

THERE'S SOMETHING FISHY IN THE MEDITERRANEAN: THE HARMFUL IMPACT OF OVERFISHING ON BIODIVERSITY

AARTI GUPTA†

INTRODUCTION

The Mediterranean Sea is connected to the Atlantic Ocean, surrounded by twenty-one countries,¹ and almost entirely enclosed by land.² Due to the attractiveness of the Mediterranean climate,³ characterized by “warm, dry summers and mild, humid winters,”⁴ the region is “highly populated and considered the greatest tourist destination in the world.”⁵ Not only is the Mediterranean an important trade route that is vital to many countries’ economies, it also houses a plethora of marine resources that serve a variety of needs.⁶ Over ten thousand marine species inhabit the Mediterranean, or seven percent of the total global marine species.⁷ Ten thousand species living within

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1. Philippe Cacaud, FAO Legal Consultant, General Fisheries Commission for the Mediterranean, *Fisheries Laws and Regulations in the Mediterranean; A Comparative Study*, Studies and Reviews No. 75 (2005) 33, <http://www.fao.org/3/a-y5880e>.

2. Carlos M. Duarte et al., *The Mediterranean Climate as a Template for Mediterranean Marine Ecosystems: The Example of the Northeast Spanish Littoral*, 44 PROGRESS IN OCEANOGRAPHY 245, 246 (1999).

3. See Carol M. Turley, *The Changing Mediterranean Sea – A Sensitive Ecosystem?*, 44 PROGRESS IN OCEANOGRAPHY 387, 387 (1999) (“The Mediterranean is highly populated and the greatest tourist destination in the world.”).

4. Duarte et al., *supra* note 2, at 246; Peter R. Dallman, PLANT LIFE IN THE WORLD’S MEDITERRANEAN CLIMATES xi (1998) (“The region around the Mediterranean Sea has a climate of mild, rainy winters and hot, dry summers.”).

5. Turley, *supra* note 3, at 387.

6. *Mediterranean Sea*, GREENPEACE INT’L (Mar. 20, 2014), <http://greenpeace.org/international/en/campaigns/oceans/our-oceans-and-seas/mediterranean/> [hereinafter GREENPEACE INTERNATIONAL] (“[M]ore than 10,000 species live in it and millions of people get food, work and pleasure from it. . .”).

7. United Nations Environment Programme (UNEP), Mediterranean Action Plan, Regional Activity Centre for Specially Protected Areas, *The Mediterranean Sea Biodiversity: State of the Ecosystems, Pressures, Impacts and Future Priorities*, UNEP-MAP RAC/SPA 2010, at 14,

such a small, nearly enclosed area makes the Mediterranean rich in biodiversity.⁸ This rich biodiversity of the Mediterranean basin has sustained human life and national economies for thousands of years.⁹

However, sustained human life and developing national economies have unfortunately spurred overfishing in the Mediterranean. This phenomenon has destroyed Mediterranean fish stocks and caused marine resources to be “over-exploited” for decades because of increased human activity, amplified demands on marine resources, and innovations in fishing technology.¹⁰ The effects of overfishing will become even more apparent as the Mediterranean population increases as predicted from 360,000,000 to roughly 520,000,000 by 2025, with the coastal population increasing to roughly 200,000,000.¹¹ Increased populations and resource demand will raise concerns over negative impacts on the Mediterranean’s marine biodiversity since diverse fisheries are susceptible to overfishing.

Several international proposals for reform have been passed in response to overfishing, including the United Nations Convention on the Law of the Sea (UNCLOS) and the European Union Common Fisheries Policy (CFP).¹² These treaties define nations’ rights with regards to the world’s oceans and encourage the declaration of fisheries protection zones.¹³ While UNCLOS and CFP apply to the international community in general, the General Fisheries Commission of the Mediterranean (GFCM) focuses specifically on the Mediterranean Sea and promotes the conservation of living marine resources within the region.¹⁴ Despite these international agreements, “illegal, unreported and unregulated fishing worldwide” has increased as fishermen ignore tighter regulations,¹⁵ and as states fail to monitor

16 (2010) [hereinafter UNEP report].

8. *Id.* at 17 (describing the “high biological diversity” of the Mediterranean Sea).

9. Dania Abdul Malak et al., IUCN RED LIST OF THREATENED SPECIES, *Overview of the Conservation Status of the Marine Fishes of the Mediterranean Sea*, 1 (2011), <https://portals.iucn.org/library/sites/library/files/documents/RL-262-001.pdf>.

10. *Id.*

11. Turley, *supra* note 3, at 393.

12. *See generally* United Nations Convention on the Law of the Sea, 1833 U.N.T.S. 397 (Dec. 10, 1982) [hereinafter UNCLOS]; Commission Regulation 2015/812, 2015 O.J. (L 133) 1 (EC) [hereinafter CFP].

13. UNCLOS, *supra* note 12; CFP, *supra* note 12.

14. *See generally* Global Mediterranean Council, *About GFCM*, GFCM, <http://www.gfcm.org/about/> [hereinafter About GFCM].

15. *Overfishing: A Threat to Marine Biodiversity*, U.N. DEP’T OF PUB. INFO. (DPI): TEN STORIES (2004), <http://www.un.org/events/tenstories/06/story.asp?storyID=800> [hereinafter TEN STORIES].

compliance or enforce reforms.

More targeted international and regional proposals are necessary to protect the Mediterranean before overfishing completely eviscerates the biodiversity of its marine life. Useful policies include establishing “spatial and temporal closure areas” for spawning and nursing, a fishing effort control system, and the compilation of more comprehensive “scientific evidence on the state of Mediterranean stocks.”¹⁶ In addition to new policy measures, greater cooperation between coastal states would enhance the sustainable utilization of fisheries resources in the Mediterranean.¹⁷ Countries in the Mediterranean must be both aggressive and proactive when establishing fishing mitigation procedures in order to protect fish species and preserve biodiversity.

I. THE MEDITERRANEAN SEA

The Mediterranean Sea covers an area of 2.5 million square kilometers¹⁸ representing 0.7% of the surface area of the world's oceans and 0.3% of their volume.¹⁹ Its coastline extends about 46,000 kilometers with an average depth of 1,500 meters.²⁰ The Mediterranean is semi-enclosed with a narrow connection to the Atlantic Ocean through the Strait of Gibraltar, the Black Sea through the Bosphorus Strait, and the Red Sea through the Suez Canal.²¹ Twenty-one countries surround the Mediterranean;²² it is bordered by Europe in the north, Asia in the east, and Africa in the south.²³ Because of its expansive geographical reach, the Mediterranean is the subject of a variety of conflicting interests with regards to marine resources, including the ongoing fishing conflict between Spain and Morocco.²⁴

There are both east–west and north–south divides in the

16. Marta Madina, *European Commission Confirms 91% of Mediterranean Stocks are Overfished*, OCEANA (2014), <http://eu.oceana.org/en/press-center/press-releases/european-commission-confirms-91-mediterranean-stocks-are-overfished> [hereinafter OCEANA].

17. Cacaud, *supra* note 1, at 33.

18. Malak et al., *supra* note 9, at 2.

19. J.P. Bethoux et al., *The Mediterranean Sea: A Miniature Ocean for Climatic and Environmental Studies and a Key for the Climatic Functioning of the North Atlantic*, 44 PROGRESS IN OCEANOGRAPHY 131, 132 (1999).

20. Malak et al., *supra* note 9, at 2.

21. Turley, *supra* note 3, at 388.

22. Cacaud, *supra* note 1, at 33.

23. Bethoux et al., *supra* note 19, at 132; Malak et al., *supra* note 9, at 2.

24. *See generally Morocco, Spain and Fishing*, AMERICAN UNIV., INVENTORY OF CONFLICT & ENV'T (ICE) CASE STUDIES (Jan. 1998), <http://www1.american.edu/iced/mORSPAIN.htm>.

