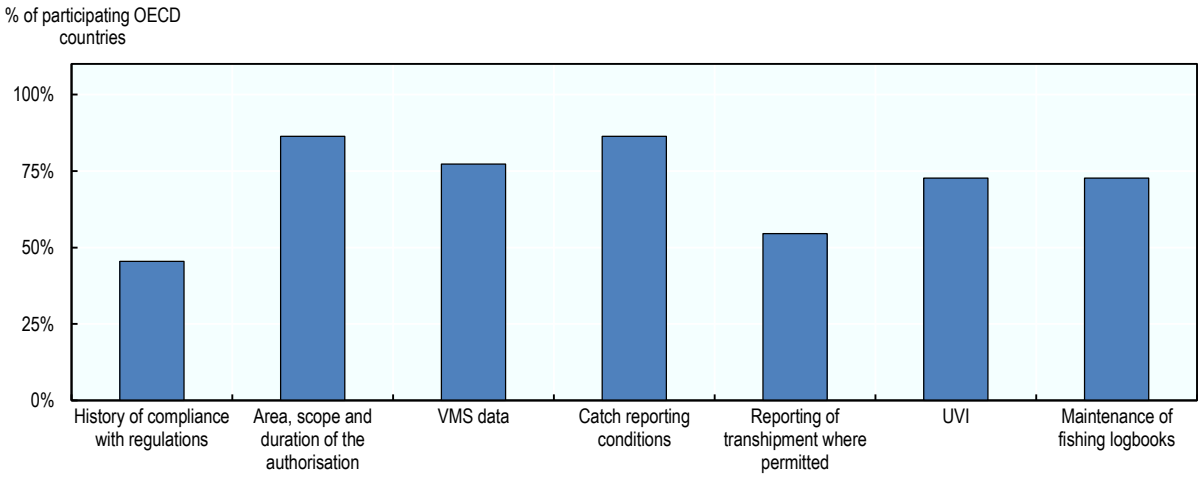
2.3.2. More lenient measures apply to harvest in domestic waters

33. Large scale vessels are characterized by big harvest capacity and potentially high degree of environmental perturbation with damaging impact (Jones, 1992[39]). Large scale

vessels often fish further offshore and in deeper waters, although there is evidence of large-scale industrial fishing vessels operating illegally in fishing zones which are exclusively reserved for small-scale fisheries (Drammeh, 2000[40]).

34. Participating countries reported slightly more permissive laws for large-scale vessels fishing in domestic waters in comparison with vessels fishing in the areas under the jurisdiction of foreign countries or in the ABNJ. In terms of registration requirements, characteristics of the vessel and details on the person or entity registering it are still widely required, but not as uniformly as for foreign vessels. As shown in Figure 2.5, to this date not all participating countries require from their large-scale vessels adoption of UVI (73%), vessel monitoring systems or VMS (77%) or maintaining fishing logbooks (73%). Only 55% of participants gave an account of functioning reporting system on transhipment, a practice facilitating the lack of transparency in terms of harvest origin. Moreover, merely 45% of the participating OECD countries provide evidence on considering the history of compliance with regulation when granting fishing authorisations.

Figure 2.5. Authorization requirements for domestic large scale fleet vessels



Source: OECD 2017 data collection on measures against IUU fishing.

2.3.3. Management of domestic small scale fisheries comes with its own set of challenges

35. It is estimated that about one-quarter of the world's catches originates from small-scale fisheries (Pauly and Zeller, 2015[41]). Despite the magnitude of these estimates, these catches often go unreported. Small-scale fleet catch is traditionally consumed domestically, often supporting nutrition of the fisher's household. In many countries, small-scale fisheries remain an informal activity or are governed with less stringency due to the lack of adequate MCS capacity (Jentoft et al., 2017[42]; OECD, 2014[43]).

36. But in many OECD countries, the informal character of small-scale fisheries is often a relic of the past. The activity frequently generates significant economic exchanges and its traditional management in many cases was replaced by central governance. Profit-driven small-scale fishers are responsible for alarming increase in illegal fishing (Drammeh, 2000[40]).

37. Management of small-scale fisheries comes with its own challenges. Rules governing small-scale fisheries are often embedded in historical context and integrated approach that recognises the importance of legitimacy in tailoring the law is necessary to

assure compliance (Hauck, 2008[44]). Acceptance of regulation, such as the registration and licensing of fishing vessels, requires the involvement of stakeholders in decision-making process to better take into consideration the specificities of small-scale fishing and the

cultural heritage they entail (Suebpala et al., 2015[45]). Poor fishing communities are concerned with regulations generating additional costs such as registration or license fees (Suebpala et al., 2015[45]).

38. To better understand the regulations governing small-scale fisheries, the questionnaire considered rules related to registration and authorisation of small-scale vessels, as well as whether applied measures reflect local specificities of these fisheries. A majority of participating OECD countries reported obligation to add such vessel to the national registry (77%) and obtain authorisation to fish prior activity (91%), suggesting general agreement among OECD members that small-scale fishers should be subject to MCS. 23% of participating countries reported empowerment programs for small-scale fishers to combat IUU fishing. For example, Australia recognises traditional fishing in Torres Strait Protected Zone (Torres Strait Treaty 1985), where the harvesting of turtles and dugongs is managed through community based management plans and the enforcement of strict gear restrictions is carried out by Indigenous Rangers.

2.4. Uneven exercising of port controls allows IUU harvest to enter the market

39. Uneven application of port[10] controls, mainly due to lack of control capacity, political will or legal framework, facilitate IUU fishing on a large scale (Liddick, 2014[1]). Non-compliant or lax ports of convenience allow "laundering" catches and allow IUU fishing products to enter the market, increasing operators' profits.

40. There is a growing reliance on port states to combat IUU fishing (Doulman and Swan, 2012[46]). This stems to a great extent from the failure of flag states to enforce the law at sea due to the high cost of MCS at sea in comparison to controls at port. A new binding international legal instrument, the Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (Port State Measures Agreement or PSMA) entered into force in June 2016 (FAO, 2016[10]). The Agreement sets out universal minimum standards to prevent IUU fishing products to be landed in ports. The PSMA measures discourage IUU fishing by increasing operating costs since vessels are forced to increase fuel use and navigation time to search for non-compliant port to offload the harvest (Le Gallic, 2008[47]).

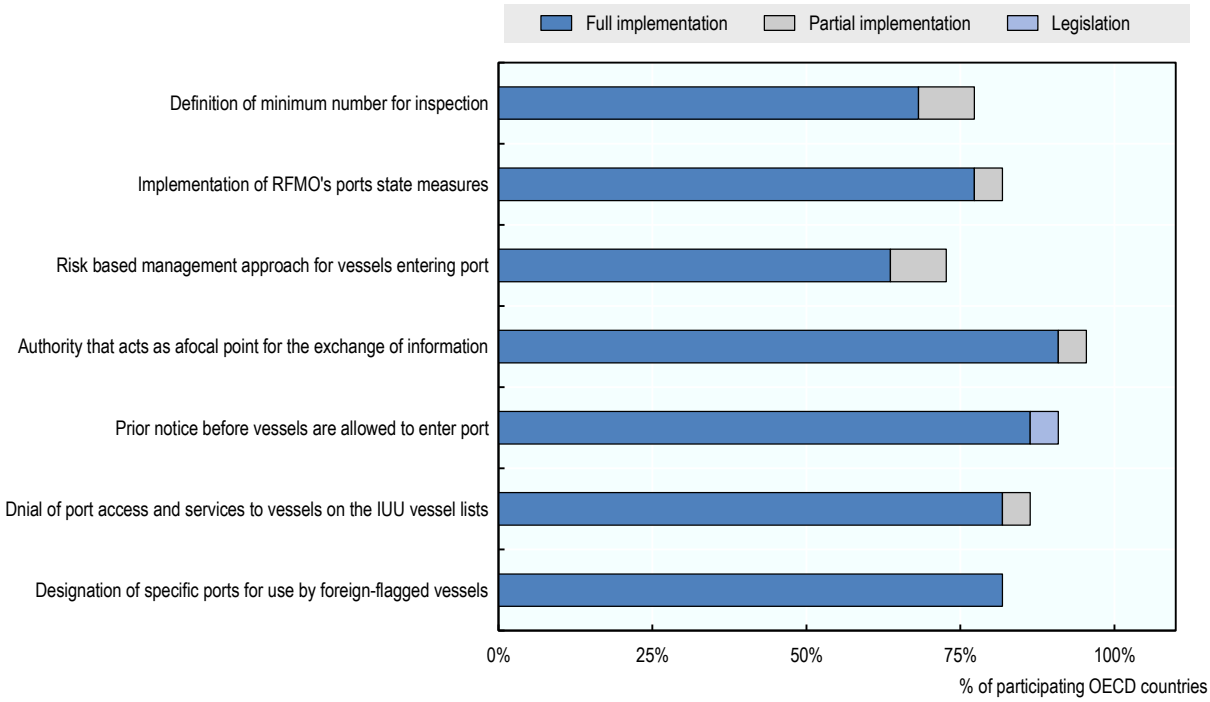
41. Most of the participating OECD countries (with exception of Canada, Colombia and Turkey) are parties to the PSMA. The agreement, which had a long transition period from 2009 when it was proposed by FAO to 2016 when it entered into force, prompted countries to considerably improve their measures related to responsibilities as a port state. Many recommendations highlighted in the agreement were adopted by the surveyed countries (Figure 2.6), and equivalent measures are noted for some who did not sign the PSMA (e.g. Canada or Colombia). On the other hand, some countries, despite signing PSMA, still fall behind in full implementation (e.g. Greece, Italy or Slovenia).

42. At the time of the analysis, 82% of participating countries reported designation of specific ports for use by foreign-flagged vessels (27% in 2005), 84% reported measures in place allowing denial of port access or services (37% in 2005), including landing, transhipments or inspections, to vessels suspected of IUU fishing, 87% require prior notice before vessels are allowed to enter the port (57% in 2005), 93% conformed designation of an authority that acts as a focal point for the exchange of information with other authorities, flag states or RFMOs (20% in 2005), 68% have risk based management approach in place

[10] "Port" includes offshore terminals and other installations for landing, transhipping, packaging, processing, refuelling or resupplying.

for vessels entering port (17% in 2005) and 73% implemented minimum number of inspections at port (13% in 2005). Moreover, 80% fulfil obligations related to port state measures arising from membership in RFMOs (17% in 2005).

Figure 2.6. Implementation of port state measures

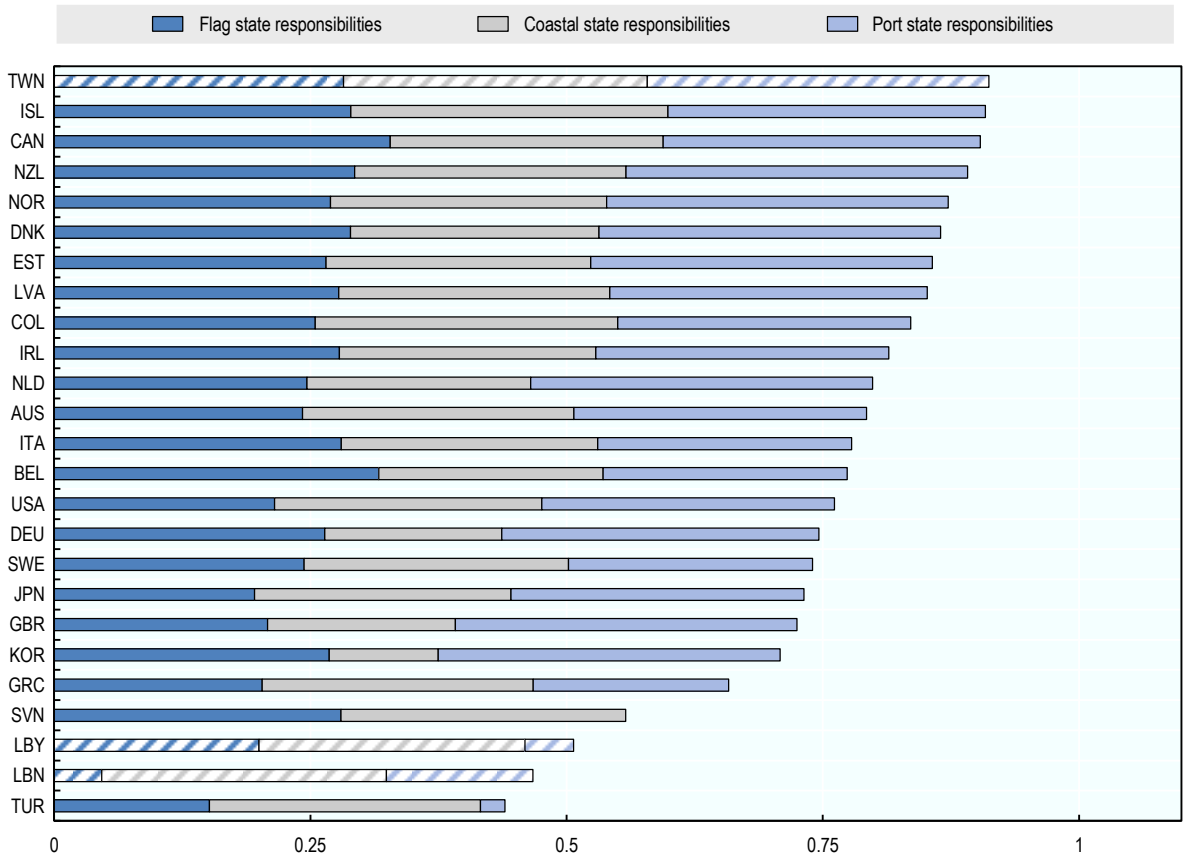


Source: OECD 2017 data collection on measures against IUU fishing.

2.5. State responsibilities - how countries compare?

43. Summarising the information on all state responsibilities measures analysed in this section, one sees that three countries (Chinese Taipei, Iceland and Canada) appear to be on the forefront of implementing identified best practices as flag, state and coastal state (Figure 2.7). In the tail, with much room for progress, one finds two non-OECD participants (Lebanon and Libya) and Turkey.

Figure 2.7. State responsibilities – evaluation by participant



Note: Hatched bars represent non-OECD countries or economies. For details on calculating the performance index, refer to Annex A.
Source: OECD 2017 data collection on measures against IUU fishing.

3. Policies addressing economic incentives to engage in IUU fishing

3.1. Reducing economic benefits of IUU fishing depresses illegal activity

44. The continuation of IUU fishing stems essentially from the high profits and comparatively low risks involved. Asymmetry in cost of doing business places fishers committed to legal activity at considerable competitive disadvantage (Liddick, 2014[1]). Moreover, economic underlying crimes such as money laundering or tax fraud are linked to IUU fishing activities.

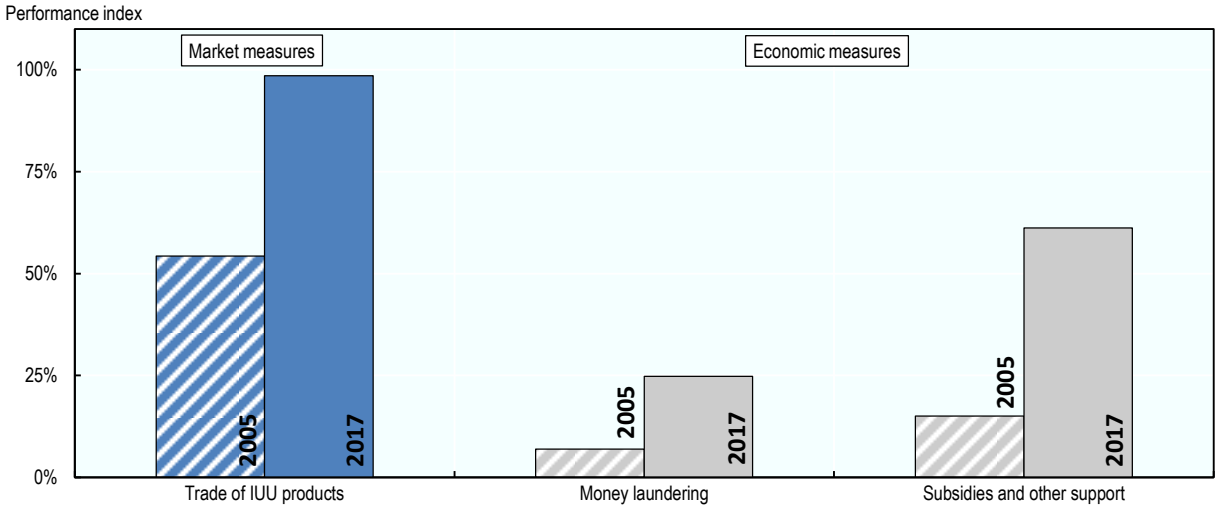
45. While the 2005 OECD review (OECD, 2005[12]) used a broad open question to investigate the existence of economic measures against IUU, this report analyses in more detail the extent of the use of economic disincentives and market tools to prevent illegal seafood entering the supply chain (Table 3.1). The analysis complements the information available through other OECD tools and indicators of economic measures put in place by countries that are not directly targeting the fisheries sector, but can strongly influence IUU development as they affect the potential benefit of these activities (FATF, 2012[48]).

Table 3.1. Economic incentives - classification

Section	Subsection
Market measures	Trade of IUU products
Economic measures	Money laundering
	Subsidies and other support

46. Collected data suggest that countries have largely improved their performances in implementing market measures related to the monitoring seafood products along the value chain (Figure 3.1). However, while to this date market measures became widely adopted and nearly all countries implement variety of tools identified as beneficial to prevent illegal fish products from entering the market, the limited implementation of economic measures stands out. In particular, the lack of measures allowing for consideration of IUU fishing as a predicate offense for money laundering is alarming. The following sections describe how the knowledge acquired over the past ten years enabled to develop new tools directly targeting money trails related to IUU fish products.

Figure 3.1. Economic incentives – progress since 2005



Note: Performance index based on weighted average of responses to the OECD questionnaire on measures against IUU fishing Results limited to the subset of questions where data were available for both 2005 and 2017. Results include OECD Members and OECD accession countries participating in the data survey. For details on methodology, refer to Annex A.
Source: OECD 2017 data collection on measures against IUU fishing.

3.2. Reliable documentation of catch origin ensures the seafood in the supply chain was caught legally

47. Catch documentation schemes (CDS) enable the traceability of fish products from the point of catch to the point of final sale along the supply chain. Reliable information provided by well-designed CDS can be effective in eliminating misreporting[11] (Hosch, 2016[49]; Österblom, 2014[50]). In this regard, the new Voluntary Guidelines for Catch Documentation Schemes released on 5 April 2017 (FAO, 2017[11]) constitute a valuable source of guidance. Furthermore, with the development of new technologies, secure electronic CDS systems reduce the risk of falsification.

48. In terms of traceability, the deployment of new technologies is progressing. Apart from standard certification schemes, applications of blockchain are on the rise (Visser and Hanich, 2017[51]). The technology is promising in terms of its potential to assure transparency of the supply chain and consequently differentiate fish caught sustainably to those caught illegally, or linked to human rights abuses. This development serves as a response to the rise of customers' awareness of the importance of food origin, both in terms of safety and social responsibility. Better labelling allows customers to make informed choices (Liddick, 2014[1]).

49. Among participating OECD countries, all reported the implementation of systems of multilateral catch documentation and certification requirements in place for traded fish products, and nearly all measures preventing trade of fish caught by vessels identified as engaged in IUU fishing (with the exception of Colombia). A good example is the EU-wide system of preventing IUU fishing products to enter its market (Box 3.1). The majority of surveyed countries also have standardized certification and documentation requirement (with the exception of the United Kingdom and New Zealand). However, only 59% of

[11] In some cases, trade measures and the use of CDS only triggered changes in the profile of IUU fishing at the global level, e.g. IUU fishing in tuna fisheries went from illegal to unreported or misreported (Hosch, 2016[49]).

participants have a fully functioning systems allowing for the use of trade information to target IUU fishing product movement along the value chain. Further 14% have such systems in place, but only partially implemented.

50. Governments are also putting considerable efforts into raising awareness among stakeholders, including the industry and the civil society, to the issue of IUU fishing. Informing customers about vulnerable species or incentivizing restaurants to create sustainable menus contributes to safeguarding the species exposed from exploitation (Petrossian, Weis and Pires, 2015[52]).

51. A big progress has been noted in inclusiveness of stakeholders along the value chain. To increase awareness of the problem related to IUU fishing, 95% of participating OECD countries reported awareness-raising activities, suggesting considerable more uniformly applied efforts in comparison with 2005 (53%). A number of countries indicated holding regular stakeholder meetings (e.g. Iceland, Italy, the Netherlands) with the representatives of the industry, as well as organising campaigns promoting legally-sourced seafood. In the United States, the efforts of the Presidential Task Force on IUU Fishing and Seafood Fraud have included a range of new public outreach efforts related to IUU fishing. Many governments also promote bottom-up approaches and encourage co-operation between operators in denouncing detected IUU fishing activities. For example, the Coalition of Legal Toothfish Operators runs an international 'Wanted' campaign offering up to USD 100 000 for information leading to the conviction of illegal fishers.

Box 3.1. The EU system for preventing IUU fishing products to enter the EU market

The Council Regulation (EC) No 1005/2008 to prevent, deter and eliminate illegal, unreported and unregulated fishing was adopted on the 29 September 2008 and entered into force on 1 January 2010. The regulation introduces a traffic light colour scheme to inform third countries on the detected problems with fulfilling international rules related to prevention of IUU fishing and introduces provisions for embargo on fish products not conforming to the EU regulations.

In case of identified problems with IUU fishing, the European Commission presents the country with a yellow card. The warning opens a formal dialogue during a minimum of 6 months. If the country improves its practices, the 6 month period can be prolonged or the yellow card can be lifted. If the problems are not addressed, the country is identified as non-cooperating and given a red card.

The identification introduces a ban on all products with catch certificate validated after the Decision entered into force. Following the listing by the EU, all seafood products harvested under the flag of a listed country cannot enter the EU market.

At this time (March 2018), 4 countries are identified as non-cooperating (Cambodia, Comoros, St Vincent and Grenadines). Three countries were delisted in 2016 (Belize, Republic of Guinea and Sri Lanka). Further nine countries or economies (Kiribati, Liberia, Sierra Leone, St Kitts and Nevis, Chinese Taipei, Thailand, Trinidad and Tobago, Tuvalu and Vietnam) are in the process of a formal dialogue.

3.3. Following direct beneficiaries of IUU fishing helps to unveil complex networks of illegal seafood suppliers

52. Financial regulations have a strong potential to impact on the way IUU fishing develops (Le Gallic, 2008[47]; Stokke, 2009[53]; OECD, 2013[24]). Investigations that concurrently consider multiple dimensions of economic crimes potentially linked to IUU fishing operations (e.g. tax crimes, money laundering or corruption) effectively deter IUU fishing (Griggs and Lugten, 2007[54]). In fact, tracing the money path from IUU fishing can provide critical evidence against behind-the-scene BO of the activity and their networks, and thus increase the chance of cutting back on the illegal activity (Box 3.2).

53. Investigating the financial transactions related to seafood trade is essential. Financial investigators can have a strong impact on unravelling complex transactional webs across multiple jurisdictions. However, the secrecy behind multiple corporate structures makes discovery of the beneficiaries of IUU fishing, difficult (Griggs and Lugten, 2007[54]; OECD, 2013[24]; Telesetsky, 2015[55]).

54. Among participating OECD countries, only 32% reported consideration of IUU fishing as a predicate offense for money laundering. The inclusion of environmental crimes such as illegal fishing in laws on money laundering is still rare. However, considering that in 2005 only Norway reported such tools in place, the progress is evident.

Box 3.2. Relevant OECD indicators on beneficial ownership

Countries face significant challenges when implementing measures to ensure timely availability of accurate information on beneficial ownership. This is particularly challenging in the fisheries sector which often involves legal persons and legal arrangements spread across multiple jurisdictions (OECD, 2013[24]; FATF, 2012[48]). Tracing the BO of activities can serve as a powerful deterrent when vessels use flag of convenience, providing a way to trace ownership of companies involved in IUU fishing (Farabee, 2016[56]).

The Financial Action Task Force (FATF) is an inter-governmental body tasked with the identification of national-level vulnerabilities enabling misuse of international financial systems. Among other things, FATF standards on transparency aim at preventing the misuse of corporate vehicles - companies, trusts, foundations, partnerships, and other types of legal persons and arrangements. Considered as a crucial component is assuring that information regarding both the legal owner and the BO, the sources of the corporate vehicle's assets, and its activities are readily available to the authorities.

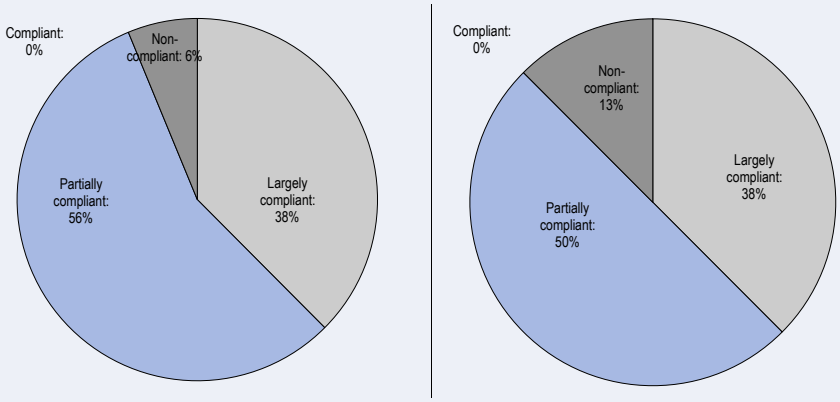
Reliable and up-to-date information on beneficial ownership can assist law enforcement and other competent authorities by identifying those responsible for the underlying illegal activity. "Following the money" going through suspect accounts or assets held by corporate vehicles in financial investigations is often the most efficient way to detect money laundering, tax crime and corruption.

Consequently, FATF developed a guidance on the implementation of two sets of recommendations of importance to combatting IUU fishing (FATF/OECD, 2014[57]):

- Recommendation 24: Transparency and Beneficial Ownership of Legal Person
- Recommendation 25: Transparency and Beneficial Ownership of Legal Arrangements

As shown in Figure 3.2, the compliance with FATF Recommendations on beneficial ownership is not well spread among OECD countries.

Figure 3.2. Technical compliance with FATF recommendations 24 and 25



Recommendation 24 **Recommendation 25**

Note: Based on assessment conducted against the 2012 FATF Recommendations, using the 2013 FATF Methodology (FATF, 2013[58]). FATF compliance based on limited number of OECD members (16 countries).
Source: FATF (2018[59]).

Given the importance of financial transparency in fighting corruption, G20 recently identified transparency of beneficial ownership of legal persons and arrangements as a

key priority action. This follows the adoption of Beneficial Ownership Principles by G8 in 2013 (Transparency International, 2014[60]).

3.4. Subsidies linked to IUU fishing need to be eliminated

55. The global debate on the effects of fisheries subsidies on IUU fishing is ongoing. In 2017, the WTO released a document urging governments to eliminate fisheries subsidies linked to IUU fishing and overfished stocks (WTO, 2017[6]). Subsidisation of fleets contributes to IUU fishing by artificially reducing capital value and making cheap vessels available for purchase by illegal fishers (Liddick, 2014[1]). Other types of support (e.g. fuel subsidies) decrease the cost of fishing and accelerate overexploitation (Pauly et al., 2002[61]), possibly leading to IUU fishing. A common lack of transparency facilitates misuses with no financial consequences (Price, 2005[62]).

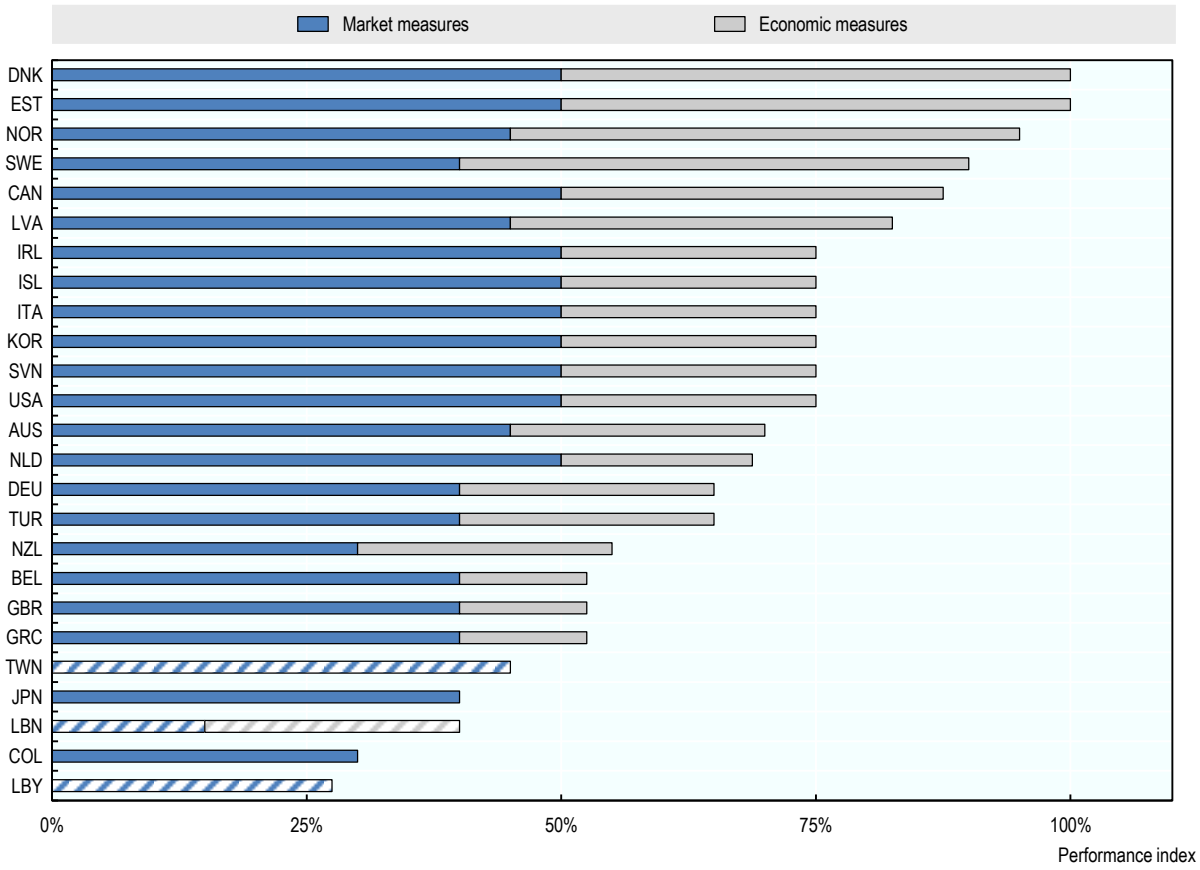
56. Participating OECD countries responded well in the past decade to the call for better management of funds designated for fisheries subsidies (OECD, 2005[12]). For instance, the European Maritime and Fisheries Fund (EMFF), which funds projects related to the European Union fisheries for 2014-2020, specifically prohibits applications from operators with a history of IUU.[12] About 70% of responders indicated regulations allowing for examination of vessels and operators' history for non-compliance when applying for financial support from the government. Similar share of participating OECD countries apply restrictions on public support to operators convicted of IUU offences. The improvement is major. Results for 2005 indicate an implementation of the two abovementioned measures by 17% and 10% of responders, respectively.

3.5. Economic incentives - how countries compare?

57. Summarising the information on implementation of measures related to economic incentives analysed in this section, one sees that three countries (Denmark, Estonia and Norway) appear to be leading in utilizing market and economic tools in detecting and eliminating IUU seafood products entering the market (Figure 3.3). Much room for improvements is noted for Libya, Colombia and Lebanon.

[12] Regulation EU No 508/2014 (15): "[…] *applications submitted by operators should only be admissible for funding under the EMFF on the condition that, within a particular period of time before submitting an application for support, the operators concerned have not committed a serious infringement, offence or fraud and have not been involved in the operation, management or ownership of fishing vessels included in the Union list of vessels engaged in illegal, unreported and unregulated (IUU) fishing or of vessels flagged to countries identified as non-cooperating third countries as set out in this Regulation.*"

Figure 3.3. Economic incentives – evaluation by participant



Note: Hatched bars represent non-OECD countries or economies. For details on calculating the performance index, refer to Annex A.
Source: OECD 2017 data collection on measures against IUU fishing.

4. Policy instruments incentivising co-operation initiatives between countries and among different authorities within countries

4.1. Co-operative efforts reduce IUU fishing cost-efficiently

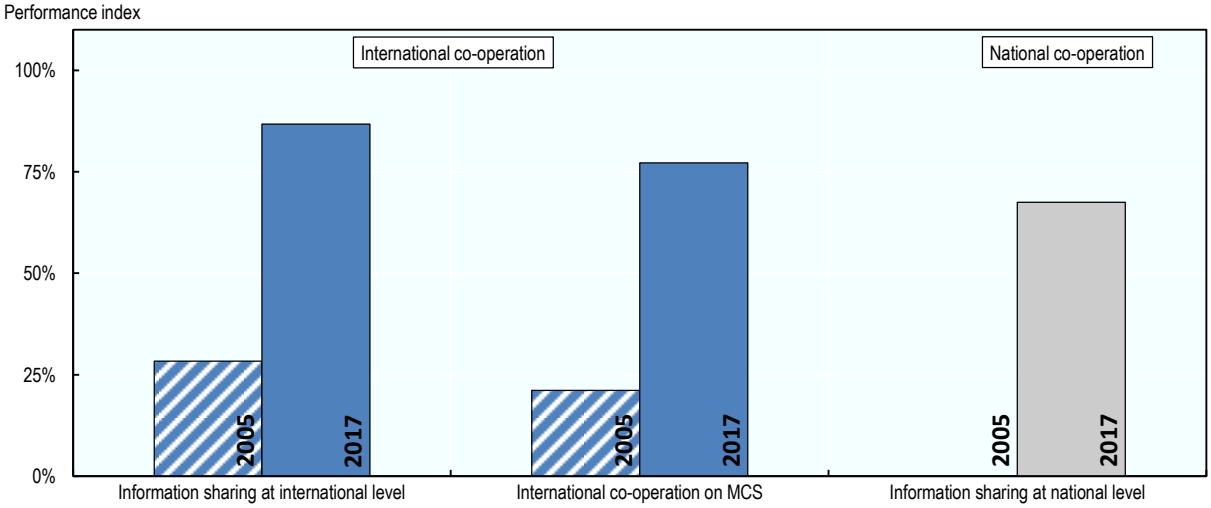
58. IUU fishing activities are dynamic and constantly adapt to the changing mix of economic incentives and regulatory environment. The mobility of IUU fishing operators, allowing swift movement across jurisdictions, provides for exploitation of weaknesses and loopholes of international law. The possibility of reflagging a vessel, in particular when one country improves its responsiveness to IUU fishing related violations (NAFIG and INTERPOL, 2017[23]), is a significant challenge (Liddick, 2014[1]). Domestic fisheries authorities and international bodies responsible for fisheries such as the RFMOs often act in isolation. This, in turn, is an impediment to cost-efficient gathering of data supporting fight against IUU fishing and related crimes (Gilman and Kingma, 2013[63]). To this end, co-operation is needed to block the economic incentives for operators along the entire value chain of the global business that is IUU fishing (Table 4.1).

Table 4.1. Co-operation - classification

Section	Subsection
International co-operation	Information sharing at international level
	International co-operation on MCS
National co-operation	Information sharing at national level

59. Figure 4.1 reports considerable improvement in co-operation mechanisms, both in the context of international co-operation against IUU fishing, mostly through RFMOs, as well as in the context of new national interagency co-operation deployed in a few countries. The two following sections describe in more detail the nature of this improved co-operation, as well as the expected underlying benefits of co-operative behaviour.

Figure 4.1. Co-operation – progress since 2005



Note: Performance index based on weighted average of responses to the OECD questionnaire on measures against IUU fishing Results limited to the subset of questions where data were available for both 2005 and 2017. Results include OECD Members and OECD accession countries participating in the data survey. For details on methodology, refer to Annex A.
Source: OECD 2017 data collection on measures against IUU fishing.

4.2. International co-operation through RFMOs leads to harmonized legislation

60. Adopted in 1994, the UNCLOS includes several provisions for mandating countries to co-operate on management of transboundary fish stocks through international organisations (UNCLOS, 1982[64]).[13] But management of highly migratory fish, including a variety of high-value tuna species, is more challenging than many other fisheries (Allen, Joseph and Squires, 2010[65]). In 2005, the OECD identified that regionalised fisheries management is a cost-effective approach to reduce IUU fishing. Co-operation through RFMOs led to a harmonisation of legislation and the development of new tools such as authorised vessel databases or lists of vessels suspected of IUU fishing, and exchange of information (OECD, 2005[12]). However, the 2005 report also concluded that information sharing and co-operation among RFMOs was not sufficient, particularly in terms of linking and integrating data on IUU fishing activities.

61. Bringing fisheries higher on the international agenda motivated improvement in communication between countries sharing interest in stocks managed by RFMOs. Among participating OECD countries, 80% reported functioning channels to exchange information regarding owners, operators and crews of vessels suspected of IUU fishing. The readiness to co-operate on information exchange increased considerably, up from 21% in 2005. Moreover, a large majority (91%) of the countries also reported the adoption of standards to share information at regional or international level, which is a considerable improvement with respect to 2005 (18%). A large majority of the participants (91%) also reported their participation in an international task force or group to combat IUU fishing and co-operative systems on MCS at regional level (80%). This suggests progress towards open communication on the issue of IUU fishing and incremental implementation of necessary provisions.

62. Considering the willingness expressed by OECD countries to co-operate at RFMO level, the study will review in the final report RFMOs' practices directly focused on eliminating IUU fishing which directly benefit from information exchange between countries. The focus will be on listing of vessels identified as participating in IUU fishing activities and transparency on non-compliance with obligations arising from membership in RFMOs. The interest bill be narrowed to RFMOs with the capacity to adopt management measures with respect to straddling or highly migratory fish stocks (see Table A.4 in the annex for membership):

- The Commission for the Conservation of Southern Bluefin Tuna (CCSBT),
- The General Fisheries Commission for the Mediterranean (GFCM),
- The Inter-American Tropical Tuna Commission (IATTC),
- The International Commission for the Conservation of Atlantic Tunas (ICCAT),
- The Indian Ocean Tuna Commission (IOTC),
- The Northwest Atlantic Fisheries Organization (NAFO),
- The North East Atlantic Fisheries Commission (NEAFC),
- The North Pacific Fisheries Commission (NPFC),
- The South East Atlantic Fisheries Organisation (SEAFO),
- The Southern Indian Ocean Fisheries Agreement (SIOFA),
- The South Pacific Regional Fisheries Management Organisation (SPRFMO),

[13] E.g. Article 64(1) states the following: "*The coastal State and other States whose nationals fish in the region for the highly migratory species listed in Annex I shall cooperate directly or through appropriate international organisations with a view to ensuring conservation and promoting the objective of optimum utilisation of such species throughout the region, both within and beyond the exclusive economic zone*. […]"

- The Western and Central Pacific Fisheries Commission (WCPFC).

63. The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) will also be included as an organisation that has a mandate to monitor fisheries in the area of its competence.

64. In addition, the report will consider potential benefits of Purple Notices issued by INTERPOL to communicate information regarding vessels wanted for illegal activities. Although the organisation is mainly concerned with fighting human trafficking and modern slavery in the fisheries sector, in 2013 first Purple Notice was given to a vessel involved in illegal fishing (INTERPOL, 2013[66]).

