UNIVERSITY OF TROMSØ UIT

NORWEGIAN COLLEGE OF FISHERIES SCIENCE

Wicked problems:

Management complexities in the Atlantic Bluefin Tuna Fisheries

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Master's Degree Thesis in Fisheries Science
Field of Study - Fisheries management (60 credits)

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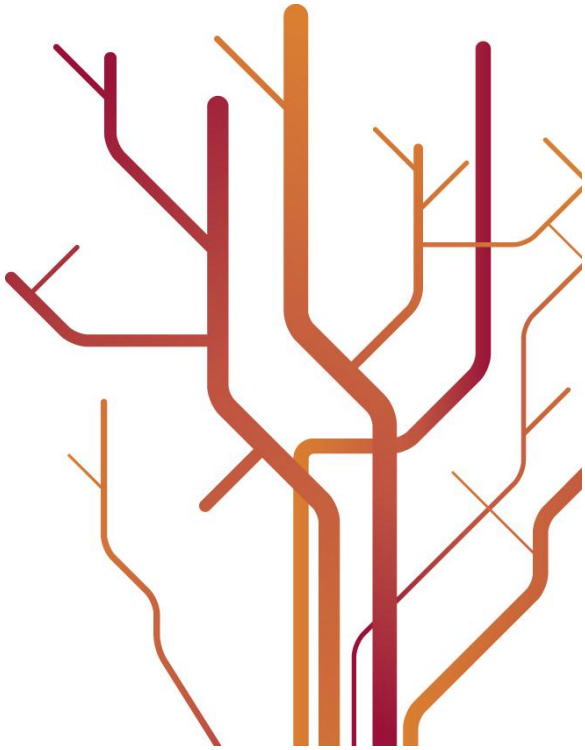

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Personally, this Master Thesis represents the end of a journey of individual development that started in august 2007. The exiting, challenging and educational years at the Norwegian College of Fisheries Science has come to an end.

There are several people who deserve my gratitude. First and foremost I want to thank Petter Holm, for his assistance, guidance and support during this process. In addition I want to thank my family, my fellow students, the entire NCFS faculty and especially my fiancée for being so supportive and patient when listening to my many different thoughts and theories.

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Abstract

This study examines the complexities of achieving sufficient management measures for the Atlantic Bluefin Tuna, with an attempt to specify failure and shortcomings within the management system. The key to the solution is embedded in man-made governance systems and legal frameworks.

With this thesis I will try to unfold the complexities of governance systems, the legal framework of fisheries management and the regional fisheries management organisation responsible for the management of the Atlantic Bluefin Tuna (ICCAT).

Key words: Atlantic Bluefin Tuna, management, complexities, ICCAT, Governance, UNCLOS, framework, wicked problem , RMFO

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1.0 Introduction

About 70 per cent of the earth's surface consists of water. The resources of the oceans are enormous, ranging from oil to tin, diamonds to gravel and metals to fish[1]. Exploitation of these recourses grows day by day as technological development opens for new ways to utilize these resources. The fish in the ocean are conditional renewable, and biodiversity loss of oceanic and coastal resources are worldwide concerns[2]. Biological diversity was defined in 1992 by UN's "Earth Summit" as the variety among living organisms which includes terrestrial, marine and other aquatic ecosystems and the ecological complexity which they are a part of. This includes diversity among species, between species and of ecosystems. Biodiversity may be used as a measure for an ecosystem's health. Human activity affects the natural resources and therefore managing the human impact on these resources is crucial to prevent overexploitation and to keep fish-stocks sustainable. Fisheries management first and foremost deal with protection of the oceanic resources with a sustainable approach.

To accomplish a successful fisheries management there is a lot of problems and conflicts to solve. Some of these problems and conflicts are often overlapping and difficult to differentiate. These are called wicked problems, meaning that they are complex and often a symptom of a greater problem[3]. Wicked problems do not necessary have an obvious solution. Such a problem is often of social nature, and how the problem is perceived is individual and might affect a possible solution.