Mediterranean.²⁵ The western and eastern basins are divided “by a sill at a depth of about 400 meters extending from Sicily to the North African coast.”²⁶ The waters in the eastern basin are much saltier²⁷ than average sea waters due to low levels of precipitation and high levels of irradiance.²⁸ Due “to the east–west gradient of both temperature and salinity,” biodiversity is only two-thirds of the biodiversity of the whole Mediterranean.²⁹ In the north–south divide, differences in climate, vegetation, and land-use³⁰ result in “abundant” temperate species in the north and subtropical species in the south.³¹ Due to the Mediterranean’s regional variances, overfishing has impacted—and will continue to impact—each of its regions differently.

II. OVERFISHING

Overfishing occurs when fish are captured at a faster rate than they can be replaced through reproduction, leading to a decline in yearly fish stocks.³² When a fishing territory is exploited, “the fish stock further contracts and develops an unbalanced population which is dominated by the youngest age groups” of fish.³³ The United Nations Food and Agricultural Organization has reported that “over 70% of the world’s fisheries are either ‘fully exploited,’ ‘over exploited’ or ‘significantly depleted’” as a result of destructive fishing.³⁴ The rate of depletion among the world’s fisheries has increased by a multiple of four in the past forty years causing the destruction of both fish and entire ecosystems.³⁵

25. C. Papaconstantinou & H. Farrugio, *Fisheries in the Mediterranean*, 1 MEDITERRANEAN MARINE SCI. 5, 5 (2000).

26. *Id.*

27. Malak et al., *supra* note 9, at 2.

28. Duarte et al., *supra* note 2, at 246.

29. Malak et al., *supra* note 9, at 3.

30. Turley, *supra* note 3, at 391.

31. Christophe Lejeune et al., *Climate Change Effects on a Miniature Ocean: The Highly Diverse, Highly Impacted Mediterranean Sea*, 25 TRENDS IN ECOLOGY AND EVOLUTION 250, 252 (2009).

32. *The Threats of Overfishing: Consequences at the Commercial Level*, DARTMOUTH UNDERGRADUATE JOURNAL OF SCI. (Mar. 11, 2012), <http://dujs.dartmouth.edu/2012/03/the-threats-of-overfishing-consequences-at-the-commercial-level/#.WAuwg4-cGUk> [hereinafter *Threats of Overfishing*]. Each year, the total number of fish declines from the level of the previous year. *Id.*

33. *Morocco, Spain and Fishing*, *supra* note 24.

34. *Threats of Overfishing*, *supra* note 32. “Exploited” means to fully take advantage of and derive a benefit from. Overexploitation means harvesting a renewable resource to the point of diminishing returns.

35. TEN STORIES, *supra* note 15.

Advanced fishing technology, including giant factory ships and large driftnets, have replaced small trawlers and fishing boats contributing to waste and illegal fishing.³⁶ This technology makes fish easier to find and catch which allows fisherman to “explore new shores and deeper waters to keep up with the increased demand for seafood.”³⁷ Specifically, giant factory ships can capture and process extremely large amounts of prey at a given time and contain large driftnets³⁸ up to seventeen kilometers in length.³⁹ Approximately “25% of the world’s captured fish end up thrown overboard because they are caught unintentionally, are illegal market species, or are of inferior quality and size.”⁴⁰

Heightened demand for fish has also contributed to overfishing. As demand for fish and fish products increase, fish prices rise and make investments in fisheries attractive to entrepreneurs and governments.⁴¹ The marine environment suffers severe consequences because of this chain reaction triggered by overfishing.⁴²

Overfishing devastates marine ecosystems in a variety of ways. Overfishing causes marine species to become either endangered or extinct because they cannot reproduce quickly enough to meet fishing demands.⁴³ Not only does overfishing “threaten the particular species of fish that is targeted for food,” it also damages other non-targeted species of fish since fishing equipment is “non-selective.”⁴⁴ Non-target fish, known as “bycatch,” are usually damaged and wasted when caught unintentionally.⁴⁵ Furthermore, overfishing leads to a disproportionate population of younger fish causing the average size of fish caught to decrease.⁴⁶ In the long run, “overfishing can have a devastating impact on ocean communities as it destabilizes the food chain and destroys the natural habitats of many aquatic species.”⁴⁷

36. *Threats of Overfishing*, *supra* note 32.

37. *Id.*

38. *Id.*

39. GREENPEACE INTERNATIONAL, *supra* note 6.

40. *Threats of Overfishing*, *supra* note 32.

41. TEN STORIES, *supra* note 15.

42. *Id.*

43. *See Threats of Overfishing*, *supra* note 32 (“Overfishing occurs because fish are captured at a faster rate than they can reproduce.”).

44. *Id.*

45. *Id.* Economists generally identify bycatch as a negative externality which does not show up in the pricing mechanism of the primary fish catch. *See generally* John R. Boyce, *An Economic Analysis of the Fisheries Bycatch Problem*, 31 J. ENVTL. ECON. & MGMT. 314 (1996).

46. *Morocco, Spain and Fishing*, *supra* note 24.

47. *Threats of Overfishing*, *supra* note 32.

II. MEDITERRANEAN FISHERIES

Mediterranean fisheries vary by location and production method.⁴⁸ Fishing activities generally take place along coastal regions where biodiversity is the greatest.⁴⁹ Though Mediterranean fishing production represents only a proportion of the world's overall production of fish, about 100,000,000 tons per year, Mediterranean fishing constitutes a substantial portion of the total European catch at nearly thirty-five percent of European value and twenty percent of European weight.⁵⁰ This is particularly notable given the relatively small surface area and volume of the Mediterranean. Additionally, the average price of fishing products is five to ten times higher in the Mediterranean than in most other regions of the world, primarily because the fish are provided fresh for consumption.⁵¹ These high prices provide strong incentives for fisheries to satisfy consumer demand for fish in the area.

There are three types of Mediterranean fisheries: “(1) small-scale [artisanal] fisheries, (2) trawling [fisheries], and (3) seining fisheries.”⁵² Artisanal fisheries are executed on a small scale requiring only “small amounts of capital and energy, small fishing vessels, short fishing trips,” and they “provide for local consumption or export.”⁵³ In 1990, European Union (EU) countries operated a total of 41,900 artisanal vessels in the Mediterranean amongst Greece, Italy, Spain, and France with Greece operating the largest number of vessels and France operating the least.⁵⁴ Second, trawling fisheries rely primarily on bottom and pelagic trawlers to capture fish.⁵⁵ Bottom trawling involves dragging a trawl along the sea floor while pelagic trawling, also known as midwater trawling, involves dragging a trawl through the free water above the ocean floor.⁵⁶ These fisheries are often characterized as

48. Papaconstantinou & Farrugio, *supra* note 25, at 6.

49. *Communication from the Commission to the Council and the European Parliament: Laying Down a Community Action Plan for the Conservation and Sustainable Exploitation of Fisheries Resources in the Mediterranean Sea Under the Common Fisheries Policy*, at 8, COM (2002) 535 final (Oct. 9, 2002) [hereinafter *Community Action Plan*].

50. Papaconstantinou & Farrugio, *supra* note 25, at 6–7.

51. *Id.* at 6.

52. *Id.* at 5.

53. *Artisanal Fisheries: What are Artisanal Fisheries?*, THE FISH PROJECT, <http://thefishproject.weebly.com/artisanal-fisheries.html> (last visited May 9, 2017).

54. Papaconstantinou & Farrugio, *supra* note 25, at 7.

55. *Id.*

56. *Pelagic or mid-water trawling*, SUSTAIN, https://www.sustainweb.org/goodcatch/pelagic_or_mid_water_trawling/ (last visited Mar. 7, 2017).

“serial” or “sequential depletion” fisheries “because fishing vessels find and deplete a stock and then move on and repeat the process.”⁵⁷ Finally, seining fisheries mainly use seine nets that hang vertically in the water with their top edge lifted by floats and their bottom edge held down by weights.⁵⁸ In 1990, EU countries operated a total of 4,300 seining vessels amongst Italy, Spain, Greece, and France.⁵⁹ All three types of fisheries are responsible for overfishing in the Mediterranean.