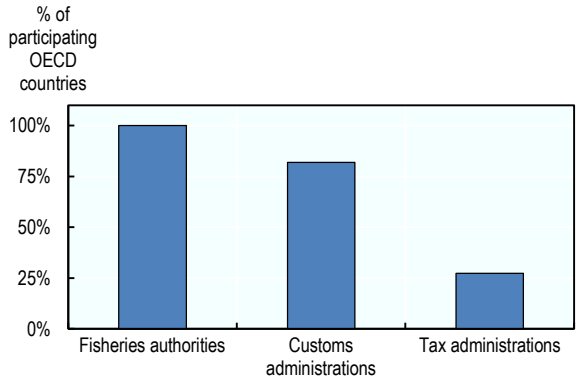
4.3. Communication between executive governmental bodies fosters efficient prosecution of IUU fishing

65. At the international level, best practices established by RFMOs are limited by the mandate of such organisations. Since 2005, interagency co-operation mechanisms have been improving, allowing a variety of actors to gather, process and disseminate information on IUU fishing activities. At the national level, fisheries authorities can benefit from the collaboration of port authorities, tax authorities, customs administrations, coastguards, trade authorities, police and other law enforcement authorities to reduce the overall cost of opposing IUU fishing by avoiding duplication of effort and enhancing enforcement capacity.

66. Tracking and analysing patterns of illicit trade or financial flows, officials of all relevant administrations can help investigators understand IUU fishing operations and their networks (Liddick, 2014[1]). As the mandate of fisheries authorities is often limited, the involvement of customs and tax authorities may contribute to the detection of the scale of the evasion. Mechanism to enable this information to be shared can result in faster and more successful prosecution. However, in order to share information between agencies, legal gateways must exist, while respecting the confidentiality of information and the integrity of work carried out by other agencies.

67. It can be challenging to bridge communication gaps between executive governmental bodies and ensure unfettered exchange of compatible data (Figure 4.2). While all participating members have relevant fisheries authorities working on detection of IUU fishing, only 82% involve customs and 27% tax administration. 80% of participants reported functioning setup of interagency task force responsible for detecting violations under IUU fishing umbrella.

Figure 4.2. Authorities involved in information sharing at national level



Source: OECD 2017 data collection on measures against IUU fishing.

68. The detection of IUU fishing benefits from inter-agency co-operation. A range of organisational models for sharing of responsibilities across agencies exist, each with distinct features. The example of the co-operation mechanism put in place in Norway - The Norwegian Task Force against Organised Fisheries Crime and (Box 4.1) illustrates the benefits of inter-agency co-operation.

Box 4.1. The Norwegian Task Force against Organised Fisheries Crime and IUU Fishing –

a value chain approach.

Establishment of an inter-agency co-operation body

The decision to implement the Norwegian Task Force against Organised Fisheries Crime and IUU Fishing has been made through a political decision. It was an initiative by the former Fisheries Minister, Helga Pedersen, in agreement with the Minister of Defence, the Minister of Finance, the Minister of Justice and the Minister of Foreign Affairs that agreed on the design and the composition of the advisory group.

The group was first established as a temporary project in 2009, as a measure to ensure closer co-operation between different agencies, and to produce updated and cross-sectoral analyses on IUU fishing and organised fisheries crime. The project had an internal evaluation and moved from a temporary to a permanent project five years later. In 2014, the Task Force was made a permanent entity in the Ministry of Trade, Industry and Fisheries. In this regards, there were no law changes, nor changes in the participating institutions' statutes or mandates, but the new initiative did demand some adaptability and greater co-operation, both internally and between different agencies.

The main objective of the Task Force is to detect crimes along the entire fisheries supply and value chain. The Task Force is tasked with detection of illegal fishing, corruption, tax and customs fraud, money laundering, embezzlement, document fraud and human trafficking. Officials working with resource control had found that detecting such crimes would require greater use of cross-sectoral analyses focusing on the actors, corporate structures, the money flows and the commodity trade to get a broader and fuller picture of the crimes taking place in the fisheries sector. Norway believes the term fisheries crime better reflects the issue of IUU fishing and motivates to unite all the law enforcement agencies towards a common goal.

The institutional setup (Figure 4.3)

The task force is placed within the Norwegian Ministry of Trade, Industry and Fisheries (MTIF). Its Secretariat is responsible for national coordination and following international processes in the field of fisheries crime. The Secretariat collects, coordinates and distributes relevant information to the Steering Group and the Contact Group. It is led by a project leader in MTIF who rapports to the Steering Group.

The Steering Group is composed of the Ministry of Labour and Social Affairs, the Ministry of Finance, the Ministry of Defence, the Ministry of Foreign Affairs, the Fisheries Directorate, the Ministry of Justice, the Ministry of Trade, Industry and Fisheries, and the Director of Public Prosecutions. The Steering Group approves the annual work plan and makes necessary clarifications related to the Task Force's work. They meet as needed.

In addition, a national analysis network consisting of the relevant underlying agencies is established with The Fisheries directorate, the Police Directorate, the National Criminal Investigation Service (Norwegian: KRIPOS), the National Authority for Investigation and Prosecution of Economic and Environmental Crime (Norwegian: Økokrim), the Tax Directorate, the Directorate of Norwegian Customs, the Coast Guard, the Norwegian Coastal Administration.

A contact group is also set up and consist of members from the operative agencies and is led by the Directorate of Fisheries. They meet around five times a year, and carry out

the following tasks:

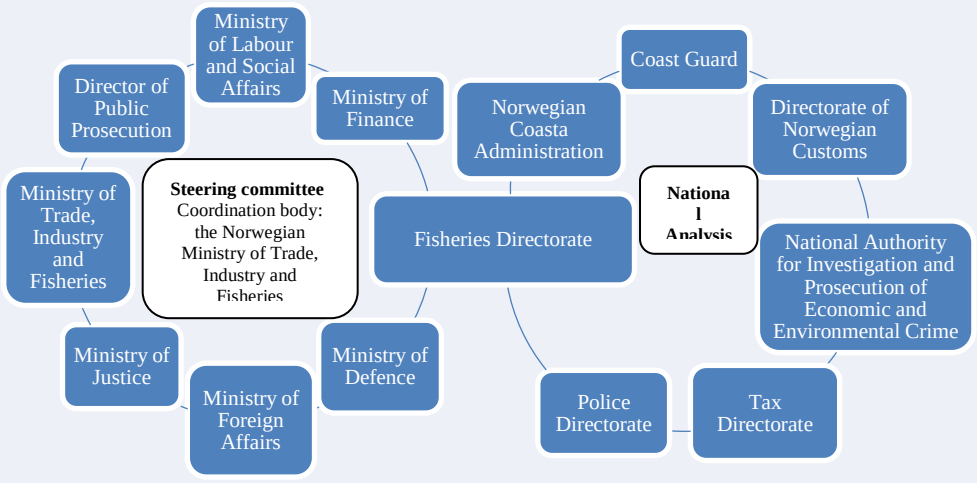
- facilitating cross-agency operational co-operation in potential cases of fisheries crime throughout the value chain

- assessing and recommending the use of intergovernmental operational co-operation between the agencies in the Task Force and involve other actors when relevant

- reporting to the Steering Group about co-operation and specific issues that are being addressed or initiated

The contact group has established two working groups: the Crime prevention group, which is led by the National Authority for Investigation and Prosecution of Economic and Environmental Crime (KRIPOS), and the Tracking group, which is led by the Norwegian Section for Analysis.

Figure 4.3. Institutional setup of the Norwegian Task Force against Organised Fisheries Crime and IUU Fishing



Key procedures for inter-institutional co-operation

The Task Force does not carry out operations, but works to improve co-operation and coordination between different agencies. For instance, the Task Force has carried out two workshops in which agencies come together and work on concrete fisheries crime cases. These have been useful to identify arenas for mutual co-operation and information sharing, contributing to improved coordination between agencies. Legislation of each agency had now set up guidelines for information exchanges and co-operation. Since the start of the Task Force, the agencies in the Task Force have gained greater direct access to information from other government agencies, and much data and information is now automatically shared between agencies. Some information can still only be provided on request and when there is suspicion of criminal activity.

Difficulties in the practicalities of co-operation

The Task Force has considered the risk of duplication since the start, and has previously adapted its mandate to avoid duplicating or conflict with other inter-agency groups, existing institutions or analysis networks. For instance, after the first review of the Task Force, it was decided to make a clearer division of work between the coordinating and

the operational bodies of the Task Force. In addition, the Task Force has identified certain laws and regulations related to privacy and data protection that impede

information sharing and cross-agency co-operation.

Benefits and results observed in inter-agency co-operation

The value chain approach, which follows the fish and collects data from each point of control it passes through, e.g. the financing and procurement of vessels and fishing gear, gaining participant access, registering and providing information about fishing, the actual catching of fish, distribution and sales, makes it easier to create analyses and gather intelligence and evidence, and has also spurred greater interest within the police to deal with fisheries crime.

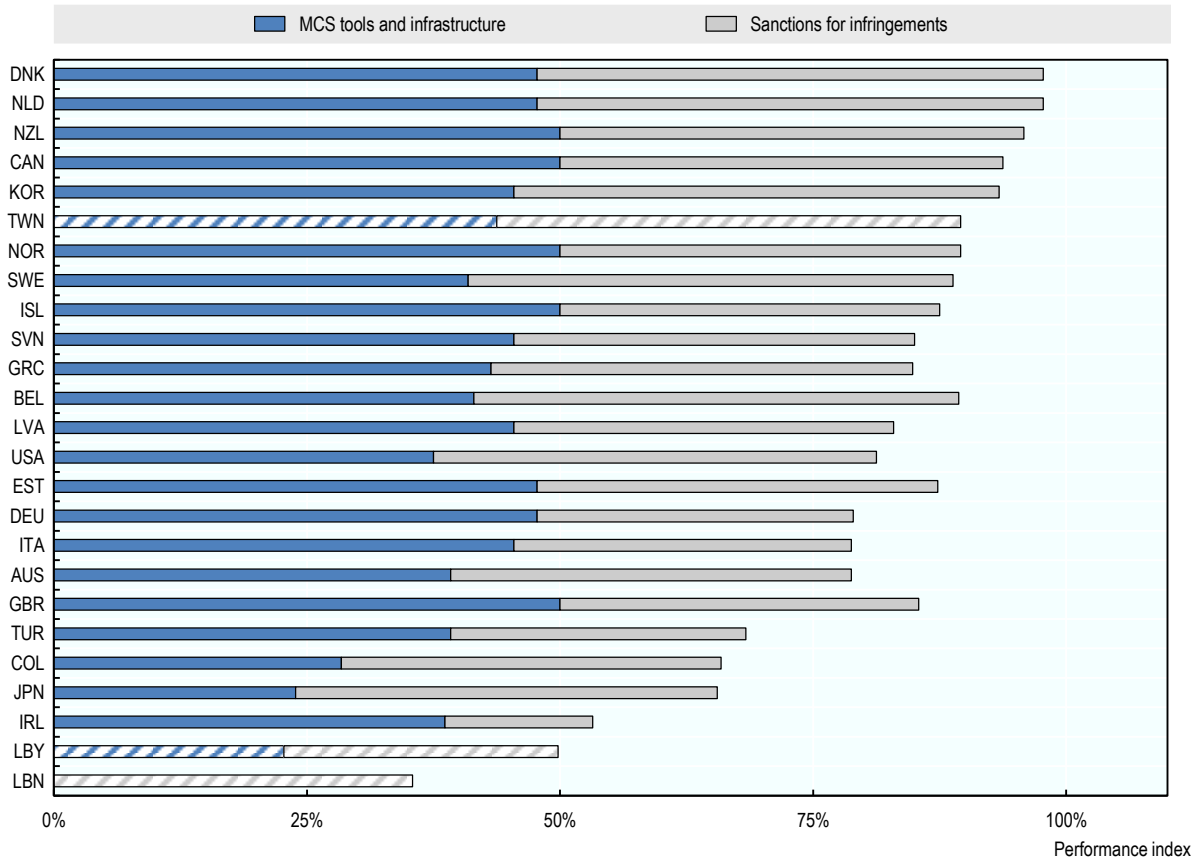
Today, agencies have increased awareness and knowledge about the issue both nationally and internationally; improved their analytical capacities; improved capacity to use surveillance tools; improved co-operation and coordination and improved information sharing between institutions.

The agencies participating in the group have identified potential changes to laws and regulations related to privacy and data protection that may improve co-operation and information sharing in the future, by making it easier to share data between agencies and develop cross-sectoral analyses. As an example of improvement, the Marine Resources Act was amended to implement the UNTOC convention, which resulted in an increase in the maximum penalty to six years in prison for transnational organised fisheries crime.

4.4. Co-operation - how countries compare?

69. Summarising the information on state co-operation analysed in this section, one sees that three countries (Denmark, Norway and Canada) appear to be leaders in implementing identified best policies and practices facilitating co-operation to reduce IUU fishing (Figure 4.4). Several countries, in particular Korea, Sweden and the United Kingdom, have room for putting in place additional measure to foster co-operation, both at national and international level.

Figure 4.4. Co-operation – evaluation by participant



Note: Hatched bars represent non-OECD countries or economies. For details on calculating the performance index, refer to Annex A.
Source: OECD 2017 data collection on measures against IUU fishing.

5. Enforcement mechanisms to combat IUU fishing

5.1. Strict enforcement is at the core of eliminating IUU fishing

70. At the national level, robust enforcement of fisheries regulations is challenging as MCS systems were generally not evolving in parallel with fleet capacity and its capabilities. The diversity of means by which seafood products arrive in various countries, such as landing in port, multiple containers or mixed cargo, render MCS difficult for enforcement authorities (Doumbouya et al., 2017[67]; Erceg, 2006[19]). This highlights the need for well-designed risk management procedures (Hilborn et al., 2001[68]) to better prioritise and target the allocation of enforcement efforts.

71. A lack of well-designed sanctioning systems creates unequal treatment and corruption incentives (Putt J., 2009[69]). Low penalties, disproportional to potential revenue from selling IUU seafood, do not play a deterring role for IUU fishing actions and are often factored in by IUU operators as the cost of doing business (Beke, Ackermann and Blomeyer, 2014[70]; NOAA, 2015[71]). Concentrated efforts towards effective enforcement of fisheries regulations (Table 5.1) follow from multiple commitments to effective oversight of fishing vessels (Box 5.1).

Table 5.1. Enforcement mechanisms - classification

Section	Subsection
MCS	MCS tools and infrastructure
	*Inspections and investigations**
Sanctions	Sanctions for infringements

Note: *Pending data availability, inspections and investigations will be reviewed in the final report. The subsection is based on numerical questions listed in Table A.3.

Box 5.1. Commitment to effective oversight of fishing vessels

UNCLOS (Article 94.1): "*Every State shall effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag*"

FAO Compliance Agreement (Article 3.1a): "*Each Party shall take such measures as may be necessary to ensure that fishing vessels entitled to fly its flag do not engage in any activity that undermines the effectiveness of international conservation and management measures.*"

UNFSA (Article 18.1): "*A State whose vessels fish on the high seas shall take such measures as may be necessary to ensure that vessels flying its flag comply with subregional and regional conservation and management measures and that such vessels do not engage in any activity which undermines the effectiveness of such measures.*"

UNFSA (19.1): "*A State shall ensure compliance by vessels flying its flag with subregional and regional conservation and management measures for straddling fish stocks and highly migratory fish stocks.*"

FAO Code of Conduct for Responsible Fisheries (Article 8.1.1): "*States should ensure that only fishing operations allowed by them are conducted within waters under their jurisdiction and that these operations are carried out in a responsible manner.*"

FAO Code of Conduct for Responsible Fisheries (Article 8.2.7): "*Flag States should take enforcement measures in respect of fishing vessels entitled to fly their flag which have been found by them to have contravened applicable conservation and management measures, including, where appropriate, making the contravention of such measures an offence under national legislation. Sanctions applicable in respect of violations should be adequate in severity to be effective in securing compliance and to discourage violations wherever they occur and should deprive offenders of the benefits accruing from their illegal activities. Such sanctions may, for serious violations, include provisions for the refusal, withdrawal or suspension of the authorization to fish.*"

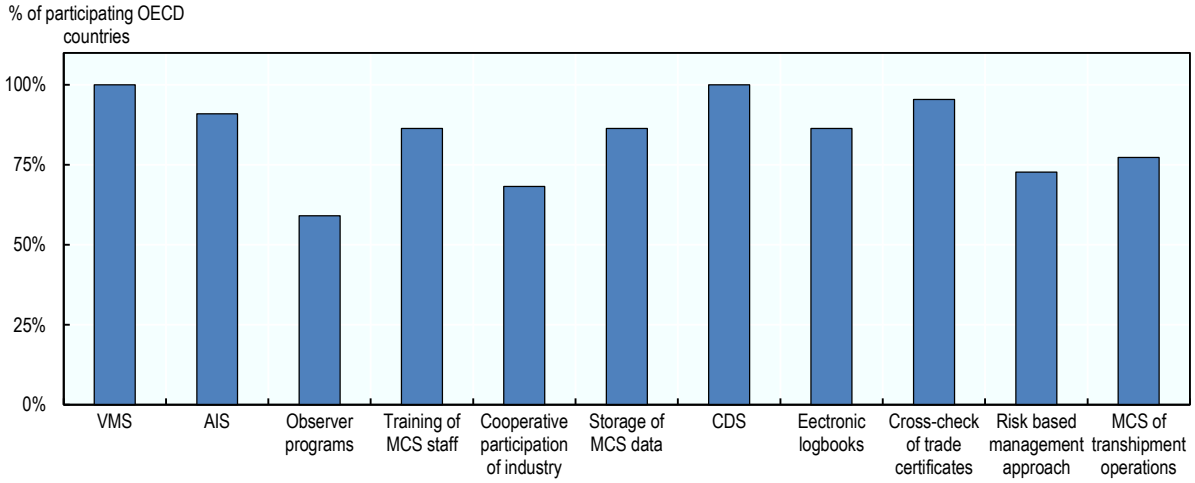
FAO Voluntary Guidelines for Flag State Performance (Article 31): "*The flag State implements a control regime over vessels flying its flag* […]").

IPOA-IUU (Article 24): "*States should undertake comprehensive and effective monitoring, control and surveillance (MCS) of fishing from its commencement, through the point of landing, to final destination* […]".

5.2. Modern technologies ease monitoring of fishing vessels

72. In 2005, the OECD examined various means of enforcement (OECD, 2005[12]). Since then progress has been made in the development of new tools and the wide application of traditional means of MCS (Figure 5.1). In 2016, OECD participating countries nearly uniformly reported the use of vessel monitoring systems (VMS), catch documentation schemes (CDS), automatic identification systems (AIS) and cross-check of trade certificates. New technologies are gaining ground as new forms of enforcement (Box 5.2). Observer programs, cooperative participation of the industry or risk based management approach are less common. All responders reported the existence of fisheries monitoring centres and near real-time controls of fishing vessels in the EEZ and ABNJ. Supporting transparency, the publication of positive (authorised) and negative (IUU) vessel lists were reported by 82% of participants.

Figure 5.1. MCS tools



Source: OECD 2017 data collection on measures against IUU fishing.

Box 5.2. Monitoring at sea with new technologies

Global emergence of large-scale marine protected areas (MPA) comes with an increasingly challenging enforcement of fisheries regulations at sea (McCauley, 2014[72]). Development of next-generation enforcement, such as drone patrols and real-time satellite monitoring, is essential for ensuring wild-caught seafood that gets on the plates is harvested legally.

Automatic identification system (AIS) and vessel monitoring system (VMS)

Adopted in 2000 by the IMO, AIS is an effective tool to accomplish navigational safety goals and prevent ship collisions. Vessels carrying AIS transponders broadcast information about identity, position and course, data which serves costal surveillance and traffic management. Initially required only from all ships over 300 GT on international voyages, cargo ships over 500 GT, tankers and passenger ships, the device became popular for insurance, convenience, security and safety reasons (Robards et al., 2016[73]). Although AIS is not designed for marine conservation or detecting IUU fishing activity, the stream of real-time data on vessel position gives a good understanding of routine vessel operations. Using algorithms developed by machine learning, AIS-derived data can be assessed for potential irregularities. Moreover, AIS data is not bound by confidentiality and can be purchased from data vendors. This approach is used by Global Fishing Watch project (http://globalfishingwatch.org/) founded in 2014 by Google, Skytruth and Oceana. The platform launched in 2016 aims for transparency in fishing industry and reveals location and behaviours of commercial fishing fleets through interactive maps.

VMS describe systems used in commercial fisheries to allow regulators to track activities of fishing vessels. The functionality of the system and the associated equipment varies with the requirements imposed by regulations pertaining to fishing in area in which the vessel is operating. The systems are regionally administered and data access is restricted.

However, commercial fishing trawlers are known to manipulate the system to by tempering the on-board "blue box" and falsify transmitted signals (Liddick, 2014[1]).

5.3. Sanctions for IUU fishing infringements remain low in relation to potential profits

73. While the FAO-IUU IPOA urges countries to adopt sufficiently severe penalties, fines for IUU fishing in 2005 (OECD, 2005[12]; Sumaila, Alder and Keith, 2006[74]) were considered too low to have a major impact on deterring IUU fishing activities, when compared to the value of IUU catches. Calls for tougher sanctions on operators (e.g. at the recent Our Ocean Conference, organised by the European Commission in Malta), are not reflected in prompt regulatory changes. Thus, although IUU fishing vessels face extra costs to avoid being caught, to bribe officials, and in the loss of their reputations, high market value of usually targeted species (Table 5.2) is often sufficient to offsets the costs. Operators simply incorporate fines into the cost for doing business.

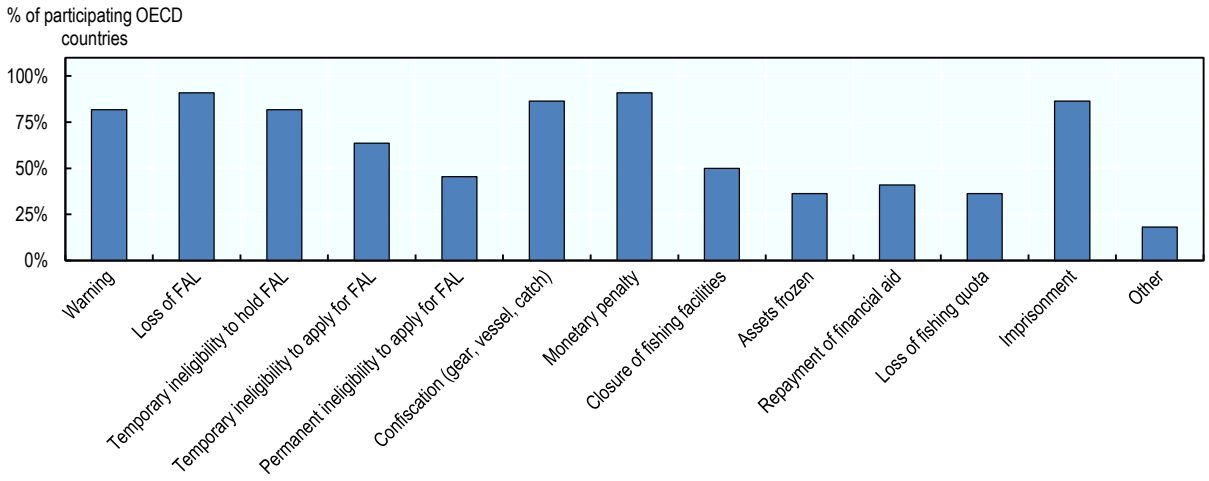
Table 5.2. Price tags for species targeted by IUU fishing

Species	Price per kg	Source
Bluefin tuna	Up to 790	https://www.bloomberg.com/news/articles/2018-01-04/bluefin-tuna-sold-for-320-000-in-1st-tsukiji-sale-of-18
Shark fins	100 (up to 650)	http://www.havocscope.com/shark-fin-price/; http://www.sharktruth.com/learn/shark-finning/
Totoaba swim bladders	20 000	https://www.theguardian.com/environment/2017/may/16/chinese-appetite-totoaba-fish-bladder-threatens-rare-vaquita
Abalone (endangered white and black abalone)	50-100	http://www.havocscope.com/abalone-price/; http://www.cbc.ca/news/canada/british-columbia/abalone-endangered-fishery-illegal-sale-1.3743687
Raw black coral	350	https://www.justice.gov/opa/pr/us-virgin-islands-company-sentenced-illegal-trade-protected-coral
Sea cucumbers	435 - 1 000	http://www.chinadaily.com.cn/world/2016-03/02/content_23706803.htm

Note: These prices intend to show the extent of potential revenue of IUU fishing, but are not exhaustive.

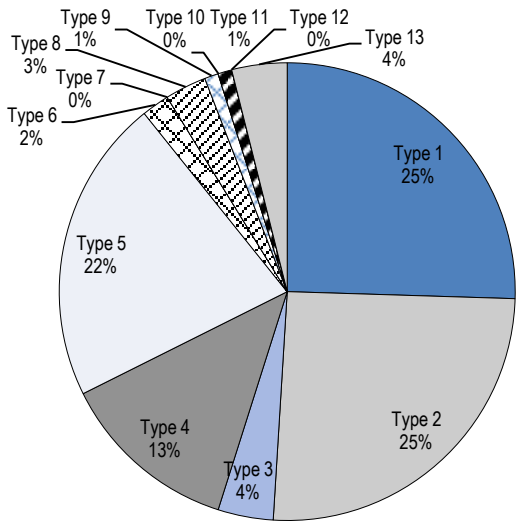
74. For the punishments to be dissuasive, cost-risk-benefit analysis of the IUU activity must be favourable to the authorities. Refined systems of sanctions provide for easier enforceable law, closing loopholes used by big players in the IUU fishing industry. Sanction for IUU fishing were reported present in national legal framework by all participating OECD countries. Participants reported various types of sanctions available (Figure 5.2). A majority apply monetary penalties (with the exception of Iceland and Slovenia), confiscations (vessel, fishing gear, other equipment or catch), taking away fishing authorisations or licences and imprisonment. 86% participants sanction nationals for IUU fishing related crimes. A majority of the reported offenses are related to not fulfilled obligations to record and report catch or catch-related data, fishing without a valid documentation and using prohibited fishing gear (Figure 5.3).

Figure 5.2. Sanctions applied by participating OECD countries



Note: FAL indicates fishing authorisation or licence.
Source: OECD 2017 data collection on measures against IUU fishing.

Type 1	Fishing without a valid licence, authorisation or permit issued by the flag state or the relevant coastal state
Type 2	Not fulfilled obligations to record and report catch or catch-related data, including data transmission by satellite vessel monitoring system, or prior notices
Type 3	Fished in a closed area, during a closed season, without or after attainment of a quota or beyond a closed depth
Type 4	Engaging in directed fishing for a stock which is subject to a moratorium or for which fishing is prohibited
Type 5	Using prohibited or non-compliant fishing gear
Type 6	Falsifying or concealing marking, identity or registration
Type 7	Concealing, tampering with or disposing evidence related to the investigation
Type 8	Obstructing the work of officials on duty in inspecting for compliance with the applicable conservation and management measures, including the work of observers in the exercise of their duties
Type 9	Taking on board, transhipping or landing undersized fish against the law in force
Type 10	Transhipping or participating in joint fishing operations with, supported or resupplied other fishing vessels identified as having engaged in IUU fishing (this includes IUU vessel lists from RFMOs or other national lists)
Type 11	Carrying out fishing activities in the RFMO area in a manner inconsistent with or in contravention of the conservation and management measures of that organisation, fishing without authorisation of the RFMO, or not co-operating with the RFMO
Type 12	Fishing without flag, as a stateless vessel, against the international law
Type 13	Engaging in other type of illegal activity

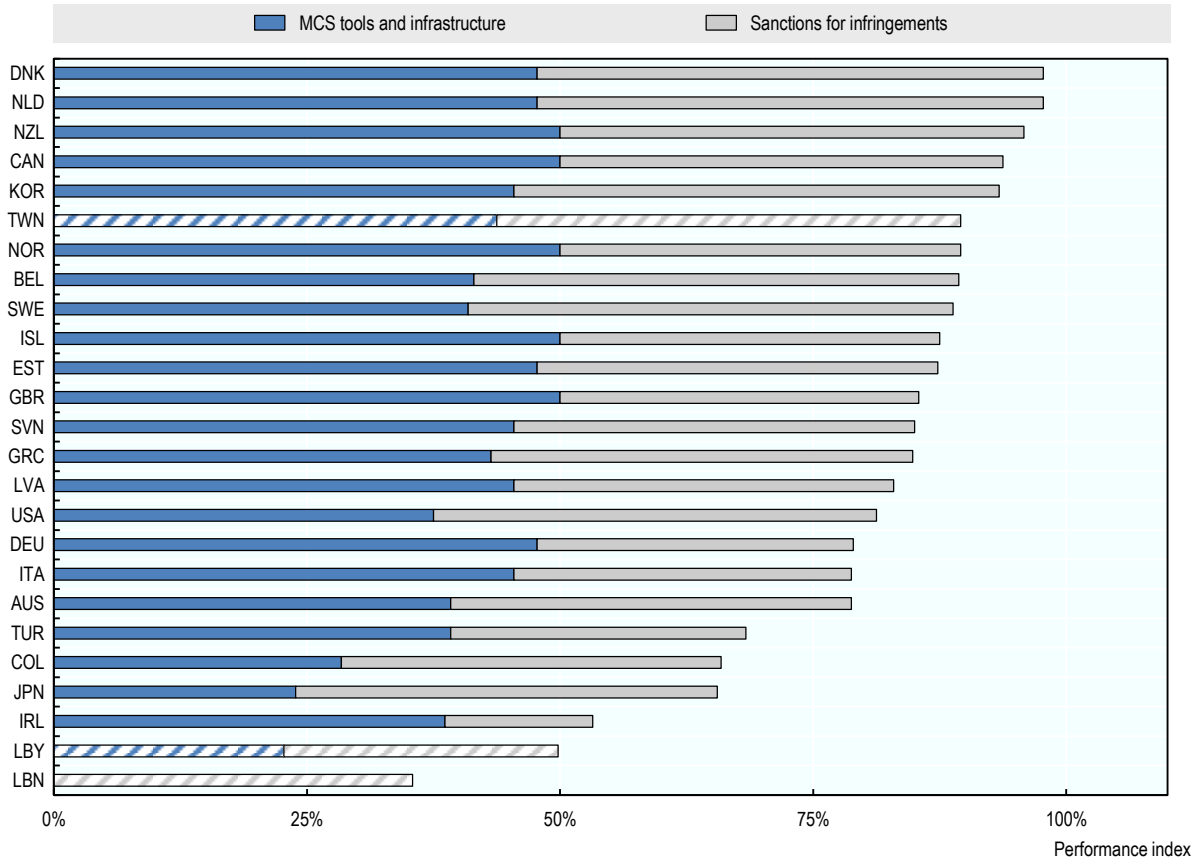


Note: Based on 102 cases from 16 countries.
Source: OECD 2017 data collection on measures against IUU fishing.

5.4. Enforcement mechanisms - how countries compare?

75. Summarising the information on enforcement mechanisms analysed in this section, one sees that three countries (Denmark, the Netherland and New Zealand) appear to be on the forefront of implementing a good mixture of MCS tools and applying sanctioning systems in line with identified best practices (Figure 5.4). Room for improvements in relation to enforcement mechanisms of fisheries regulations are noted for Lebanon, Libya and Ireland.

Figure 5.4. Enforcement mechanisms – evaluation by participant



Note: Hatched bars represent non-OECD countries or economies. For details on calculating the performance index, refer to Annex A.
Source: OECD 2017 data collection on measures against IUU fishing.

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Annex A. Evaluation methodology

The empirical analysis is based on answers provided through the questionnaire by participating countries and economies. The questionnaire consisted of four types of questions:

- contextual questions which were analysed qualitatively and not included in the quantitative analysis;
- questions on the implementation of policies and measures recognised as best practices in terms of deterring IUU fishing;
- multiple choice (checkbox) questions describing modalities associated with the implementation of policies and measures recognised as best practices in terms of deterring IUU fishing;
- Numerical questions serving supplementary analysis on sanctions.

The criteria for quantitative assessment of the submitted answers are available in Table A.1. Questions are evaluated against established standards provided by the literature (as contained within the column 'Notes and references'). Each answer was assigned a numerical score according to the transparent key contained in the columns relating to score ("Score 0%", "Score 20%", "Score 50%", "Score 100%"). Responses to the multiple-choice (checkbox) questions were scored as a proportion of implemented options over the total number of possible options for the given question (Table A.2). Numerical questions are used as a stand-alone analysis (Table A.3).

The score aggregation was undertaken at two levels. First, scores were aggregated across sub-sections as a weighted average, with the weights provided in Table A.1 (Column "W"). Simple questions on implementation are assigned a weight of 1. Detailed questions on the implementation of each measure, therefore conveying a more comprehensive description of the measure, were assigned a weight of 2.

The aggregation across sections was done by assigning an equal weight to each sub-section score. Section scores were then aggregated at the category level using equal weights for each section. The final score represents a measure of implementation of a selection of policies intended to deter IUU fishing in percentage terms for participating country or economy. Comparison between 2005 and 2017 was limited to the subset of questions where data was available for 2005 (Column "C"), based on responses to the previous OECD data collection on IUU fishing (OECD, 2005[75]).

The aggregation across responders was done by weighing individual indexes with their respective production values (OECD, 2017[76]). For countries with production values not available, values were estimated based on production volumes sourced from FAO (FAO, 2017[13]) and average price calculated based on OECD countries that provided data for the given year (OECD, 2017[76]).

Table A.1. Questionnaire evaluation table

Q	Section	Sub-section	Question	W	C	Score 0%	Score 20%	Score 50%	Score 100%	Notes and references
1	Flag state responsibilities	Registration of vessels	Registration of national vessels fishing in the areas under the jurisdiction of foreign countries or in the ABNJ	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(FAO, 1993[77]; FAO, 2014[8]; Englender et al., 2014[20]; Churchill, 2012[21]; Erceg, 2006[19]; Erikstein and Swan, 2014[30])
2	Flag state responsibilities	Registration of vessels	Registration of national vessels conducting fishing-related activities in the areas under the jurisdiction of foreign countries or in the ABNJ	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(FAO, 2014[8]; Kroodsma, Miller and Roan, 2017[78])
3	Flag state responsibilities	Registration of vessels	Registration requirements for national vessels fishing in the areas under the jurisdiction of foreign countries or in the ABNJ	2		Multiple-choice (checkbox) question (score depends on the number of checked options)				(FAO, 2014[8])
4	Flag state responsibilities	Registration of vessels	Updating of the registry of vessels flying the national flag	1		No updating; irregular updating (e.g. less than once a year); no registry	NA	Updating is periodical; updating follows a predefined schedule	Updating in real or near-real time	(FAO, 2014[8])
5	Flag state responsibilities	Registration of vessels	Public availability of the registry of vessels flying the national flag	1		Registry is not public	NA	Registry is public for a limited subset of vessels; registry is available to the public upon request; registry is not complete due to poorly implemented registration system	Registry is public	Refers to basic information allowing vessel identification, e.g. name, IMO, etc.; publication can be at national or supra-national level; (FAO, 2014[8])
6	Flag state responsibilities	Registration of vessels	Prohibition of registration of vessels with a history of IUU fishing	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(FAO, 2014[8])
7	Flag state responsibilities	Registration of vessels	Prohibition of registration of vessels already registered by another state, except on a temporary basis	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(FAO, 2014[8])
8	Flag state responsibilities	Registration of vessels	Sanctions on vessels engaged in IUU fishing before deregistration	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(FAO, 2014[8])

Q	Section	Sub-section	Question	W	C	Score 0%	Score 20%	Score 50%	Score 100%	Notes and references
9	Flag state responsibilities	Authorisation of vessels	Authorisation of national vessels to fish in the areas under the jurisdiction of foreign countries or in the ABNJ	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(FAO, 2014[8]; Morin, 2015[79]; Erceg, 2006[19])
10	Flag state responsibilities	Authorisation of vessels	Authorisation of national vessels to engage in fishing-related activities in the areas under the jurisdiction of foreign countries or in the ABNJ	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(FAO, 2014[8]; Kroodsma, Miller and Roan, 2017[78])
11	Flag state responsibilities	Authorisation of vessels	Entity or natural person receiving a fishing authorisation			Qualitative question				NA
12	Flag state responsibilities	Authorisation of vessels	Information required for issuing a national vessel with an authorisation to fish in the areas under the jurisdiction of foreign countries or in the ABNJ	2		Multiple-choice (checkbox) question (score depends on the number of checked options) – details in Table A.2				(FAO, 1993[77]; FAO, 2014[8])
13	Flag state responsibilities	Authorisation of vessels	Public availability of the list of vessels flying the national flag authorised to fish (i.e. fishing licence register) in the areas under the jurisdiction of foreign countries or in the ABNJ	1		List is not public	NA	List is public for limited subset of vessels; registry is available to the public upon request; list is not complete due to poorly implemented authorisation system	List is public	Publication can be at national or supra-national level; (FAO, 2014[8]; Kroodsma, Miller and Roan, 2017[78])
14	Flag state responsibilities	Authorisation of vessels	Bilateral agreements for national vessels on fish in the areas under the jurisdiction of foreign countries			Qualitative question				NA
15	Flag state responsibilities	Authorisation of vessels	Public availability of the list of bilateral agreements with foreign countries on fishing in the areas under their jurisdiction	1		List is not public	NA	List is public but content or coverage is limited (e.g. no details on financial terms)	List is public and its content is comprehensive (e.g. includes details on financial terms)	Includes agreements negotiated at national and supra-national level; NA if there is no such agreements in place; (FAO, 2014[8])
16	Coastal state responsibilities	Measures applying to foreign vessels	Fishing by foreign vessel in the country's EEZ			Qualitative question				NA
17	Coastal state responsibilities	Measures applying to foreign vessels	Authorisation of foreign vessels to fish in the country's EEZ	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	

Q	Section	Sub-section	Question	W	C	Score 0%	Score 20%	Score 50%	Score 100%	Notes and references
18	Coastal state responsibilities	Measures applying to foreign vessels	Entity or natural person receiving a fishing authorisations for a foreign vessels			Qualitative question				NA
19	Coastal state responsibilities	Measures applying to foreign vessels	Record-keeping of the activity of foreign vessels authorised to fish in the country's EEZ	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	E.g. keeping a record of catch, used gear, areas fished etc.
20	Coastal state responsibilities	Measures applying to foreign vessels	Public availability of the list of vessels (including vessels flying a foreign flag)authorised to fish in the country's EEZ	1		List is not public	NA	List is public for limited subset of vessels (e.g. only national when foreign vessels are allowed); registry is available to the public upon request; list is not complete due to poorly implemented authorisation system	List is public	
21	Coastal state responsibilities	Measures applying to foreign vessels	Limits on the number of fishing licences issued to vessels or the harvest volume allowed for harvest (including for vessels flying a foreign flag)	1		No limits	NA	NA	Limits in place	
22	Coastal state responsibilities	Measures applying to foreign vessels	Chartering arrangements	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	
23	Coastal state responsibilities	Measures applying to large scale vessels	Registration requirements for large scale vessels fishing in the country's EEZ	2		Multiple-choice (checkbox) question (score depends on the number of checked options) – details in Table A.2				
24	Coastal state responsibilities	Measures applying to large scale vessels	Information required for issuing a large scale vessel with an authorisation to fish in the country's EEZ	2		Multiple-choice (checkbox) question (score depends on the number of checked options) – details in Table A.2				
25	Coastal state responsibilities	Measures applying to small scale vessels	Measures applicable to small scale fisheries	2		Multiple-choice (checkbox) question (score depends on the number of checked options) – details in Table A.2				(Suebpala et al., 2015[45]; FAO, 2015[9])