Management is important and necessary because fisheries governance is multidimensional and must cope with a number of conflicting concerns, values, principles and goals. There are different concepts and principles that constitute the foundation of an efficient management. The management theory and processes which are used are inseparable from culture, society and politics. As society change, the management approach will change. Adaptive,

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[1] Division for Ocean Affairs and the Law of the Sea, Office of Legal Affairs, United Nations. (1998). *The United Nations Convention on the Law of the Sea - a historical perspective.*

[2] Kay, R., & Alder, J. (2nd edition 2005). *Coastal planning and management.*

[3] Kooiman, J. et al. (2008). *Interactive governance and governability: an introduction.*

collaborative and consensual management reflects the overall changes as to how society relate to the environment.

The United Nations Law of the Sea (UNCLOS) is an international attempt to regulate all aspects of the resources and utilities of the sea which includes navigational rights, territorial sea limits, economic jurisdiction, conservation and management of living marine resources, protection of the marine environment, a marine research regime and a dispute settlement body which is binding for all States[4]. The UNCLOS calls for economic provisions from developed to undeveloped countries. It establishes explicit jurisdictional limitations on the ocean area that countries may claim, including a 12-mile territorial sea limit and a 200-mile Exclusive Economic Zone (EEZ) limit. The convention is binding for all Governments that has signed and ratified the treaty, and is to be accepted as a whole. The contracting government should make sure that it does not perform any action that might defeat the conventions objects and purposes.

Within EEZs over 90 per cent of commercially important fish stocks are found. Nevertheless, the introduction of exclusive coastal state jurisdiction has not put an end to the decline of fish stocks. In 2005 the FAO Fisheries and Aquaculture Department estimates that ¼ of the global marine fish stocks were overexploited, depleted or recovering from depletion. Another half of the stocks were fully exploited and producing catches at or close to their maximum sustainable limits.

The 1995 UN Fish Stocks Agreements purpose is to "ensure the long-term conservation and sustainable use of straddling and highly migratory fish stocks through effective implementation of the relevant provisions of UNCLOS"[5]. The agreement as a whole applies only to the conservation and management of straddling and high migratory fish stocks on the high seas. But an exception from this is Article 5, which states that the coastal state must apply its general principles in the exercise of its sovereign rights for the purpose of exploring, exploiting conserving and managing straddling and highly migratory stocks within its

[4] Winter, G. (2009). *Towards Sustainable Fisheries Law- A Comparative Analysis.* Retrieved from IUCN Environmental Policy and Law Paper No. 74

[5] Winter, G. (2009). *Towards Sustainable Fisheries Law- A Comparative Analysis.* Retrieved from IUCN Environmental Policy and Law Paper No. 74

EEZ. The management of highly migratory species requires cooperation between the coastal states and other states who is fishing for the resource according to Article 64 in UNCLOS.

1.1 Problem definition, research question and objective

Among the oldest fisheries in the world is the Tuna fishery according to FAO, going back to Phoenician trap fisheries around 2000 BC[6]. The fishing for Tunas is of high global economic importance. Even though the total catch volume is less than 5 per cent of the total world marine fish catches, the landed value is estimated to be around 20 per cent of the global market in total[7]. The red meat is highly desirable in the market. In January 2011 a 342 kilogram Bluefin Tuna was sold in Japan for a record price of 360 000 dollars[8]. As this indicates fishing for Tunas can be highly remunerative, and because of this fishermen are competing over the best catches.

According to UNCLOS Article 64, Annex I the Tuna (*Thunnini*) are considered to be highly migratory species[9]. This implicates that they are species with wide geographic distribution, both inside and outside countries EEZ's. The migration of species or fish-stocks does not necessarily correspond to the jurisdictional boundaries of states, and therefore collaboration between the current states is inevitable. Unfortunately this possibly will cause issues and conflicts among the states collaborative relationship.

In accordance with the international protection organization Oceana the Bluefin Tuna is on the verge of collapse due to overfishing, mismanagement and illegal fishing[10]. During the 1990's Japanese businessmen revolutionized the Mediterranean fishing industry by investing

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[6] Maguire, J. et al. (2006). *The state of world highly migratory, straddling and other high seas fishery resources and associated species*

[7] Maguire, J. et al. (2006). *The state of world highly migratory, straddling and other high seas fishery resources and associated species*

[8] Hayes, J. (2009). *Bluefin Tuna Fishing and Japan: Big fish, high prices, quotas, proposed bans, stockpiles and Bluefin fish farms*

[9] FAO. (2012). *Highly migratory species*

[10] OCEANA. (2008). *16th ICCAT Special Meeting of the Commission*

in a troubled Spanish fishing fleet[11]. They introduced the use of Tuna fattening pens at sea, which allows fishermen to haul in more and smaller Tunas during the limited fishing season to fatten them up in the pens to minimum catch size and sell them fresh from the pens all year. This technique is now used all across the Mediterranean. According to a report from WWF in 2008 the "pen-Tunas" accounted for more than half of the total Bluefin catch[12].