There are three types of Mediterranean living resources: (1) demersal resources, (2) small pelagic stocks, and (3) large pelagic stocks.⁶⁰ Demersal resources mostly consist of commercial species that “live and feed close to the seabed.”⁶¹ These species include grey mullets, sea bass, and sea breams which live along the coast; red mullets, poor cod, and sole which live along the upper zone of the continental shelf; Norway lobster and flat fishes which live along the continental shelf; and blue whiting and greater forkbeard which live in deep waters.⁶² Among these species, juveniles are under the most important fishing pressure because they are the easiest to catch even if targeted unintentionally by fishing efforts.⁶³ Small pelagic stocks are generally “distributed close to the coast, over the continental platform.”⁶⁴ These species, including sardines and anchovies, embark on seasonal migrations so the fisheries exploiting these species typically follow a cyclical schedule.⁶⁵ Large pelagic stocks consist of “large fish which live near the surface” of the water.⁶⁶ Examples include swordfish, tuna, and pelagic sharks which all have a “migratory and gregarious” nature.⁶⁷ Bluefin tuna are exploited, in particular, as “juveniles of this species are submitted to a heavy fishing pressure.”⁶⁸ Ultimately, all

57. MATTHEW GIANNI, HIGH SEAS BOTTOM TRAWL FISHERIES AND THEIR IMPACTS ON THE BIODIVERSITY OF VULNERABLE DEEP-SEA ECOSYSTEMS: OPTIONS FOR INTERNATIONAL ACTION 13 (2004).

58. *See Artisanal Fisheries*, *supra* note 53.

59. Papaconstantinou & Farrugio, *supra* note 25, at 7.

60. *Id.* at 7–8.

61. *Id.* at 7.

62. *Id.*

63. *See id.* at 8. (“In general, juveniles are under the most important fishing pressure. This results essentially from the fact that the sizes at first catch are very often similar to those at which fishes appear in the fisheries (recruitment). The artisanal fleets affect more the adult population, even though there is some degree of overlap.”).

64. *Id.*

65. *Id.*

66. *Id.*

67. *Id.*

68. *Id.*

varieties of Mediterranean marine species have been affected by overfishing in some way.

Despite significant differences between the western and eastern basins with regards to biodiversity, their patterns of overfishing are strikingly similar, with differences in catches rarely exceeding nine percent.⁶⁹ To provide an overview of the impact of overfishing on each part of the Mediterranean, the Sea can be broken down into seven divisions, all of which involve conflicts between surrounding countries: (1) Balearic area, (2) Gulf of Lions, (3) Sardinia, (4) Adriatic Sea, (5) Ionian Sea, (6) Aegean Sea, and (7) Levant Sea.⁷⁰

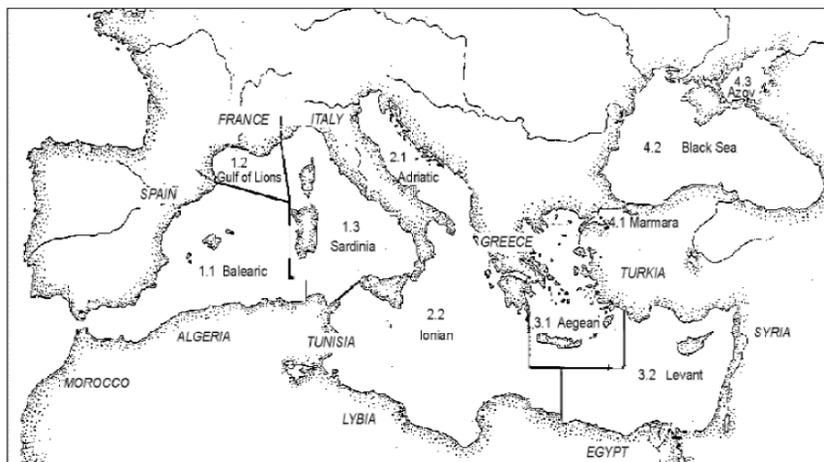


Figure 1: GCFM's Fishing Divisions of the Mediterranean⁷¹

The Balearic area “includes Spanish, Moroccan, and Algerian fisheries” and is a highly contested area.⁷² This area has “relatively high productivity” and the “small-scale inshore fishery is also well-developed,” . . . “where purse seiners and trawlers predominate”.⁷³ While sardines have been underexploited in the northern part because of low market demand,⁷⁴ there has been a gradual rise in anchovy stock exploitation and anchovy populations have steadily declined over time.⁷⁵

69. *Id.* at 10.

70. *Id.* at 11–14.

71. *Id.*

72. *Id.* at 11.

73. *Id.* at 7.

74. *Id.*

75. *Id.*

The Gulf of Lions includes French and Spanish fisheries and is dominated by small-scale fishing.⁷⁶ It is one of the most highly productive areas in the Mediterranean.⁷⁷ In the Gulf, the use of purse seines and trawlers has gradually increased and the methods are responsible for a spectacular increase in the anchovy catch.⁷⁸

Sardinia primarily includes Italian and Tunisian fisheries and is characterized by “generally low productivity” relative to other areas within the Mediterranean.⁷⁹ Small-scale fleets dominate and “represent[] more than 75%” of vessels in the area.⁸⁰ Hake, red shrimp, and mullet are fully exploited while sardines and anchovies are overexploited.⁸¹

The Adriatic Sea includes Italian fisheries and is the most productive area in the Mediterranean.⁸² The Sea’s “flat bottom covered by mud and sand” is biologically diverse due to a “strong nutrient outflow from incoming rivers.”⁸³ It is particularly conducive to “molluscan shellfish, small commercial invertebrates, and fish of high commercial value.”⁸⁴ The Adriatic Sea “is exploited by different fishing gear: trawls (pelagic and bottom), purse-seines, static nets and dredge fishery for clams in Italian waters.”⁸⁵ While the clam fishery was once “perhaps the most valuable fishery in the Mediterranean,” it has recently suffered from overfishing.⁸⁶

The Ionian Sea is dominated by Italian and Tunisian fisheries.⁸⁷ It is the second most productive division in the Mediterranean.⁸⁸ Its trawl fisheries are “aimed principally at [catching] shrimp” but have led to a “general state of full to overexploitation for several species, such as hake, rockfish, and red mullet.”⁸⁹

76. *Id.*

77. *Id.*

78. *Id.* at 11–12. The anchovy catch increased from 300 tons in 1980 to 8000 tons in 1989. *Id.* at 12.

79. *Id.* at 12.

80. *Id.*

81. *Id.*

82. *See id.* (describing the Adriatic Sea as “extremely productive”).

83. *Id.*

84. *Id.*

85. *Id.*

86. *Id.* at 13.

87. *Id.*

88. *Id.*

89. *Id.* There has also been an increased effort to exploit clams doubling production between 1979 and 1993. *Id.*

The Aegean Sea is dominated by Greek fisheries which consist of “about 20,000 small-scale fishery vessels equipped [with] trammel nets, gill-nets, long lines (surface or bottom), traps and beach seines.”⁹⁰ This area is “characterized by complex bathymetry” [which measures water depth] and a “narrow continental shelf.”⁹¹ While “formally considered an area of low biological productivity,” catches have increased in recent years,⁹² with the result that “stocks in this area are now in a general state of full to overexploitation for several species,” including anchovies.⁹³

The Levant Sea includes Turkish and Egyptian fisheries which rely primarily on small-scale and medium-sized vessels.⁹⁴ The Levant Sea is “characterized by a narrow continental shelf, high depth, and a low level of biological productivity.”⁹⁵ Greater scientific knowledge of the Nile Delta’s stock status and exploitation levels is wanting even though stock assessment studies for this area demonstrate a “generally overfished condition.”⁹⁶

The chart below illustrates the status of various species of fish in the Mediterranean. The chart classifies species by the division in which they are normally found, the rate at which they are overfished, and the necessary reduction in fishing necessary to prevent continued overexploitation. As the chart on the next page demonstrates, hake and blue whiting are the most exploited species and will require the most effort to preserve.⁹⁷

90. *Id.* at 14.