Q	Section	Sub-section	Question	W	C	Score 0%	Score 20%	Score 50%	Score 100%	Notes and references
26	Port state responsibilities	Port state measures	Ratification of the FAO Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (PSMA)			Qualitative question				NA
27	Port state responsibilities	Port state measures	Designation of specific ports for use by foreign-flagged vessels	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(FAO, 2016[10]; Swan, 2016[80]; Witbooi, 2014[81])
28	Port state responsibilities	Port state measures	Denial of port entry or use (including landing, transhipments and access to other port services or inspection) to a vessels suspected of IUU fishing	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(FAO, 2016[10]; Swan, 2016[80]; Witbooi, 2014[81])
29	Port state responsibilities	Port state measures	Prior notice before vessel is allowed to enter port and confirmation requirement from the flag state	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(FAO, 2016[10]; Swan, 2016[80]; Witbooi, 2014[81])
30	Port state responsibilities	Port state measures	Designation of an authority that act as focal point for exchange of information with other authorities, flag states and RFMOs	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(FAO, 2016[10]; Swan, 2016[80]; Witbooi, 2014[81])
31	Port state responsibilities	Port state measures	Risk based management approach for vessels entering a port	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(FAO, 2016[10]; Swan, 2016[80]; Witbooi, 2014[81])
32	Port state responsibilities	Port state measures	Implementation of RFMO ports state measures	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(FAO, 2016[10]; Swan, 2016[80]; Witbooi, 2014[81])
33	Port state responsibilities	Port state measures	Definition of minimum levels for inspection of vessels	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(FAO, 2016[10]; Swan, 2016[80]; Witbooi, 2014[81])
34	Market measures	Trade of IUU products	Prevention of trade or import of fish caught by vessels identified as engaged in IUU fishing	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(Le Gallic, 2008[47]; Stokke, 2009[53]; Lövin, 2011[29]; Young, 2016[82]; Hosch, 2016[49])
35	Market measures	Trade of IUU products	System of multilateral catch documentation and certification requirements for traded fish products	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(FAO, 2017[11])
36	Market measures	Trade of IUU products	Standardisation of certification and documentation requirements	1		No process in place	NA	NA	Process in place, at minimum for main species	(FAO, 2017[11])

Q	Section	Sub-section	Question	W	C	Score 0%	Score 20%	Score 50%	Score 100%	Notes and references
37	Market measures	Trade of IUU products	Use of trade information to target IUU fishing trade	1		No process in place	NA	Process in place for main species only	Process in place for all species	Applicable process include, e.g., cross-check of trade data or risk analysis conducted to directly target IUU fishing; (FAO, 2001[4])
38	Market measures	Trade of IUU products	Other traceability systems			Qualitative question				NA
39	Market measures	Trade of IUU products	Inclusiveness of stakeholders along the value chain: awareness-raising among stakeholders to deter IUU trade	1	1	No relevant programs	NA	Relevant programs in place, but with limited reach	Relevant programs in place	(FAO, 2017[11]; Petrossian, Weis and Pires, 2015[52])
40	Economic measures	Money laundering	Consideration of IUU fishing as a predicate offense for money laundering	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(UNODC, 2011[3]; OECD, 2013[24]; Griggs and Lugten, 2007[54]; Österblom, 2014[50])
41	Economic measures	Subsidies and other support	Examination of a vessels and operators' history of non-compliance when applying for financial transfers/support from government	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation or no subsidies	(Griggs and Lugten, 2007[54])
42	Economic measures	Subsidies and other support	Restrictions on public support for operators convicted of IUU fishing offences	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation or no subsidies	(Sumaila, 2013[83]; Schmidt, 2017[84])
43	National co-operation	Information sharing at national level	Existence of task force or inter-agency group to combat IUU fishing	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(OECD, 2013[24]; Szigeti and Lugten, 2015[85])
44	National co-operation	Information sharing at national level	Authorities involved in sharing information on IUU fishing at national level	2		Multiple-choice (checkbox) question (score depends on the number of checked options) – details in Table A.2				(OECD, 2013[24]; Szigeti and Lugten, 2015[85])
45	National co-operation	Information sharing at national level	Co-ordinating authority			Qualitative question				NA
46	National co-operation	Information sharing at national level	Other mechanisms or procedures for inter-agency co-operation			Qualitative question				NA
47	International co-operation	Information sharing at international level	Internationally exchange of information on vessel owners, operators and crews			Qualitative question				NA

Q	Section	Sub-section	Question	W	C	Score 0%	Score 20%	Score 50%	Score 100%	Notes and references
48	International co-operation	Information sharing at international level	Adoption of standards to share information at international level	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(Gilman and Kingma, 2013[63])
49	International co-operation	Information sharing at international level	Existence of a focal point to exchange information with other countries on matters relevant to IUU fishing	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(Gilman and Kingma, 2013[63])
50	International co-operation	Information sharing at international level	Participation in an international task force or group to combat IUU fishing	1		No participation	NA	NA	Participation	(OECD, 2016[86])
51	International co-operation	Co-operation on MCS	Co-operative systems of monitoring, control and surveillance at regional level	1	1	No legislation	Legislation but no implementation	Partial implementation of legislation	Full implementation of legislation	(Lodge et al., 2007[87])
52	MCS	Transparent procedures	Number of authorities involved in the process of registration and authorisation to fish			Qualitative question				NA
53	MCS	Transparent procedures	Co-operation between agencies			Qualitative question				NA
54	MCS	MCS tools and infrastructure	Control regime over vessels in the EEZ and the ABNJ	2		Multiple-choice (checkbox) question (score depends on the number of checked options) – details in Table A.2				
55	MCS	MCS tools and infrastructure	Fisheries monitoring centre and near real-time controls of fishing vessels in the EEZ and the ABNJ	1		No monitoring	NA	Monitoring is limited (e.g. to domestic EEZ)	Monitoring in real time, 24/7	Monitoring limitations may include (1) not full coverage, (2) delayed processing of information, (3) limited monitoring time frame; (Beke, Ackermann and Blomeyer, 2014[70]; Cacaud, Kuruc and Spreij, 2003[88])

Q	Section	Sub-section	Question	W	C	Score 0%	Score 20%	Score 50%	Score 100%	Notes and references
56	MCS	MCS tools and infrastructure	Publication of IUU vessel list	1		No lists published	NA	Publication is limited (e.g. only covering RFMOs areas)	Lists published (nationally or by supra-nationally)	Publication limitations may include (1) not full coverage; (Beke, Ackermann and Blomeyer, 2014[70]; Cacaud, Kuruc and Spreij, 2003[88]; Erceg, 2006[19])
57	MCS	Inspection and investigations	Total number of inspections conducted outside of ports in areas under national jurisdiction in 2015 and 2016			Numerical question – details in Table A.3				
58	MCS	Inspection and investigations	Total number of inspections conducted in ports under national jurisdiction in 2015 and 2016			Numerical question – details in Table A.3				
59	MCS	Inspection and investigations	Number of national vessels that received sanctions in 2015 and 2016			Numerical question – details in Table A.3				
60	MCS	Inspection and investigations	Total tonnage of national vessels that received sanctions in 2015 and 2016			Numerical question – details in Table A.3				
61	MCS	Inspection and investigations	Number of foreign vessels that received sanctions in 2015 and 2016			Numerical question – details in Table A.3				
62	MCS	Inspection and investigations	Total tonnage of foreign vessels that received sanctions in 2015 and 2016			Numerical question – details in Table A.3				
63	MCS	Inspection and investigations	Planned improvements in MCS capacity			Qualitative question				NA
64	Sanctions	Sanctions for infringements	IUU fishing sanctions within the national legal framework	1		No legislation	NA	NA	Legislation available	(Putt J., 2009[69]; Kao, 2015[18]; Selbe, 2014[89])
65	Sanctions	Sanctions for infringements	Differentiation of penalties by nationality			Qualitative question				NA
66	Sanctions	Sanctions for infringements	Sanctions on nationals	1		Not included	NA	NA	Included	Refers to legislation including sanctions on nationals on board of fishing vessels in the high seas and BO, regardless where the vessel is registered; (Putt J., 2009[69]; Kao, 2015[18]; Selbe, 2014[89]; Erceg, 2006[19])

Q	Section	Sub-section	Question	W	C	Score 0%	Score 20%	Score 50%	Score 100%	Notes and references
67	Sanctions	Sanctions for infringements	Out-of-court settlement systems			Qualitative question				NA
68	Sanctions	Sanctions for infringements	Number of out-court-settlements related to IUU fishing in 2015 and 2016			Numerical question – details in Table A.3				
69	Sanctions	Sanctions for infringements	Scope of sanctions scheme	2		Multiple-choice (checkbox) question (score depends on the number of checked options) – details in Table A.2				
70	Sanctions	Sanctions for infringements	Average time to complete court procedures (in months) in 2015 and 2016			Numerical question – details in Table A.3				
71	Sanctions	Sanctions for infringements	Actions against infringements of RMFOs conservation and management measures			Qualitative question				NA
72	Sanctions	Sanctions for infringements	Third party participation in case of investigation			Qualitative question				NA

Note: Column 'W' indicates weight of given question in calculation of sub-section score. Column 'C' indicates whether question is part of quantitative comparative analysis between 2005 and 2017, i.e. whether data from 2005 was collected. Questions highlighted in grey are not scored; these are contextual question used in the qualitative analysis. Partial implementation implies either (1) implementation to limited subset of fisheries, (2) no sufficient enforcement tools to assure full implementation of the policy. NA indicates no applicability.
Source: OECD Data Collection 2017.

Table A.2. Options for multiple-choice (checkbox) questions

Question	Option
3	History of the vessel
3	Characteristics of the vessel e.g. length, tonnage, fishing methods, powers, date of build
3	Name and nationality of legal or natural person whose name the vessel is registered
3	Name and nationality of legal or natural person responsible for managing the operations of the vessels
3	Name and nationality of legal or natural person with beneficial ownership of the vessel
3	Lloyds/IMO number when registering the vessels
3	Requirements also applying to fishing-related activities
12	History of compliance with regulations
12	Areas, scope and duration of the authorisation
12	VMS data
12	Catch reporting conditions
12	Reporting of transhipment where permitted
12	UVI
12	Observer coverage
12	Maintenance of fishing logbooks
12	Working conditions applying on board
12	Sustainability criteria
12	Information on private agreements negotiated directly with foreign governments
23	History of the vessel
23	Characteristics of the vessel e.g. length, tonnage, fishing methods, powers, date of build
23	Name and nationality of legal or natural person whose name the vessel is registered
23	Name and nationality of legal or natural person responsible for managing the operations of the vessels
23	Name and nationality of legal or natural person with beneficial ownership of the vessel
23	Lloyds/IMO number when registering the vessels
23	Requirements also applying to fishing-related activities
24	History of compliance with regulations
24	Areas, scope and duration of the authorisation
24	VMS
24	Catch reporting conditions
24	Reporting of transhipment where permitted
24	UVI
24	Maintenance of fishing and related logbooks
25	Authorisation to fish
25	Registration of the vessel
25	Empowerment programs to combat IUU fishing
25	Other traditional practices in place*
44	Fisheries authorities
44	Tax administrations
44	Customs administrations
44	Any other relevant authority or agency with interests in the fisheries sector*
54	VMS (where appropriate)
54	AIS (where appropriate)
54	Observer programs (where appropriate)
54	Training programs for MCS staff
54	Cooperative participation of industry
54	Storage of MCS data
54	CDS
54	Electronic logbooks
54	Cross-check authenticity of trade certificates
54	Risk based management approach
54	MCS of transhipment operations
54	Other*

Question	Option
69	Warning
69	Suspension or revocation of fishing authorisation/licence
69	Temporary ineligibility to hold a fishing authorisation/licence
69	Temporary ineligibility to apply for a fishing authorisation/licence
69	Permanent ineligibility to apply for a fishing authorisation/licence
69	Permanent or temporary confiscation of gear, equipment, vessel, catches
69	Monetary penalty
69	Cloture of fishing facilities
69	Assets frozen
69	Repayment of financial aid
69	Loss of fishing quota
69	Imprisonment
69	Other*

Note: * Option "Other" or similar, when available, was not used in quantitative assessment.
Source: OECD Data Collection 2017.

Table A.3. Numerical questions

Question
Total number of inspections conducted outside of ports in areas under national jurisdiction
Total number of inspections in ports under national jurisdiction
Number of vessels flying the flag of your state that received at least one sanction
Total tonnage of vessels flying the flag of your state that received at least one sanction from your authorities
Number of vessels flying the flag of a foreign country that received at least one sanction from your authorities
Total tonnage of vessels flying the flag of a foreign country that received at least one sanction
Number of out-court-settlements related to IUU fishing
Average time to complete court procedures (in months)

Source: OECD Data Collection 2017.

Table A.4. Membership list of RFMOs and other organisations with a mandate to monitor fisheries or other marine resources

	CCAMLR	CCSBT	GFCM	IATTC	ICCAT	IOTC	NAFO	NEAFC	NPFC	SEAFO	SIOFA	SPRFMO	WCPFC
OECD member countries													
Australia	CP	CP				CP					CP	CP	CP
Belgium	CP	CP*	CP*	CP*	CP*	CP*	CP*	CP*		CP*	CP*	CP*	CP*
Canada				CP	CP		CP	CNCP	CP				CP
Chile*	CP			CNCP								CP	
Denmark	CP*	CP*	CP*	CP*	CP	CP*	CP*/CP[1]	CP[2]		CP*	CP*	CP[1]/CP*	CP*
Estonia	CP*	CP*	CP*	CP*	CP	CP*	CP	CP*		CP*	CP*	CP*	CP*
Finland*	CP*	CP*	CP*	CP*	CP	CP*	CP*	CP*		CP*	CP*	CP*	CP*
France*	CP	CP*	CP	CP	CP[3]/CP*	CP	CP*/CP[3]	CP*		CP*	CP	CP*	CP
Germany	CP	CP*	CP*	CP*	CP*	CP*	CP	CP*		CP*	CP*	CP*	CP*
Greece	CP*	CP*	CP	CP*	CP*	CP*	CP*	CP*		CP*	CP*	CP*	CP*
Iceland					CP		CP	CP*					
Ireland	CP*	CP*	CP*	CP*	CP*	CP*	CP*	CP*		CP*	CP*	CP*	CP*
Israel*			CP										
Italy	CP	CP*	CP	CP*	CP*	CP*	CP*	CP*		CP*	CP*	CP*	CP*
Japan	CP	CP	CP	CP	CP	CP	CP		CP	CP	CP		CP
Korea	CP	CP		CP	CP	CP	CP		CP	CP	CP	CP	CP
Latvia	CP*	CP*	CP*	CP*	CP*	CP*	CP	CP*		CP*	CP*	CP*	CP*
Mexico*				CP	CP								CNCP
Netherlands	CP*	CP*	CP*	CP*	CP*	CP*	CP*	CP*		CP*	CP*	CP*	CP*
New Zealand	CP	CP						CNCP			CNCP	CP	CP
Norway	CP				CP		CP	CP		CP			
Poland*	CP	CP*	CP*	CP*	CP*	CP*	CP	CP*		CP*	CP*	CP*	CP*
Portugal*	CP*	CP*	CP*	CP*	CP*	CP*	CP	CP*		CP*	CP*	CP*	CP*
Slovenia	CP*	CP*	CP	CP*	CP*	CP*	CP*	CP*		CP*	CP*	CP*	CP*
Spain*	CP	CP*	CP	CP*	CP*	CP*	CP	CP*		CP*	CP*	CP*	CP*
Sweden	CP	CP*	CP*	CP*	CP*	CP*	CP*	CP*		CP*	CP*	CP*	CP*
Turkey			CP		CP								
United Kingdom	CP	CP*	CP*	CP*	CP[4]/CP*	CP*	CP*	CP*		CP*	CP*	CP*	CP*
United States	CP			CP	CP		CP	CNCP	CP			CP	CP
OECD accession countries													
Colombia				CP								CNCP	
Costa Rica*				CP	CNCP								
Lithuania*	CP*	CP*	CP*	CP*	CP*		CP	CP*		CP*			CP*
Non-member countries and economies													

	CCAMLR	CCSBT	GFCM	IATTC	ICCAT	IOTC	NAFO	NEAFC	NPFC	SEAFO	SIOFA	SPRFMO	WCPFC
Lebanon			CP									CP*	
Libya			CP		CP								
Chinese Taipei		CP		CP	CNCP				CP			CP	CP

Note: Includes OECD member countries (excluding land-locked countries with no fishing fleets and EEZs), OECD accession countries, and countries and economies participating in the project. CP indicates contracting parties or members of the agreement or convention; CNCP indicate non-contracting co-operating parties or cooperating non-member of the agreement or convention.
Membership in respect to: [1] Faroe Islands; [2] Faroe Islands and Greenland; [3] St. Pierre and Miquelon; [4] overseas territories of the United Kingdom. * - indicates OECD member and accession countries not participating in the project.
Source: Membership lists confirmed with relevant secretariats.

Organisation for Economic Co-operation and Development

TAD/FI/RD(2018)3

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20 April 2018

TRADE AND AGRICULTURE DIRECTORATE
FISHERIES COMMITTEE

Statistics and data collection

3-4 May 2018
Paris, France

This document is presented under Item 6 of the Draft Agenda of the 121st session of the Fisheries Committee for INFORMATION. This work is carried out under Intermediate Output Result 3.2.3.4.2 of the 2017-18 PWB of COFI.

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Note by the Secretariat

This document is presented under Item 6 of the Draft Agenda of the 121st session of the Fisheries Committee for INFORMATION. This work is carried out under Intermediate Output Result 3.2.3.4.2 of the 2017-18 PWB of COFI. It provides an update of the process and changes made for the next data collection cycle.

Statistics and data collection

1. Status update

1. The fisheries and aquaculture questionnaires will be sent at the beginning of May 2018.

2. In total, five questionnaires will be sent in 2018:

    1. *Marine landings*
    2. *Inland fisheries*
    3. *Employment in fisheries and aquaculture*
    4. *Fishing fleet*
    5. *Fisheries Support Estimate (FSE)*

3. With respect to the 2017 data call, the following questionnaires will not be sent in 2018:

    1. *Aquaculture production*: as mentioned at the last COFI, this questionnaire will no longer be sent. From now on, the aquaculture production data will be directly sourced from the FAO public platform FishstatJ.
    2. *Total Allowable Catches (TAC), quotas and catches*: this year no questionnaire will be sent as this domain is currently under development and the questionnaire will be revised. Next questionnaire will be sent in 2019.
    3. *Targets & Thresholds for fish stocks*: this year no questionnaire will be sent as this domain is currently under development and the questionnaire will be revised. Next questionnaire will be sent in 2019.

2. Changes to questionnaires

4. The questionnaires have been revised following the feedback provided by countries during the last data submission as follows:

- The metadata tab has been completely redesigned: it is now shorter and easier to complete due to a clearer instructions and inclusion of examples.

METADATA information judged important for understanding the data	
1. Please indicate the source of the data *Example: administrative records/data, agricultural census, sample surveys, estimation through balance, expert judgement, etc*	
2. Please indicate the name of the collection you have used as source *Example: if your data source is administrative data, report the name of the register*	
3. Please indicate the name of the institution responsible for the data collection *Example: the Ministry of Agriculture, the National Institute of Statistics, a local fisheries agency, etc*	
4. Please indicate the frequency of data collection/compilation *Example: yearly, quarterly, monthly, irregular, etc*	
5. Please indicate when (=year, month) you last received the data from the source	
6. Please specify here if data refer to calendar or fiscal year	
7. Please provide here a link to a statistics release calendar, if available	
8. Please report any characteristics of the data collection you might judge important *Example: the variables collected, the sampling method used (if any), or any*	
9. Please describe the target population, *i.e.* the population for which the information is sought, and how much of it is covered	
10. Please specify if the whole country is covered or if data refers to sub-regions	
11. Please specify if all sectors of the economy are covered or if data refers to sub-sectors	
12. Please report any other comment on data coverage you might have	
13. Please describe if data are the result of any manipulation *Example: aggregation, estimation, imputation, trasformation, or seasonal adjustment*	
14. Please indicate how data are disseminated *Example: news release, paper publication, bulletin, on-line database, CD-ROM, etc*	
15. Please report any other comment on data quality or any recommendation you might want to provide to guide users	

- Value and quantity data are presented on the same tab in the *Marine landings* and *Inland fisheries* questionnaires. This makes the questionnaire easier to complete and makes it easier to see where missing data needs to be added.

3 ALPHA CODE	SPECIES NAME	UNIT OF MEASURE	1995 F	1996 F	1997 F	1998 F	1999 F	2000 F	2001 F	2002 F	2003 F	2004 F	2005 F	2006 F	2007 F	2008 F	2009 F	2010 F	2011 F	2012 F	2013 F	2014 F	2015 F	2016 F	2017 F
SPECIES_TOTAL	ALL SPECIES - GRAND TOTAL	Tonnes																							
SPECIES_TOTAL	ALL SPECIES - GRAND TOTAL	National currency																							
ASU	Asp [Aspius aspius]	Tonnes																							
ASU	Asp [Aspius aspius]	National currency																							
PTB	Barbel [Barbus barbus]	Tonnes																							
PTB	Barbel [Barbus barbus]	National currency																							
BIC	Bighead carp [Hypophthalmichthys nobilis]	Tonnes																							
BIC	Bighead carp [Hypophthalmichthys nobilis]	National currency																							
ALR	Bleak [Alburnus alburnus]	Tonnes																							
ALR	Bleak [Alburnus alburnus]	National currency																							

- Some automatic formulas have been embedded in the *Employment* and *Fishing fleet* questionnaires in order to make the questionnaire easier to complete and to ensure consistent data.

- All questionnaires will be prefilled with available data starting from 1995 (from 2000 for FSE) as well as the metadata. Countries will still have a chance to provide historical series if available.

- All questionnaires have been completed with an extra-column for flags (Break in series, Non-publishable and confidential value, Estimated value, Provisional value).

3. Deadline for data submission

5. The deadline for data submission is 31 August 2018.

4. Employment: shared data collection with FAO

6. As announced at the last COFI meeting, OECD is collaborating with FAO in order to streamline the collection of employment data and send a common FAO-OECD questionnaire for this.

7. The project involves the construction of a dataset common to both organisations. A first comparison between OECD and FAO data has highlighted the existence of several inconsistencies.

8. In order to address these inconsistencies and completely harmonise the FAO and OECD existing data, an email will be addressed to both OECD and FAO data correspondents in September or October where they will be asked to:

- provide feedback and revisions as needed to achieve consistency,
- confirm a final version of the data,
- identify a single contact person for future data submission as the two organisations often have different contacts.

9. A harmonised data collection process will be put in place once these three steps have been completed for all countries.

Organisation for Economic Co-operation and Development

TAD/FI/RD(2018)1

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18 April 2018

TRADE AND AGRICULTURE DIRECTORATE
FISHERIES COMMITTEE

ACTIVITY REPORT AND WORK UNDERTAKEN IN THE OECD OF INTEREST TO THE COFI: NOVEMBER 2017 – APRIL 2018

2-4 MAY 2018
PARIS, FRANCE

This room document is submitted to the 121st Session of the Fisheries Committee, under the item 11 of the Draft Agenda, for INFORMATION.

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ACTIVITY REPORT AND WORK UNDERTAKEN IN THE OECD OF INTEREST TO THE COFI
November 2017 –April 2018

1. Publication of COFI work

1.1. OECD Review of Fisheries: Policies and Summary Statistics 2017 (published on 5 December, 2017)

1. The Review of Fisheries has been regularly published for more than thirty years. This latest report covers developments in both production and polices in fisheries and aquaculture. This edition includes 35 countries and economies and the participants in this Review represent nearly half of global fisheries production, and the majority of production of aquaculture. This document focuses on OECD Fisheries Support Estimate database which is an inventory of policies supporting fisheries and the fishing sector that shows the different ways in which budgetary policies are designed and delivered.

2. OECD publication and activities (non-COFI)

Environment

2.1. Safety Assessment of Transgenic Organisms in the Environment, Volume 7, OECD Consensus Documents (published on 21 December 2017; ENV)

2. This report is the seventh volume of the OECD Series on Harmonisation of Regulatory Oversight in Biotechnology, which relates to the environment risk or safety assessment of transgenic organisms. It compiles the OECD consensus documents issued in 2016 and 2017. As modern biotechnologies have been applied to products, high safety standard for genetically engineered products is required for industry and trade. This document provides science-based information on a specific host organism or trait. Its work aims to promote mutual understanding among countries, avoid duplication, and increase the efficiency of the risk assessment process. The publication is of particular interest to COFI delegates as this is the first OECD biosafety publication to address an animal species, the Atlantic salmon (Salmo salar). It describes the biology and ecology of wild Atlantic salmon and of the farmed form, elements of genetics, research on genetically engineered salmon and resources for its risk assessment. Therefore, it is valuable to applicants for commercial uses of transgenic organism, regulators in national authorities as well as the wider scientific community.

2.2. OECD Environmental Performance Reviews: Canada (published on 19 December 2017; ENV)

3. This is the third Environmental Performance Review of Canada. It evaluates progress towards sustainable development and green growth, with special features on climate change mitigation and urban wastewater management. Canada, the world's second largest country by area, has abundant natural resources. Its vast territory includes large tracts of undisturbed wilderness. However, urbanisation and agriculture are putting pressure on the natural asset base. Since 2000, Canada has made progress in decoupling economic growth from air pollution, energy consumption and GHG emissions, but it remains one of the most energy- and emissions-intensive economies in the OECD. One percent of Canada's marine and coastal areas are protected. This is well below the Aichi 2020 target of ten percent. Further progress is needed to transition to a green, low-carbon economy.

2.3. OECD Environmental Performance Reviews: Peru (published on 22 December 2017; ENV)

4. This document is the first review of Peru's environmental performance. It evaluates progress towards sustainable development and green growth, with a focus on sustainable use of the natural resources base. As Peru is the world's largest single species fisheries producer (anchovies) and a leading producer of fishmeal and fish oil, this report examines the environmental performance of the fishing sector. This information benefits COFI delegates to understand characteristics and trends of the Peruvian fisheries sector and institutional framework for fisheries policies, and to promote policy dialogue and peer learning.

2.4. Indicators on Terrestrial and Marine Protected Areas: Methodology and Results for OECD and G20 countries

5. This paper was reviewed by the OECD Environmental Policy Committee and its Working Party on Environmental Information in November 2017. This report contains a methodology for calculating the extent of terrestrial and marine protected areas recorded in the World Database on Protected Areas. The method allows the data on protected areas to be summarised in a harmonised and more detailed way than currently available.

2.5. Impact evaluation and cost-effectiveness analysis of biodiversity policies (terrestrial and marine)

6. Work is underway through the Working Party on Biodiversity, Water and Ecosystems on examining the effectiveness of terrestrial and marine biodiversity policies. The paper reviews the methodologies for impact evaluation and cost-effectiveness analysis and provides an inventory of existing studies. Preliminary findings to date indicate that there are nearly no impact evaluation studies in the context of marine biodiversity policies. A first draft [ENV/EPOC/WPBWE(2017)5/REV1] was circulated to WPBWE delegates in October 2017, with the second draft to be circulated in April 2018.

Ocean economy

2.6. Greening the Blue Economy in Pomorskie, Poland (published on 21 Nov 2017; LEED)

7. This report is an output from a project on boosting skills ecosystems for greener jobs, by the Local Economic and Employment Development. As Pomorskie is a coastal area on the Baltic Sea, the document focuses on the development of the blue economy, which is associated with sustainable development of the oceans and coastlines surrounding the region. It analyses the specific skills needed to support green growth in Pomorskie and how related labour market and training programmes can be made more effective in supporting the blue economy.

2.7. Ongoing work on the Ocean Economy and Innovation

8. The Ocean Economy Group in STI continued co-operating with stakeholders in different ocean communities and beyond. A new report *Innovation and the Ocean Economy* will be produced at the end of 2018, with continued activities in the 2019-20, including further examination of innovation networks in the ocean economy (i.e. on how public and private actors co-operate in different marine or maritime sectors to achieve successful research and innovation outcomes); new foresight activities on the synergies and impacts of new and forthcoming ocean industrial activities and marine ecosystems; fostering new approaches to further the valuation of the ocean economy; and continuing to review the blend of science and technologies innovation policies for the ocean.

2.8. OECD Investment Policy Reviews: Viet Nam 2018

9. This report will be published in April, 2018. The review includes an assessment of the investment climate in Viet Nam and explores the challenges and opportunities faced by the government in its reform efforts. In this report, the part on investment framework for green growth would be relevant to the COFI project, *Country study of fisheries and aquaculture policy in Viet Nam*, as a policy framework on green growth is an important aspect of sustainable fisheries and aquaculture.

Bio-economy

2.9. Technology Roadmap: Delivering Sustainable Bioenergy (published on 7 December 2017; IEA)

10. This document examines the role of bioenergy in view of changes to the energy landscape over the past five years and recent experience in bioenergy policy, market development and regulation. As the current rate of bioenergy deployment is below the levels required in low carbon scenarios, the document suggested recommendations on building frameworks which can provide a low-risk investment climate, ensuring market access, and technical and institutional capacity building support for the emerging and developing economies. In this report, algae and other aquatic biomass are being explored as potential future source of bioenergy feedstocks and continuing work to evaluate the potential these novel energy feedstock is recommended.

2.10. Meeting Policy challenges Facing a Sustainable Bioeconomy

11. This report will be published in April, 2018. The document investigates key aspects surrounding the sustainability of bioeconomy development: the use of biomass as feedstock for future production; the design and building of biorefineries for the manufacture of a range of fuels, chemicals and materials, and also for electricity generation; and the use of biotechnologies such as synthetic biology, metabolic engineering and gene editing. As marine bio-resources hold great potential as a novel source of bioenergy, this document would help policy makers to develop appropriate frameworks for marine biotechnology.

3. Events

3.1. Green Growth and Sustainable Development Forum on Greening the ocean economy

12. In 21-22 November 2017, the sixth annual Green Growth and Sustainable Development Forum was held as part of the OECD Ocean Economy week. The Forum examined the environmental and economic implications of the use of oceans and discussed innovative approaches for making the ocean economy more sustainable. A specific session focused on 'targeting criminal activities at sea with economic and financial perspectives'. An issue paper 'an inventory of new technologies in fisheries: challenges and opportunities in using new technologies to monitor sustainable fisheries' was prepared as input to the Forum.

3.2. Ministerial Council Meeting

13. In 30-31 May 2018, the Ministerial Council Meeting (MCM) will be held and chaired by France. One of the core issues on this year's MCM agenda is the environment, including the ocean economy. A background document on 'Greening the Ocean Economy: Opportunities, challenges, and the role of the OECD in enhancing concerted multilateral action' is being prepared to help inform discussions under agenda item *10. Multilateralism to meet the challenges of biodiversity, the climate and natural resources within the framework of SDGs*. A first draft [ENV/EPOC(2018)16] was circulated to COFI delegates in April 2018 for comments or suggested amendments before it is finalised for the MCM. The paper draws on the OECD's 2017 Green Growth and Sustainable Development Forum, and addresses key issues for greening the ocean economy: marine biodiversity conservation, sustainable fisheries and aquaculture, marine plastics, climate change, and the role of science and technology.

4. Secretariat missions

4.1. Nordic Council of Ministers, side event with international organisations, 7-9 November 2017, Oslo, Norway

14. Claire Delpeuch attended the meeting to discuss key policy issues of interest to fisheries administrations in Nordic countries, the European Commission and other international organisations. She also presented on-going OECD work on fisheries and exchanged views on topics for possible future interest.

4.2. Launch of the Review of fisheries and aquaculture policies in Viet Nam, Hanoi, 30 January - 2 February 2018, Hanoi, Viet Nam

15. Claire Delpeuch and Barbara Hutniczak met with all relevant bodies of the Vietnamese government, sector stakeholders, international organisations and interested member states embassies as well the delegation of the European Union, to present the Review project, identify key policy issues, and discuss the challenges and opportunities in relation with sustainable fisheries and aquaculture production in Viet Nam. The data and information collection process was launched with the contracted experts.

4.3. Workshop for attachés and assignees to Korean embassies in foreign countries and international organizations, 21-23 February 2018, Sejong, Korea

16. The objective of this workshop was to strengthen global cooperation in the fields of oceans and fisheries, and was organized by Ministry of Oceans and Fisheries of the Republic of Korea. Woojin Nam presented recent OECD projects, focusing on the Fisheries Support Estimate database and discussed how to build a strong relationship between the OECD and Korea.

4.4. FAO Expert Consultation on trade in fisheries services, 20-23 March 2018

17. Roger Martini attended this expert consultation. The overall objective of the consultation was to enable better-informed decisions on fisheries management policies. Analyses of how trade in fisheries services impact on national finances as well as on food and nutrition security, livelihoods and aquatic ecosystems should underpin these decisions.

18. The consultation was expected to identify the framework, scope and strategy for strengthening FAO's work on fish trade to better include measures to promote international trade in services and the formulation of recommendations to improve the

participation of developing countries in this trade. The results of the consultation will be presented to the FAO COFI subcommittee on fish trade.

Organisation for Economic Co-operation and Development

TAD/FI/RD(2018)4

For Official Use **English - Or. English**

18 April 2018

TRADE AND AGRICULTURE DIRECTORATE
FISHERIES COMMITTEE

Committee Progress Report on the Implementation of the 2017-18 Programme of Work and Budget for Fisheries: January- December 2017

2-4 May 2018

This document is submitted for INFORMATION. The Committee is requested to NOTE the progress in implementing the Output Results and their associated expenditures over the period of January-December 2017.

Franck JESUS, tel; 01 45 24 89 22, email; franck.jesus@oecd.org

JT03430366

NOTE BY THE SECRETARIAT

COMMITTEE PROGRESS REPORT ON THE IMPLEMENTATION OF THE 2017-18 PROGRAMME OF WORK AND BUDGET FOR AGRICULTURE: January- -December 2017

1. In 2008, the OECD Council approved a set of measures aimed at increasing transparency in monitoring the implementation of the approved Programme of Work and Budget (PWB) C(2008)93/REV2). One component called for the introduction of regular, standard Committee reporting. Under the terms of the Council decision, reports are to be issued twice a year. Until now this reporting has been combined with that for the Committee for Agriculture, but going forward a separate report will be provided for COFI.

2. This document reports on the implementation of the Programme of Work and Budget (PWB) for the output results of the Fisheries Committee under Output Area 3.2.3, Agriculture and Fisheries Sustainability within Output Group 3.2, Agriculture. And it covers the period January through December 2017. It summarises the progress achieved in the implementation of the output results and intermediate output results and reflects the actual expenditures at the output result level over this same period. There have been no budgetary adjustments and the programme is on track.

Table 1. Programme of Work and Budget 2017-18 OUTPUT GROUP: 3.2 Agriculture Progress Report

(January 2017 - December 2017).

STRATEGIC OBJECTIVE:	3 Contribute to Shaping Globalisation for the Benefit of All through the Expansion of Trade and Investment		
OUTPUT GROUP:	3.2 Agriculture		
OUTPUT AREA:	3.2.3 Agriculture and Fisheries Sustainability		
RESOURCES:		**2017 K EUR**	
		Total Estimated Cost (TEC)[1]	Expenditure
	Part I	765	775
	VCs	259	24
	Total	**1 024**	**799**

COMMITTEE INFORMATION	**MANDATE or SUNSET**
Fisheries Committee (COFI) *Partners:* Details available in the Participation plan.	31/12/2020

Expected Outcomes

Awareness/Understanding

- Increased understanding among Members, international organisations (IOs) and international fisheries management bodies on the nature, scale and impacts of fisheries policies. Output Result(s) 3, 4.
- Increased understanding of the different tools governments can use to support and develop their fisheries and aquaculture sectors sustainably. Output Result(s) 3, 4.

[1] TEC is equal to the sum of the Part I funds (Part I Budget and CPF), Voluntary Contributions in Hand and New Voluntary Contributions.

- Lessons and evidence for improvements of fisheries policies and the benefits of reform at both at the national and international level. Output Result(s) 3, 4.
- increased appreciation and knowledge of best practices across a range of fisheries policy instruments and institutional arrangements. Output Result(s) 3,4.

Usage

- Greater usage of date and analytical tools by national administrations, other IOs and fisheries management bodies on fisheries policy reform. Output Result(s)3,4
- Guidance on best practices in fisheries and aquaculture governance. Output Result(s) 3,4.
- Use of analytical outputs by negotiators seeking to improve the sustainability of fisheries policies. Output Result(s) 3, 4.

Effects

- Improved Sustainability of fisheries and aquaculture production. Output Result(s) 3,4.
- Improved economic outcomes in coastal communities. Output Result(s) 3,4.
- Improved productivity and resilience of marine ecosystems. Output Result(s) 3,4.

			K EUR		
2017-18 Expected Output Results in Priority Order	**Accountable Committee/Subsidiary Body/Global Forum**	**Ongoing/ Time Bound (end-date)**	**Total Estimated Cost (TEC)錯誤! 尚未定義書籤。**	**Expenditure**	**Comments on implementation (Budget and delivery of Output Result)**
3. Fisheries and aquaculture sustainability (three reports, one workshop, one dictionary, one mobile application, one set of guidelines)	COFI	Time Bound Q4 2018	488	212	**Partially Completed – On track for completion as planned –** Voluntary contributions included in the TEC have not been received as anticipated for a number of intermediate output results (3.3, 3.4 and 3.5) that were to be entirely VC financed. This work has therefore not yet been initiated.
3.1. Combatting illegal, unreported or unregulated fishing (one report, one workshop)	COFI	Time Bound Q4 2018			**Partially Completed – On track for completion as planned –** The COFI was updated on progress on this item at its 120th Session in November 2017. All expected surveys have been received and preliminary results will be presented at the 121st Session in May 2018. These results will be verified with respondents between the 121st and 122nd sessions. A draft version of the report will be presented at the 121st session, with a final version for declassification expected on-time for the 122nd Session.

3.2. Identifying reform pathways for sustainable fisheries management (one report)	COFI	Time Bound Q4 2018	**Partially Completed – On track for completion as planned –** An analytical framework was presented for discussion at the 120th Session, as well as a questionnaire for information. An update will be presented in May 2018 to the 121st COFI Session and a final report is expected to be on-time for declassification at the 122nd Session. A companion conference will be organised just before the 121st COFI session, the outcomes of which will contribute to the final report for this output. The conference is to be financed by a voluntary contribution from Korea.
3.3. Using innovative monitoring technologies to better manage fish stocks and tackle IUU fishing (one report)	COFI	Time Bound Q4 2018	**Not Started – As Planned -** Pending arrival of voluntary contributions.
3.4. Sixth Edition of the Multilingual Dictionary of Fish and Fish products (one dictionary, one mobile application).	COFI	Time Bound Q4 2018	**Not Started – As Planned -** Pending arrival of voluntary contributions.
3.5. Responsible Business Conduct in the Fisheries Supply Chain (one set of guidelines)	COFI	Time Bound Q4 2018	**Not Started – As Planned -** Pending arrival of voluntary contributions.

4. Monitoring, evaluation and statistics of fisheries policies (one publication, one database, one model, one web page, one report)	COFI	Ongoing	536	587	**Partially Completed – On track for completion as planned**
4.1. OECD Review of Fisheries (one publication)	COFI	Ongoing			**Partially Completed – On track for completion as planned –** The 2017 OECD Review of Fisheries report was released on schedule in November 2017. A country study of the fisheries and aquaculture sectors in Viet Nam is underway. This is funded by a voluntary contribution from Australia. **Final Delivery Information** OECD Review of Fisheries 2017 TAD/FI(2017)14/FINAL
4.2. Fisheries and aquaculture statistics (one database)	COFI	Time Bound Q4 2018			**Partially Completed – On track for completion as planned –** A document was submitted to the 119th COFI session updating delegates on statistics and data collection. The 2017 data collection process is now complete. Several improvements and simplifications to the data collection process have been implemented.
4.3. Analytical tools for fisheries and aquaculture policy evaluation (one model)	COFI	Time Bound Q4 2018			**Partially Completed – On track for completion with reduced scope –** Progress on the enhancement of the fisheries and aquaculture component of the AGLINK commodity forecasting model has not been possible due to the lack of a model sharing agreement with the FAO. As a result, work for this output has focused on contributing feedback to model results and presentation in the Fish chapter of the Agricultural Output Report. This chapter will be presented at the 121st COFI session.
4.4. Fisheries innovation platform (one web page)	COFI	Time Bound Q4 2018			**Partially Completed – On track for completion as planned –** In follow up to work on the Fisheries and Aquaculture Innovation Platform (FAIP) mandated under the 2015-16 PWB, the Secretariat updated delegates at the 119th COFI session on the patent data base and R&D expenditures from the FSE. An update on progress will be presented to the 121st COFI session.