The inter-governmental fishery organization ICCAT (International Commission for the Conservation of Atlantic Tunas) is responsible for the conservation of Tunas and Tuna-like species in the Atlantic Ocean and its adjacent seas[13]. Their responsibility include assembling fishery statistics from its members and from all entities fishing for these species in the Atlantic Ocean, coordination of research as for instance stock assessment, developing scientific-based management advice, providing a mechanism for Contracting Parties to agree on management measures and to produce relevant publications. In their 2008 stock assessment ICCAT estimated that the total catches was at least three times more than what their scientists had recommended for sustainability[14]. The assessment also indicated that the spawning stock biomass has been declining rapidly the past few years. This is raising serious concerns for the survival of the Tuna stocks.

Several Tuna species are in the danger zone of being overexploited. One of the species is the Atlantic Bluefin Tuna (thunnus thynnus), which still exists in western and eastern parts of the Atlantic Ocean and the Mediterranean[15].

Based on the above outline the intention and objective with this Master Thesis is to explain the complexities of achieving sufficient management measures for the Atlantic Bluefin Tuna, and attempt to specify failure and shortcomings within the management system. The key to

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[11] Moffett, M. (2009). *It's open season for bluefin Tuna - How the world's appetite for sushi could outweigh concerns about overfishing*

[12] Moffett, M. (2009). *It's open season for bluefin Tuna - How the world's appetite for sushi could outweigh concerns about overfishing*

[13] ICCAT. (2012). *The International Commission for the Conservation of Atlantic Tunas*

[14] Moffett, M. (2009). *It's open season for bluefin Tuna - How the world's appetite for sushi could outweigh concerns about overfishing*

[15] WWF. (2012). *Bluefin Tuna - Endangered delicacy (Blåfinnet Tunfisk - Truet delikatesse)*

the solution is embedded in man-made governance systems and legal frameworks, in which I will try to unfold.

1.2 Methodology and structure of thesis

There are two different categories of methods that can be used in scientific research. We differ between qualitative and quantitative methods. Qualitative methods are based on hermeneutics and phenomenology, which is the science of interpreting theories and the science of human experience[16]. The method requires different forms of systematically assembling, processing and analyzing materials from conversations, observations or written text. The goal is to explore the meaning and intention of social phenomenon or processes. Qualitative research methods can be used for systematization of and giving insight in human expressions, either linguistic statements or behavior. Language and behavior has a significant dimension that requires qualified and reflexive interpretation to evolve into scientific knowledge.

Quantitative research methods are based on quantifiable variables which systematize by different forms of statistical methods. Numbers and statistics are not explanatory in itself and therefor interpretation is also a central element in quantitative research.

The research methods which should be chosen are depended on the problem as presented and the intention of the study. The problem of this thesis - to explain the complexities of achieving sufficient management measures for the Atlantic Bluefin Tuna, and attempt to specify failure and shortcomings within the management system is to a large extent a social phenomenon or process. Therefore the qualitative research method seems reasonable.

An exploring design is often of current interest in most qualitative research projects. This implies that many of the procedures will be made in transit as new knowledge is gained. This might represent both strengths and weaknesses because problem formulations and approaches have to be adjusted as the project progresses. This may threaten the validity, reliability and

[16] National Research Ethical Committee(De nasjonale forskningsetiske komiteer). (2010). *Qualitative and Quantitative research methods - similarities and differences (kvalitative og kvantitative forskningsmetoder – likheter og forskjeller)*

quality of the research. Though it is the flexibility of the method that makes it possible to gain new and unexpected knowledge, and with this in mind it is worth the risk.