91. *Id.* at 13.

92. *Id.*

93. *Id.* at 14.

94. *Id.*

95. *Id.*

96. *Id.*

97. Turley, *supra* note 3, at 393.

Species		Fishing area	Overfishing rate (F/F _{msy})	Reduction in fishing effort to stop overfishing (F _{msy})
Anchovies (<i>Engraulis encrasicolus</i>)		Adriatic (GSA17-18)	2.1 (2013)	52%
Hake (<i>Merluccius merluccius</i>)		Gulf of Lyon (GSA7) Southern Adriatic (GSA18) Northern Spain (GSA6)	9.8 (2013) 5.3 (2012) 9.9 (2013)	90% 81% 90%
Blue whiting (<i>Micromesistius poutassou</i>)		Northern Spain (GSA6)	9.5 (2013)	89%
Striped red mullet (<i>Mullus surmuletus</i>)		Malta and South of Sicily (GSA15-16)	4.1 (2012)	76%
Deep water pink shrimp (<i>P. longirostris</i>)		Western Ionian (GSA19)	2.0 (2012)	49%
Sardine (<i>Sardina pilchardus</i>)		Adriatic (GSA 17-18)	2.3 (2013)	57%

Figure 2: State of Commercial Fish Stocks in the Mediterranean EU Waters⁹⁸

Mediterranean fish stocks, already seriously endangered from overfishing, will be burdened even more with human populations estimated to increase to “520–570 million by 2025, with the coastal population increasing from 133 to 200–220 million.”⁹⁹ Parallel reductions in fishing efforts are necessary to stabilize these stocks and preserve biodiversity in the area.

98. *Id.*

99. *Id.*

III. BIODIVERSITY

Biodiversity has an interpenetrating nature and is a source of global environmental security because the flexibility it provides cannot be replaced by manmade alternatives. Biodiversity provides commercial, economic, and social benefits that are difficult to replicate.¹⁰⁰ For instance, biodiversity boosts ecosystem productivity, regulates global climate conditions, and produces one-third of the oxygen humanity breathes.¹⁰¹ Since many of the benefits derived from biodiversity are public goods, a “global commons” problem arises because resource users lack incentives to maintain the supply of the public goods; there is no monetary value to conserving the biodiversity.¹⁰²

Biological productivity “fuels life in the ocean, drives its chemical cycles, and lowers atmospheric carbon dioxide.”¹⁰³ In the Mediterranean biological productivity is very uneven, with some regions experiencing greater biological production than others.¹⁰⁴ The Mediterranean’s highest level of biodiversity is concentrated between depths of zero and fifty meters deep, whereas only nine percent of Mediterranean species live below one thousand meters.¹⁰⁵ Even without overfishing the Mediterranean lacks “the strong currents and good vertical mixing that renews the nutrients in the surface waters,” leading to low biological productivity in some areas.¹⁰⁶ The Mediterranean’s “basin-wide circulation, hot-dry and seasonal climate and low land runoff contribute to the low productivity of the sea.”¹⁰⁷ In addition, currents and waves severely damage “the benthos, [] seagrass beds, [] [and] rocky and coral bottoms” which leads to sediment

100. Anup Shah, *Why is Biodiversity Important? Who Cares?*, GLOBAL ISSUES (Jan. 19, 2014), <http://www.globalissues.org/article/170/why-is-biodiversity-important-who-cares>.

101. U.N. Secretary-General, *Oceans and the Law of the Sea*, ¶ 1, U.N. Doc. A/60/63/Add.1 (July 15, 2005).

102. *See id.* ¶ 99 (explaining that “[e]conomic theory and evidence demonstrates that open access to [biological] resources leads to inefficient exploitation to the point that no further surplus value can be derived from these resources”). A public good is one that is both non-excludable in that individuals cannot be effectively excluded from use and non-rivalrous in that use by one individual cannot reduce availability to others. Examples include streetlights and clean air.

103. D. M. Sigman & M. P. Hain, *The Biological Productivity of the Ocean*, 3 NATURE EDUC. KNOWLEDGE 10, 10 (2012). Biological productivity is the amount and rate of production which occur in a given ecosystem over a given time period. It is nature’s capability to reproduce and regenerate, thus accruing biomass. *See id.* (describing the “ocean productivity” of phytoplankton).

104. Papaconstantinou & Farrugio, *supra* note 25, at 14–15.

105. *Id.*

106. *Id.* at 6.

107. Turley, *supra* note 3, at 387.

erosion making it difficult for species to reestablish themselves.¹⁰⁸ Though biological production is minimal in some parts of the Mediterranean, its overall biodiversity is rich due to geologic, environmental, and hydraulic factors including climate, salinity, and temperature gradients.¹⁰⁹

Mediterranean marine biodiversity has fluctuated drastically¹¹⁰ due to overfishing.¹¹¹ The three levels of biodiversity affected by overfishing are genetic diversity, species diversity, and ecological diversity.¹¹² Genetic diversity is the “genetic variability that occurs among members of the same species.”¹¹³ A “loss of genetic diversity weakens a population’s ability to adapt” to new environments.¹¹⁴ Fishing can apply enough pressure to decrease fishery populations to a point where they lose genetic variability; there are simply “not enough members in the gene pool to carry the full range of variability that once comprised the population.”¹¹⁵ Species diversity measures the “variety of species found in a community or ecosystem.”¹¹⁶ A loss of species diversity “weakens a community’s ability to adapt” to new environments.¹¹⁷ Overfishing can deplete species diversity by causing extinction and reducing species richness.¹¹⁸ Ecological diversity “measures the variety of types of biological communities.”¹¹⁹ A “loss of ecological diversity weakens the whole biosphere’s ability to adapt.”¹²⁰ Maintaining genetic, species, and ecological diversity is crucial to sustaining overall biodiversity.

108. Papaconstantinou & Farrugio, *supra* note 25, at 15.

109. Malak et al., *supra* note 9, at 2.

110. Carlo Nike Bianchi, *Biodiversity Issues for the Forthcoming Tropical Mediterranean Sea*, 580 HYDROBIOLOGIA 7, 7 (2007).

111. Mercedes Lee & Carl Safina, *The Effects of Overfishing on Marine Biodiversity*, originally published in 13 CURRENT: J. MARINE EDUC. 5, 5 (1995), <http://www.seaweb.org/resources/articles/writings/safina1.php>.

112. *Id.*

113. *Id.* at 5–6.

114. *Id.* at 6.

115. *Id.*

116. *Id.* at 7.

117. *Id.*

118. *Id.*

119. *Id.* at 8.

120. *Id.*

IV. INTERNATIONAL LEGAL FRAMEWORK

A. *United Nations Convention on the Law of the Sea*

Signed in 1982¹²¹ in Jamaica and effective in 1994, UNCLOS attempts to create a unified and comprehensive governance regime for the world's oceans, representing the "codification of customary international law and its progressive development."¹²² It defines the rights and responsibilities of nations regarding their use of the world's oceans and establishes guidelines for the management of marine natural resources.¹²³ Out of 167 parties represented in the Convention, 157 signed and 60 ratified the agreement.¹²⁴ While the United Nations (UN) has no direct role in implementing UNCLOS, the International Maritime Organization, International Seabed Authority, and International Whaling Commission all help monitor compliance.¹²⁵

One of the most powerful features of UNCLOS is that it determines the extent of national sovereignty over various regions of the oceans.¹²⁶ UNCLOS creates six marine jurisdictions and divides marine space both horizontally and vertically.¹²⁷ Vertically, "the sea is divided into the seabed or ocean floor and the superjacent water column."¹²⁸ Horizontally, the ocean is differentiated into zones according to relative distance from a nation's shoreline with various legal rights associated with each: (1) internal waters; (2) territorial waters; (3) contiguous zone; (4) exclusive economic zone; (5) continental shelf and (6) high seas.¹²⁹ These zones are depicted below.¹³⁰

121. Daniel Hollis & Tatjana Rosen, *United Nations Convention on Law of the Sea (UNCLOS), 1982*, THE ENCYCLOPEDIA OF EARTH (2013), <http://www.eoearth.org/view/article/156775/>; U.N. Secretary-General, *supra* note 101, ¶ 187.