4.5. Informing fisheries-related trade negotiations (one report)	COFI	Time Bound Q4 2018			**Partially Completed – On track for completion as planned –** A report on *Support to Fisheries – Levels and impacts* was declassified via the written procedure following the 119th COFI session and published as a part of the OECD Food, Agriculture and Fisheries Papers in May 2017. A draft of a second report on modelling impacts of support will be presented to the 121st COFI session in May 2018 and is on track for declassification at the 122nd COFI session. **Final Delivery Information** Support to Fisheries: Levels and impacts
TOTAL			1 024	799	

Argentina is committed politically and legally against the illegal, unreported and unregulated (IUU) fishing.

It is not only a commitment but also the firm stance of Argentina for the sustainable use and conservation of aquatic and marine resources, in line with the 2030 Agenda and its Sustainable Development Goals (SDGs), in particular SDG 14.

We will continue to defend an active position at the national, regional and international levels to ensure an effective conservation, management and development of living aquatic resources, taking into consideration that fisheries, including aquaculture, are key for the achievement of food security and for the well-being of our people.

In this path, the action against IUU fishing will continue to be vital for the achievement of this overall objective for the benefit of mankind.

The present power point is complemented with the video of the Prefectura Naval Argentina that is available in:
https://drive.google.com/file/d/1_2XK5C-RQebkx_VPHmq40ff1OGIIjo52/view,

On a permanent basis, Argentina pursues and seizes vessels dedicated to illegal, undeclared and unreported fishing activity, in compliance with:

-the regulations established by the PAN-IUU of Argentina, which are part of and develop the FAO PAI-IUU,

-the International Conventions that are in force law for Argentina such as UNCLOS, CCAMLR, the Agreement to Promote Compliance with International Measures for the Conservation and Management of Fishing Vessels Fishing in the High Seas,

-the Treaty of the Rio de la Plata and its Maritime Front, the CITES, the Agreement on the Conservation of Albatrosses and Petrels, the National Constitution in its art. 42 and concordant, Law 24.922 which orders the Federal Fishing Regime and the regulations resulting from referred instruments.

Therefore, the Federal Fisheries Council in the context of its legal mandate, Art. 9 of Law 24,922-Federal Fisheries Regime, approved the National Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (PAN-IUU), by Resolution 08/2007 of legal binding.

The Argentine PAN- IUU is framed in the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (PAI-IUU) adopted by the FAO Committee on Fisheries (COFI) on 2nd March 2001 and approved by the FAO Council at its 120th session.

Action taken by the Argentine Prefecture, Navy and Air Force.

This action is carried out within the framework of the coordination of the Integrated System of Control of Fishing Activities (SICAP), through which Argentina reinforces its presence, identifies the fleets that are fishing and discourages their illegal entry into Argentine jurisdictional waters, deploying ships and aircraft belonging to these forces.

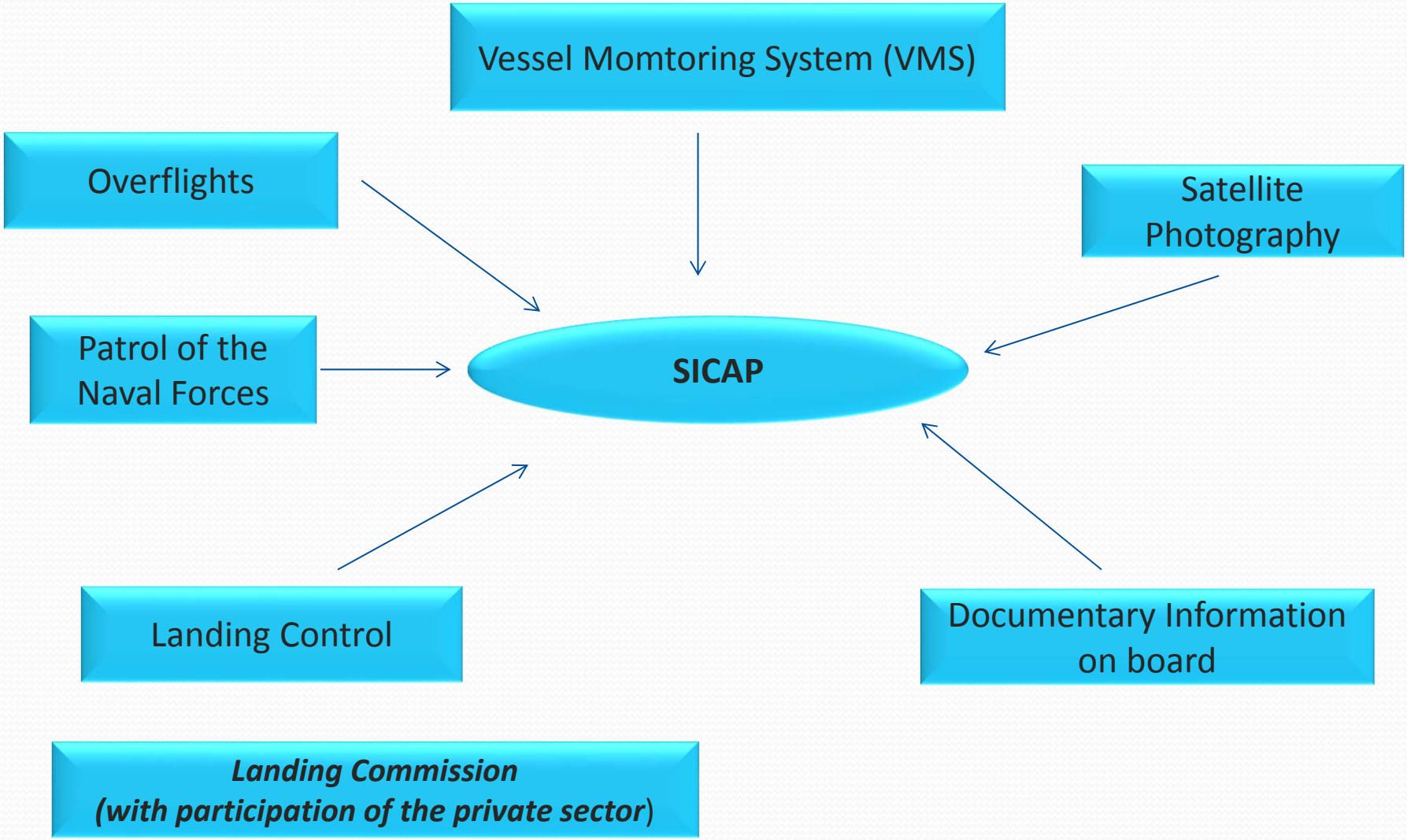
The increase in patrols that has been verified in recent years was reflected in the greater number of arrests of infringing vessels.

The Undersecretariat of Fisheries and Aquaculture of the Nation works in this system through the National Direction of Fisheries Coordination, Control and Inspection and its Delegations in the Argentine numerous ports, located in the provinces of Buenos Aires, Río Negro, Chubut, Santa Cruz and Tierra del Fuego.

In addition, it is worth to note the scientific intervention through the National Observers Program.

The Argentina´s Naval Prefecture patrols and controls the Argentine sea and intervenes in cases of IUU fishing, with warning, action on the ship that develops this activity that includes its arrest and the vigilance of its stay in the port of arrest, during the legal process that is followed to said ship, with application of Administrative Law and, where appropriate, with the intervention of the Federal Justice.

SISTEMA INTEGRADO DE CONTROL PESQUERO



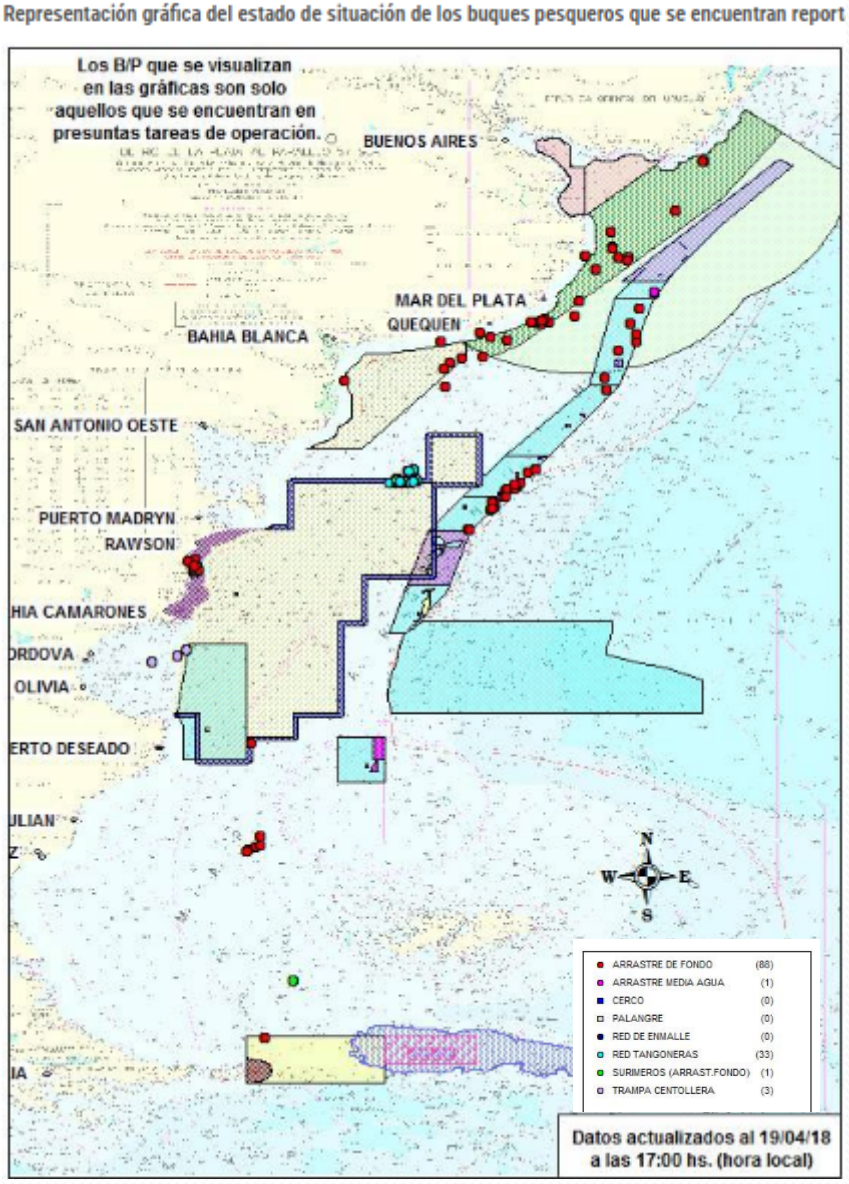
Control and Inspection of Fisheries

All the ships that operate in the Exclusive Economic Zone of Argentina are of Argentine flag and respond to the national regulations established by Argentina as Flag State .

All vessels have a fishing permit or license issued by the national authority (Federal Fisheries Council) or the provincial fisheries authority, and is included in the FISHERIES REGISTRY.

All vessels are required to discharge at national ports, and transhipment at sea is not authorized

Monitoreo Satelital



Every day, every 12 hours, the image is updated on the website that shows where the vessels of the Argentine fleet and the fishing areas with current catch restrictions are located.

https://www.agroindustria.gob.ar/sitio/areas/pesca_maritima/monitoreo/

-Permanent closure areas (haulage) 220,000 km2 (7.5% of the ZEEA).
*Protection of hake juveniles.
*Pollock wells.
- Temporary shelters for the protection of chondrichthyans and toothfish.

- Areas of restricted effort

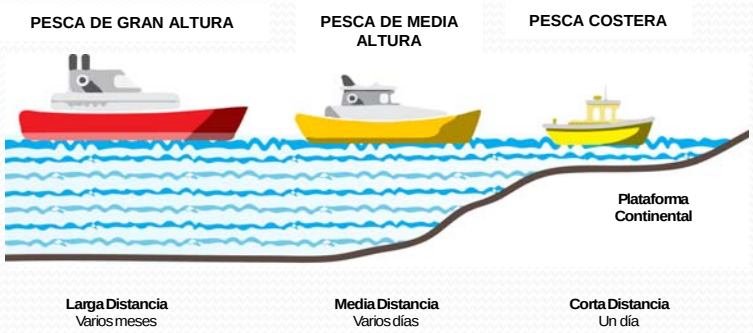
- Marine protected areas.
* Coastal-provincial.
* Oceans: Namuncurá / Banco de Burdwood.

Control of the Exclusive Economic Zone

- **The Argentine Naval Prefecture (PNA) patrol mile 200 with ships and aircrafts.**
- **The AIS signal of the vessels operating in the vicinity of the ZEEA is also monitored by radars.**
- **When an unauthorized entry is detected, notice is given and the offending vessel is ordered to enter an Argentine port to carry out the inspections and determine the corresponding sanctions.**

- All vessels deliver a Fishing Part before starting the disembarkation.
- 75% of the discharges have control in the port (Act of Unloading)
- The entire national fleet has Satellite Monitoring that reports its position every hour.

PUERTOS



CONTROL Y FISCALIZACIÓN

PROCESSING - DATABASE · General Fisheries System

- Integration with provincial databases
- Control of quotas and cupification (CITC)
- Maximum Alowable Catch Compliance (CMP)
- Duty
- Infringements and sanctions

- **Certificate of Legal Capture and Cargo Control.**
- **National Fisheries Statistics (for administration and research).**

Control of the EEZ

- In the event of an escape attempt, it proceeds the chase and capture of the vessel.
- The Argentine Navy collaborates with the Argentina Naval Prefcture (PNA). If the vessel is not captured, an international arrest warrant is issued (INTERPOL).
- 72 ships from 15 different countries have been captured.

OECD CONSENSUS DOCUMENT ON THE BIOLOGY OF ATLANTIC SALMON (*Salmo salar*)

issued by ENV/EHS (Environment, Health and Safety Division)

121st session of the Fisheries Committee
OECD, 2-4 May 2018

Bertrand Dagallier, ENV/EHS

Biosafety work at ENV/EHS

Risk assessment of products from modern biotechnology
[=genetically-engineered organisms, or "GMOs":
plants (crops, flowers, trees), animals, micro-organisms]

Environment Directorate, Health and Safety Division, 2 programmes:

- **Biosafety (Environmental Safety)**; *and*
- **Novel Food and Feed Safety**

> Develop tools to help Authorities in risk/safety assessments of biotech products intended for commercial use

> Collate science-based info. on the host organism characteristics and interactions with environment of release, of interest for regulatory assessments

Main output for **environmental safety**:

"Consensus Documents" on the biology of concerned species,
on traits introduced in plants, and general guidance

OECD Biology consensus documents

57 consensus documents published, mainly on crops (and trees) biology

Consensus doc. on the biology of **Atlantic salmon** published in May 2017: First one on animal species

Project Leads: **FIN, NOR, USA**

Content:

1. Biology and ecology of wild Atlantic salmon
2. Biology and rearing of domesticated farmed Atlantic salmon
3. Genetics of Atlantic salmon

Annex I. *Selected Research on genetically engineered Atlantic Salmon*

Annex II. *Resources for risk assessment*

Atlantic salmon biology consensus doc.

1. Biology and ecology of wild Atlantic salmon

- Classification and nomenclature
- Life stages and generation time
  …Alevin/Fry/Parr –Smoltification -Post-smolt. Sea/ Lake/ Sexual maturity
- Reproduction
- Centres of origin and geographical distribution
  …Native/Naturalised populations/ Introduction outside natural areas
- Habitats, migration, and ecological niche
  …Spawning/Juvenile freshwater/Marine habitats – Migration - Limiting env. conditions
- Population dynamics
- Population status and trends
  Populations (by country)/ Trends in abundance/ Threats / Conservation measures
- Interactions with other organisms
  Salmon as prey/as predators/ Competition/ Pathogens

Atlantic salmon biology consensus doc.

2. Biology and rearing of domesticated farmed Atlantic salmon

- Domestication
- Culture and rearing practices for commercial aquaculture
- Biocontainment
  …Chromosome set manipulation (triploidy)/ Sex control technologies
- Interactions with the external environment
  Escapees/ Pathogen transfer/ Drugs and chemicals…

3. Genetics of Atlantic salmon

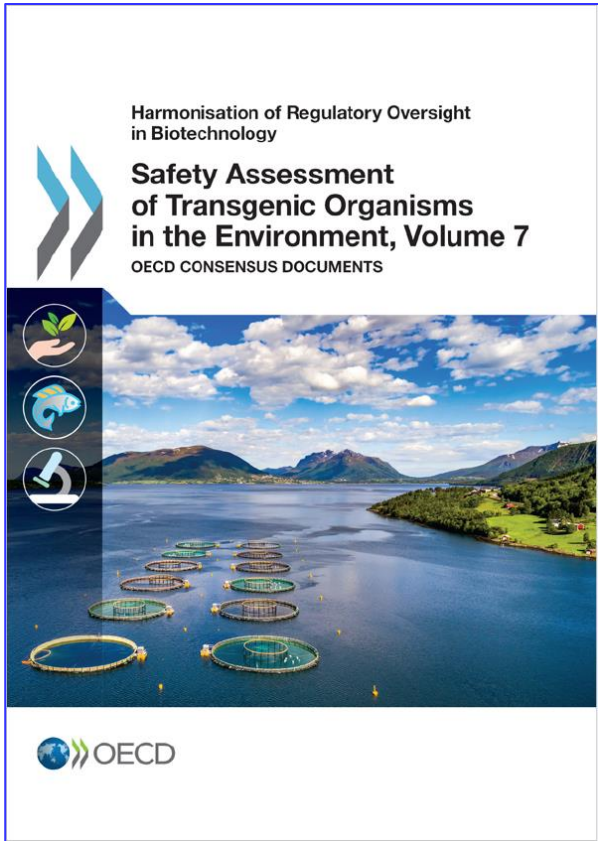
- Genetic information
  Cytogenetics/ Molecular population genetics… Genomics/ … Interspecific and intergeneric crosses
- Genetic and ecological information on deliberate and accidental releases
  Fate of released fish/ Genetic consequences…

Atlantic salmon biology consensus doc.

- **Consensus doc. on the biology of Atlantic salmon**
  No. 64, Series Harmonisation of Regulatory Oversight in Biotechnology, posted on BioTrack public website May 2017:
  www.oecd.org/org/biotrack

- **Compendium biosafety Series Vol. 7**
  includes biology cons. docs of:
  - Sorghum
  - Tomato
  - **Atlantic salmon**

  published Dec. 2017



Conference on Genome Editing

OECD Conference on Genome Editing: Applications in Agriculture – Implications for Health, Environment and Regulation 28-29 June 2018

- ENV, STI & TAD involved. Funded by CPF (SG Office), CRP (TAD).
- Programme SG/ICGB/A(2018)1/PROV Biosafety & Food/feed safety topics, 1) Applications of genome editing in agriculture, 2) Risk and safety considerations, 3) Regulatory aspects

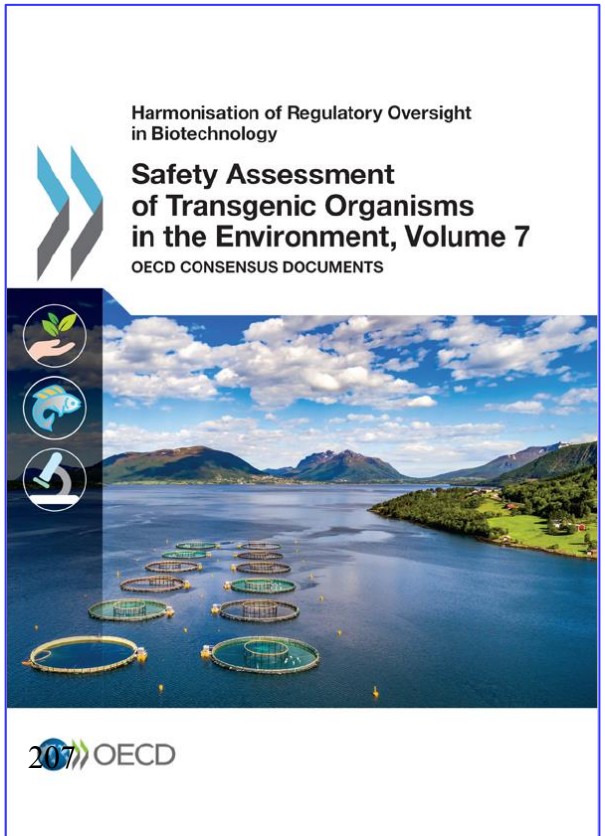
- One presentation: Application of genome editing in farm animals - in aquatic systems, *by Dr. Anna Troedsson-Wargelius, Molecular Biology Section, Institute for Marine Research, Norway*

- Conference proceedings to be published by the end of 2018

Thank you!

- **Consensus document on the biology of Atlantic salmon (*Salmo salar*): *www.oecd.org/org/biotrack***

- **Biosafety Series Vol. 7**



Greening the Ocean Economy:
Opportunities, challenges and the role of the OECD in enhancing concerted multilateral action

2018 Ministerial Council Meeting Background Document

Edward Perry, Special Advisor, OECD Environment Directorate
Fisheries Committee, 4 May 2018

BETTER POLICIES FOR BETTER LIVES

Background and purpose

- Background document to 2018 Ministerial Council Meeting (MCM) 30-31 May, French Presidency

- MCM Agenda item 10: “Multilateralism to meet the challenges of biodiversity, climate change and natural resources”

- Paper aims to
  - Outline key issues related to greening the ocean economy
  - Highlight recent and potential future work from across the OECD

6th GGSD Forum on Greening the Ocean Economy: Key Messages

- Ocean governance framework is fragmented and complex
- **Marine Spatial Planning** is young; peer learning would be useful
- Apply **OECD RBC Due Diligence** guidance to **fisheries**
- **Marine biotech**: need for more viable business models for the production and use of algae for green sectors
- Better **align policies** outside core ocean policies (trade and agriculture)
- Need more work on **plastics** (design, disposal, recycling etc)
- **Environmental externalities** of maritime transport sector still under-priced; consider e.g. carbon pricing
- Need to extend the use of **economic valuation** to ocean-related activities, especially for MSP
- Need to better **monitor** impacts of human activities on oceans (monitoring progress of SDG-14 implementation)

Process for developing paper

- Contributions from across the OECD
- Reviewed via written procedure by
  - Environment Policy Committee
  - Committee For Scientific and Technological Policy
  - Fisheries Committee
- Final paper to be posted next week ENV/EPOC(2018)16/REV1

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Main themes of the paper

- Healthy oceans are key for economic growth and well-being
- A multilateral response is imperative
- Delivering sustainable growth of the ocean economy requires healthy and resilient ecosystems
- Policy alignment and reform can increase sustainability of fisheries and aquaculture
- Ocean economy affects, and will be affected by, climate change
- Ocean plastics are of growing concern
- Scientific and technological advances could have transformational impact
- Development co-operation could drive more sustainable practices in developing countries

Priorities for future OECD work

- Conservation and sustainable use of biodiversity:
  - Measurability of post-2020 biodiversity targets and implications for indicators
  - Monitoring and tracking economic instruments
  - Subsidies harmful to marine and terrestrial biodiversity
- Mitigation and adaptation e.g. decision-making in the coastal zone
- Fisheries and aquaculture
  - Analysis on how the fish resource is converted into local economic benefits
  - Development of regular monitoring systems to track progress towards adoption and implementation of sustainable regulation
  - Stock status indicator to track biological sustainability of fisheries
- Sustainable management of plastics
- Innovation and technology
- Supporting developing countries

OECD Ocean Economy Group

Innovation Policies for Space and Oceans (IPSO) Unit

Science, Technology and Innovation Directorate

James Jolliffe
Economist, Ocean Economy Group, IPSO
Directorate for Science, Technology and Innovation
Email: claire.jolly@oecd.org

The Ocean Economy in 2030 (OECD 2016)

- **Forward-looking** assessment of the global ocean economy to 2030 and beyond
- Emphasis on **development potential** of established and emerging ocean-based industries
- And **implications** for ocean environment and ocean management

Current phase: Innovation for a Sustainable Ocean Economy

Four ongoing areas of OECD research and analysis:

1. Explore the role of **scientific advances and enabling technologies** in driving innovation for sustainable development
2. Analyse new and emerging **patterns of collaboration** among actors in ocean R&D
3. Extend the use of **economic valuation, analysis and tools** further into ocean management
4. Identify **best practices and successful policy mixes** to foster innovation and sustainable growth of ocean-based industries.

Report due end-2018

Follow-up OECD STI project in 2019-20

- Further work on innovation networks in the ocean economy
  - How do public and private actors co-operate in different sectors?
  - How are successful research and innovation outcomes achieved?

- Further new approaches to valuing of the ocean economy
  - Pursue our work on satellite accounts for ocean-based industry and marine ecosystem accounts
  - Socioeconomic assessment methodologies for research infrastructures, such as ocean observations

- Undertake new foresight activities
  - Explore the synergies and impacts of ocean industrial activities and marine ecosystems

- Review the blend of science and technologies' innovation policies for the ocean
  - Including special topics such as gender

If you are interested in contributing, or would like to find out more information about our activities, contact:

Anita Gibson (anita.gibson@oecd.org)

OECD CO-OPERATIVE RESEARCH PROGRAMME:

Biological Resource Management for Sustainable Agricultural Systems

Fisheries Committee

2-4 May 2018

CRP Open Forum

- Visions of the Future in Food Production
- Presentation on Industrialising land-based fish farming for a protein-hungry future: an interdisciplinary approach to environmental and economic success

Relevant 2018 Conferences and Workshops

- 3 events could have a relevance for fisheries issues:
  - 2018 Circular Economy for Agri-Food Resource Management
  - OECD Conference on Genome Editing: Applications in Agriculture – Implications for Health, Environment and Regulation
  - Workshop on Socio-Economic Transformation for Enhanced Agricultural Productivity: Translating research into policy

Relevant 2018 Fellowships

- 2 relevant fellowships to fisheries issues
  - A global assessment of the impacts and risk-based management of farmed exotic fish escapes on marine ecosystems
  - Using gender perspectives in small-scale fisheries research to improve policy

Relevant 2017 Conferences and Workshops

- 2 events with a relevance for fisheries issues:
  - Digital Transformation of Animal Health Monitoring
  - International Symposium on Food Credence Attributes: How can we design policies to meet consumer demand?

Relevant 2017 Fellowships

- 6 relevant fellowships to fisheries issues
- 3 completed :
  - Disentangling ecosystem functioning of a nursery area by wavelet analysis of long term ecological time series: the Guadalquivir estuary
  - Sustainable pre-infection solutions for mitigating parasitic lice infestations in salmon aquaculture
  - Optimising science, technology and innovation for studying ocean acidification effects on commercial species (Ostiones)

Application Process

The Call for Applications for Funding in 2019:

Open until
10 September 2018

CRP Member Countries

- Australia
- Austria
- Belgium
- Canada
- Chile
- Czech Republic
- Denmark
- Estonia
- Finland
- Germany
- Hungary
- Ireland
- Italy
- Japan
- Korea
- Netherlands
- New Zealand
- Norway
- Slovak Republic
- Spain
- Sweden
- Switzerland
- United Kingdom
- United States

Thank you!

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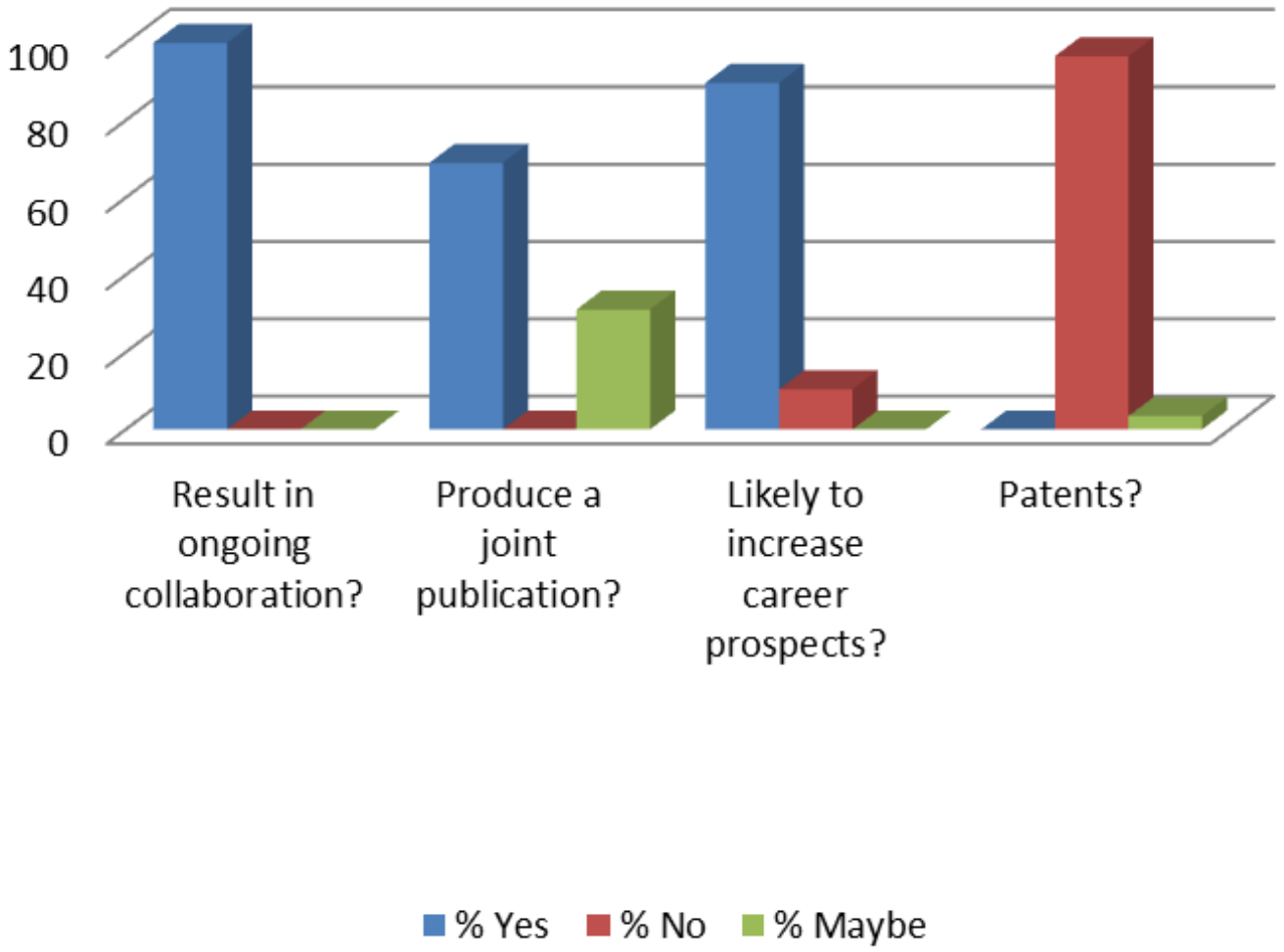
Reactions to the Fellowships



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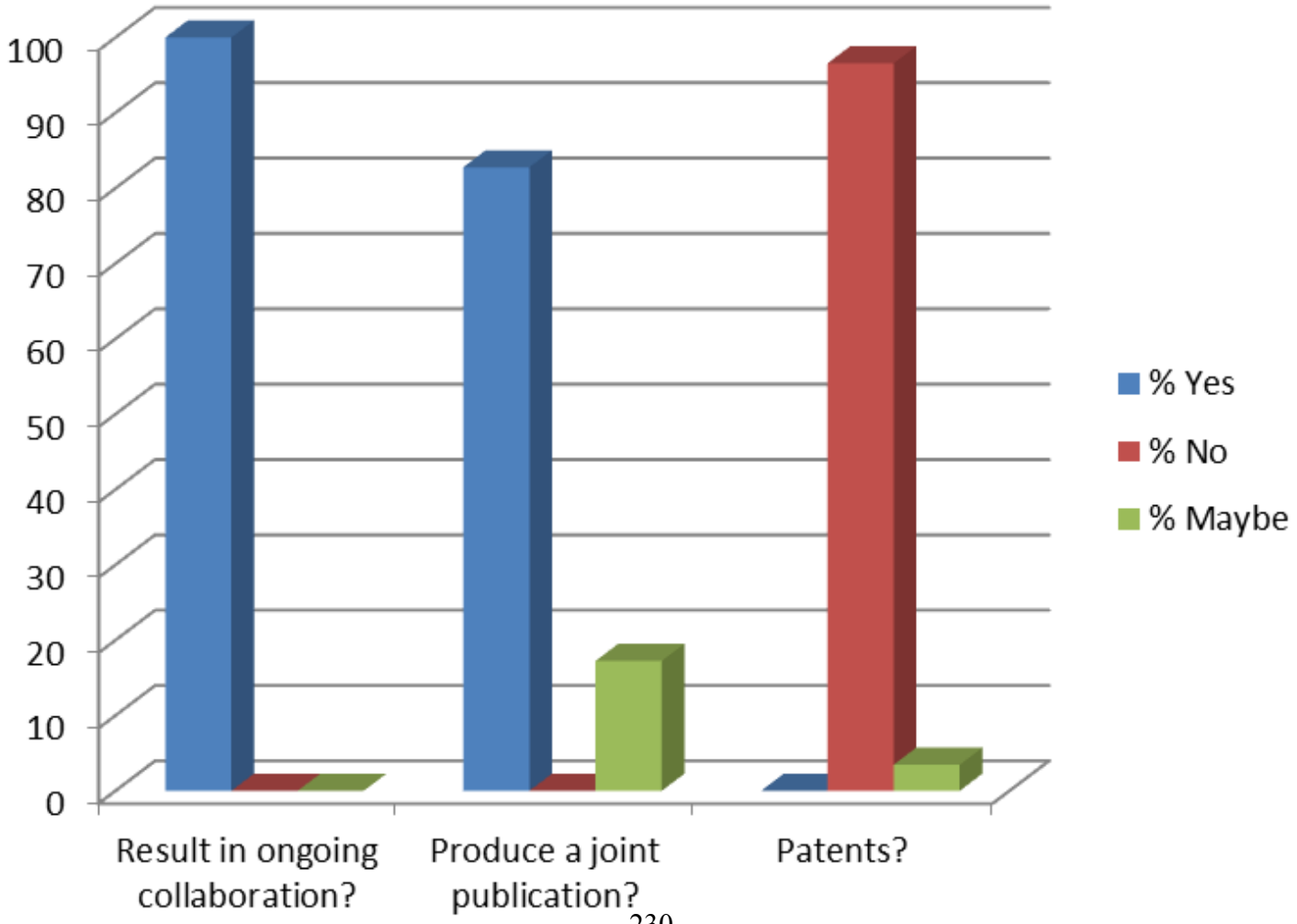

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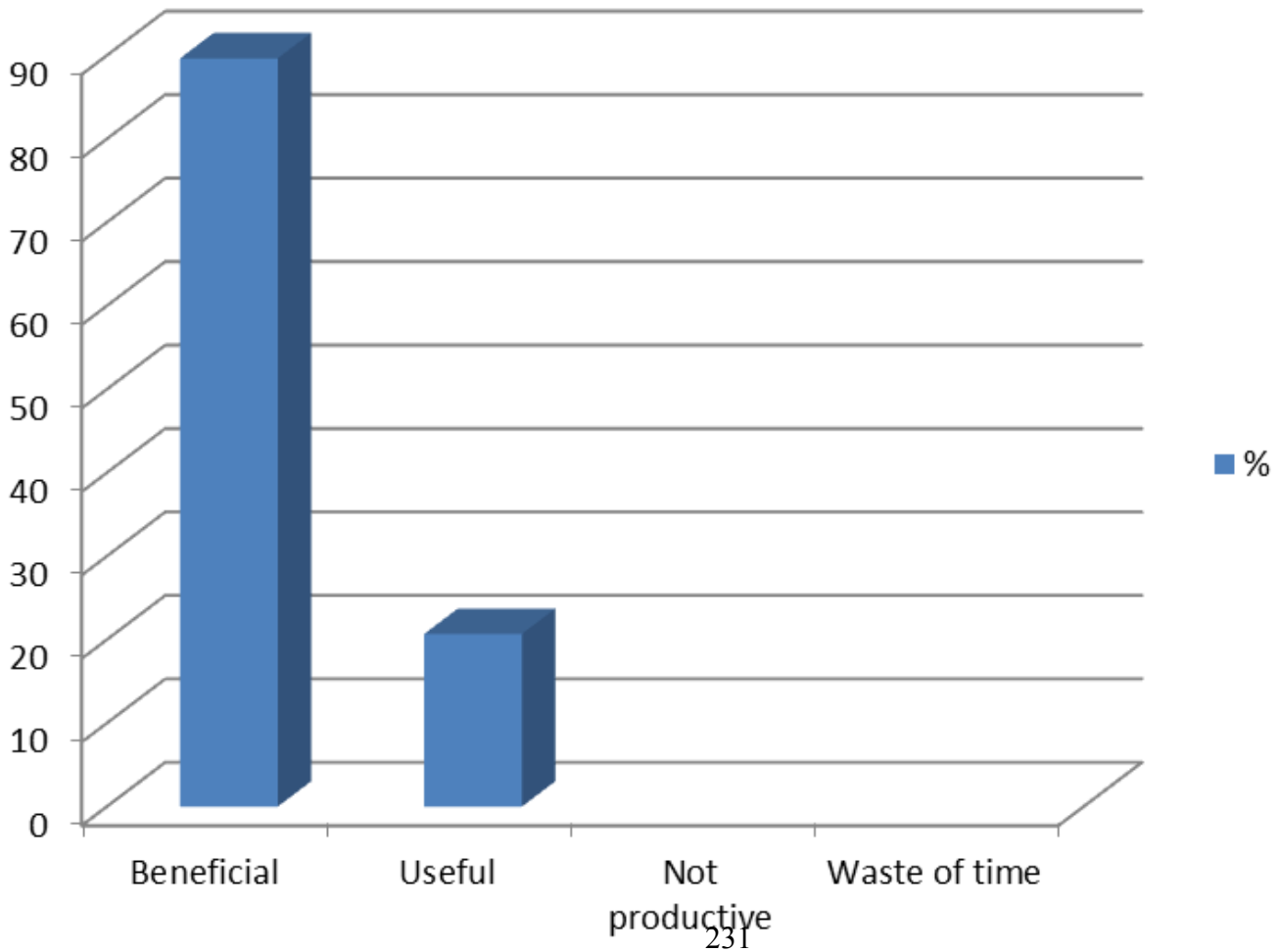