1.3 The structure of the thesis

As the thesis main species of interest is the Atlantic Bluefin Tuna it appears reasonable to give an introduction to its main characteristics, distribution, ecological and economic significance. This will be presented in chapter 2. In chapter 3 the theoretical and legal framework of fisheries management will be presented.

Chapter 4 include an analysis of ICCAT's as a regional management organisation, and the development and state of the Atlantic Bluefin Tuna. In chapter 5 I will discuss the findings of the previous chapters.

2.0 Characteristics of the Atlantic Bluefin Tuna and its fisheries.

For centuries scientists and philosophers has been fascinated by the biological properties of the Atlantic Bluefin Tuna. The impressive size and swimming speed are only some of the characteristics which have influenced the perception of this species. Life history of a species which includes information about habitat, growth and reproduction is important to establish, particularly because it affects how a fishery is assessed and managed. In this chapter I will try to give an indication of the Atlantic Bluefin Tunas main characteristics, distribution, ecological and economic importance.

2.1 Characteristics of the Atlantic Bluefin Tuna

All highly migratory Tuna belong to the suborder Scombroidei. There are 15 different species of Tuna which is classified into five genera *Thunnus, Katsuwonus, Euthynnus, Auxis and Allothunnus*[17]. The Atlantic Bluefin Tuna belong to the genera *Thunnus*. Among the Atlantic

[17] FAO. (2011). Review of the state of world marine fishery resources

Bluefin Tuna species four stocks have been recognized, but only two stocks are utilizable do to depletion[18]. The populations mainly differ in age at maturity and spawning area. For instance the Atlantic Bluefin Tuna spawning in the Mediterranean (Eastern stock) matures around the age of 5, while the Bluefin spawning in The Mexico gulf matures around the age of 12 (Western stock). The populations exhibit different homing behaviour when they mature and return to distinct areas to spawn. It is reasonable to believe that they spawn in areas where the survival of their larvae is greatest. Even though their migration pattern has an encountering point throughout the North Atlantic, they do not interbreed. These factors point out a significant difference between these populations, and indicate the need for assessing the stocks differently to reach sensible management measures.

The Bluefin Tuna is the largest of the bony fishes and the average adult fish weighs about 250 kilograms. The largest Bluefin Tuna ever measured was 304 cm and 679 kilograms and was caught outside Nova Scotia in 1979[19]. The Bluefin Tuna has a torpedo-shaped body that is nearly circular in cross-section. The colour on the Tunas back is deep blue, while the lower sides and belly are white. The second dorsal fin is reddish brown. It distinguishes from other *Thunnus* by the colour of the dorsal fin, the number of gill rakers on the first arch, and its short pectoral fins[20].

The Atlantic Bluefin Tuna is a mesopelagic species which indicates that it ranges from coastal and oceanic waters and between 50 meters to 1000 meters depth. According to FAO the Atlantic Bluefin Tuna is able to dive to depths in excess of 1000 meters, encountering an exceptionally wide range of temperatures[21]. The geographic distribution of the Atlantic Bluefin Tuna is through the North Atlantic and its adjacent seas, including the Mediterranean Sea.

[18] Safina, C., & Klinger, D. (2008). Collapse of Bluefin Tuna in the Western Atlantic. *Conservation Biology*, pp. 243-246.