122. Hollis, *supra* note 121.

123. *Id.*

124. *Id.*

125. *Id.*

126. *Id.*

127. U.N. Secretary-General, *supra* note 101, ¶ 179.

128. *Id.*

129. The baseline is the boundary from which a nation may begin measuring to determine the portions of the ocean or continental shelf over which it may exercise sovereignty. Hollis, *supra* note 121.

130. *Id.*

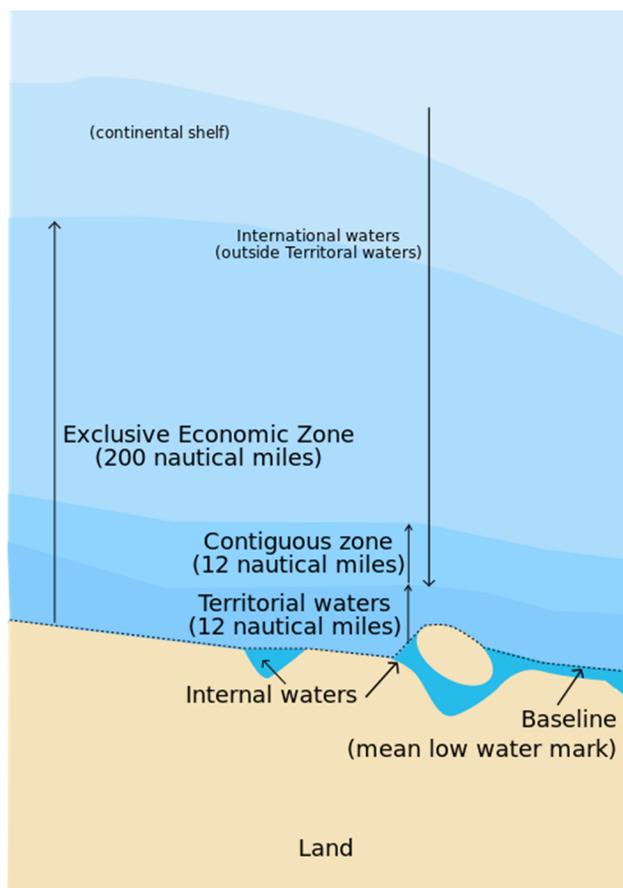


Figure 3: UNCLOS Marine Jurisdictions¹³¹

(1) Internal waters include all water and channels on the inland side of the baseline.¹³² The nation that contains these waters holds exclusive sovereignty.¹³³

(2) Territorial waters include all water stretching to twelve nautical miles (fourteen miles) from the baseline.¹³⁴ Within the territorial waters, a nation has exclusive sovereignty over the water, airspace, and seabed.¹³⁵ The coastal nation is free to set laws and regulate resource use.¹³⁶ While innocent passage is acceptable, non-

131. UNCLOS, *supra* note 12, art. 8, ¶ 1.

132. *Id.*

133. Hollis, *supra* note 1; UNCLOS, *supra* note 12, art. 2, ¶ 1.

134. UNCLOS, *supra* note 12, art. 3.

135. *Id.* art. 2, ¶ 2.

136. *Id.* art. 21, ¶ 1.

innocent activities, including fishing, weapons practice, spying, and polluting, are unacceptable within these waters.¹³⁷

(3) The contiguous zone includes all waters stretching twenty-four nautical miles from the baseline¹³⁸ (twelve more nautical miles beyond the outer boundary of the territorial waters).¹³⁹ The nation with jurisdiction may continue to enforce laws as necessary against transgressions in customs, taxation, pollution, and immigration in these waters.¹⁴⁰

(4) The exclusive economic zone (EEZ) includes all waters up to two hundred nautical miles from a nation's baseline.¹⁴¹ In the EEZ, coastal states have sovereign rights (including the right to explore, exploit, manage, and conserve) over both living and non-living natural resources.¹⁴² The coastal state also enjoys rights to protect the marine environment and conduct marine scientific research.¹⁴³ With regards to the conservation of living marine resources, a coastal state must determine an allowable catch and promote optimal utilization.¹⁴⁴

(5) The continental shelf is either the area between the coastline and continental margin's outer edge or two hundred nautical miles from the coastal state's outer edge (whichever is greater).¹⁴⁵ Coastal states have exclusive control over living resources within the continental shelf.¹⁴⁶ Water above the portion of the continental shelf that is not contained within the EEZ is considered the high seas.¹⁴⁷

(6) The high seas includes all water that is not part of the EEZ, territorial sea, or internal waters of a state.¹⁴⁸ Under the freedom of high seas regime, states enjoy freedom of navigation, overflight, and fishing on the high seas.¹⁴⁹ However, these freedoms must be exercised with due concern for other states' interests along with regard for the

137. *Id.* arts. 17–19. “Innocent passage” is passing through the territorial sea of another nation in an expeditious and continuous manner. *Id.* art 19, ¶ 1.

138. *Id.* art. 33, ¶ 2.

139. Hollis, *supra* note 121.

140. UNCLOS, *supra* note 12, art. 33, ¶ 1.

141. *Id.* art. 57.

142. *Id.* arts. 56, 73.

143. *Id.* art. 56.

144. *See id.* art. 61–62. An allowable catch is a limit set for a particular fishery, generally for either a year or fishing season. *See id.* (describing the coastal state's “allowable catch” duties).

145. *Id.* art. 76, ¶ 1.

146. *Id.* art. 77, ¶¶ 1, 4.

147. Hollis, *supra* note 121.

148. UNCLOS, *supra* note 12, art. 86.

149. *Id.* art. 87, ¶ 1.

general conservation and management of resources.¹⁵⁰ Landlocked states, in particular, have a right of access to and from the sea without taxation of transportation through transit states.¹⁵¹ UNCLOS vests primary responsibility for ensuring the protection of the high seas with flag states.¹⁵²

Article 119 of UNCLOS is significant for conserving living resources, including those living in the high seas.¹⁵³ UNCLOS no longer uses maximum sustainable yield as the goal of conservation measures; rather, it favors relevant environmental and economic factors which may be used to determine the level of abundance to be maintained in a fishery.¹⁵⁴ However, the language regarding these obligations is general and does not impose strict obligations.¹⁵⁵ UNCLOS *does* contain innovative provisions regarding the conservation of marine resources.¹⁵⁶ However, it requires its signatories or ratifying states to determine the nature of conservation measures, if any, that should be implemented in the fishery.¹⁵⁷ State action in this area is difficult to monitor.¹⁵⁸

B. 1995 UN Fish Stocks Agreement

The 1995 UN Fish Stocks Agreement is the first multilateral agreement created to implement UNCLOS provisions.¹⁵⁹ It seeks to “improve the conservation and management of straddling and highly

150. U.N. Secretary-General, *supra* note 101, ¶ 180.

151. UNCLOS, *supra* note 12, art. 127, ¶ 2.

152. *Id.*, art. 31. A flag state is the state under whose laws a commercial vessel is registered or licensed. The flag state is responsible for enforcing regulations over its vessels. These responsibilities include inspection, issuance of safety, and certification. *See id.*, art. 94 (describing the duties of the flag state).

153. *See id.*, art. 119.

154. *See id.* (describing how to determine “allowable catch and establish[] other conservation measures for the living resources in the high seas”). Maximum sustainable yield is the largest amount of fish that can be taken from a species’ stock over an indefinite period. *Glossary of Statistical Terms*, ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD), <https://stats.oecd.org/glossary/detail.asp?ID=1644> (Nov. 14, 2001).

155. *See* U.N. Secretary-General, *supra* note 101, ¶ 187 (“Fishing on the high seas must be exercised in conformity with the *general* provisions on conservation and management”) (emphasis added).