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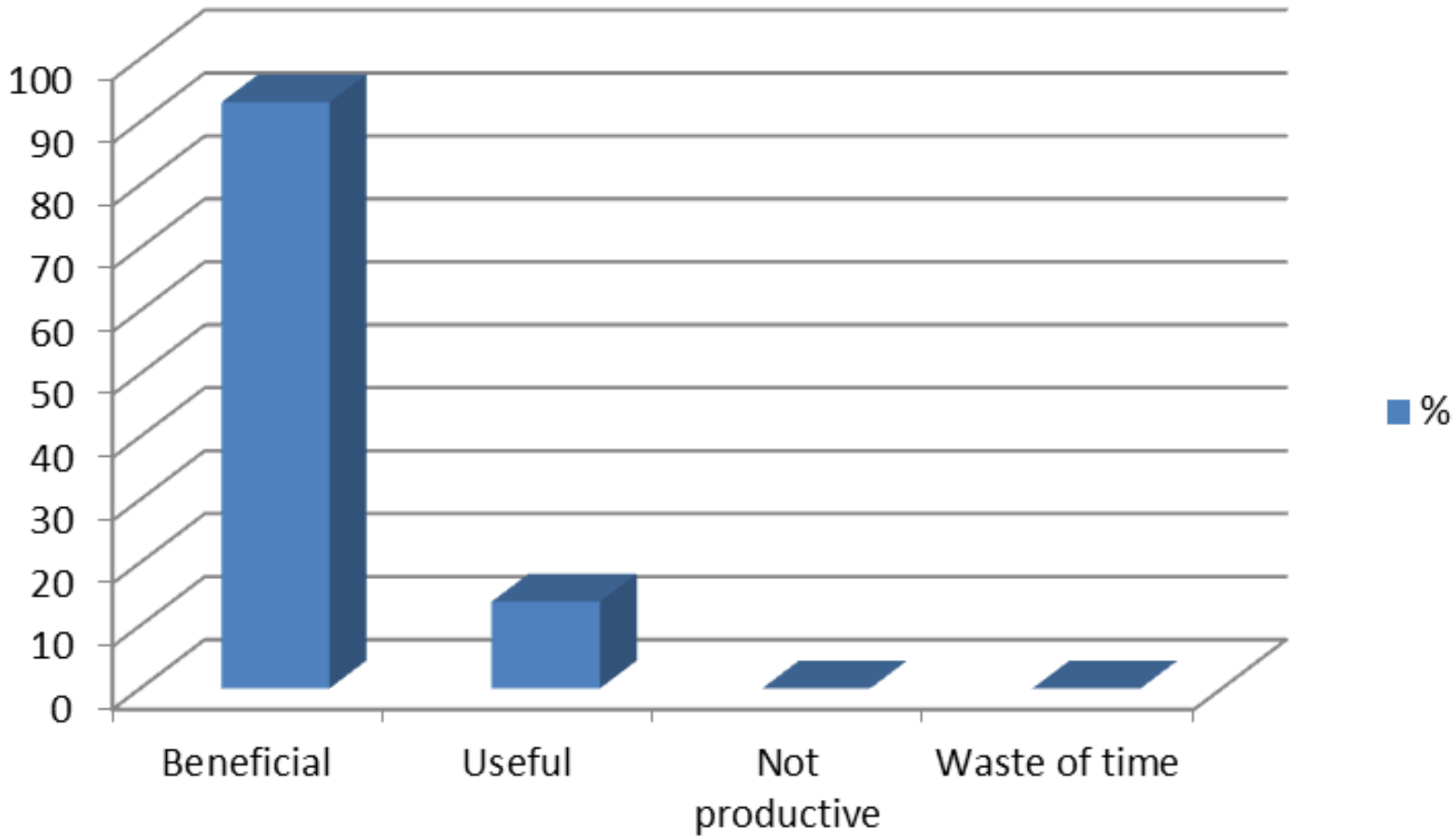

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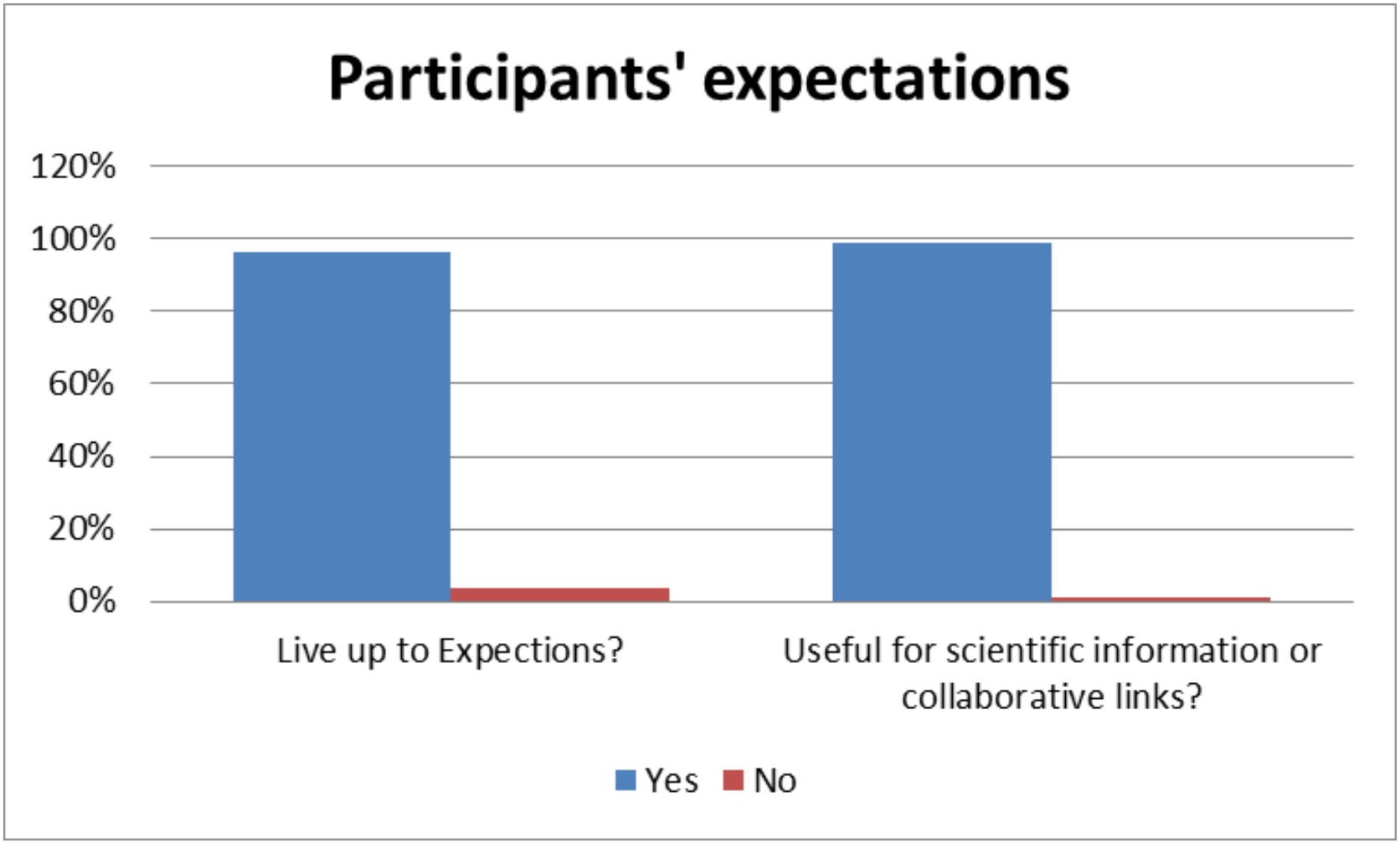
Reactions to the Conferences



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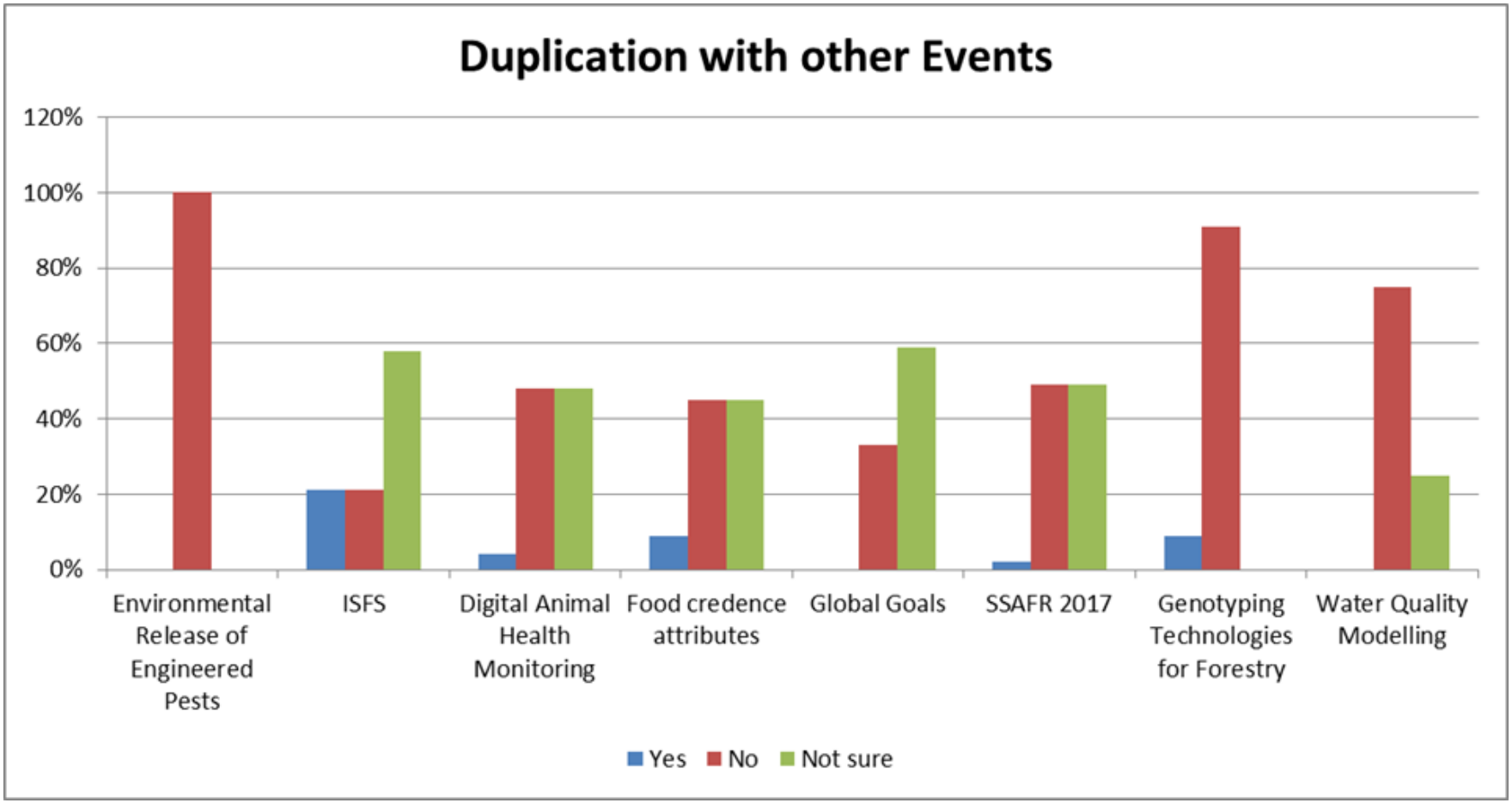

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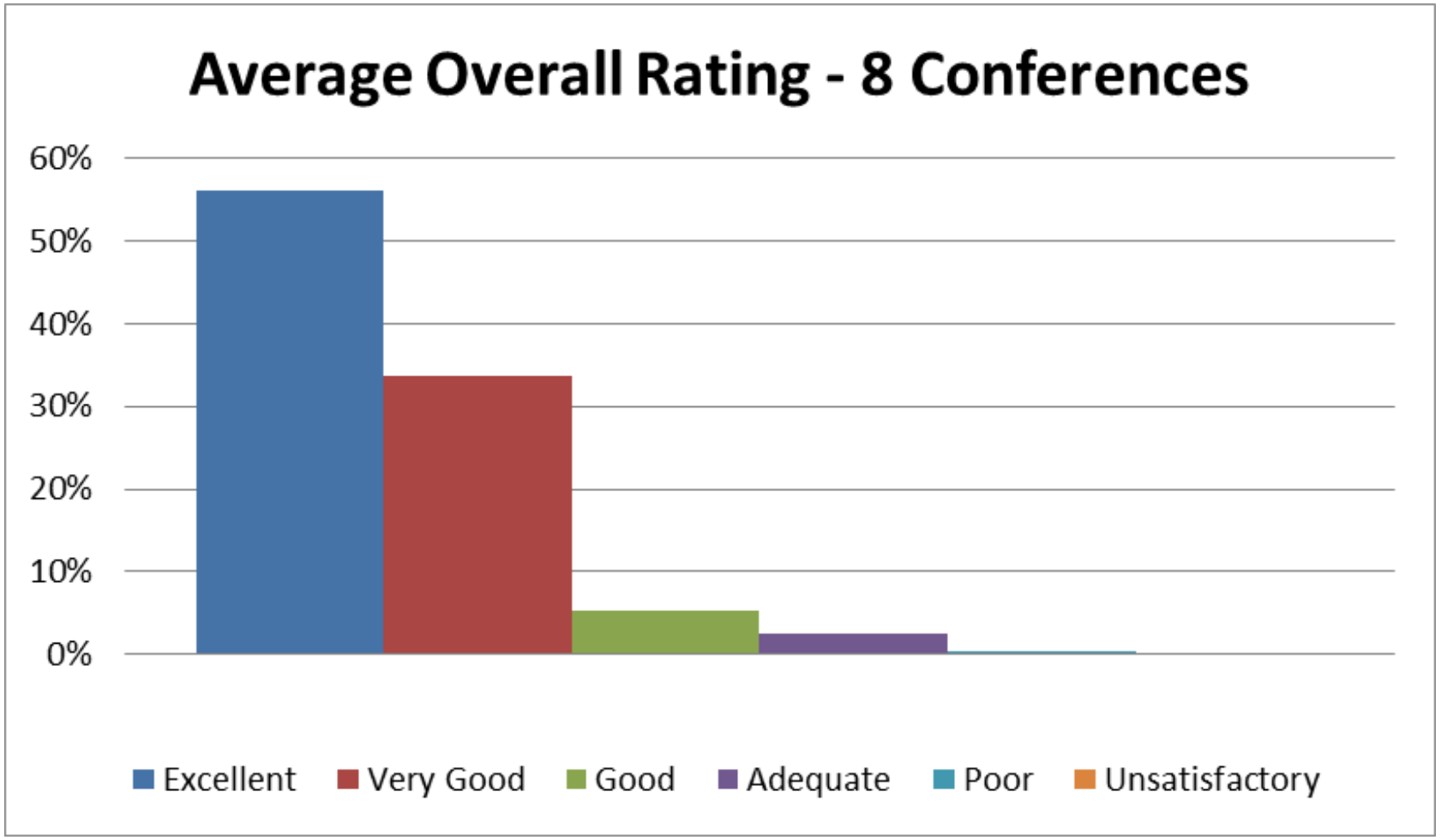
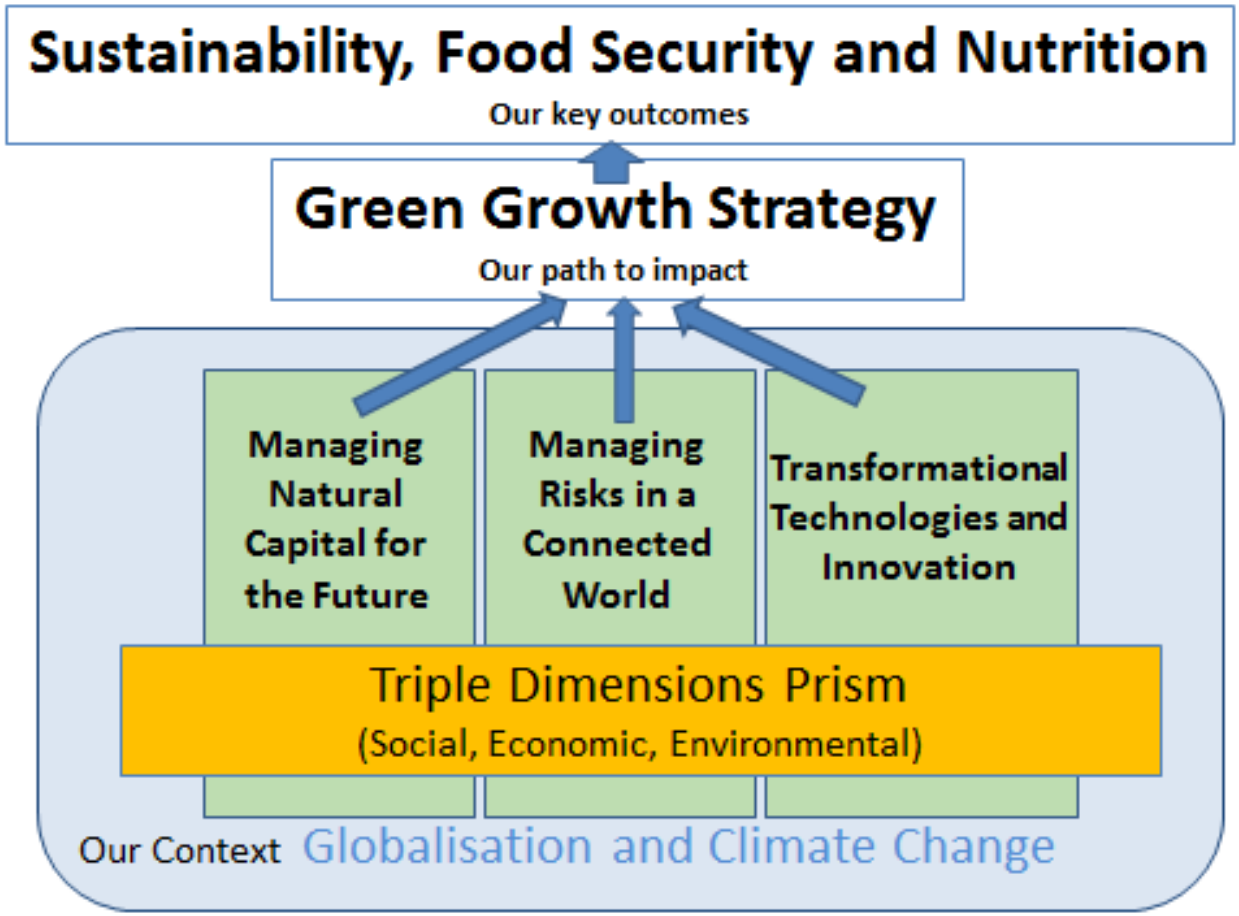


CRP Research Paradigm for 2016-2020



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One of the most acute problems of the development of the fishery complex is the aging of the fishing fleet.

The new concept of the industry development of the Russian Federation until 2030 is intent on the replacement of half of the existing fleet. The main driver of modernization will be the mechanism of the «investment quota».

«Investment quota» is a new unique mechanism aimed at modernization of the fishing fleet through the construction of new, high-tech, energy-saving and environmentally aimed vessels and the development of processing of fish products. Quotas are allocated specifically for investment purposes, namely for projects on the construction of modern fishing vessels at domestic shipyards and the building of onshore fish processing plants.

This practice able to attract over 200 billion rubles of private investment in the construction of the fleet and coastal plants during the next 5-7 years without additional funds from federal budjet. As a result, more than 100 ships and 10 large coastal plants can be built.

The main feature is that the investment quotas are not subsidies for the development of the fishing industry by creating excess capacity leading to excess catch. On the contrary, it is a unique mechanism for creating conditions for resource support for the needs of the fishing fleet in view to its subsequent modernization and replacement of obsolete vessels and equipment.

The mechanism for allocating the share of the quota for investment purposes

It should be noted that the share of the quota of catch for a single investment object is determined on the basis of the length and gross tonnage of the ship under construction, as well as the nature of the equipment for a specific area of production of fish. At the same time, both length and gross tonnage are determined in accordance with the measurement and definition rules established by international treaties (conventions) of the Russian Federation. For example, for a vessel of a **type A**[1] a share of the quota of 6.53 percent for pollock and pacific herring is given. In its turn, for the construction of medium-tonnage and low-tonnage vessels, a quota is granted for less liquid types of fish - cod, flounder, etc.

The laying and construction of ships should be carried out on the territory of the Russian Federation, and the total value of goods, works or services purchased (provided) in the territory of the Russian Federation during construction and commissioning must be at least 30% of the total volume (40 if the application is filed after 2020).

The following technological operations should be carried out in the territory of the Russian Federation: the formation of the ship hull; fabrication of material for the hull; development of design and technological documentation in the amount necessary for the construction of the vessel. If the applications for the share of the quota for investment purposes are submitted after 2020 to the above requirements we can add the development of design and technological documentation in the amount necessary for the development, production, modernization and maintenance of the ship's main engine or engines as well as production of engines, propulsors and the power system of the ship.

The construction of ships should be started after January 1, 2016.

All equipment that will be installed on the investment object must be new and produced after January 1, 2016.

The term for construction (with the registration of property rights for the investment object) should not exceed more than 5 years from the date of the contract. In agreement with Federal Agency for Fisheries and the Ministry of Industry and Trade this term can be extended for 1 year 1 time.

Legal mechanism for obtaining a quota share for investment purposes

The applicant applies to the Federal Agency for Fisheries in the manner prescribed by law. In his address he, inter alia, indicates information about the type of fishing vessel, as well as the necessary legal documents confirming the construction of a new vessel. After consideration by the interdepartmental commission the applicant is granted a share of the quota for investment purposes.

The current practice of implementing the mechanism for obtaining a quota share for investment purposes

In 2017, the Federal Agency for Fisheries registered 34 applications (1 withdrawn) for the construction of fishing fleet vessels. For the Far East is expected to construct 6 trawler-processors of large-capacity and length of 108 meters and 3 seiners of length of 55 meters. For the Northern Basin, applications require construction of 14 large-capacity trawler-

[1] Type A - a trawler processor longer than 105 meters, with gross tonnage of more than 5000 register tons, availability of equipment for the production of fillets and / or minced meat from pollock and / or pacific herring total capacity of at least 75 tons of products per day, availability of equipment for the production of flour at least 40 tons of products per day, the availability of freezing equipment with a total capacity of at least 150 tons per day).

processors with a length of more than 80 meters, 9 medium-tonnage vessels with a length of 58 meters to 70 meters, and one 35 meter vessel.

The cost of construction of large-capacity vessels amounted to 3.8 to 7 billion rubles for each, and medium-tonnage vessels of about 1.4 billion rubles per vessel.

The total volume of investments for 33 projects will be about 110 billion rubles. All the vessels listed will be built at shipbuilding plants in the European part of Russia.

In 2018 a historic event happened - after the bid company of 2017, the first contracts were signed for securing and granting investment loans. All existing projects provide for fleet renewal of the Northern and Far Eastern fisheries basin.

Thus, for the first time, not only in Russian but also in world practice, a mechanism was implemented that would allow to attract significant funds for the modernization of the fishing fleet, and will also be an excellent incentive for the development of the fishing industry and will contribute to a more rational exploitation of the biological resources.

2017 was characterized by a record catch level for the last 25 (4.9 million tons). Growth compared to last year amounted to more than 124 thousand tons or 2.6%, and an increase to the level of 2013 is about 15%. It should be noted that according to the estimates of the science, further exploitation of the biological resources in the short term will allow increasing the production of aquatic biological resources by no less than 200 thousand tons. The total volume of fish processing for 2017 was about 4.2 million tons (3% higher than in 2016). The volume of production of aquaculture amounted to 220 thousand tons (7% higher than in the previous year).

In 2017 export turnover increased by 12%, import - by 16%. Traditionally export products are dominated by frozen products with relatively low added value. According to economic indicators fisheries sector shows the best dynamic in terms of investment growth among other sectors. The fisheries sector contribution to the national GDP in 2017 amounted to 229 billion rubles (growth of 2.4%).

2017 was also characterized by progress in science. The Board of Directors of scientific research institutes functions successfully. The procedures for determining the TAC have become more transparent. Decisions are also made taking into account the position of the industry community. The development of a research vessel of the 7th generation is at the final stage. There are planned up at least 3 units of the fleet to 2025. This fact will ensure high-quality commercial reconnaissance, including the strategically important regions of the World Ocean. In the Far East a scientific research fleet was merged what allow optimize efforts in resource research.

A lot of work has been done to reduce the impact on the fish stock. In particular, a ban on the use of drift-nets has been introduced. A draft of new Fisheries Rules for the Far Eastern Fisheries Basin has been prepared. New restrictions are included as with respect to industrial production, and in the field of traditional fisheries. The efficiency of reproduction of the biological resources was increased - in 2017 all fish farms were merged into one system, the volume of grown and released juveniles exceeded 9.2 billion (2.1% more than in 2016).

Educationally we could note that 9,200 people were trained in the fish industry institutions, and 7.2 thousand people were released.

Active measures are being taken to modernize the fishing fleet - the total investment volume for the 33rd shipbuilding projects will be about 110 billion rubles. All the vessels listed will be built at shipbuilding plants in the European part of Russia.

The work on the preparation of the updated Strategy for the development of the fisheries complex until 2030 should be noted. The new strategy will be more business-oriented - this concerns both regulatory and incentive measures, this also applies to the work of subordinate institutions.

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U.S. Federal Fisheries Management Legislation and Council System

NOAA FISHERIES

Sam Rauch

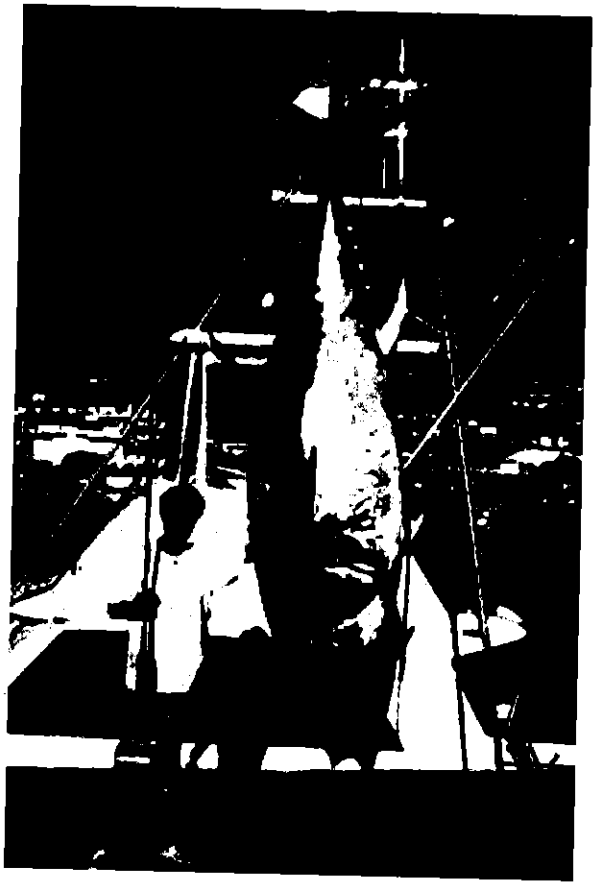
Deputy Assistant Administrator for Regulatory Programs

Acting Deputy Assistant Secretary for International Fisheries

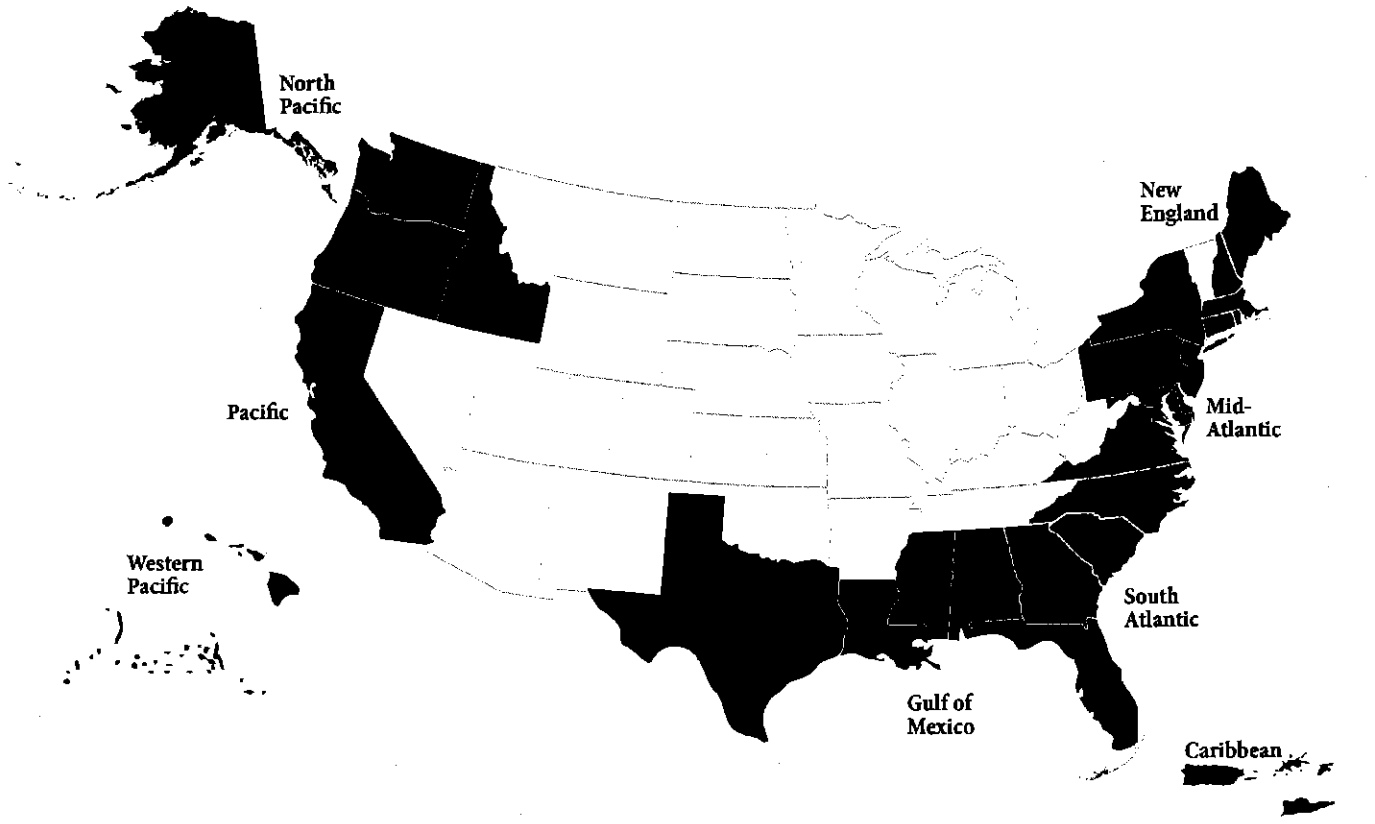
May 2, 2018

Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act)

- Provides the legislative structure and process to manage the Nation's fisheries
- Establishes regional fishery management councils
- Includes ten national standards, with goals for balancing harvest levels and socio-economic considerations
- Provides the framework for 46 science-based fishery management plans which encompass over 475 regulated fish stocks and stock complexes



Regional Fishery Management Councils



New England | Mid-Atlantic | South Atlantic | Caribbean | Gulf of Mexico | Pacific | Western Pacific | North Pacific

Fishery Management Councils

Role of Councils:

- For each fishery that requires conservation and management, prepare and submit to the Secretary

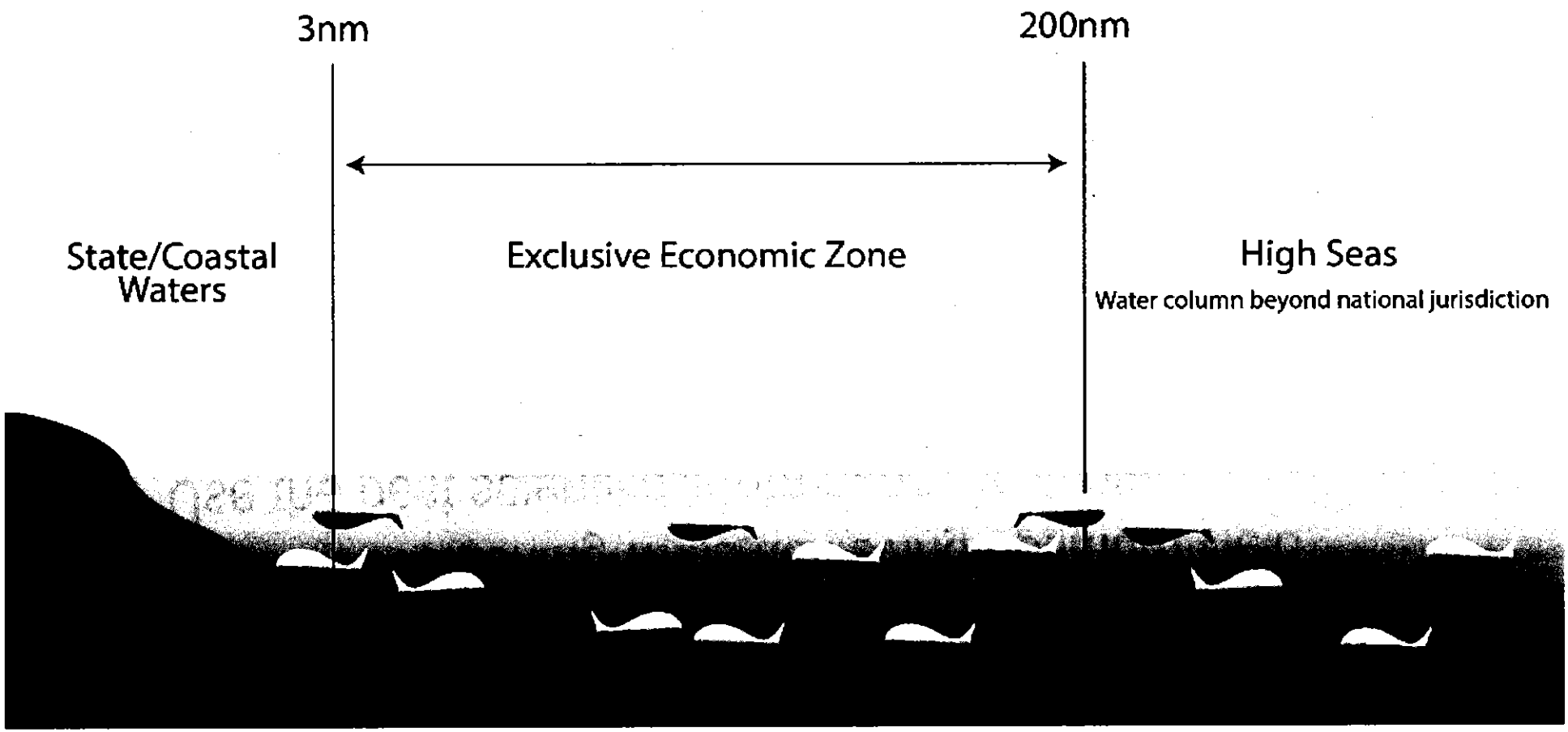
  (A) a fishery management plan, and

  (B) amendments to each such plan that are necessary

- Convene Committees and Advisory panels
- Conduct Public Meetings
- Set Annual Catch Limits based on best available science
- Select management options
- Develop, with their Scientific and Statistical Committee, research priorities

1 nautical mile (nm) = 1852 meters

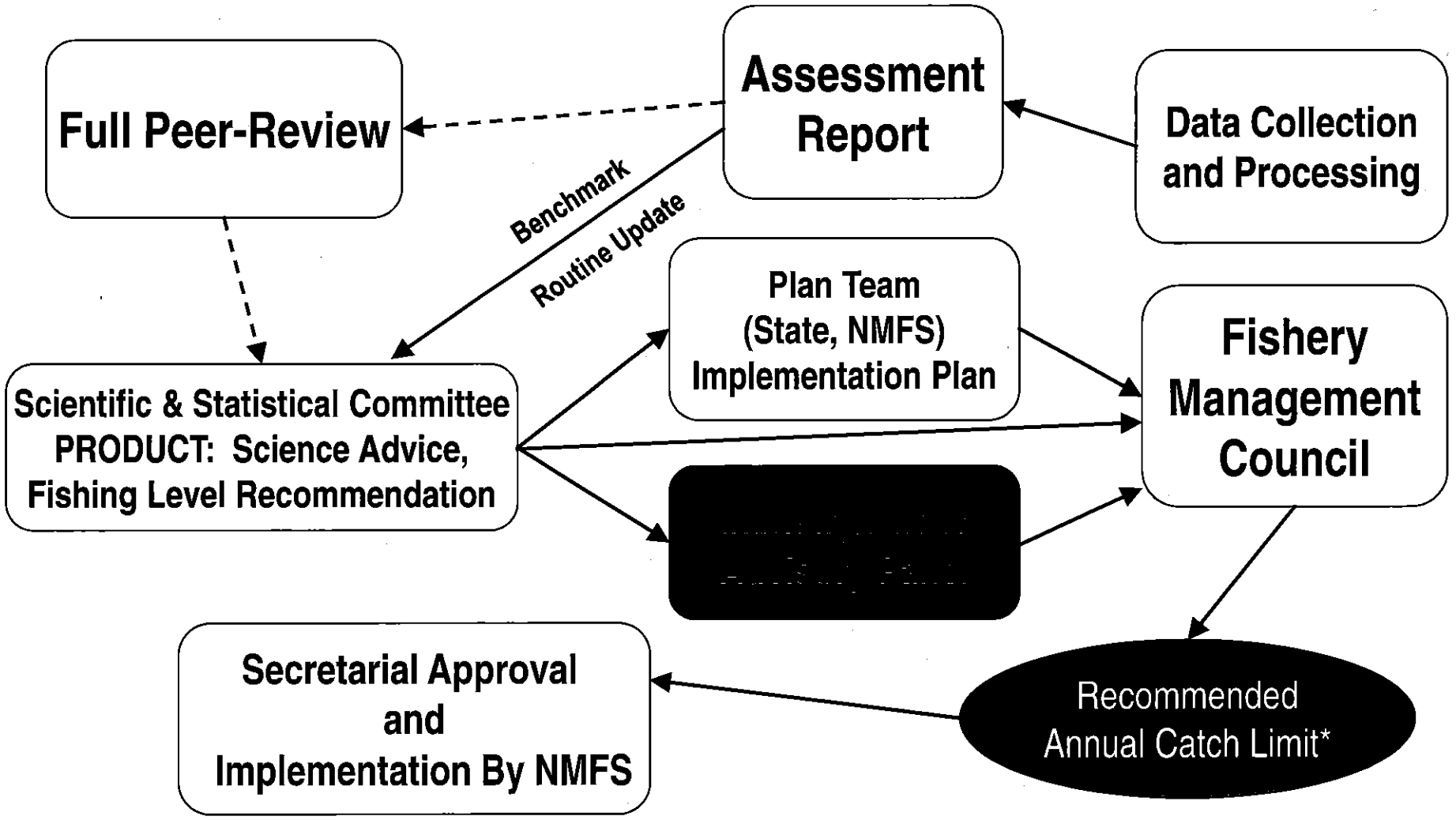
The Magnuson-Stevens Act (1976)



National Standards: 10 Principles for Managing Fish

1. Prevent overfishing while achieving optimum yield
2. Use the best scientific information available
3. Manage individual stocks as a unit
4. No discrimination
5. Promote efficiency
6. Consider variations in fisheries and catches
7. Minimize costs and avoid duplications
8. Consider the importance of fishery resources to communities
9. Minimize bycatch
10. Promote safety of human life at sea

The Core of the MSA: Science and Management

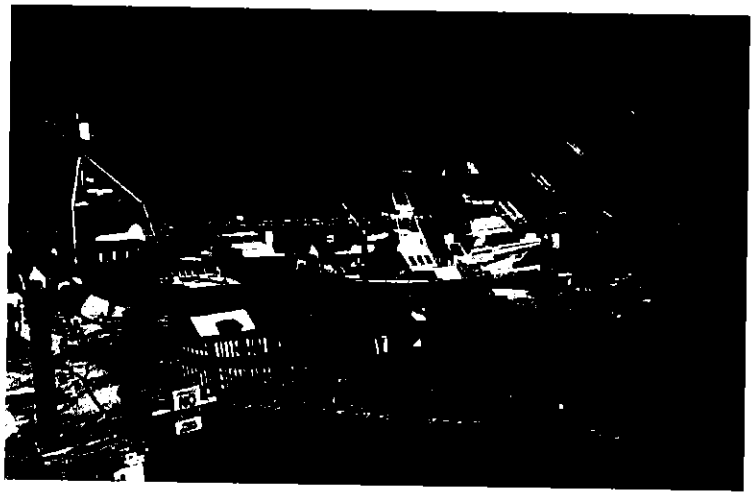


*Cannot exceed SSC's Fishing Level Recommendation based on best science.