156. UNCLOS, *supra* note 12, art. 119.

157. *Id.*

158. *See* U.N. Secretary-General, *supra* note 101, ¶ 98–99 (describing the benefits gained from biodiversity as a “tragedy of the commons”).

159. Giselle Vigneron, *Compliance and International Environmental Agreements: A Case Study of the 1995 United Nations Straddling Fish Stocks Agreement*, 10 GEO. INT’L ENVTL. L. REV. 581, 586 (1998).

migratory fish stocks on a global scale and in a comprehensive manner.”¹⁶⁰ One method it uses in pursuit of its goals is creating regional organizations with “strong enforcement powers” and the capacity to impose binding obligations on states that are parties to UNCLOS.¹⁶¹ States must either become a member of a regional organization or agree to apply the conservation and management measures established by such a regional organization.¹⁶² Flag states, in particular, must “control [their] fishing vessels on the high seas by means of fishing licenses, authorizations, or permits in accordance with any regionally or globally agreed-upon procedures.”¹⁶³ Further, a flag state has reporting obligations, including an obligation to “record and report in a timely manner [its] vessel positions [and its] catch of target and non-target species.”¹⁶⁴ Regional organizations, such as the Global Council of the Mediterranean, are empowered under the UN Fish Stocks Agreement, but they still lack an independent verification system to hold fishing nations accountable.

C. Common Fisheries Policy (Community Action Plan)

Regional fisheries management conventions are responsible for addressing conservation and management of marine living resources.¹⁶⁵ First created in 1970, the Common Fisheries Policy (hereinafter “CFP”) is the EU’s fisheries policy and sets catch quotas for various types of fish.¹⁶⁶ Fishing limits must be set at sustainable levels no later than 2020, although there are still no enforcement or verification mechanisms in place if targets are not met.¹⁶⁷ To comply with the CFP and reduce overfishing, scientists have called for a decrease of fifty to sixty percent in the average fishing effort.¹⁶⁸

The Community Action Plan was developed under the CFP in 2002.¹⁶⁹ The Community Action Plan calls for the EU to play a leading

160. *Id.*

161. *Id.* at 587.

162. *Id.* at 587–88.

163. *Id.* at 590.

164. *Id.*

165. See *Mediterranean Fish Stocks on the Brink*, MEDREACT (July 2, 2016), <http://medreact.org/2016/02/07/mediterranean-fish-stocks-on-the-brink/> [hereinafter MEDREACT].

166. See generally CFP, *supra* note 12; MEDREACT, *supra* note 162; Carmen-Paz Marti Dominguez, *Fact Sheets on the European Union: The Common Fisheries Policy: Origins and Development*, EUROPEAN PARLIAMENT (June 2016), http://www.europarl.europa.eu/atyourservice/en/displayFtu.html?ftuId=FTU_5.3.1.html.

167. MEDREACT, *supra* note 164.

168. *Id.*

169. See generally Community Action Plan, *supra* note 49.

role in the Mediterranean¹⁷⁰ in ensuring the “conservation and sustainable exploitation of fisheries resources.”¹⁷¹ It advocates for declaring fisheries protection zones up to two hundred nautical miles from the Mediterranean coast and improving fisheries management throughout the Sea¹⁷² including better regulated recreational fishing.¹⁷³ Since most catches are made within fifty miles off of coastlines, the establishment of two hundred mile fisheries protection zones will likely contribute to better control of fisheries, particularly if all countries in the area cooperate.¹⁷⁴ Protection zones for fisheries would reduce the high seas area and modify access rights to certain fisheries which would mitigate excess fishing in these areas.¹⁷⁵ The Action Plan also calls for decisions at the international level with regard to highly migratory species, at the community or international level for demersal and small pelagic stocks, and at the national level for stocks fished by single member states.¹⁷⁶ Better monitoring the allocation of appropriate licenses and the size or use of the vessel monitoring system would alleviate some overfishing.¹⁷⁷ Finally, a reduction in fishing time as well as establishing total allowable catch limits for certain targeted species would reduce some catches.¹⁷⁸

V. MEDITERRANEAN LEGAL FRAMEWORK

Fisheries management in the Mediterranean is at a relatively early stage of development.¹⁷⁹ While scientists recommend that twenty to fifty percent of the Mediterranean Sea be fully protected, only one percent is currently protected.¹⁸⁰ “Quota systems are generally not applied, mesh-size regulations are usually set at low levels relative to scientific advice,” and fishing time has not been reduced.¹⁸¹

The EU adopted the Mediterranean Fisheries Regulation (hereinafter “Mediterranean Regulation”) in 2006 which applies only

170. *See id.* at 9 (“The Community must continue to take the lead in implementing an effective conservation and management system for Mediterranean fisheries.”).

171. Cacaud, *supra* note 1, at 35.

172. *Id.*

173. Community Action Plan, *supra* note 49, at 20.

174. *Id.* at 14.

175. Cacaud, *supra* note 1, at 35.

176. Community Action Plan, *supra* note 49, at 10–11.

177. *Id.* at 16.

178. *Id.* at 15–16.

179. Papaconstantinou & Farrugio, *supra* note 25, at 15

180. GREENPEACE INTERNATIONAL, *supra* note 6.

181. Papaconstantinou & Farrugio, *supra* note 25, at 5.

to the seven EU member states in the region (Spain, France, Greece, Cyprus, Italy, Slovenia, and Malta).¹⁸² Its goal is to improve fisheries management in order to “achieve sustainable fisheries, protect the fragile marine environment, and restore fish stocks to healthy levels.”¹⁸³ The Mediterranean Regulation utilizes an ecosystem approach by implementing certain technical measures including minimum mesh sizes, minimum distances from the coast, and maximum overall dimensions for fishing gears.¹⁸⁴ It also employs a “decentralized decision-making process” and establishes “multi-annual management plans both at the national and community level”.¹⁸⁵ In the Regulation’s “bottom-up integrated approach,” the “Member States are requested to draw up National Management Plans for the fisheries in their territorial waters,” which address fishing conducted by trawl nets, shore seines, and dredges.¹⁸⁶ While the Mediterranean Regulation came into effect in June 2010, the tools it introduced remain in an experimental stage¹⁸⁷ as Member States have “have largely failed to take all necessary measures to ensure full implementation.”¹⁸⁸ The Regulation could be expanded to all twenty-one countries in the region to provide more adequate coverage.

The GFCM was established under the provisions of Article XIV of the Food and Agricultural Organization of the UN Constitution and consists of twenty-three member states along with the EU.¹⁸⁹ The GFCM “promote[s] the development, conservation, rational management and best utilization of living marine resources, as well as the sustainable development of aquaculture in the Mediterranean” through cooperation with other regional fisheries management organizations.¹⁹⁰ Among other things, the GFCM mandates narrow entry to fisheries, limitations on fisheries in certain areas and during certain time periods, and restrictions on the horsepower and length of certain fishing vessels.¹⁹¹ However, coastal states have been reluctant

182. Ina Dimireva, *The Mediterranean Fisheries Regulation—Briefing*, EUBUSINESS (June 10, 2010), <http://www.eubusiness.com/topics/fisheries/mediterranean.806/>.

183. *Id.*

184. *Id.*

185. *Id.*

186. *Id.*

187. Note, *What Kind of Management for Mediterranean Fisheries?*, EUR. PARL. DOC. IP/B/PECH/IC/2012-068 (Nov. 2012).

188. Dimireva, *supra* note 181.

189. *About GFCM*, *supra* note 14.

190. *Id.*

191. Papaconstantinou & Farrugio, *supra* note 25, at 15.

to exercise their rights and extend national jurisdiction over Mediterranean waters,¹⁹² despite the GFCM's recommendations.¹⁹³ Thus far, "few [states] have claimed an [EEZ] or a fishing zone extending beyond" their territorial waters.¹⁹⁴ International law vests exclusive jurisdiction in the flag state that registered the vessel.¹⁹⁵ Therefore, the GFCM struggles to conserve marine resources because it lacks power to sanction vessels that violate conservation measures.¹⁹⁶

Fisheries legislation of the various Mediterranean countries contains a variety of conservation and management measures that can be classified into two broad categories: (1) "those aiming to keep the fishing effort under control," and (2) those aiming to rationalize exploitation patterns.¹⁹⁷ The first set of measures "is based on restrictions imposed on the number or fishing capacity of the vessels, rather than on catch limits and control of discards and by-catches"¹⁹⁸ Some of these measures use a licensing system to prevent an increase in the number of fishing vessels.¹⁹⁹ Other measures act indirectly by placing upper limits on the fishing capacity of individual vessels through tonnage or engine power limitations.²⁰⁰ These requirements are objective and, if necessary, can easily be observed and enforced in fishing ports. The second set of measures concerns gear specification, fishing practices or techniques, gear positioning, fishing seasons, and resource exploitation patterns, all commonly known as technical measures.²⁰¹ However, "in the absence of satisfactory results from scientific investigations on spawning or nursery grounds, first maturity sizes, mesh selectivity studies, etc., the adequacy, effectiveness and suitability of many measures have yet to be verified."²⁰²

192. Cacaud, *supra* note 1, at 33.

193. Papaconstantinou & Farrugio, *supra* note 25, at 15.

194. Cacaud, *supra* note 1, at 33;

195. *Id.*

196. *See generally* Vigneron, *supra* note 158..

197. Papaconstantinou & Farrugio, *supra* note 25, at 15.

198. *Id.*

199. *Id.*

200. *Id.*

201. *Id.*

202. *Id.*

VI. CASE STUDY: FISHING CONFLICT BETWEEN MOROCCO AND SPAIN

A. *Morocco*

Conflicts over fishing rights have been an ongoing and historical issue between Morocco and the EU, as well as between Morocco and Spain dating back to the 1970's.²⁰³ Morocco's coastline covers 2,141 miles along the Mediterranean Sea and Atlantic Ocean."²⁰⁴ Moroccans have been fishing since the 1930s with annual catches exceeding 430,000 tons.²⁰⁵ Morocco employs more than 100,000 people in the fishing industry accounting for "approximately 45% of [Morocco's] agricultural exports."²⁰⁶ Morocco's fishing industry has "two distinct sectors: coastal fisheries and high seas."²⁰⁷ The coastal fleet consists of approximately 2,609 vessels and faces "stiff competition" from Spain, while the high seas fleet accounts for the Moroccan fishing industry's principal return value "since their catches are comprised mostly of high-priced cephalopods and white fish."²⁰⁸

Morocco declared a seventy mile coastal fishing limit in 1973.²⁰⁹ Then, in 1981, Morocco extended their EEZ to 200 miles, even though it had not entered into negotiations with nearby countries, including Spain, to delimit the extent of its EEZ in the Mediterranean.²¹⁰ Next, in 1988, "Morocco signed a four year agreement with the EU which restricted EU vessels to a catch of 95,000 tons annually in Moroccan waters" in exchange for "financial assistance in a package worth ECU70 million per year."²¹¹ In 1990, the Moroccan government initiated measures to improve its ports and increase port usage by Moroccan fishing fleets.²¹² While these measures benefitted Morocco, they increased competition with its rival, Spain.²¹³

203. *Morocco, Spain and Fishing*, *supra* note 24.

204. *Id.*

205. *Id.*

206. *Id.*

207. *Id.*

208. *Id.*

209. *Id.*

210. *See* Cacaud, *supra* note 1, at 34; *See Morocco, Spain and Fishing*, *supra* note 24 ("All of these declarations caused the Spanish much trepidation and led to initiation of several bilateral agreements.").

211. *Morocco, Spain and Fishing*, *supra* note 24.

212. *Id.*

213. *Id.*

Tension between Morocco and Spain peaked in 1992 when Morocco “threaten[ed] to cancel the Morocco/EU four year fishing agreement” which directly impacted Spain.²¹⁴ In 1992, Morocco allowed only 736 European boats into its waters in exchange for financial assistance worth ECU102 million per year.²¹⁵ Finally, in 1995, the Moroccan government “suspended the access of EU boats to [its] waters” because of overfishing concerns stemming from high levels of permitted fishing and poaching by foreign fleets.²¹⁶ Morocco accused Spain of depleting fish stocks in Moroccan waters and argued that Spanish overfishing triggered species loss and prevented Moroccans from benefitting from their own natural resources.²¹⁷ This caused “over 600 Spanish boats to remain in port for months until the conflict was settled in November 1995.”²¹⁸

Morocco signed and ratified UNCLOS in 2007 and signed and ratified the 1995 UN Fish Stocks Agreement in 2012.²¹⁹ As such, Morocco has expressed its consent to be bound by both treaties and is obliged to refrain from acts that would defeat the treaty’s purpose and objectives.²²⁰

B. Spain

Given its position in the Mediterranean, Spain plays a huge role in the overfishing problem and has been in a heated conflict with Morocco over fishing rights.²²¹ Spain is the largest per capita seafood and products consumer in the EU, employing “81,000 [] Spaniards [] as sailors on fishing boats and over 500,000 Spaniards” in the fishing industry.²²² With 18,900 vessels, Spain has the largest fishing fleet in the EU.²²³ Of Spain’s 18,900 boats, 16,750 are in Spanish waters, 1,100 boats are in EU waters, and 1,140 boats are in international or third

214. *Id.*

215. *Id.*

216. *Id.*

217. *Id.*

218. *Id.*

219. U.N. Office of Legal Affairs, Division for Ocean Affairs and the Law of the Sea, *Chronological Lists of Ratifications of, Accessions and Successions to the Convention and the Related Agreements*, http://www.un.org/depts/los/reference_files/chronological_lists_of_ratifications.htm (last updated Sep. 23, 2016) [hereinafter *Chronological Lists of Ratifications*].

220. *EU Member States: Signing and Ratifying a Treaty*, KATHOLIEKE UNIVERSITEIT LEUVEN, CENTRE FOR BIOMEDICAL ETHICS AND LAW (2008), http://europatientrights.eu/countries/signing_and_ratifying_a_treaty.html.

221. *Morocco, Spain and Fishing*, *supra* note 24.

222. *Id.*

223. *Id.*

country waters.²²⁴ Of these 1,140 boats, “half of the vessels ply Moroccan territorial waters” and account for “65% of the Spanish catch.”²²⁵ The following chart lays out the various fish species and fishing gear used to find them in Spanish waters as of 2014.

FISHING AREA	SPECIES	STATUS	FISHING GEAR	LANDINGS (ton)
Northern Alborán Sea (GSA1)	Hake		Bottom trawl	245 (2014)
Balearic islands (GSA5)			Passive gears	38 (2014)
Northern Spain (GSA6)			Bottom trawl & passive gears	2230 (2014)
Gulf of Lions (GSA7)			Bottom trawl Passive gears	200 (2014) 24 (2014)
Northern Spain (GSA6)	Sardine		Purse seine	9733 (2013)
Northern Alborán Sea (GSA1)	Red Mullet		Bottom trawl	116 (2013)
Gulf of Lions (GSA7)			Passive gears	14 (2013)
Northern Alborán Sea (GSA1)	Blue and red shrimp		Bottom trawl	38 (2013)
Northern Spain (GSA6)			Bottom trawl	184 (2014) 545 (2014)
Northern Spain (GSA6)	Blue Whiting		Bottom trawl	1020 (2013)

Figure 4: State of Some Commercial Fish Stocks in the Mediterranean EU Waters: Spain²²⁶

Like Morocco, Spain signed and ratified both UNCLOS in 1997 and the 1995 UN Fish Stocks Agreement in 2003.²²⁷ In 1996, Spain was fully integrated into the EU’s CFP.²²⁸ In 1997, Spain “claimed a 37-mile wide fisheries protection zone measured from the outer limit of [its] territorial sea.”²²⁹ While it has declared a two-hundred mile EEZ off its coast, Spain has “indicated that [the EEZ] is not applicable to the Mediterranean waters” without providing an explanation.²³⁰ As a result, Spain is not responsible for determining allowable catch limits

224. *Id.*

225. *Id.*

226. *Id.*

227. *Chronological Lists of Ratifications*, *supra* note 8.