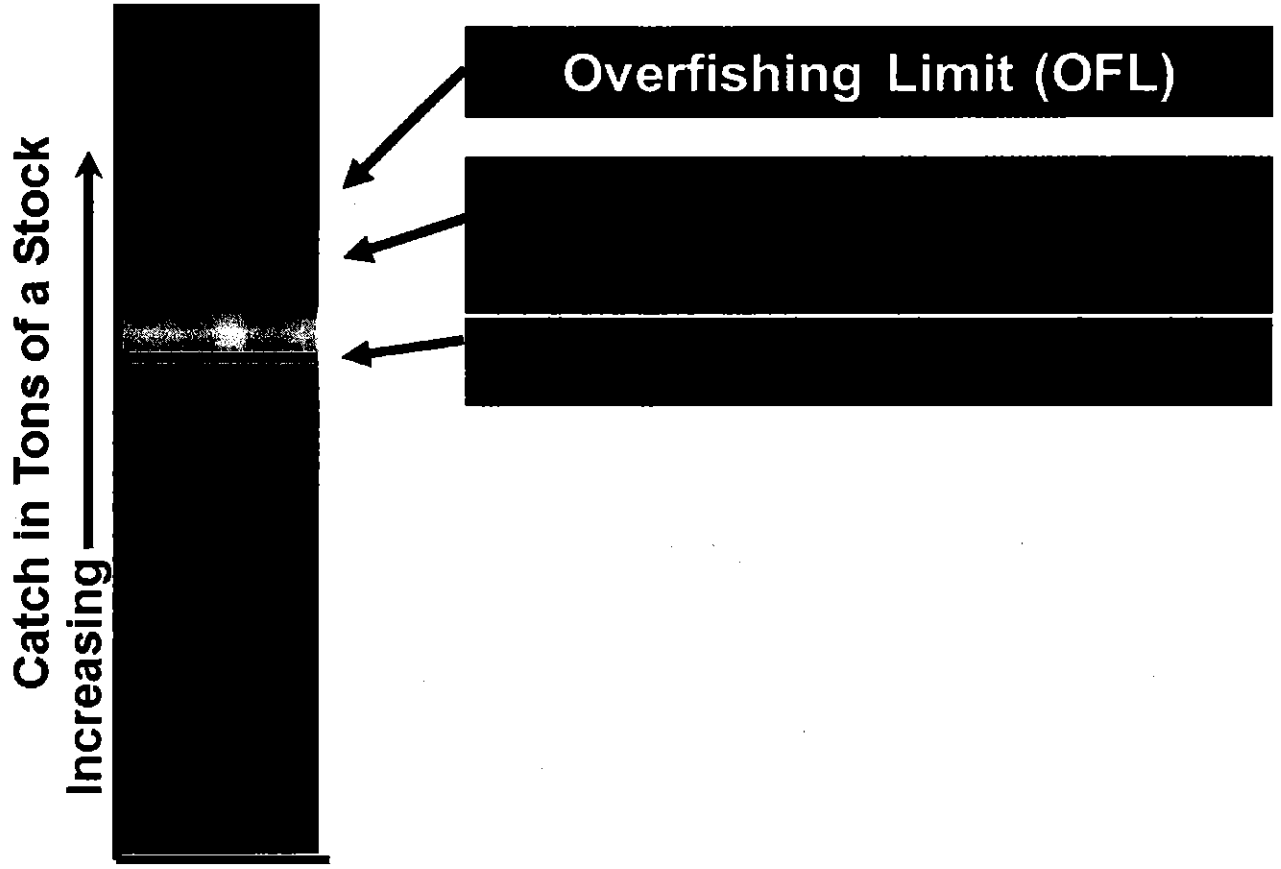
Fishery Management Tools

Fishery Management Councils and NMFS use a variety of tools to manage fish stocks:

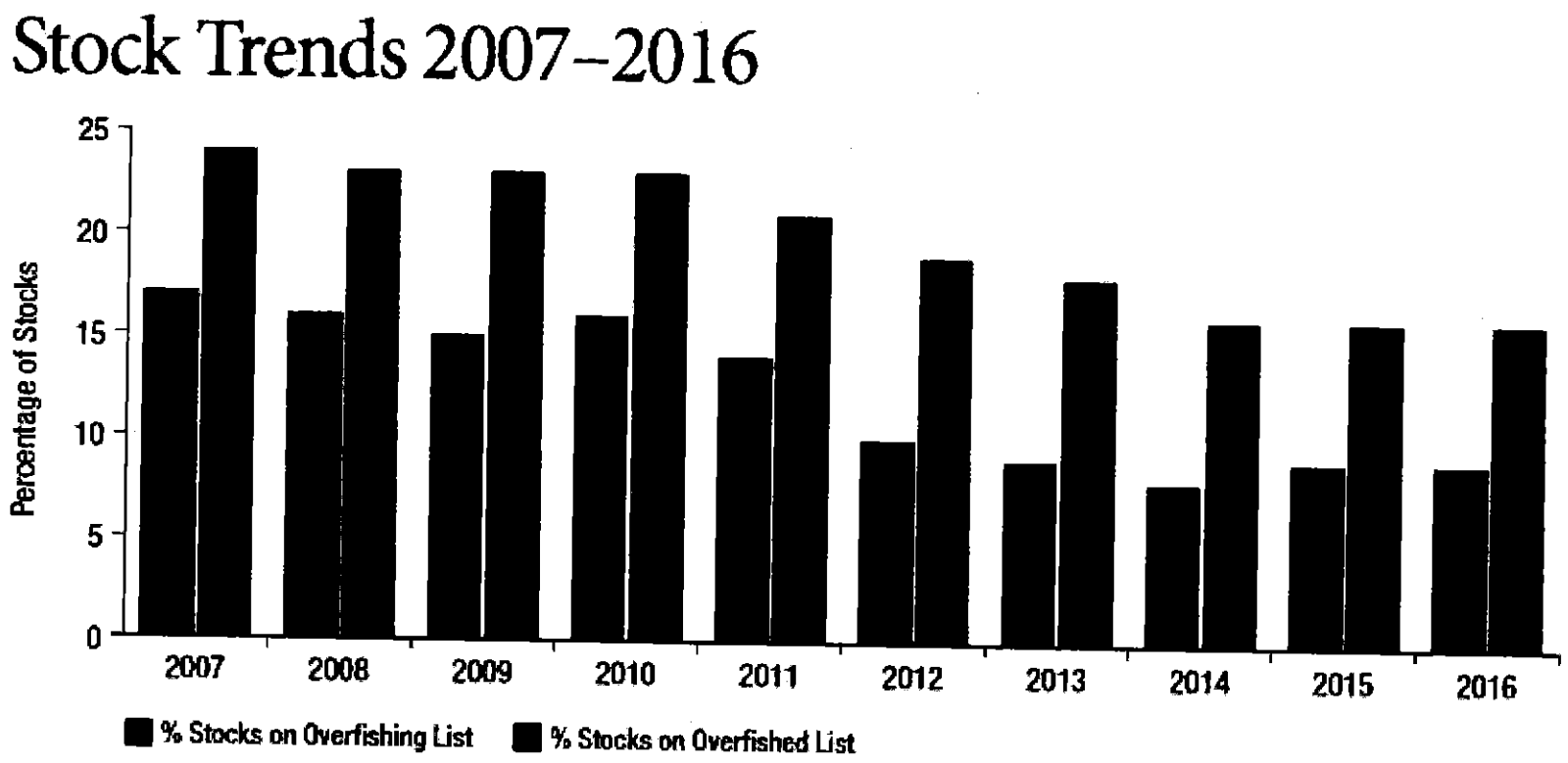
- Annual catch limits
- Catch shares
- Seasonal Quotas
- Size limits
- Bag limits
- Trip limits
- Time/area closures
- Seasonal closures
- Gear restrictions



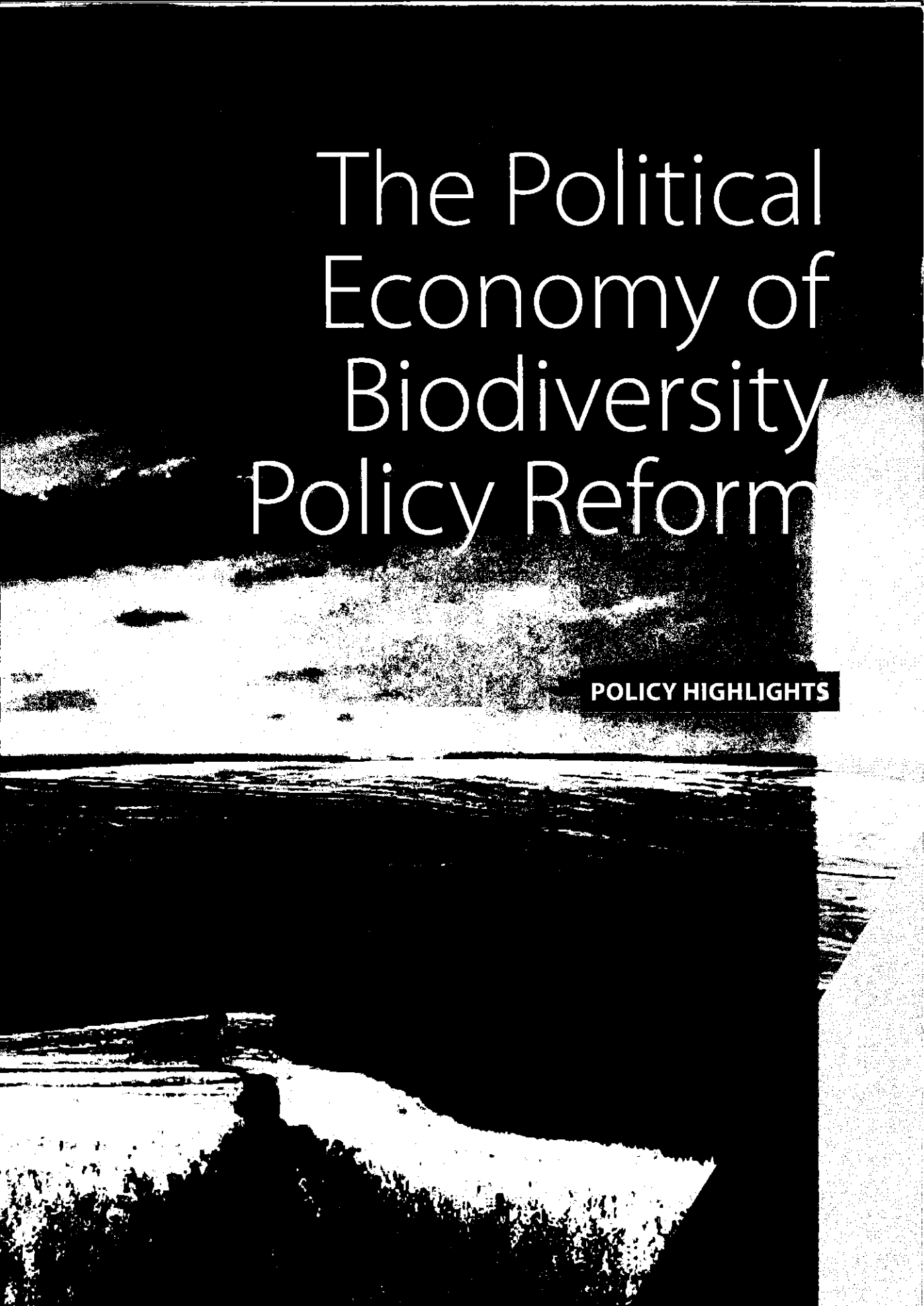
Managing Stocks with Annual Catch Limits



The Number of Stocks at Risk are Declining



The Political Economy of Biodiversity Policy Reform



POLICY HIGHLIGHTS

The Political Economy of Biodiversity Policy Reform

The need for more widespread and ambitious policy instruments for biodiversity conservation and sustainable use is widely acknowledged. Progress, however, has not been as rapid and effective as needed and global biodiversity trends continue to decline. This loss of biodiversity and associated ecosystems results in costly impacts on human health, well-being and economic growth.

As countries strive to implement more ambitious and cost-effective biodiversity-related policies, policy makers often encounter a number of barriers. These may include concerns about potential competitiveness impacts or distributional issues, the influence of vested interests or the political and social acceptability of reform. Drawing insights from a political economy perspective on biodiversity related policy reform – how decisions are made, in whose interests and how reform is promoted or obstructed and why – can shed light on how to overcome these barriers.

The report ***The Political Economy of Biodiversity Policy Reform*** (OECD, 2017) examines lessons learned from the political economy of biodiversity related reforms. It draws on the literature on salient issues that arise in the context of policy reform and four new case studies: the French tax on pesticides; agricultural subsidy reform in Switzerland; European Union payments to Mauritania and Guinea Bissau to finance marine protected areas management via conservation trust funds; and individually transferable quotas for fisheries in Iceland. Each case study focusses on the drivers for reform, the types of obstacles encountered, key features of the policy reform, and the lessons learned from the reform experience.

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BETTER POLICIES FOR BETTER LIVES

Potential barriers to environmental policy reform

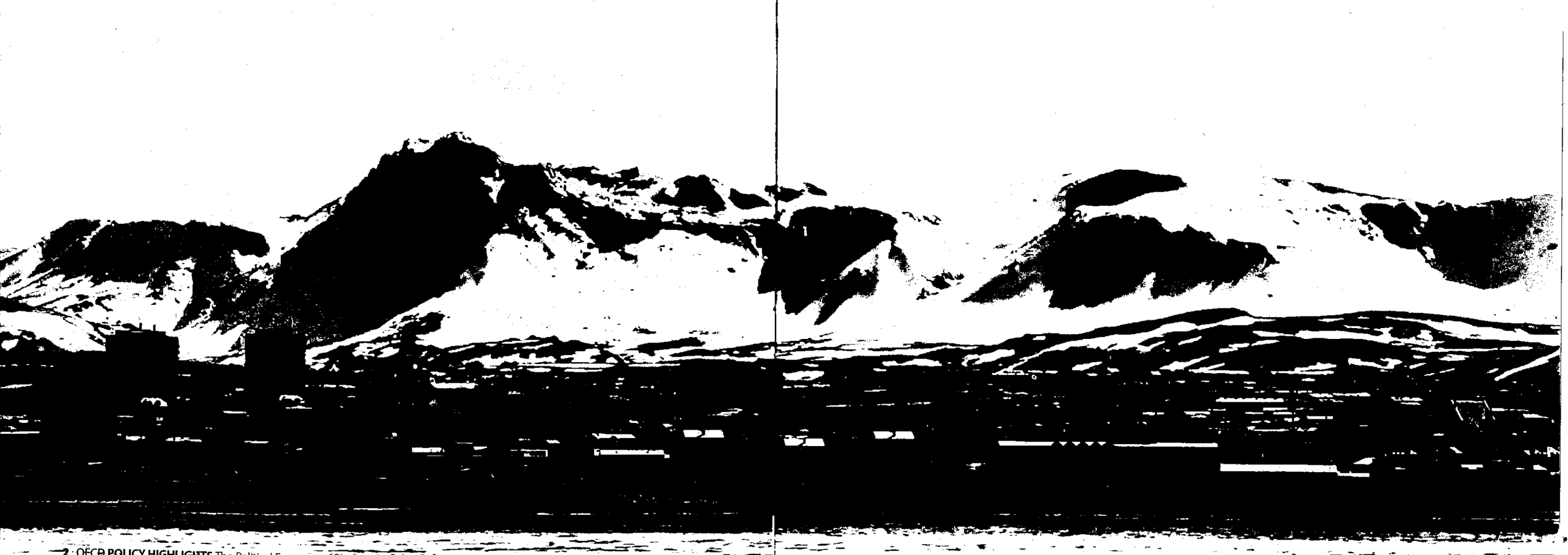
Some of the issues that arise in the political economy of broader environmental policy are also relevant for gaining insights on biodiversity related reforms. These include:

COMPETITIVENESS IMPACTS: potentially adverse impacts on competitiveness can manifest in two ways: (1) increasing environmental stringency could cause firms to incur higher production costs, which drives up prices, reduces sales and profit, and can therefore result in at least some decrease in employment and economic activity (Morgernstern et al., 2002); or (2) more stringent regulations may cause a competitive disadvantage compared to jurisdictions with lower standards, thus creating an incentive for businesses to relocate -- the so-called "pollution haven" effect (Esty and Geradin, 1998). In general, there is scant empirical evidence of environmental regulation causing major economic or job losses, but the impact will depend on the type of sector and firm characteristics.

DISTRIBUTIONAL IMPACTS: the expected distribution of costs and benefits of a policy influences its political feasibility. Concerns about regressive impacts (where low-income households are impacted by price rises to a greater extent than higher income households) have been a barrier to environmental policy reform. In cases where the distributional impacts are likely to be a concern, appropriate policy packages can help to ease the transition. For example, recycling the revenue raised from taxes or subsidy removal can offset such effects (OECD, 2006).

INFLUENCE OF VESTED INTERESTS: the influence of vested interests and rent-seeking behaviour has also been cited as a hindrance to environmental reform (Robin et al., 2003). Heavy lobbying by affected industries can thwart policy change. In some cases, the inflated rents reaped by affected firms as a result of their lobbying efforts derive not only from capture of subsidies or grants, but also from lowered taxes, less stringent investment regulations and the exclusion of the costs and benefits of ecosystem services and biodiversity from policy assessments. The resources at the disposal of rent-seeking parties may provide them with an advantage relative to the broader range of stakeholders affected by environmental damages, who may not have the time or money to organise as effectively.

POLITICAL AND SOCIAL ACCEPTABILITY OF REFORM: increasing the stringency of environmental regulations or eliminating harmful subsidies is a process subject to complex political considerations that increase the difficulty of obtaining support. Societal conditions may influence the behaviour of elected officials, who feel the need to provide positive economic news (OECD, 2005). Thus, maintaining the status quo becomes politically attractive. Political acceptance is also dependent on (among other concerns) the perceived effectiveness of the policy, the degree of fairness, and the degree of awareness of the problem being addressed.

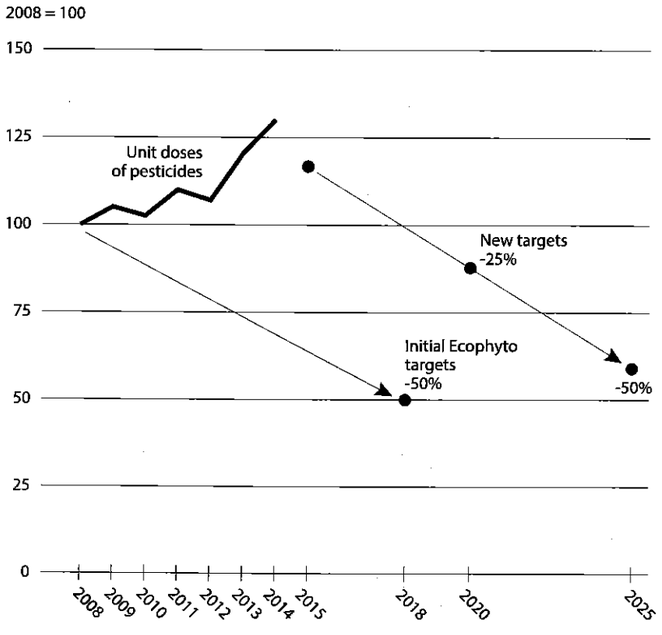


Case study 1: **The evolution of the tax on pesticides and the pesticide savings certificates in France**

As the leading agricultural producer in the European Union, accounting for 16% of the EU's agricultural surface, France is the second largest user of pesticides in the EU in terms of total volume (after Spain) (Marcus and Simon, 2015) and was the eighth largest consumer worldwide in 2010 (OECD, 2016). The use of pesticides supports agricultural production but also contributes to environmental degradation and risks to human health.

The first tax on pesticides was introduced in France in 1999, later replaced by a tax on diffuse pollution in 2008, which applies to pesticide sales. The tax rate has increased moderately over the years and the tax base has expanded to cover a greater number of harmful substances. However, competitiveness concerns limited more significant increases in the tax rate. The resulting low level of the tax has not provided a sufficiently strong incentive to reduce use, and the ambitious target to reduce pesticide use by 50% if possible, has not been reached. Indeed, pesticide use has continued to rise (Figure 1). The recent adoption of a novel instrument, pesticide savings certificates, represents a compromise with the agricultural sector, which opposed stricter regulation or a further increase in the tax rate on pesticides. This case study highlights the importance of addressing potential competitiveness impacts, the benefits of broad stakeholder engagement and how a solid evidence base to support the reform can help the government to stand firm against lobbying pressure.

Figure 1. **Evolution of pesticide use compared to objectives of the Ecophyto Plans I and II**

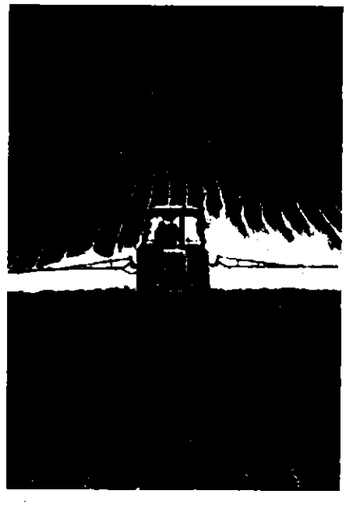


Source: OECD (2016), *OECD Environmental Performance Reviews: France 2016*, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264252714-en. OECD based on data from MAAF (2016), Tendances du recours aux produits phytopharmaceutiques de 2009 à 2014.

Note: Changes in agricultural "number of unit doses" (Nodu) compared to Ecophyto plan. 2015 is an estimate based on 2012-14 average.

EUR 157 BILLION

In the EU, the annual health and economic costs related to endocrine-disrupting chemicals is estimated at EUR 157 billion, with pesticides accounting for the largest share of these costs at around EUR 120 billion (Trasande et al., 2015).



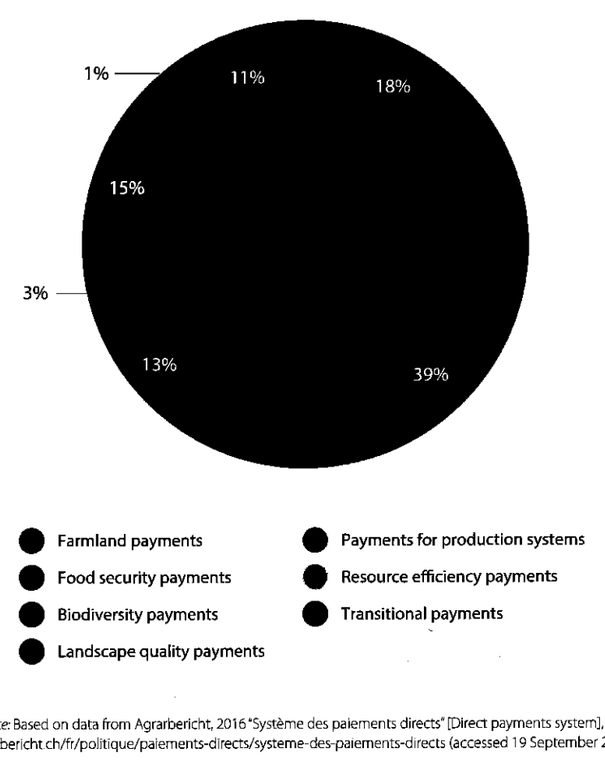
Case study 2: **Agricultural subsidy reform in Switzerland**

From an economic perspective, agriculture plays a relatively minor and declining role in Switzerland, yet it is nevertheless the largest user of land in the country and plays a crucial role for biodiversity. Since the early 1990s, Switzerland has undertaken a series of major agricultural policy reforms, reducing market intervention and introducing the system of direct payments, which included both general direct payments and ecological payments.

However, by 2009, many of the ecological targets set by the Federal Council had not been achieved and more fundamental questions were being raised about the effectiveness and efficiency of the direct payment system. This led to the development of the system to better target policy objectives, including for biodiversity. The reforms were adopted in the Agricultural Policy 2014-17. As a result, in 2014, biodiversity payments amounted to about 13% of total direct payments (just over CHF 364 million) (Figure 2). In addition, CHF 40.4 million was paid for organic production and close to CHF 32 million for extensive production.

This case study demonstrates how an alliance of market-oriented and ecological interests can help to spur reform. It also illustrates how devising politically and socially acceptable compromises, including the use of transition payments (which amounted to around CHF 308 million in 2014) to offset negative distributional impacts, can help overcome barriers to reform.

Figure 2. **Distribution of direct payments by category, 2014**



Source: Based on data from Agrarbericht, 2016 "Système des paiements directs" [Direct payments system], www.agrarbericht.ch/fr/politique/paiements-directs/systeme-des-paiements-directs (accessed 19 September 2016).

CHF 100 MILLION

In Switzerland, the external costs of pesticides have been estimated at CHF 100 million per year (Zandonella et al., 2014).

Case study 3: **EU payments to Mauritania and Guinea Bissau for marine protected areas under the fisheries partnership agreements**

The coast of West Africa has been identified as a marine eco-region of global importance. The region's fisheries are an important contributor to GDP, providing livelihoods for fishers and processors, as well as a source of hard currency (from exports of fishery products). Fisheries also boost government revenues through fisheries partnership agreements and taxes.

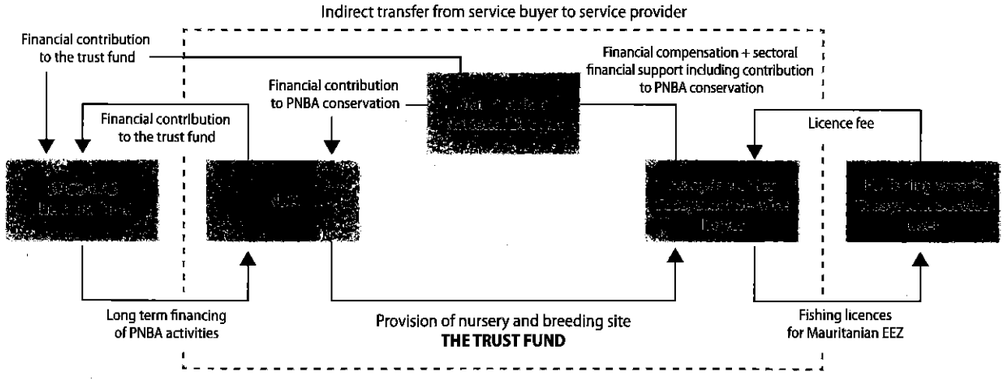
The pressure on West African fish stocks increased six-fold between the 1960s and the 1990s, mainly due to over-fishing. To help conserve marine biodiversity, marine protected areas (MPAs) are prevalent in the region. In Mauritania and Guinea Bissau, conservation trust funds were created to provide sustainable financing to MPAs with the objective of channelling funds, including from the EU through Fisheries Partnership Agreements. These arrangements can be considered as international payments for ecosystem services. The financing scheme implemented in Mauritania to fund the Banc d'Arguin National Park (PNBA) via the conservation trust fund, BACoMaB, is illustrated in Figure 3.

EUR 59 MILLION

The 2006 Fisheries Partnership Agreement with Mauritania was the EU's single largest agreement providing EUR 86 million a year directly from the EU (EC, 2007). The agreement has recently been renewed, committing EUR 59 million per year to the partnership, with EUR 4 million supporting the fishing communities, including environmental sustainability, job creation and tackling illegal and unregulated fishing.

This case study demonstrates how concerted lobbying efforts by environmental NGOs established a shared understanding of the benefits that marine conservation could bring to the fisheries sector. It also highlights how wavering political support as a result of changing leadership can threaten the long-term stability of financing for conservation and the importance of a secure legal basis for agreements to avoid back-sliding.

Figure 3. **Funding marine protected areas in Mauritania from Fisheries Partnership Agreements through a conservation trust fund**



Source: Adapted from Binet et al., 2013. Note: "EEZ"= exclusive economic zone.

Case study 4: **Individually transferrable quota system and resource rent tax in Icelandic fisheries**

Although the relative importance of the fishing industry in Iceland's economy has declined, it still is one of the mainstays of the economy, accounting for 5% of GDP in 2015. Around 57% of total merchandise export value came from seafood exports in 2015.

The introduction in the 1980s of the individually transferrable quota (ITQ) management system in the Icelandic fisheries was driven by a looming crisis. It became apparent that the status quo would most likely lead to fisheries collapse and major economic hardships for the country as a whole. With the Fisheries Act in 1990, the ITQ system became comprehensive and thus, the cornerstone of the fisheries management system. Evidence suggests that the Icelandic ITQ system has been very successful in increasing efficiency in the fisheries (Figure 4) and created the correct incentives for fishers when it comes to safeguarding and rebuilding fish stocks.

This case study shows how a crisis threatening an economically vital industry can provide the political drive to establish a sustainable resource management system. It also illustrates that despite the overall economic gains of the reform, there were still winners and losers, which spurred subsequent reforms to the system.

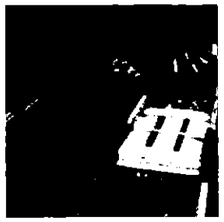
25% OF TOTAL EXPORTS

The Icelandic marine ecosystem has supported a robust fishing industry, accounting for about 7% of GDP in 2012, with marine products representing more than 25% of total exports of goods and services (measured in value) (OECD, 2014).

Figure 4. **Significant consolidation of the Icelandic fishing fleet led to higher profitability**

Source: Based on data from Statistic Iceland (2016), personal correspondence with G. Thordardottir. Note: GRT= "gross registered tonnes".

Insights on overcoming barriers to biodiversity-relevant policy reform



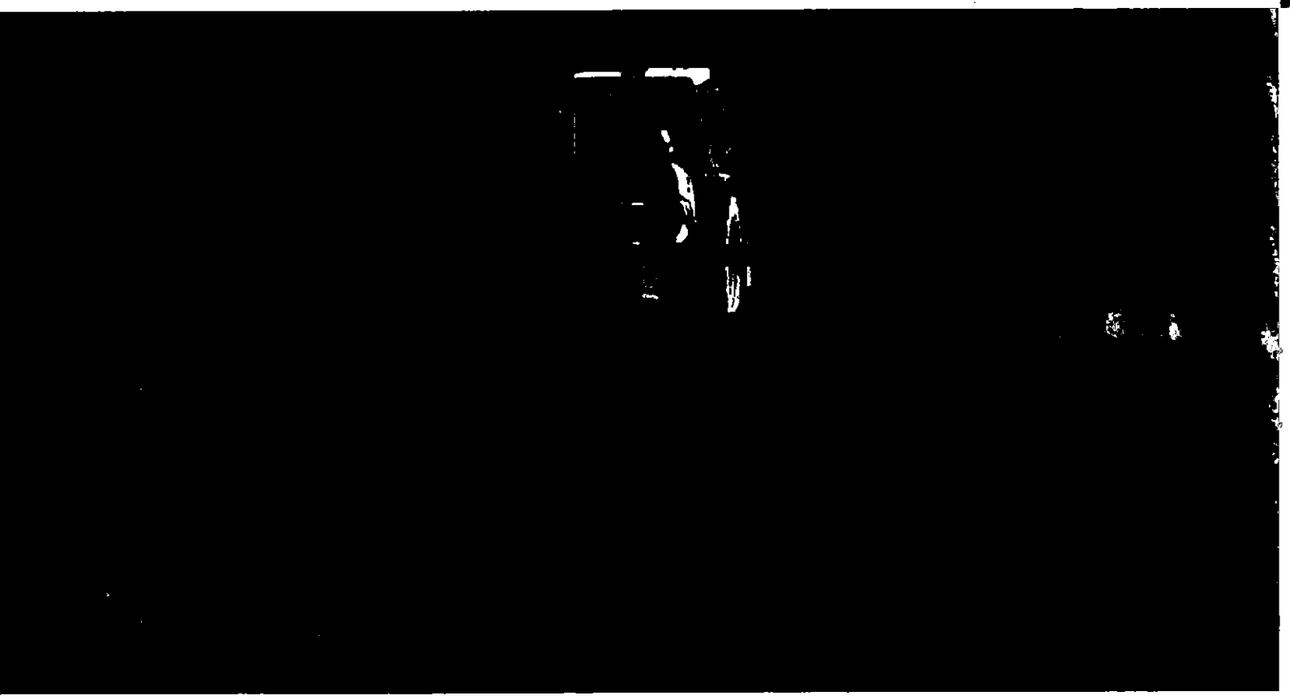
Lesson 1:
Seize opportunities to advance biodiversity related reforms: from crisis to public concern

The case studies point to the need to be ready to act quickly when presented with windows of opportunity that may be outside the influence of domestic policy-makers and unrelated to environmental concerns.

- The major reform of **Icelandic** fishery policy was driven by an urgent need to prevent the imminent collapse of an economically important industry. While addressing threats to biodiversity was not an explicit aim of the reform, safeguarding biodiversity was a positive by-product of the reform, which put the fisheries sector on a more sustainable long-term footing.

- In **Switzerland**, the Parliamentary elections in 2011 saw the Green Liberal Party successfully ride the wave of anti-nuclear sentiment in the aftermath of the environmental disaster at Japan's Fukushima plant in March of that year, making the composition of the Parliament particularly conducive to approving the reform. Also, the reform was developed under the leadership of the then Director of the Federal Office of Agriculture who is credited with being an important influence on driving reform.

- For **France**, growing public concern about the potential risks of pesticide use to human health and the environment has become an increasingly important reform driver, opening opportunities for stronger policy action. Public opinion, as expressed through market choices (via growing demand for organic products and willingness to pay a premium for such products) is increasingly prominent. Heightened media attention, campaigns by NGOs, and swelling public pressure have given momentum to further action on specific types of pesticides.

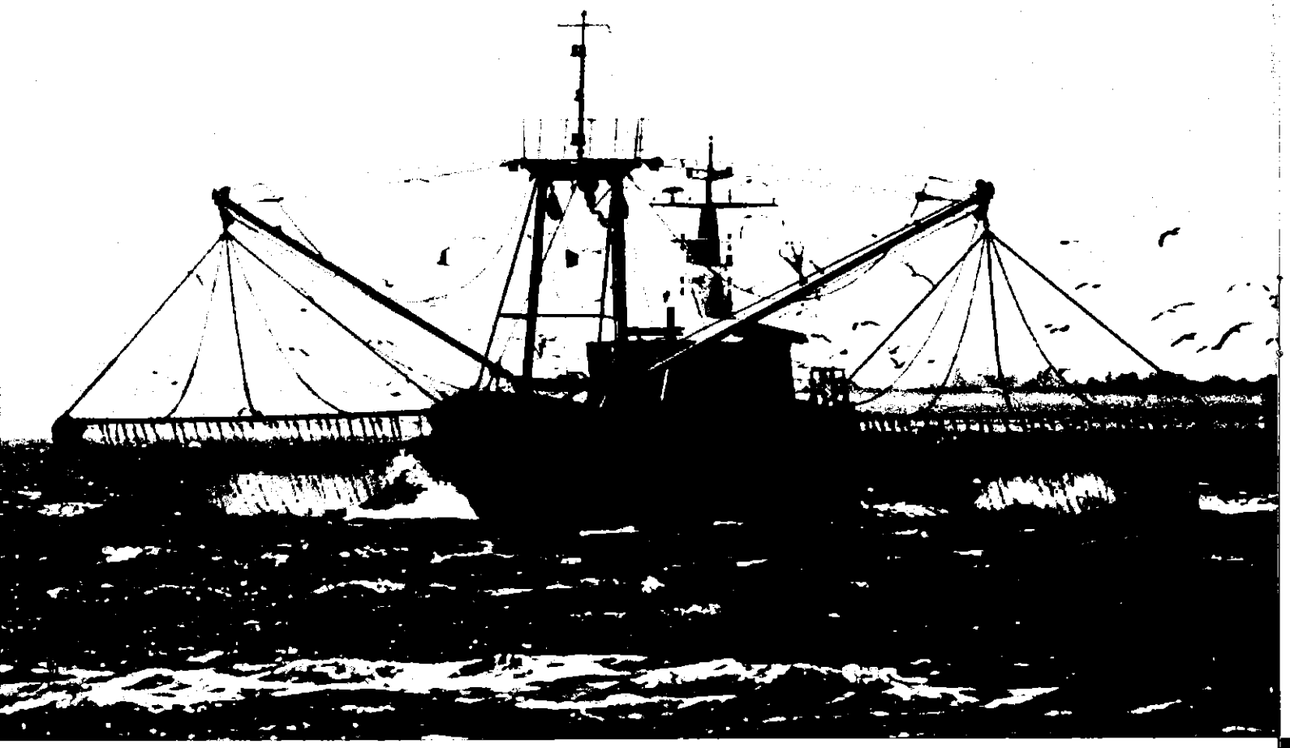


Lesson 2:
Build alliances between economic and environmental interests

Several of the case studies illustrate how economic and environmental interests can be aligned to build support for biodiversity related reform. Building such alliances can advance reforms beneficial for biodiversity in instances where a more narrow focus on only "green" issues might fail. This can include forming coalitions, either explicitly or behind-the-scenes, with other interest groups who may share the same desired outcomes, though their motivations may not at all be driven by concerns for biodiversity or the environment more broadly.

In **Switzerland**, arguably, the main impetus for the change in agricultural policy was support for market-oriented reforms to encourage free trade and bring the direct payments system more closely in alignment with the World Trade Organisation's "Green Box" criteria. Building a coalition among market-oriented interests promoting trade liberalisation and environmental interests were particularly crucial for advancing the reform. Active lobbying by environmental NGOs using both economic and environmental arguments helped to win support in Parliament.

- In the case of **Mauritania** and **Guinea Bissau**, concerted lobbying efforts by environmental NGOs to clearly link the economic benefits to fisheries of well-functioning ecosystem services helped to gain financing for conservation trust funds for marine protected areas (MPAs). A well-established and credible NGO acted as a "broker", playing a key role in establishing a shared understanding of the benefits that MPAs bring to the fishing sector and the benefits trust funds bring to marine conservation. In Guinea Bissau, environmental NGOs also played an important role by laying the ground work for broader institutional change concerning conservation.



Lesson 3:
Devise targeted measures to address potential impacts on competitiveness and income distribution

The case studies illustrate the importance of minimising costs of reform on targeted sectors and stakeholders as a means to overcome potential opposition to reform. Recycling the revenue from environmentally related taxes or putting into place transitional measures can help to minimise the cost to affected sectors. Other economic instruments, such as resource rent taxes, can be used to address distributional concerns to more widely and efficiently share the benefits of harvesting common property resources.

- In the case of **France**, as Europe's leading agricultural producer, limiting the potential costs to the agricultural sector of policies to reduce pesticide use has been a prerequisite to advancing reform. Recycling the revenue from the tax on diffuse pollution to mainly benefit farmers helped to gain the political acceptability of the tax and of subsequent increases in the tax rate and the expansion of the tax-base. This revenue recycling mechanism was also a critical factor that supported maintaining the ambitious reduction targets.

- In **Iceland**, the fisheries management reform has been both a clear economic success and a way of safeguarding the sustainability of the fish stocks. However, discontent arose in the years following the reform due to the initial free allocation of the quotas to existing fishers based on their recent catch levels at the time. This is considered by some to have been an unjust way of disbursing rights to harvest a commonly owned resource. The resource rent tax introduced in 2012 sought to remedy these distributional issues to some extent.