228. Cacaud, *supra* note 1, at 35.

229. *Id.*

230. *Id.*

and promoting optimal utilization of its Mediterranean territory thereby negatively impacting the marine environment. Spain also has a fishing zone extending beyond its territorial waters but it lacks a fisheries protection zone established in the Alboran Sea, off the Spanish coast facing Morocco.²³¹

Spanish sea fishing is divided into four distinct groups, depending on the zone of activity, for management purposes: “fishing in territorial waters, fishing in Community waters, fishing in third [world] country waters, and fishing in international waters whether regulated by multilateral organizations or not.”²³² The European Commission negotiates bilateral fishing agreements with third world countries on behalf of Spain.²³³ Spain has only directly negotiated a bilateral agreement with South Africa, an agreement renewed annually with the authorization of the Council of the EU.²³⁴ While Spain and Morocco do not have bilateral agreements in place, Morocco and EU agreements impact Spain’s fishing activities and contribute to the tension between the two countries.

C. Resolved Conflict?

Bilateral agreements between Morocco and Spain have been proposed but have largely failed. For example, in 2011, a potential deal between Spain and Morocco was blocked by Moroccan officials.²³⁵ Under the deal, Morocco would have received forty-six million dollars “to let some 120 fishing boats, mostly from Spain, operate in its waters.”²³⁶ Even though the EU Parliament voted in favor of the proposal, Moroccan officials reacted angrily by banning all European fishing boats from Morocco’s national territorial waters.²³⁷ This ban continued until 2014 when a fishing protocol was proposed that allows one-hundred Spanish vessels to ply Moroccan waters in exchange for forty million dollars paid each year by the EU.²³⁸ While this agreement

231. *Id.*

232. *Review of Fisheries in OECD Countries 2009: Policies and Summary Statistics*, ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD) 241 (2010).

233. *Id.*

234. *Id.*

235. *Spain Demands EU Payments to Cover Loss of Moroccan Fishing Rights*, THE TELEGRAPH (Dec. 15, 2011), <http://www.telegraph.co.uk/news/worldnews/europe/spain/8957996/Spain-demands-EU-payments-to-cover-loss-of-Moroccan-fishing-rights.html>.

236. *Id.*

237. *Id.*

238. *A Hundred Spanish Fishing Vessels Return to Moroccan Waters*, MERCOPRESS (Sept. 9, 2014), <http://en.mercopress.com/2014/09/09/a-hundred-spanish-fishing-vessels-return-to-morocca>

includes conditions on types of catches, “taking Moroccan sailors onboard community boats,” and types of vessels,²³⁹ it is a legitimate first step in mitigating tension between the two countries.

CONCLUSION

The problem of overfishing in the Mediterranean must be addressed by both international and regional policies. A common problem within the international treaties passed thus far is a lack of viable monitoring mechanisms or the ability to sanction violations. There must be penalties in place including a greater number of individual fines and a higher overall fine to deter states from violating a treaty. Additional penalties could include banning countries who violate the treaty from fishing or reducing such countries’ funding from the EU. States need incentives that reflect the true cost of their fishing activities in the Mediterranean. Bilateral fisheries access agreements could overcome the loss of access to fishing grounds previously encompassed within the high seas.²⁴⁰ The “UN Committee for Sustainable Development have called for a restoration of depleted fisheries and continue to stress the importance of stricter fishing regulations in oceans and inland waters.”²⁴¹

Regionally, there are many measures the Mediterranean can implement to reduce overfishing and its devastation on biodiversity. Management of Mediterranean fisheries requires a complete and flexible set of tools, the use of which may be tailored depending upon the type of fishery. First, “spatial and temporal closure areas” must be designated for the spawning and nursing of commercial species.²⁴² These protected areas would allow fish populations to replenish free of exploitation. Setting up a “fishing effort control system” that is based on a “real-time database of information on fishing vessel operations” would help monitor fish stocks.²⁴³ Also, use of an “individual effort quota will be more appropriate in multi-specific stocks” while an “individual catch quota” would help manage “mono-specific stocks.”²⁴⁴

Improvement of scientific evidence on the state of Mediterranean

n-waters.

239. *Id.*

240. Cacaud, *supra* note 1, at 35.

241. *Threats of Overfishing*, *supra* note 32.

242. OCEANA, *supra* note 16.

243. Papaconstantinou & Farrugio, *supra* note 25, at 16.

244. *What Kind of Management for Mediterranean Fisheries?*, *supra* note 186, at 32.

stocks is needed to “support more informed management.”²⁴⁵ More scientific knowledge would help states set adequate catch limits, ensure that the appropriate species are being protected, and likely enhance the confidence of disparate stakeholders in the Mediterranean. Adoption of a “precautionary approach when data is unavailable” is needed to “allow [for] a reduction of fishing pressure, and the preservation of stocks until proper data becomes available.”²⁴⁶ Finally, it would be helpful to develop “cooperative research [programs] to monitor the environment and resources and to manage the shared stocks on the basis of stock assessments”²⁴⁷ Together, these conservation measures are capable of allowing fish stocks to recover from overfishing²⁴⁸ and guarantee fishery populations at sea.²⁴⁹

Artisanal fisheries are the most challenging and costly to assess, manage, and monitor because they are the most prominent in the Mediterranean. They are particularly hard to manage because they involve “a high diversification of fishing gears and techniques,” they “target[] a large variety of species,” and the use of fishing techniques are adjusted both “spatially and seasonally.”²⁵⁰ Given the diversity and complexity of these fisheries, quota systems and traditional fishing effort controls are largely ineffective.²⁵¹ An ecosystem-based approach incorporating spatially-explicit measures, such as closures in reproductive or recruitment areas and rotation of marine protected areas would be the most beneficial means of rehabilitating exploited populations and maintaining fisheries.

A high level of cooperation between coastal states is necessary to ensure sustainable consumption of fisheries resources in the Mediterranean. Improving regional action plans, including multi-annual plans, must be a priority for repressing overfishing in the Mediterranean²⁵² and achieving sustainable management of stocks.²⁵³ This would improve the states’ accountability to one another and

245. OCEANA, *supra* note 16.

246. *Id.*

247. Papaconstantinou & Farrugio, *supra* note 25, at 16.

248. OCEANA, *supra* note 16.

249. *Id.*

250. S. Mati -Skovo et al., *Effectiveness of Conventional Management in Mediterranean Type Artisanal Fisheries*, 91 ESTUARINE, COASTAL & SHELF SCI. 314, 314 (2011).

251. *See id.* at 322 (noting that “quota systems and many means of fishing effort control are generally not applied.”).

252. *See* Lejeusne et al., *supra* note 31, at 257 (“Regional action plans, which are a priority, must focus on networking initiatives.”).

253. OCEANA, *supra* note 16.

enhance each member state's ability to make continued progress in conservation measures.

Not only does fisheries management need to be addressed in a scientific or technical manner, but also in a social or cultural manner. Fisheries management must promote cooperation between various types of fisheries rather than resentment. Currently, subsistence fishers typically fail to comply with regulations regarding restrictions on quantities of allowed fishing gear.²⁵⁴ Moreover, commercial artisanal fishers argue that the catches of subsistence fishers are "often sold in unofficial market[s] hindering" artisanal sales.²⁵⁵ Future management approaches aiming to mitigate prevailing conflicts between types of fisheries should increase participation in the management process. Additionally, involving fisheries in the management process would add legitimacy to the rules governing the fisheries in question, produce conservation strategies that are respected and willingly complied with, and would ensure that critical traditional and local knowledge is continually brought to bear in regulatory, regional, and administrative decision-making processes. Fusing conservation and other social priorities should be an essential consideration in future legislative decisions regarding the Mediterranean and overfishing.

254. Mati-Skovo et al., *supra* note 250, at 323.

255. *Id.*