- For **Switzerland**, advancing reforms to better target agricultural support required politically and socially acceptable compromises in the reform package. The reform balanced interests by slightly increasing the overall level of budgetary support for agriculture, while re-distributing that support across the new categories of payments, including biodiversity payments. In addition, transition payments were included in the reform package to minimise negative impacts on farmers

Lesson 4:
Build a robust evidence base to support reform and provide resistance to pressure from vested interests

A robust scientific and economic evidence base is an essential tool in the arsenal of governments seeking to advance policy reforms. Such an evidence base can help to clearly identify the benefits and beneficiaries of reform, make the case for change and provide means to resist pressure from vested interests.

- In **Switzerland**, environmental NGOs played a key role as part of their lobbying efforts to disseminate information about expected benefits of reforms to specialised agricultural groups, such as alpine farmers, which benefitted from more payments for extensive production and biodiversity payments under the new system. This helped to encouraged their engagement to support the reform process.

- In **France**, a robust evidence base supported by scientific research has been critical for the government to stand firm against lobbying pressure in the context of the recent introduction of the pesticides savings certificates.

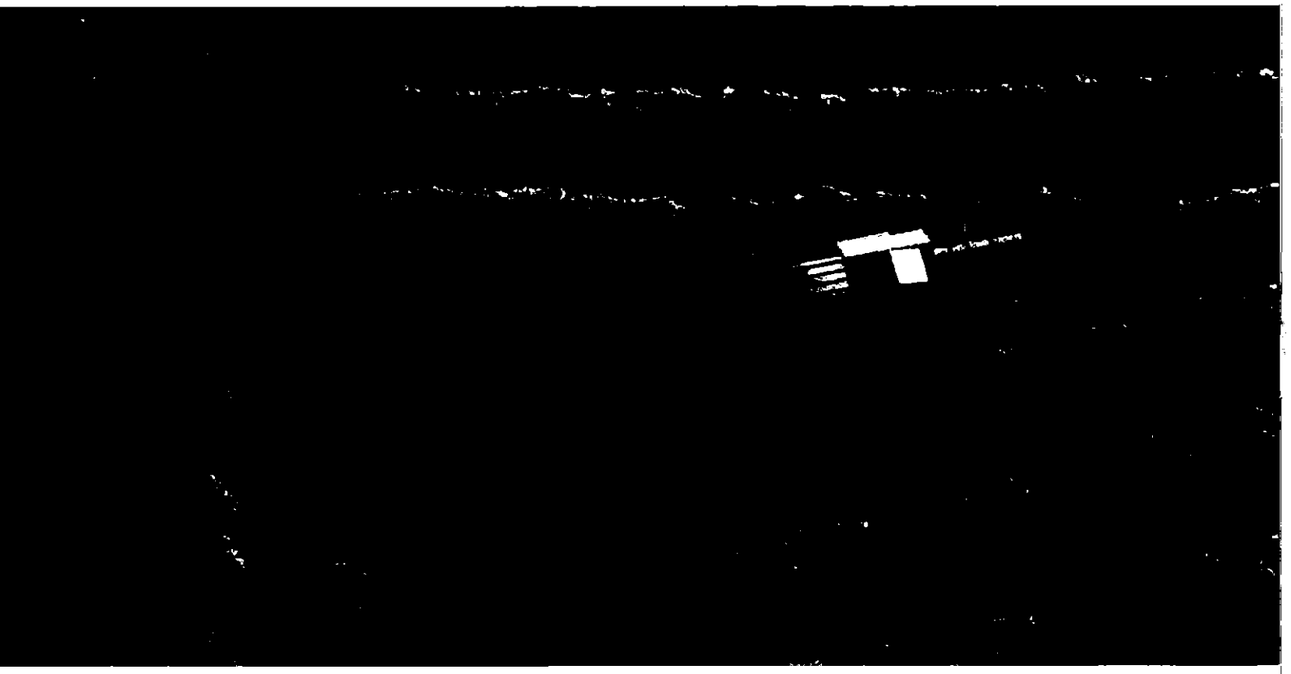
Lesson 5:
Encourage stakeholder engagement to build broad and durable support for reform

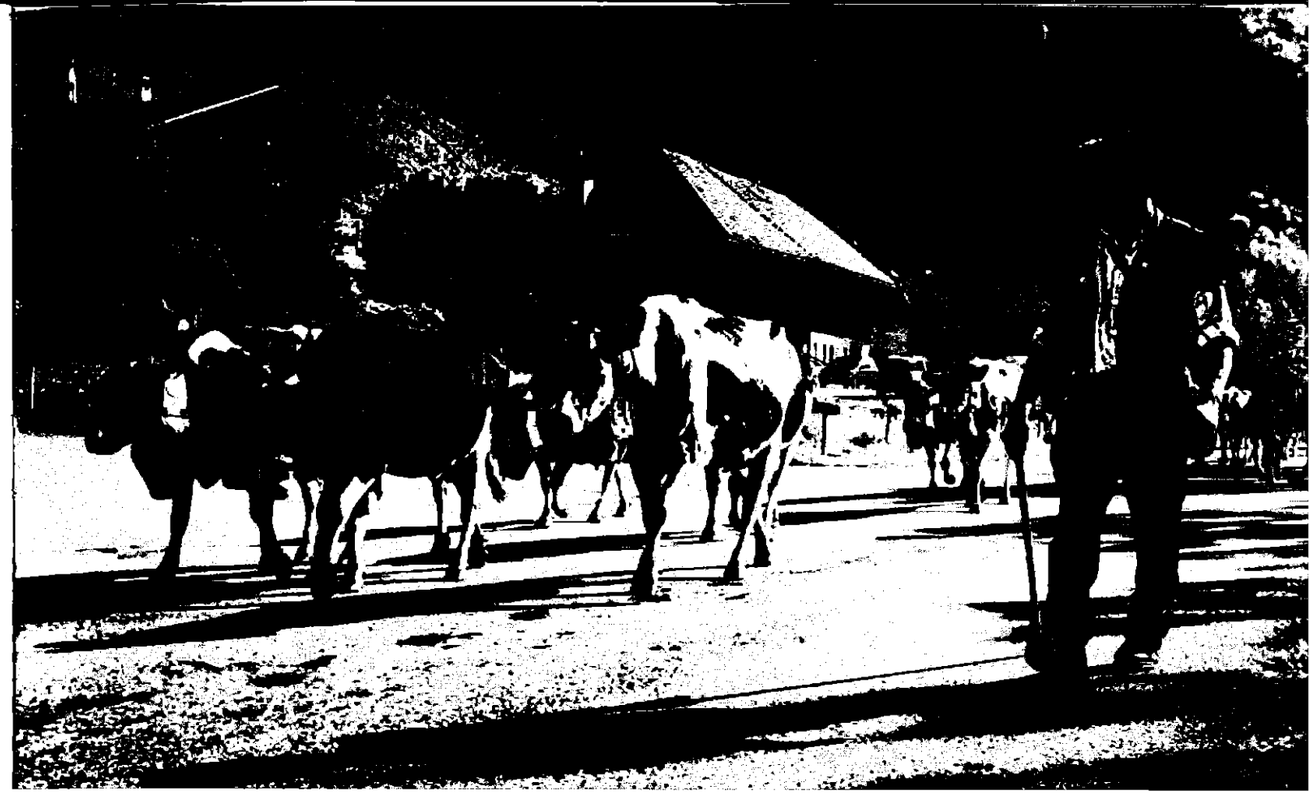
The case studies reveal distinct approaches to stakeholder engagement, with differing outcomes. For France and Switzerland, where stakeholder engagement has been very broad and intensive, reforms have been incremental, proceeding at a slow pace, but generally in a positive direction. In contrast, limited stakeholder engagement likely contributed to the speedy adoption of more drastic reforms to establish the comprehensive ITQ system in Iceland.

- In **France**, broad stakeholder engagement inspired by the "Grenelle model" has been important for overcoming resistance of vested interest. Greater representativeness of stakeholders has had a positive influence on policy reforms in this case, as it has encouraged the engagement of a number of smaller, innovative pioneers who are helping to advance the agro-ecology agenda. Although this time-consuming and resource-intensive consultation process means that progress has been gradual and modest, it is generally moving in a positive direction.

- For **Switzerland**, a political system with elements of direct democracy means that reforms require extensive consultations with many stakeholders. As a result, agreeing and implementing policy reforms is a lengthy, but well-structured process (OECD, 2015). In the case of the reform of the direct payments system, broad stakeholder consultation helped to involve not only major lobbying groups including environmental NGOs, economics institutions, and the Farmers Union, but also smaller agricultural groups, including organic farmers associations and farmers located in alpine areas, who were well-positioned to benefit from the reform.

- In **Iceland**, the major reform to establish the ITQ system was led mainly by government authorities, including scientists. Such sweeping reforms would have been difficult to implement as quickly if the process had included the participation of all the different stakeholders. At the same time, limited stakeholder engagement at the outset may have led to a greater need for piecemeal amendments to the system over time to respond to specific stakeholder demands.





Lesson 6:
Consolidate gains to ensure that reforms are sustained over time

The cases reviewed attest to the importance of ensuring that reforms are sustained over time. Vested interests, for example, do not simply disintegrate once a policy reform has been enacted. As the influence of political parties changes as a result of election cycles, and new coalitions emerge, political priorities can shift too. Similarly, when there is high turn-over of leadership and staff in key institutions, a void may be created when champions or experts move on, resulting in existing policies becoming vulnerable to back-tracking. Continuous training of staff, awareness raising, provision of evidence-based results, ex-post assessments of reforms, and active lobbying can help to maintain successful reforms over time. Furthermore, agreements with a firm legal basis will be more enduring that those based on an informal understanding, which can be contested and altered once leadership changes.

- In the case of **Mauritania**, wavering political support threatens the long-term stability of the conservation trust fund. Early momentum to establish financing arrangements for conservation trust funds has dissipated in the context of competition for scarce financial resources and shifting government priorities. The transitory nature of the arrangement, which is renegotiated on a regular basis, could also jeopardise long term commitments. Several options exist to address this issue, including ensuring the trust funds rapidly demonstrate their potential as actual grant-makers.

- In the case of **Switzerland**, not long after the agricultural reform of 2014-17 was voted by Parliament, the Farmers Union launched a call for a popular initiative proposing a change to Article 104 of the Federal Constitution, which sets out the multifunctional purpose of agriculture in Switzerland. The popular initiative seeks to place greater emphasis on goal of food security, which is seen as a step backwards for those who supported the recent reform. Further, Swiss agricultural subsidies remain relatively high compared to other OECD countries (OECD, 2015) and the direct payments system still consists of a number of subsidies that have unclear, or possibly contradictory, impacts on environmental objectives. To continue to pursue biodiversity objectives and put Swiss agriculture on a more sustainable footing, the system will need to continue to evolve with better targeted direct payments.

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OECD Environment Directorate, December 2016

Sustainable financing for marine ecosystem services in Mauritania and Guinea-Bissau

COUNTRY STUDY

OECD ENVIRONMENT POLICY PAPER NO. 10

OECD

BETTER POLICIES FOR BETTER LIVES

This Policy Paper summarises key messages from the case study on European Union payments to Mauritania and Guinea-Bissau for the conservation of marine protected areas under the Fisheries Partnership Agreements. The detailed case study is available in the 2017 OECD report *The Political Economy of Biodiversity Policy Reform*. A separate "Policy Highlights" brochure, which distils key messages and lessons learned from the full report is also available.

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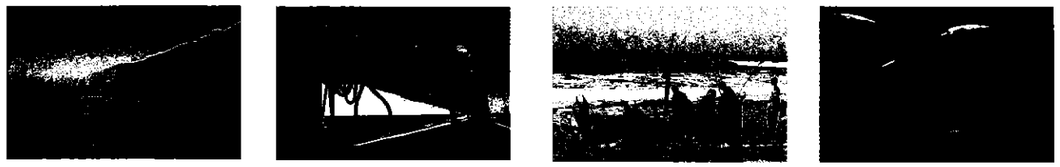


Contents

Overview

Mauritania and Guinea-Bissau are the custodians of some of the world's most significant marine and coastal ecosystems, supporting fisheries of global importance and on which many people depend for their livelihoods. These fisheries are under threat from overfishing – which increased six-fold between the 1960s and the 1990s. The pressure on West African fish stocks is driven by foreign fleets and the substantial expansion of artisanal fisheries. Marine and coastal ecosystems are also under pressure from coastal development, the oil industry, pollution and climate change. This paper examines the efforts of Mauritania and Guinea-Bissau to establish sustainable financing for marine protected areas, via conservation trust funds, to help conserve and sustainably use these vital ecosystems.

The challenge

Sustainable use of these fisheries depends on regulating fishing, as well as the effective management of a network of marine protected areas (MPAs) along the West African coast. The MPAs support the ecosystems that maintain the fishing potential of the surrounding seas, to the benefit of fishing fleets. In developing countries, the costs of managing MPAs are often supported by international donors, but this support can be short-term and vulnerable to changing priorities. Long-term sustainable financing for MPAs is therefore needed.

The policy response

Both Mauritania and Guinea-Bissau have negotiated financial support within the framework of European Union (EU) Fisheries Partnership Agreements (FPAs) to help finance MPAs. This arrangement can be considered an international payment for ecosystem services, with those who benefit from the ecosystem contributing to its sustainable management. To protect these funds from shifting political priorities, conservation trust funds have been created in both countries. These trust funds are independent entities financed by a range of international and national sources.

The impact

In both Mauritania and Guinea-Bissau, the FPA and conservation trust fund arrangements have helped to significantly increase finance for the conservation of marine and coastal areas. As of April 2015, total commitments to endow Mauritania's trust fund (BACoMaB) had reached EUR 22 3 million, with funds sourced from the Mauritanian Government via the EU FPA as well as from a range of international donors. Guinea-Bissau's more recent BioGuinea Foundation, established in 2011, has received commitments of EUR 5 million, including EUR 1 million from the Guinea-Bissau government.

Key messages

From a political economy perspective, several lessons can be drawn from the experiences of Mauritania and Guinea-Bissau in mobilising finance for the conservation trust funds. Building a shared understanding of the economic benefits that marine conservation can bring to the fisheries sector was vital. This required lobbying, consensus building and co-ordination by non-government organisations (NGOs) acting as brokers. Both cases also highlight the importance of a secure legal and institutional basis for MPA management and financing to prevent wavering political support and changing priorities threatening the long-term stability of conservation financing.

Sustainable financing for marine ecosystem services in Mauritania and Guinea-Bissau

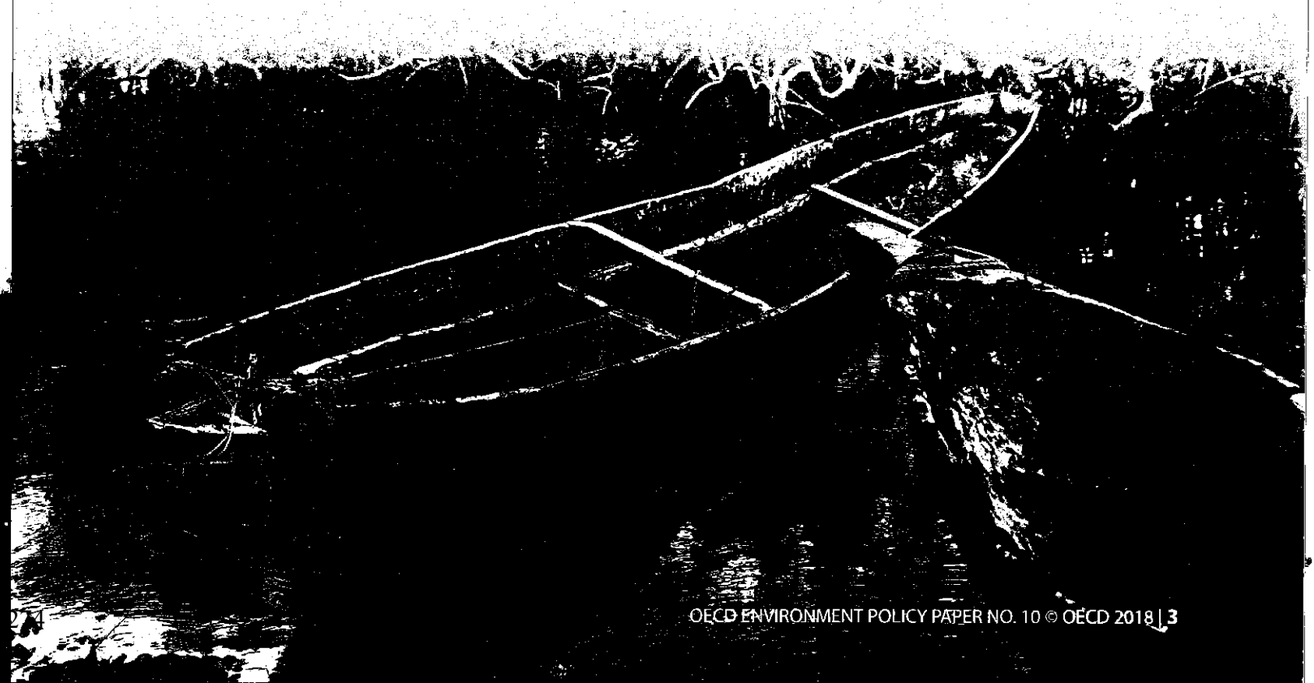
The marine and coastal ecosystems of West Africa are of global importance, essential for maintaining regionally and globally threatened biodiversity – from turtles to seals and migratory birds. These ecosystems also provide a range of other vital services,[1] including a fishery resource of global, and local, significance. West Africa's fisheries are sought after by fishing fleets from around the world, sustaining a valuable industry.

These ecosystems are also of immense value to local economies and livelihoods. Fishing activities contribute to gross domestic product (GDP), provide livelihoods for fishers and processors, are a source of hard currency (from exports of fishery products), and boost government revenues through fisheries agreements and taxes (de Graaf and Garibaldi, 2014). In addition, fish contributes to at least 20% of the total animal protein intake in the coastal countries of West Africa (FAO, 2009).

Currently the main threat to marine and coastal ecosystems in West Africa is overfishing, exacerbated by coastal development, the oil industry, pollution and climate change. The pressure on West African fish stocks increased six-fold between the 1960s and the 1990s, driven by fishing by European, Russian and Asian fleets (Hogan, 2003), as well as the substantial expansion of artisanal fisheries (Matthew, 2003).

This paper summarises efforts in two West African countries – Mauritania and Guinea-Bissau – to mobilise international finance to sustain the marine biodiversity upon which fisheries depend, and to establish conservation trust funds. It examines the main impacts and challenges encountered, and draws out some lessons of wider relevance.

1. Ecosystem services are the benefits people obtain from ecosystems.



The policy challenge: Ensuring sustainable finance for marine conservation and sustainable use

The waters of the West African coastline are a globally important source of fish – including horse mackerel, sardines, squid, cuttlefish and octopus, shrimps and hake.[2] The Mauritanian shelf is considered one of the most productive fishing areas worldwide, with catches reaching about one million tonnes per year. However, this large-scale exploitation has resulted in a 75% decline in demersal[3] fish resources since 1982 (Gascuel et al., 2007).

The West African countries that make up the environmentally significant Marine Ecoregion[4] have taken a two-pronged approach to addressing this challenge, on the one hand regulating fishing practices and on the other establishing marine protected areas (MPAs). MPAs can provide a wide variety of benefits: the conservation of areas that are home to important biodiversity, serving as nursery grounds for fisheries and enhancing fish stocks, protecting habitats that buffer the impacts of storms and waves, and removing excess nutrients and pollutants from the water (OECD, 2016).

Countries in the West African region have a long experience of MPA establishment and management: the National Parks of Banc d'Arguin (Mauritania), Langue de Barbarie and Sine Saloum Delta (Senegal), for example, were created as early as 1976. The identification of ecological corridors between MPAs, and the pooling of countries' conservation efforts, resulted in the establishment of a regional network of MPAs in West Africa in 2007. Today the network includes 23 MPAs. Management of MPAs typically involves [illegible] applying types or levels of permitted use in [illegible]. For instance, many MPAs in Guinea-Bissau allow fishing by people living in and around them, with restrictions on the technology or gear they may use. In Mauritania, the Banc d'Arguin MPA is partially closed to fishing, allowing only the park residents (the Imraguens) to fish with small sailboats (Guénette et al., 2014). Many MPAs in the ecoregion also include areas that are strictly closed to fishing.

MPAs are intended to conserve habitats and fish populations and can also sustain or increase the overall yield of nearby fisheries (Balmford et al., 2004, OECD). Mauritania's Banc d'Arguin MPA supports about 23% of the total production and 18% of the total catch of the Mauritanian shelf ecosystem, and up to 50% for coastal fish. Of the 29 fish groups exploited, 15 depend on the Banc for more than 30% of their food, directly or indirectly (Guénette et al., 2014).

Managing an MPA effectively entails costs however: to employ staff and finance training, ensure adequate monitoring and enforcement, and other maintenance. In West Africa, where national capacities for government funding of MPA management are weak, project-based support by international donors has played an important role. In general, donor funding for MPAs is part of a wider portfolio of finance, and tends to support establishment costs, training, and other forms of capacity building. It also aims to put frameworks in place so that MPAs can become financially self-sufficient. Such support, however, is often short-term and can be vulnerable to changes in donor priorities (Carr-Dirick and Klug, 2002).

2. For details see Guénette et al. (2014).

3. Demersal fish live and feed on or near the bottom of seas or lakes.

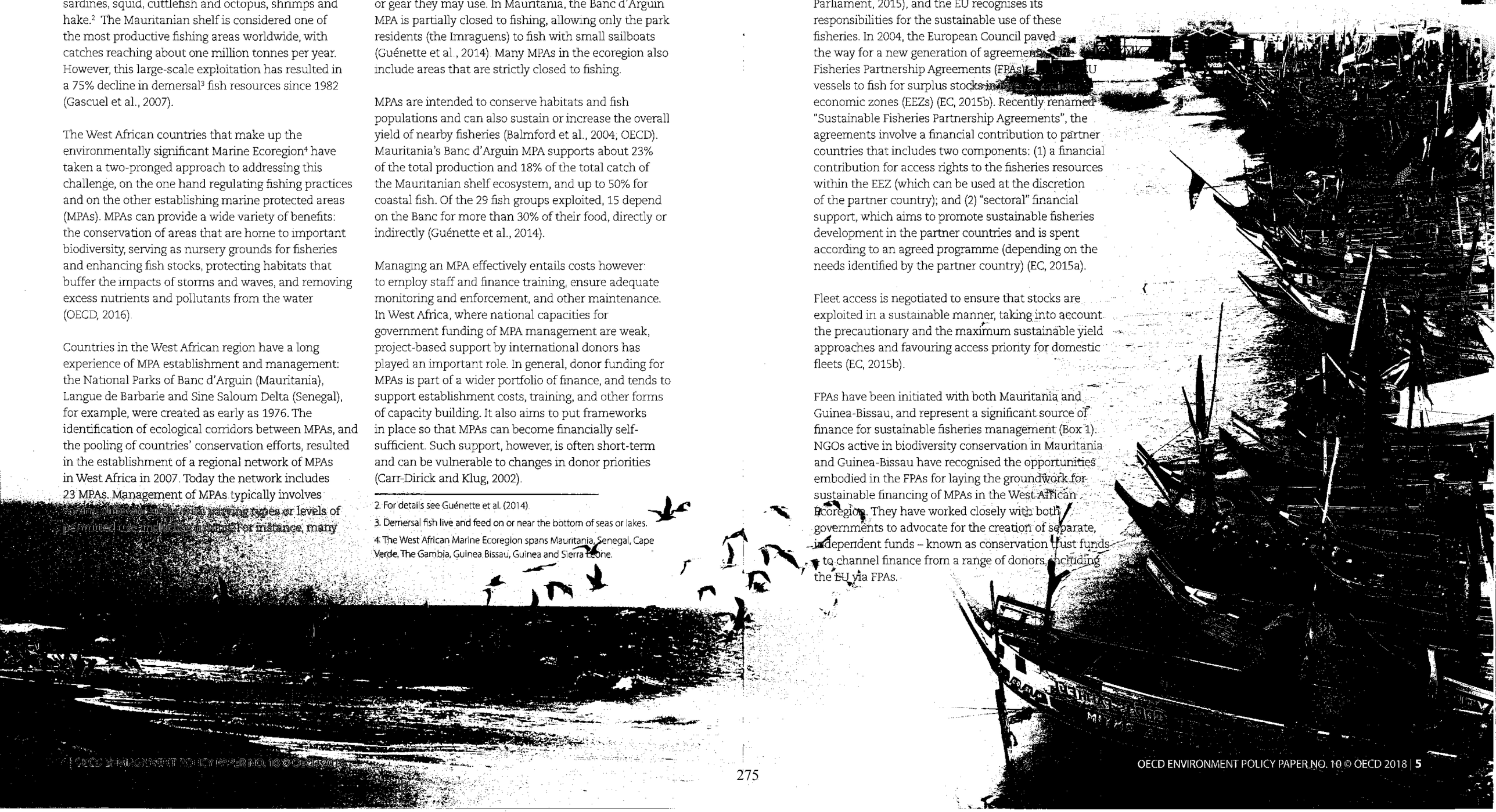
4. The West African Marine Ecoregion spans Mauritania, Senegal, Cape Verde, The Gambia, Guinea Bissau, Guinea and Sierra Leone.

Response: Channelling international ecosystem payments into conservation trust funds

A quarter of the EU's fishing catches take place in third countries and international waters (European Parliament, 2015), and the EU recognises its responsibilities for the sustainable use of these fisheries. In 2004, the European Council paved the way for a new generation of agreements [illegible] Fisheries Partnership Agreements (FPAs) [illegible] U vessels to fish for surplus stocks in [illegible] economic zones (EEZs) (EC, 2015b). Recently renamed "Sustainable Fisheries Partnership Agreements", the agreements involve a financial contribution to partner countries that includes two components: (1) a financial contribution for access rights to the fisheries resources within the EEZ (which can be used at the discretion of the partner country); and (2) "sectoral" financial support, which aims to promote sustainable fisheries development in the partner countries and is spent according to an agreed programme (depending on the needs identified by the partner country) (EC, 2015a).

Fleet access is negotiated to ensure that stocks are exploited in a sustainable manner, taking into account the precautionary and the maximum sustainable yield approaches and favouring access priority for domestic fleets (EC, 2015b).

FPAs have been initiated with both Mauritania and Guinea-Bissau, and represent a significant source of finance for sustainable fisheries management (Box 1). NGOs active in biodiversity conservation in Mauritania and Guinea-Bissau have recognised the opportunities embodied in the FPAs for laying the groundwork for sustainable financing of MPAs in the West African Ecoregion. They have worked closely with both governments to advocate for the creation of separate, independent funds – known as conservation trust funds – to channel finance from a range of donors, including the EU via FPAs.

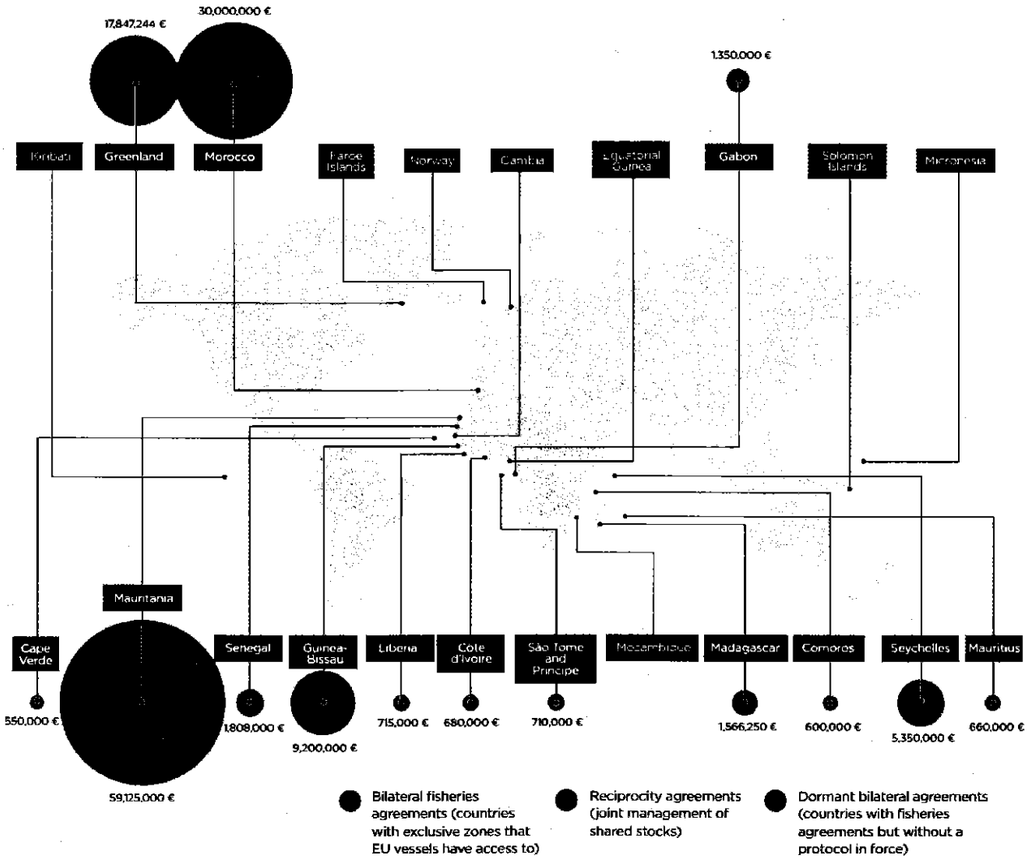


Box 1. Fisheries Partnership Agreements in West Africa

In the West Africa Marine Ecoregion, the FPA initiated in 2006 with Mauritania was the EU's single largest agreement, both in financial terms (EUR 86 million a year directly from the EU), and in terms of fisheries opportunities (Figure 1). Approximately 200 licences were available for European vessels to fish in Mauritanian waters (EC, 2007). The agreement was renewed in 2015, committing EUR 59 million per year to the partnership, with EUR 4 million to support the fishing communities, including environmental sustainability, job creation and tackling illegal and unregulated fishing (EC, 2015a). Other countries of the Ecoregion with an FPA with the EU include Cape Verde, Guinea-Bissau (with more than EUR 9 million committed), and Senegal.

In 2009, for example, the total EU contributions were 15 times the national budget for fisheries in Mauritania and accounted for more than 16% of the country's total public revenues; the EU contribution is comparable in Guinea-Bissau (15.6% of total public revenues) (Oceana, 2011).

Figure 1. EU Fisheries Partnership Agreements are significant in West Africa



Source: EC (2015b), "EU SFPAs: Sustainable Fisheries Partnership Agreements", Infographic, https://ec.europa.eu/fisheries/sites/fisheries/files/docs/body/2015-sfpa_en.pdf.

Conservation trust funds are "private, legally independent grant-making institutions that provide sustainable financing for biodiversity conservation and often finance part of the long-term management costs of a country's protected area system" (CFA, 2008). They can offer several advantages, including (GEF Secretariat, 1998):

- providing a vehicle for collaboration among the government, NGOs, and the private sector;
- the capacity to involve a wide range of stakeholders through participatory structures;
- the capacity to attract a diverse range of national and international funding sources;
- a stable, long-term source of funding, allowing for long-term planning and strategy implementation.

Mauritania's BACoMaB Trust Fund

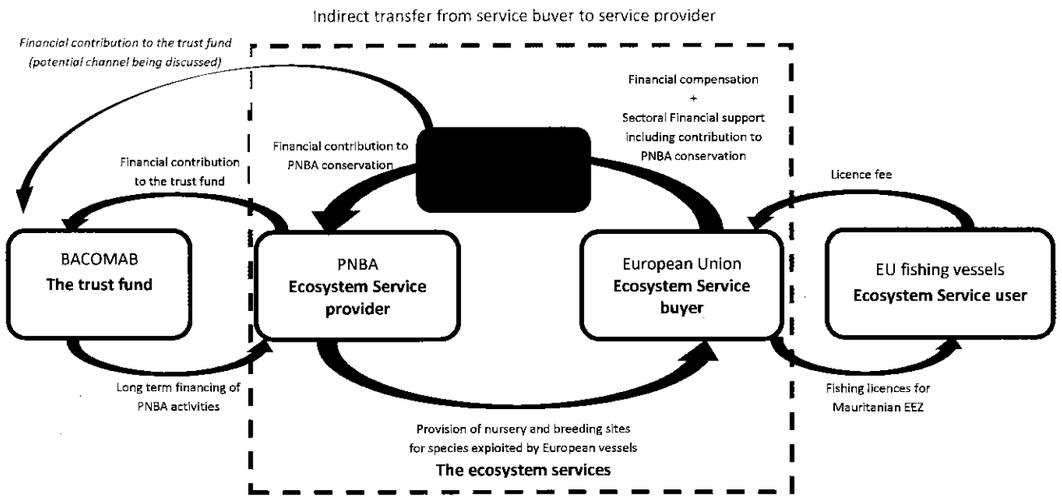
The impetus for establishing the BACoMaB Trust Fund (*Fonds Fiduciaire du Banc d'Arguin et de la Biodiversité Côtiére et Marine*) for marine conservation in Mauritania emerged in the early 2000s in a context of declining donor support. Conservation organisations working in Mauritania began to explore ways of achieving more sustainable financing for the Banc d'Arguin National Park (PNBA), a large MPA covering 20% of the whole Mauritanian shelf and one of the most important zones in the world for nesting birds and migratory waders. The Banc d'Arguin is a key contributor to marine ecosystems, constituting a major nursery for several species and sustaining a large part of the Mauritanian marine production (Guénette et al., 2014).

Lobbying, co-ordination of stakeholder interests and action then followed. This was driven, in particular, by the *Fondation Internationale du Banc d'Arguin* (FIBA), a long-term partner of Banc d'Arguin National Park with a strong influence on conservation in Mauritania (Goyet, 2016; Renaud, 2016). Persistent and determined lobbying of various EU institutions (DG Fisheries, DG Research, DG Development, and DG Environment) between 2003 and 2005 generated support from the highest authorities in the EU (Office of the President of the European Commission) for the park to be a key element of the FPA with Mauritania (Goyet, 2016). This decision was partly based on research that identified the Banc d'Arguin as a key contributor to fish resources (Guénette et al., 2014).

The BACoMaB Trust Fund is not funded directly. Under the FPA, the EU provides sectoral support funds (i.e. EUR 4 million a year) that are paid into Mauritania's national budget. The Mauritanian government then channels part of the sectoral financial support (EUR 1 million a year) to the PNBA (Figure 2). As these funds largely exceeded the PNBA's absorption capacity, it was agreed to allocate 50% of these funds (EUR 500 000 a year) to BACoMaB. The government's commitment to contribute to the BACoMaB Trust Fund has been a key factor in attracting additional contributions from other international partners.

This arrangement has been described as an international payment for ecosystem services, with the EU acting as an ecosystem service buyer, financing the trust fund to enable the park authorities to effectively manage the MPA (Binet et al., 2013).

Figure 2. Paying for ecosystem services in Mauritania: funding marine protected areas from Fisheries Partnership Agreements (FPAs) through a conservation trust fund



Source: Adapted from Binet et al. (2013), "First international payment for marine ecosystem services: The case of the Banc d'Arguin National Park, Mauritania", *Global Environmental Change*, (23) 1434-1443.

Guinea-Bissau's BioGuinea Foundation

Guinea-Bissau hosts the largest mangrove area in West Africa and the most important green turtle nesting site in West and Central Africa. Various laws enacted between 1997 and 2011 led to the establishment of a network of protected areas in Guinea-Bissau, including several MPAs. Dialogue and growing understanding of the relationship between management of coastal and marine protected areas and the fish breeding and nursery grounds they sustain led to agreement that fisheries funds could support the management of important coastal and marine protected areas. The link was thus made between the conservation of the coastal environment and the fisheries of Guinea-Bissau and beyond. This shared understanding at the technical level ensured sustained commitment despite the frequent turn-over in governments engendered by political instability. The enthusiasm and willingness of key advocates for the scheme, including people in government, were also important factors for success.

The BioGuinea Foundation (FBG) was legally established and registered in 2011 under English law. The purpose of this conservation trust fund is to generate sustainable finance for the national system of protected areas. The experience of BACoMaB in Mauritania was a key factor in its creation, with the same international partners involved in conservation in both countries. The EU was also a strong supporter of the process, having been involved from the beginning. The trust fund is currently in the process of securing its initial seed capital. Commitments in the order of EUR 5 million have been made, which include EUR 1 million from the Guinea-Bissau government. Of this, EUR 500 000 is to be drawn from the sectoral support included in the 2014-17 Protocol of the FPA with the EU (as specified in the approved joint programming for 2015), and the rest from other sources (Bastos, 2016). The first tranche of EUR 500 000 was transferred by the government to the FBG in January 2016.

Economic and environmental impacts

Economic impacts

The FPA and conservation trust fund arrangement have helped to significantly increase Mauritania's budget for the conservation of marine and coastal areas. As of April 2015, total commitments to endow BACoMaB had reached EUR 22.3 million, of which EUR 21.3 million has been disbursed. The Mauritanian government has contributed EUR 2.8 million from the 2006-08 and 2008-12 protocols of the FPA with the EU, while other donors include the Agence Française de Développement (AFD: EUR 3.5 million), the German KfW Development Bank and the MAVA Foundation (EUR 10 and 6 million respectively). For a trust fund established as recently as 2009, this level of capitalisation is very satisfactory according to some observers. It has, however, been achieved progressively, which means that BACoMaB has yet to be a major source of support for conservation activities in Mauritania (Lefghih, 2016). Since 2014 BACoMaB has allocated grants of EUR 650 000 for coastal and maritime surveillance, conservation, and research activities – only a small proportion of the amount of capital in the endowment (BACoMaB, 2015).

Distributing the increased financial support among different and competing stakeholders is a challenge, and competition among them risks stifling reform in favour of marine biodiversity in Mauritania. PNBA and BACoMAB compete for FPA funds, in spite of their supposedly shared interest in conserving the Banc d'Arguin. The current executives of the PNBA wish to benefit from the totality of the FPA funds and regularly criticise the legal basis for channeling funds to BACoMAB, stating that the conservation trust fund itself is not mentioned in the FPA Protocols, nor in the Mauritanian budget law of 2007. The government's contribution is based on a legally questionable agreement between the previous Director of PNBA in 2013 and the BACoMaB (Beddiyouh, 2016). This has offered the basis for the current Director of PNBA to challenge the use of PNBA funds for the endowment of BACoMaB (Beddiyouh, 2016).

Donors, however, remain supportive to a certain extent. Ensuring the financial sustainability of the PNBA through the BACoMaB remains an important objective for the EU (Appriou, 2016). This is motivated by the multi-level governance set up by the trust fund to manage its endowment, allocate grants, and monitor and evaluate the activities of beneficiaries (Appriou, 2016; Lefghih, 2016). As the PNBA lacks this governance structure, a direct and unconditional allocation of funds to PNBA is difficult to justify before the Court of Auditors of the EU (Beddiyouh, 2016). BACoMaB recently took the initiative to address a request for direct funding to the EU and the Mauritanian Ministry of Fisheries, and appears to have obtained positive feedback. This potential new channel for receiving EU funds is currently being discussed (Appriou, 2016; Beddiyouh, 2016).

In Guinea-Bissau, the arrangement is more recent. Government commitments to the FBG trust fund remain ad hoc, and are not currently challenged, but concerns have been raised that it is now time for the trust fund to show that it can indeed support conservation activities. In this context, the French Global Environment Fund[5] recently granted support to a set of pilot programmes to be run by the trust fund independently of its endowment.

5. *Fond Français pour l'Environnement Mondial.*

Environmental impacts

Although it is too early to assess the impacts of the conservation trust funds on the marine environment, by offering a secure source of funds to manage MPAs they offer significant potential to improve environmental outcomes. The effectiveness of MPAs in ensuring more sustainable fisheries has been documented in many cases, especially those which ban all fishing (i.e. no-take zones). MPAs allow fish stocks to recover, and can increase total catch and catch-per-unit-effort (Garcia et al., 2013; Guénette et al., 2014; OECD, forthcoming). As for the FPAs, in principle, they should only allow EU vessels to fish the surplus resources of partner countries. However, this concept of surplus is very difficult to apply in practice due to lack of reliable information on fish stocks and fishing effort of the various fleets. A report by the European Court of Auditors found that the implementation of access conditions was not sufficiently robust and the Commission's role in monitoring implementation of the protocols was limited (European Court of Auditors, 2015). Earlier reviews of FPAs have raised similar concerns about the effectiveness of the agreements in improving sustainable fisheries management. Even with such mixed results, however, FPAs play an important role in the wider effort to improve the sustainability of fisheries.

Lessons learned

From a political economy perspective, several lessons can be drawn from the experience of Mauritania and Guinea-Bissau in establishing conservation trust funds for marine protected areas.

Making the economic case for ecosystem services can build commitment to ensuring sustainable finance

Making clear links between the greater provision of ecosystem services and economic benefits was a useful strategy in both Mauritania and Guinea-Bissau for establishing broad support. Local support for conservation trust funds also requires that they rapidly demonstrate their potential as actual grant makers. This is especially important given that the opportunity cost of allocating finance to a conservation trust fund (rather than to more immediate needs) is felt acutely by the government, and given that the benefits (more sustainable fisheries, biodiversity conservation) are longer-term and accrue to a wide range of actors (fishers, tourists).

Concerted lobbying and consensus building are key

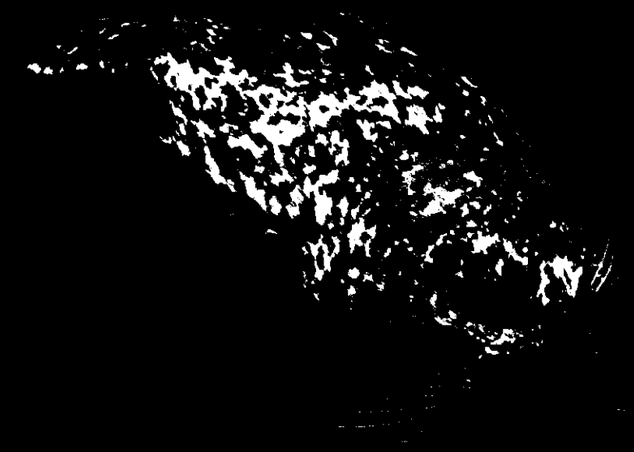
In both Mauritania and Guinea-Bissau it was concerted lobbying efforts by environmental NGOs that helped to establish a shared understanding of the benefits that MPAs bring to the fishing sector and the benefits trust funds bring to marine conservation. A well-established and credible "broker" (FIBA) played a key role in establishing this consensus, through active lobbying and co-ordinating all those involved in country, in the EU, and in the broader donor community. Aligning the interests of governments and the conservation community was essential to seize opportunities offered by shifts in the EU's fisheries policy. Support from other donors (KfW, AFD, MAVA foundation) was, in part, built on the demonstrable commitment of governments to engage in the process, and on the innovative character of the arrangement.

Conservation funding mechanisms need to be financially and institutionally sustainable

Environmental policies and their reforms in developing countries are often disrupted by a lack of domestic funding or financing restrictions by donors. This undermines achievements and progress made. This is why funding mechanisms that are sustainable, such as conservation trust funds, are important. However, underpinning this financial arrangement with a strong institutional framework is equally important. Vested interests do not simply disintegrate once a policy reform has been enacted – political priorities can shift and governments can change. Frequent changes in leadership and staff in key institutions may create a void when champions or experts move on, resulting in existing policies becoming vulnerable to back-tracking. For example, as Mauritania's capitalisation of the endowment was based on an informal understanding, it was rapidly challenged when leadership of partner institutions changed. This has jeopardised the partnership between the trust fund and the protected area authorities. Thus, the agreements themselves need to be grounded in a firm legal basis. External support can help build the institutional capacity required. In Guinea-Bissau, support by the International Union for Conservation of Nature (IUCN) and the World Bank has been instrumental in setting up and running the FBG and in laying the ground work for broader institutional change for conservation.

Towards a more permanent solution?

In a context in which governments' priorities have shifted away from conservation (resulting in fewer resources for sectoral support under the FPAs) and in which relatively low interest rates challenge the rationale for placing funds in an endowment, it is unclear whether and how resources from FPAs will continue to support marine conservation. The transitory nature of the arrangement could also jeopardise long-term commitments, as FPAs and protocols are renegotiated on a regular basis, as are government budgets. Paradoxically, such uncertainties are one of the main justifications for establishing conservation trust funds in the first place. One option to address this would be for the EU to directly finance the trust funds to ensure its own goals (and financial management rules) under the Common Fisheries Policy are met.



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Sustainable financing for marine ecosystem services in Mauritania and Guinea-Bissau

This Policy Paper summarises efforts in two West African countries – Mauritania and Guinea-Bissau – to mobilise international finance to sustain the marine biodiversity upon which fisheries depend, and to establish conservation trust funds. It examines the main impacts and challenges encountered, and draws out some wider lessons learned for other countries tackling similar environmental issues. This country study country study draws on the 2017 OECD report *The Political Economy of Biodiversity Policy Reform*.

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For further reading on the political economy of biodiversity-related reform, see the following report on which this Policy Paper is based:

OECD (2017), *The Political Economy of Biodiversity Policy Reform*, OECD Publishing, Paris, www.oecd.org/environment/the-political-economy-of-effective-biodiversity-policy-reform-9789264269545-en.htm.

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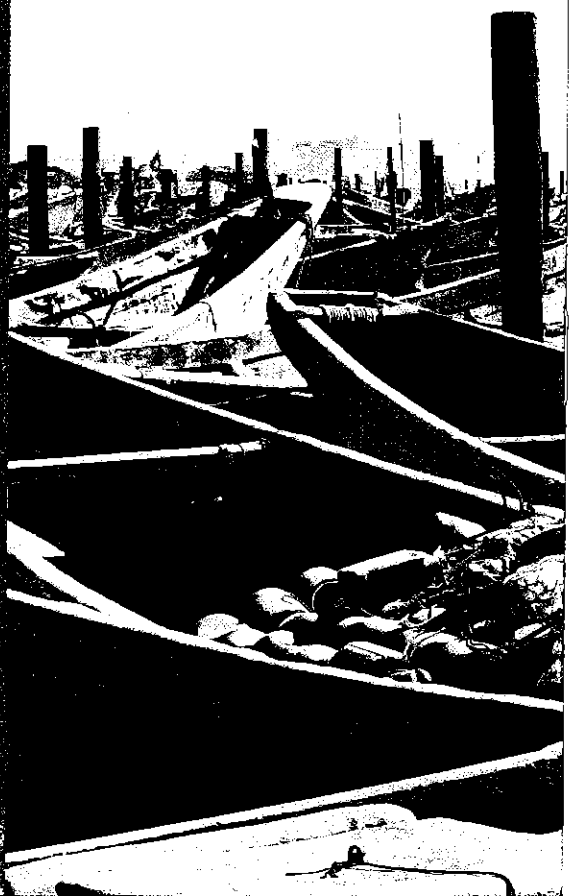

OECD
BETTER POLICIES FOR BETTER LIVES

OECD Environment Directorate,
February 2018

Sustaining Iceland's fisheries through tradeable quotas

COUNTRY STUDY

OECD ENVIRONMENT POLICY PAPER NO.

OECD

BETTER POLICIES FOR BETTER LIVES

This Policy Paper summarises key messages from the case study on the political economy of reform of the fisheries management system in Iceland. The detailed case study is available in the 2017 OECD report *The Political Economy of Biodiversity Policy Reform*. A separate "Policy Highlights" brochure, which distils key messages and lessons learned from the full report is also available.

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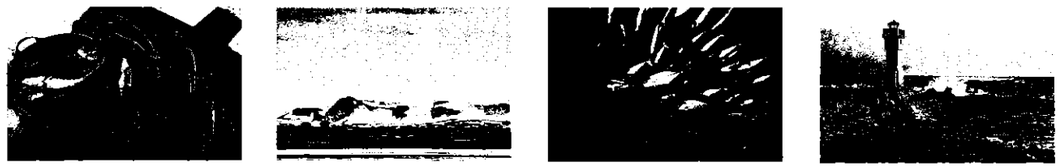


Contents

1 Overview

Iceland's rich marine resources are vital to the country's prosperity, but prior to the 1990s were being depleted at an unsustainable rate. This was despite efforts to impose various restrictions on fishing and to keep out foreign fleets. Without further drastic action, fish stocks and the entire industry based upon them was in imminent danger of collapse, threatening major economic hardship for the entire country.

The challenge

As a common property resource, fisheries are notoriously difficult to manage in a sustainable manner. Imposing limits on fishing gear, effort and fishing periods was simply prompting a "race to fish" amongst competing vessels in Iceland's fishing industry. There was no incentive for individuals to hold back their fishing effort and the fishery continued to suffer from overexploitation. This situation was exacerbated by government support to the industry – including allowing total catch volumes which exceeded scientifically recommended levels.

The policy response

In the face of looming disaster and with little time for broad consultation, the government introduced a comprehensive system of individual transferable quotas (ITQs) via the Fisheries Act in 1990. The ITQ system gives fishers permanent quota shares which they can also lease or sell, providing an incentive to take a long-term view on the harvesting and management of the resource. Fishers can be confident of being able to reap the benefits later of restricting fishing now. Alternatively, less efficient vessels can opt to leave the industry and receive compensation through the sale of their quotas, thus helping to encourage a more efficient and profitable sector.

The impact

The Icelandic ITQ system is seen as a success in terms of economic efficiency and as a way of drastically reducing fishing effort to safeguard the sustainability of fish stocks. It provided the incentives for fishers to safeguard stocks through decreasing effort and catches, while at the same time securing their long-term economic future. Although conserving biodiversity was not an explicit objective, the reform created the necessary incentives to reduce total catch levels and thus to put the fishery on a sustainable footing. Currently, none of the commercially harvested species in Iceland is considered to be threatened due to overfishing.

Key messages

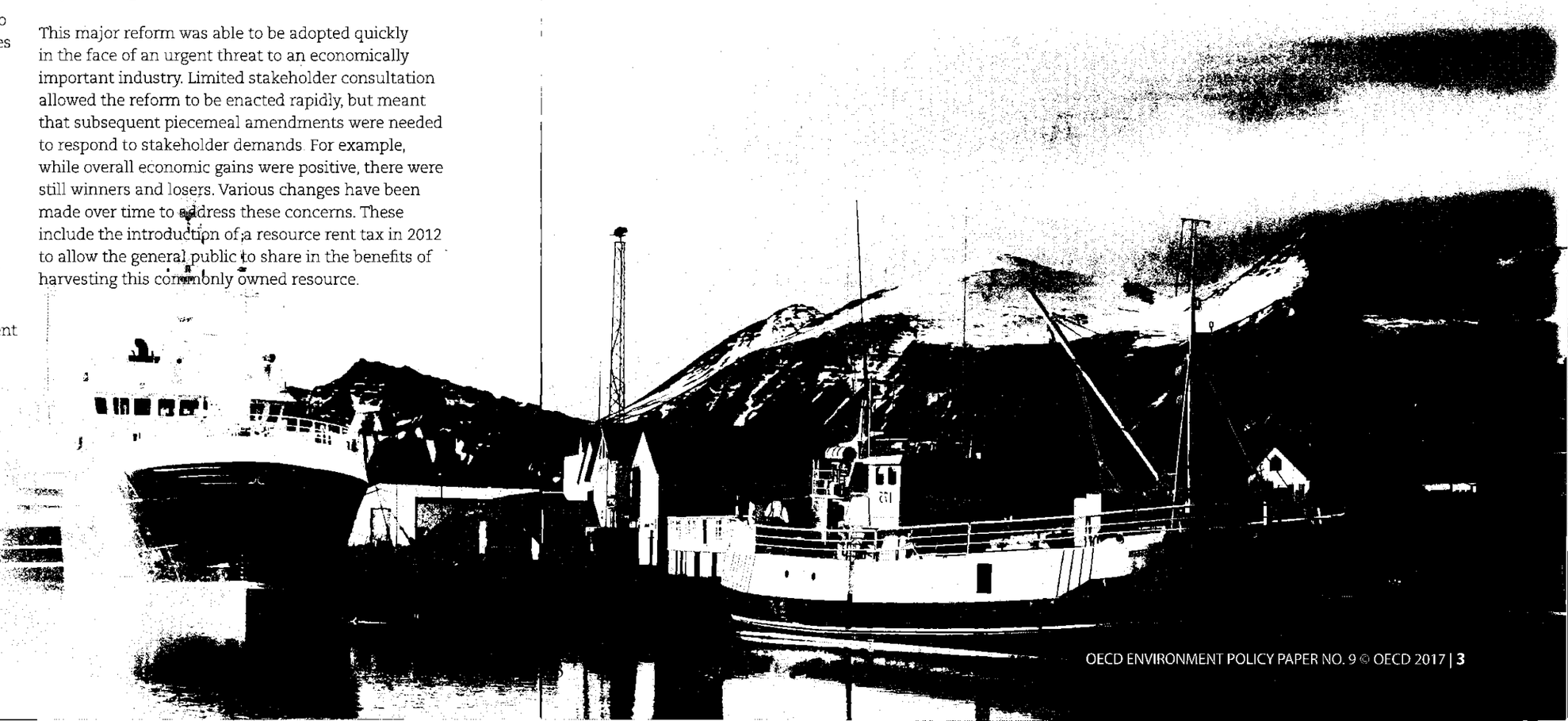
This major reform was able to be adopted quickly in the face of an urgent threat to an economically important industry. Limited stakeholder consultation allowed the reform to be enacted rapidly, but meant that subsequent piecemeal amendments were needed to respond to stakeholder demands. For example, while overall economic gains were positive, there were still winners and losers. Various changes have been made over time to address these concerns. These include the introduction of a resource rent tax in 2012 to allow the general public to share in the benefits of harvesting this commonly owned resource.

2 Sustaining Iceland's fisheries through tradeable user rights

Fishing is a mainstay of the Icelandic economy. The warm and cold currents in Icelandic seas combined with nutrient-rich seawater provide an environment highly conducive to flourishing marine life and high-yield fishing grounds. This productive marine ecosystem has supported a robust fishing industry, accounting for about 5% of gross domestic product (GDP) in 2015, and is still vital to Iceland's prosperity, being the most important industry in many rural regions.

From the end of World War II, however, the increasingly unsustainable exploitation of fisheries became a serious problem. Fishing in Iceland expanded considerably in the post-war period, with fishing fleets taking ever-increasing catches due to technological advances and a considerable increase in the size of the Icelandic fleet. Contrary to the prevailing belief at the time, good fishery management was not secured by imposing various restrictions on fishing, limiting access by foreign fleets or providing subsidies for scrapping fishing vessels. In the 1970s and early 1980s, Iceland's Marine Resource Institute published alarming reports (known as "The Black Reports"), warning that if overfishing continued catches were going to fall drastically and calling for reform.

This paper describes the reform taken by Iceland to avert this looming crisis and restore fish stocks to sustainable levels. The paper outlines the process involved in designing and implementing this reform. It also reflects on the challenges encountered and the environmental, economic and social impacts of the reform. It concludes by discussing some wider lessons raised for other governments seeking to tackle similar environmental problems.

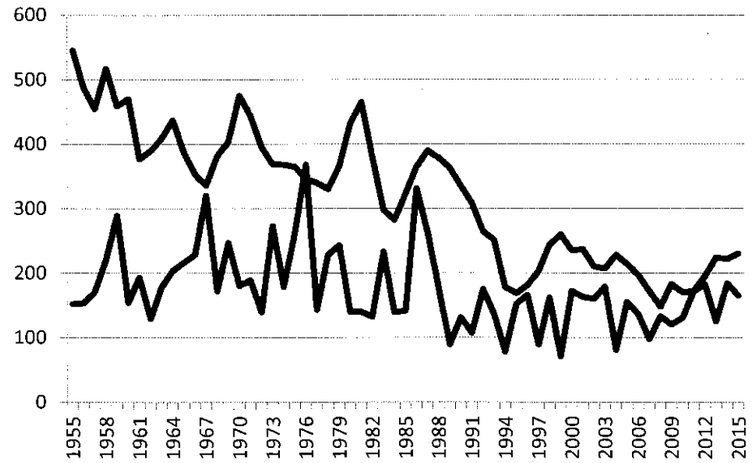


3 The initial policy challenge: sustaining a common resource

Following the publication of the first Black Report in 1975, the government introduced several measures to manage the fishery. These were predominantly "effort restrictions" (limitations on the number of days spent at sea and on the type of gear used), as well as setting total allowable catches (TACs) for different species. To reduce fishing by vessels from other nations, fishing limits had gradually been extended, to 12 miles, 50 miles and 200 miles in 1958, 1972 and 1976 respectively, resulting in significant declines of foreign catches in Icelandic waters.

However, none of these efforts dealt with the common property nature of the resource, and the fishery continued to suffer from overexploitation. It became apparent that Icelanders themselves had increased their fishing fleets and effort beyond what was biologically sustainable and that the economic performance of the fishing industry was poor as a result. The emphasis had been on increasing investments – often with state support – in the fishing fleet to generate jobs and support rural regions depending on fisheries (Schrank, 2003; Matthiasson, 2008). Furthermore, political and economic pressure from both the electorate and the industry meant that decisions by the Minister of Fisheries on allowable catches most often exceeded the scientifically determined TAC advised by the Marine Resource Institute, resulting in higher actual landings (Figure 1). These deviations from the scientific recommendations were justified by referring to the uncertainty of scientific evidence and the economic and social necessity of safeguarding employment.

Figure 1. Fish catches regularly exceeded the recommended TAC for cod, 1995-2015 (metric tonnes)



Source: Based on data from Marine Research Institute (2016), http://data.hafro.is.

A second Black Report was released in 1983. It was clear that the status quo would most likely lead to disaster. Given the importance of the fisheries for the national economy, its collapse would most certainly result in major economic hardships for the country as a whole. The poor economic performance of the fisheries, coupled with scientific evidence on the poor state of commercially important stocks, finally pushed parliament to introduce additional management measures.

4 Policy response

A comprehensive system of individual transferrable quotas (ITQs) was introduced with the Fisheries Act in 1990. The reform built on ITQ systems that had been previously used in some fisheries (herring, capelin, and demersal fisheries[1]), and which had proven to be very successful in reducing fleet sizes and fishing effort. The essential feature of the ITQ system is that the quotas represent defined shares in the TAC of given stocks each fishing year (Box 1). While it was necessary to reduce TACs for many species, notably cod, the fishers received quota shares in return, which helped them to survive the consequent economic hardships. The quotas are permanent, perfectly divisible and fairly freely transferable. Discarding of fish is prohibited, as is high-grading (an attempt to increase the value of the catch by tossing out low-value fish caught unintentionally).

Box 1. What are individual transferrable quotas and why are they important?

Individual transferable quotas (ITQs) for fisheries are a property rights system that creates incentives for fishers to harvest fish stocks sustainably.[2] The regulator sets a species-specific total allowable catch (TAC), then allocates portions of the TAC, called quotas, to individual fishers or fishing companies to be held in perpetuity. These quotas give fishers secure access to harvesting rights which enables them to take a long-term perspective on the sustainable management of the resource; they can be confident that by restricting fishing to within sustainable levels it will safeguard their harvest or increase their opportunities to increase fishing later. Restricting the TAC to sustainable levels also increases the value of quotas. This is of utmost importance as it eliminates the wasteful race-to-fish and the so-called "tragedy of the commons", in which many individual users acting in their own self-interest deplete a shared resource through unregulated action. If the TAC is set at an appropriate level and there is effective monitoring and enforcement, ITQs can result in sustainable exploitation of fish stocks.

ITQ systems also create incentives for fishers to operate in an economically efficient manner. The quotas are transferrable, so owners can trade, lease or sell them. This creates financial incentives to maximise the net return they generate on their quota. The less efficient vessels can exit the fishery, for which they are compensated through the sale of their quotas.

The ITQ reform process was primarily driven by scientists, politicians and public servants. The involvement of other stakeholders, such as industry leaders and trade unions, was minimal. The limited initial stakeholder engagement allowed for the rapid adoption of this major reform, but it meant that piecemeal adjustments were later made to the system to respond to stakeholder demands. For example, regional quotas were put in place to support communities where fishing is an economic mainstay, small vessels were initially exempted from the ITQ system to protect rural employment; and a coastal fisheries system was devised to accommodate new entrants using small-scale line fishing, considered by some to be more ecologically sound. However, some of these exemptions and adjustments undermined the economic efficiency and sustainability of the fisheries management system (discussed below).

1. Demersal fish such as cod live and feed on or near the bottom of seas or lakes.

2. See OECD (2012).

5 Economic, environmental and social impacts

Economic impacts

From a pure economic theory point of view, property rights-based systems in fisheries, if designed and implemented correctly, should yield numerous economic benefits, including:

- Reduced fishing effort due to the elimination of competition between vessels.
- Reduced cost of effort as firms can focus on catching their share with the lowest costs.
- Improved quality of catch as the firms are restricted by the quotas and can only increase revenue by improving quality.
- Reduction in fleet size due to rationalisation through buying and selling of quotas (less efficient vessels sell quotas and opt out of the fishery).
- The generation of profits.

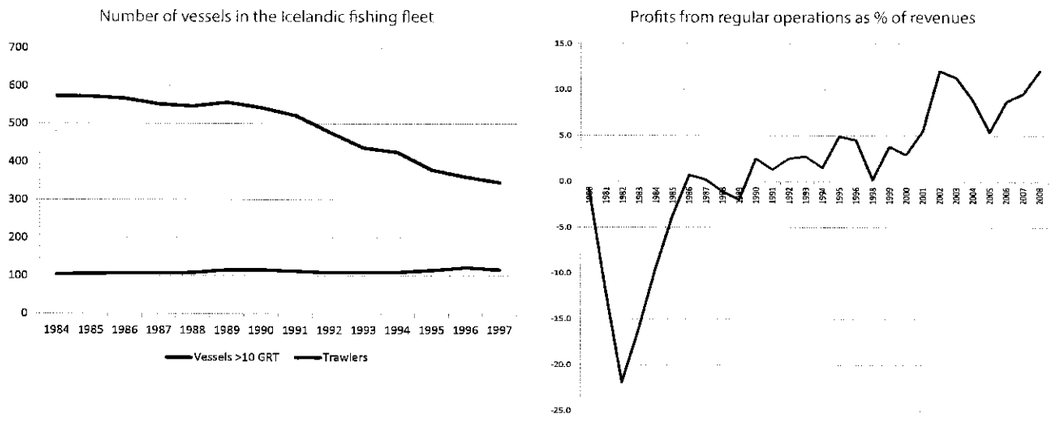
There is ample evidence to support the view that the Icelandic ITQ system has been very successful in increasing efficiency in the fisheries. Overcapitalisation, in the form of too large a fleet, unravelled quickly and profitability increased (Figure 2). The former situation in which the fishing fleet was receiving state aid rapidly became history.[3] Although direct subsidies in the Icelandic fisheries were generally lower than in many other countries, various support programmes existed, e.g. public investments funds, funds granting fuel subsidies, vessel buyback programmes and export grants. Also, before the ITQ system, the exchange rate of the national currency was regularly adjusted to improve the competitiveness of Iceland's fish exports.[4] These support measures all ceased after the introduction of the ITQs.

Following the ITQ reforms, total productivity in the fishing industry increased – it was 73% higher in 1995 than in 1973, compared to an increase in total productivity in other industries (excluding fish processing) of 21% over the same period (National Economic Institute, 1999). One measure of the economic efficiency of the ITQ system is quota values over time. The annual quota rental values in the Icelandic fisheries increased dramatically (around 20-fold) between 1984 and 1999 (OECD, n.d.).

3. For a discussion see e.g. Arnason (2005) and Asche et al. (2014).

4. For a discussion see Schrank (2003).

Figure 2. Significant consolidation of the Icelandic fishing fleet led to higher profitability



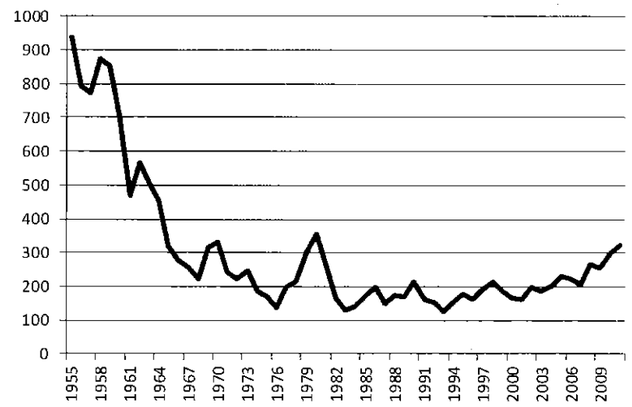
Note: GRT= "gross registered tonnes".

Source: Based on data from Statistics Iceland (2016), Rekstraryfirlit fiskveiða 1997-2015 [http://px.hagstofa.is/pxis/pxweb/is/Atvinnuvegir/Atvinnuvegir__sjavarutvegur__afkomasja/SJA08101.px, (accessed 16 August 2016); and personal communication with G. Thordardottir.

Environmental impacts

It is more difficult to evaluate the biological success of the system because of the inherent complexity and dynamics of the ecological system. However, it is clear that the reduction in fishing effort has secured the sustainability of most of the commercially exploited species. Figure 3 shows that since the ITQs were introduced, cod spawning has slowly begun to stabilise and recover from the sharp declines of previous decades. Currently, none of the commercially harvested species in Iceland is considered to be threatened due to overfishing. For many years, demersal fish catches exceeded levels recommended by scientists, but over the past decade the limit of total allowable catches has been in line with the advice of the Marine Research Institute (see Figure 1).

Figure 3. Trends in spawning stock biomass for cod



Source: Based on data from Marine Resource Institute (2016), http://data.hafro.is/assmt/2016/cod/.

While the main purpose of most of the marine fisheries management areas (i.e. geographically designated management areas) has been to secure the sustainable use of the harvested resources, their goal was not necessarily to conserve biological diversity per se (MENR, 2014). For this reason, traditional management measures that protect habitat and reproduction capabilities in the ecosystem have always been applied along with the ITQ system in Iceland. These measures include closures of spawning grounds and areas to protect juveniles, as well as restrictions on gear types for certain time periods and fishing grounds. These measures are based on scientific recommendations provided by the Marine Research Institute and are implemented frequently. Some zones have been closed to fishing for many years, while others are closed for shorter time periods. The Coast Guard plays an active role in patrolling these management measures.

Social impacts

While the ITQ system has been considered a success from an economic efficiency perspective and has helped fish stocks to recover, political tensions and discontent have still come to the surface. The emergence of distinct winners and losers prompted political demands that have led to a number of exemptions and amendments to the system over the years, as well as efforts to better distribute the benefits of harvesting this commonly owned resource. Some of the key social questions facing policy makers, and how they were addressed, are outlined below.

How to ensure fair sharing of benefits?

Introducing a property rights-based system, such as ITQs, leads to changes that benefit some more than others. Much of the discontent over the years following the reform has been due to the initial free allocation of the quotas to existing fishers based on their catch levels at the time. This approach of initially "grandfathering" fishing rights is very common for property rights-based systems because it is often politically easiest and can be more efficient than some other means of distribution. However, more than three decades later, this is considered by some people in and outside the industry to have been an unjust way of allocating rights to harvest a commonly owned resource. According to the Fisheries Act, fish in Icelandic waters are the common property of the nation, yet the right to harvest them has been transferred to the quota owners. People who live in fishing regions where quotas are sold or leased are often left with few other employment opportunities and can experience economic and social hardships. Although the quota owners receive payment for their quotas, others that depended on fishing for their livelihood, directly or indirectly, do not receive such payments. While it is undeniable that the Icelandic economy has benefitted greatly from a more efficient fishing industry, the ITQ system generates profits for companies in the industry which some believe should be shared to a greater extent to the general public.

A resource rent tax introduced in 2012 sought to remedy some of these concerns. The tax takes into consideration the profit margin of harvesting different species and the revenues raised go to the general government budget. The tax levied on the industry amounted to ISK 12.8 billion for the fishing year 2012/13 and ISK 7.7 billion for the fishing year 2014/15. To put this into perspective, total tax receipts from all Icelandic firms (tax on revenue and profits) amounted to roughly ISK 58.6 billion in 2015 (Statistics Iceland, 2014; The Financial Management Authority, 2016).

How to safeguard small-scale fishers?

The transferability of quotas is an essential feature if a quota system is to increase the economic efficiency of the fishery. Quotas are sold or leased from less efficient vessels to more efficient ones. The smallest boats in the fishing fleet were originally exempt from the ITQ system due to political desire to conserve employment in rural fishing villages by safeguarding this fleet from consolidation through quota trade. However, although as a fleet they were allocated a total catch limit, no restrictions were put on effort or catches for individual boats. The catches of this fleet were substantial, accounting for around 35% of the total cod catches in Iceland in the 1994/95 fishing year. After various attempts to reduce the fishing effort of these small vessels, the Minister of Fisheries finally decided in 2004 to require them to enter the ITQ system.

Demands were still made for specific measures for smaller vessels, however, mostly on the ground that entry into the fishing industry was difficult for newcomers. Also, small-scale hand-line fishing was considered by some to be ecologically superior to other fishing methods – and it was argued that encouraging such activities could create employment and revitalise fishing communities. The authorities thus allowed for a specific coastal fishery system, which opened up in 2009. This is mainly a cod-fishery where small vessel owners can apply for a specific license. The only gear allowed is hand-line and the fishing season is limited to the summer months. However, this rapidly has turned into a derby-style fishery, with fishers competing to catch as much as quickly as possible. As this fishing is mostly carried out by seasoned fishers who had already left the industry or are already quota holders, it failed to ease access for new entrants (University Centre of the Westfjords, 2010).

This experience clearly shows the complicated political economy issues that can arise in fisheries reforms where certain fleet segments are not treated in the same way. By exempting small-scale fishers from being managed under an ITQ system they had an incentive to free-ride instead of participating in rebuilding fish stocks (Haraldsson, 2008).

How to protect fishing-dependent regions?

There have also been concerns about quotas being sold or leased from towns or regions where fishing is the mainstay of the economy. To address these concerns, special regional quotas were introduced in 2002. The authorities set aside a part of the TAC for specific species and distributed it to rural regions. As ITQs are determined as a percentage of TACs, this meant that the regional quotas were distributed at the cost of quota holders, who were not compensated for their loss. These quotas are a relatively small share of the total TAC and decisions regarding their distribution are taken by the Minister of Fisheries. These decisions are based on various factors, such as the employment status of the town or region concerned, whether quotas have been leased or sold from the area, how dependent the region is upon fisheries, etc. The idea behind the regional quotas is to help the communities rather than the fishing firms directly.

Whether and how the ITQ system has affected regional development in Iceland is a complicated issue as factors other than fisheries have an effect on whether people and businesses leave or enter various regions.[5] A recent study indicates that the effects of the regional quotas differ widely from one region to another (Karlsson and Johannesson, 2016). Interestingly, the regional quota allocation has also benefitted the greater capital region, due to its geographical proximity to some of the regions that received regional quotas. This is probably due to the region's importance in processing and handling fish (Karlsson and Johannesson, 2016).

5. See Runolfsson (1997) and Ásgeirsson (2012).

6 Lessons learned

The Icelandic ITQ system has been a success in terms of economic efficiency and as a way of drastically reducing fishing effort to safeguard the sustainability of the fish stocks. It provided the correct incentives for the sustainable harvesting of fish and made it possible for fishers to safeguard stocks through decreasing effort and catches, while at the same time securing their long-term economic future.

However, the reform still generated winners and losers, an issue which piecemeal amendments following the reform have sought to address. Understanding the political economy of reform – i.e. how decisions are made, in whose interests and how reform is promoted or obstructed and why – can be crucial to reform success. This is certainly the case for biodiversity related reform, where obstacles can include competitiveness concerns, distributional implications (impacts on income), vested interests, and political feasibility (OECD, 2017). What lessons with wider resonance have emerged from the Icelandic experience?

An imminent crisis aided speedy adoption

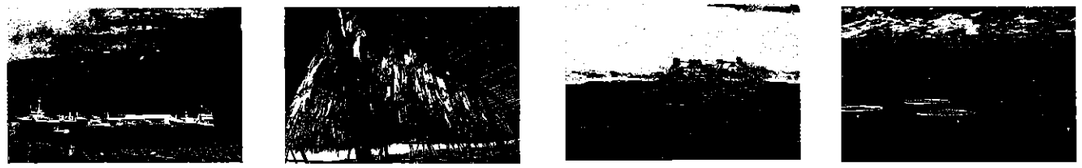
The introduction of the Icelandic ITQ system for managing its fisheries was a major reform spurred by an imminent collapse of the most important fish stock, which would have put the fishing industry in peril and would have meant economic hardship for the country as a whole. Given the importance of the fishing activity to the Icelandic economy people were willing to undertake strong measures. Having positive experiences from similar measures on a smaller scale helped.

Limited initial stakeholder engagement led to subsequent piecemeal reforms

Generally, stakeholder engagement can help secure the broad support and durability of reforms. Where governments need to act quickly to avert a crisis, however, a balance needs to be struck to provide opportunities for stakeholder engagement, without unduly delaying the reform process. In the case of Iceland, some industry stakeholders, such as fishers and people whose livelihood depended to a great extent on fishing, were not explicitly engaged in the reforms or the implementation of the ITQ system. Including every possible stakeholder group would have taken time and resulted in a political debate at every step of the process. On the other hand, limited initial stakeholder engagement meant that subsequent piecemeal amendments were later made – such as to protect small fishers and certain regions – which may have undermined the sustainability and efficiency of the system. Such trade-offs are typical of the political economy surrounding biodiversity related reforms.

Overall economic gains may be positive, but there are still winners and losers

Although the ITQ system increased the economic efficiency and profitability of fisheries, the initial free allocation of quotas via the grandfathering scheme raised concerns about the distribution of benefits reaped from a common property resource. The resource rent tax offered a constructive way of allowing the country to share the benefits more widely.



Biodiversity protection needs additional safeguards

Although the reform was mainly driven by economic concerns, it nevertheless benefitted biodiversity by putting the fisheries on a more sustainable footing. As the focus of ITQs is typically limited to a subset of commercially exploited fish species, their ability to conserve biodiversity in the broader context is constrained by the scope of their application. When it comes to limiting the overall effects of fishing on biodiversity, other measures in addition to TACs for different species are needed.[6] Thus, traditional management measures that protect habitat and reproduction capabilities in the ecosystem have always been in place along with the ITQ system.

6. For a discussion on similar issues in New Zealand, see Mace, Sullivan and Cryer (2014) and for a general discussion of how incentive based measures may be applied to help conserve biodiversity see Pascoe et al. (2010) and Innes et al. (2015).

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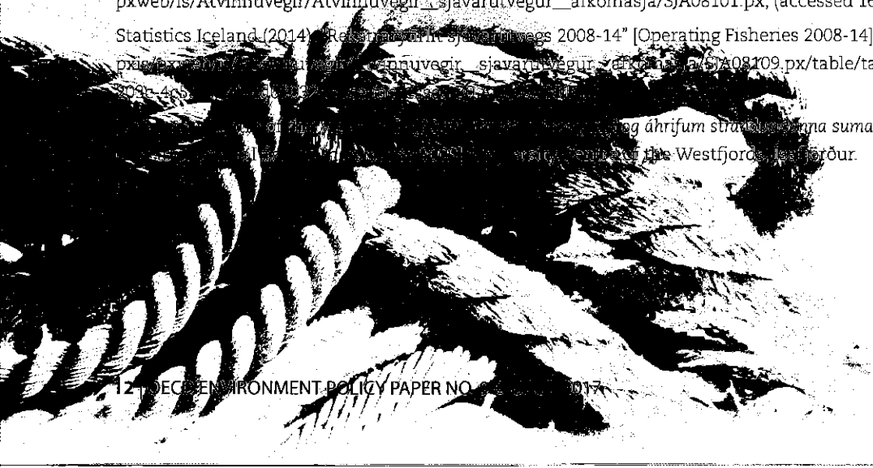

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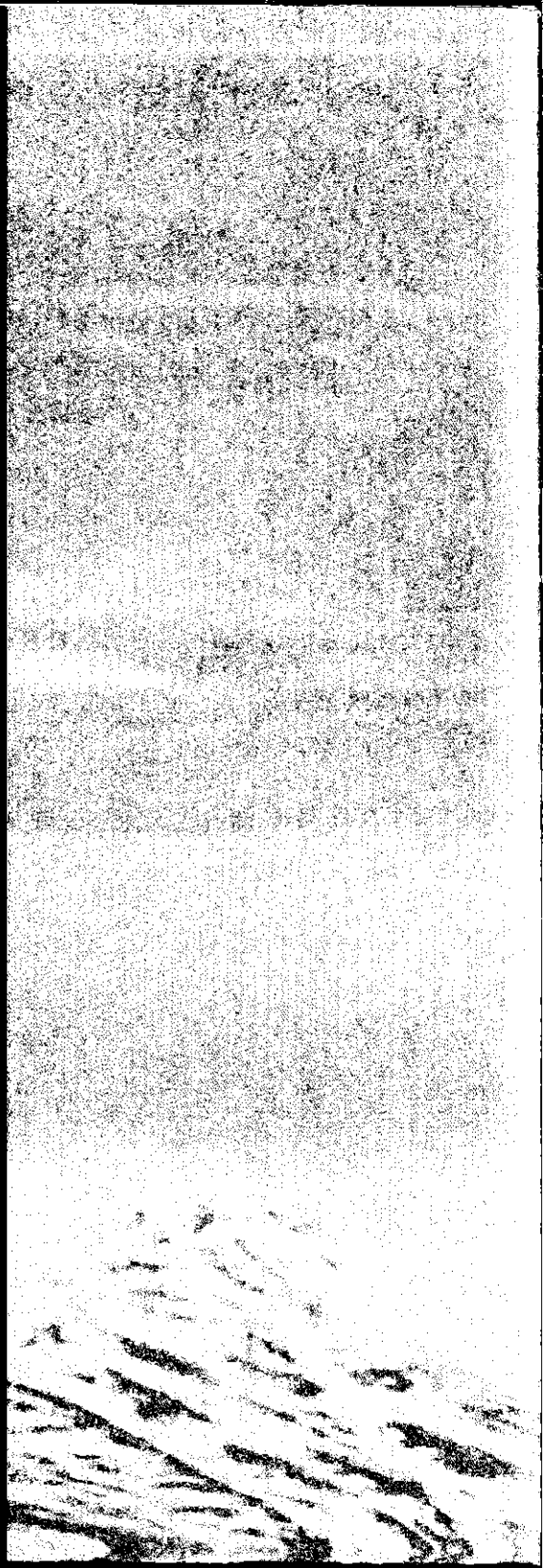
Sustaining Iceland's fisheries through tradeable quotas

This Policy Paper analyses the reform undertaken by Iceland to avert a looming crisis and restore fish stocks to sustainable levels. The paper outlines the process involved in designing and implementing this reform. It also reflects on the challenges encountered and the environmental, economic and social impacts of the reform. It concludes by discussing some wider lessons learned for other governments seeking to tackle similar environmental problems. This country study draws on the 2017 OECD report *The Political Economy of Biodiversity Policy Reform*.



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For further reading on the political economy of biodiversity-related reform, see the following report on which this Policy Paper is based:

OECD (2017), *The Political Economy of Biodiversity Policy Reform*, OECD Publishing, Paris, www.oecd.org/environment/the-political-economy-of-effective-biodiversity-policy-reform-9789264269545-en.htm.

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