[19] Goujon, M., & Majkowski, J. (2012). *Biological characteristics of Tuna*

[21] Goujon, M., & Majkowski, J. (2012). *Biological characteristics of Tuna*

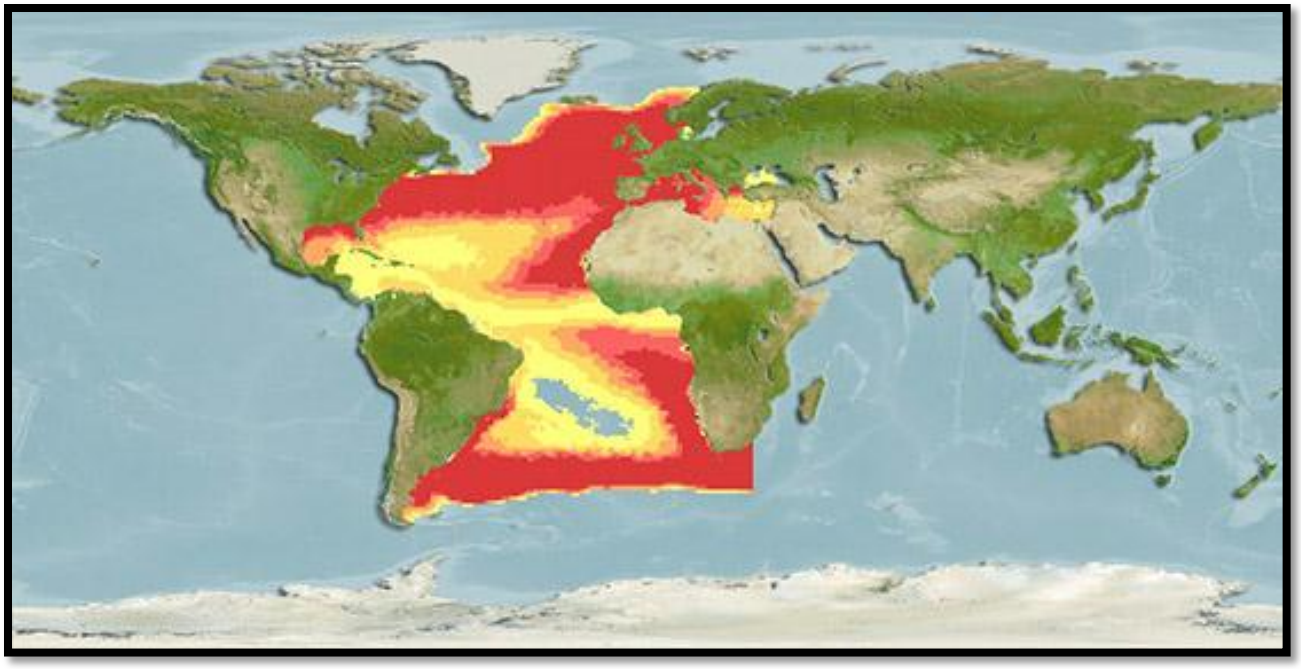

Figure 1: geographical distribution of Atlantic Bluefin Tuna[22]

Tunas exceed the net distance travelled by any other marine fish. This phenomenon was affirmed by tagging studies of Tunas and billfishes according to the FAO. The Bluefin Tuna uses white muscle during short bursts, while the red muscle allows the Tuna to swim at high speed for a long period of time.

Satisfaction of Tuna's oxygen requirements can only be met by swimming constantly. Tunas does not contract their jaws and opercula muscles to pump water over their gills, instead they swim with open mouths which forces the water over their gills and contributes to absorption and utilization of oxygen. This is called ram ventilating. Ram ventilating has an essential consequence: suffocation will occur if the Tuna stop swimming. According to FAO Tunas have to keep a continuous speed over 0.65 m/s (2.3 km/h) to provide a sufficient flow of water over their gills. The absence of a swim bladder also indicates the need for continuous movement to maintain hydrostatic equilibrium. To have an effective oxygen transfer from the gills to other tissues the capacity of the heart is vital. Compared to the "average fish" the size of the Tuna's heart is almost 10 times the size in correlation with body weight. The significant size of the heart increases the ability to pump blood through the entire body.

[22] MarineBio.org. (2012). *Atlantic Bluefin Tunas, Thunnus thynnus*

As a consequence of constant swimming to maintain vital functions the muscular metabolism continuously generates heat as a by-product. This heat may be used to hunt in colder waters. Tunas maintain their body temperature above the ambient water by passing arterial blood through vascular counter current heat exchangers called rete miriable. This vascular system allows an increase in muscle temperature in regions where this network of vein and arteries are found. It allows the Tuna to thermoregulate certain areas of their body. The increase in temperature leads to an increase in the fundamental metabolic temperature, which makes the Tuna able to split ATP at a higher rate to produce ADP. ADP provides energy for physiological processes such as muscular contraction. As the energy levels increase their swimming durance or speed accelerates. Thermoregulation allows Tunas to sustain high swimming speeds for a long period of time and to recover quickly after prolonged physical exertion. To draw a biophysical conclusion their bodies are designed and intended for high performance at both sustainable and burst swimming speeds.

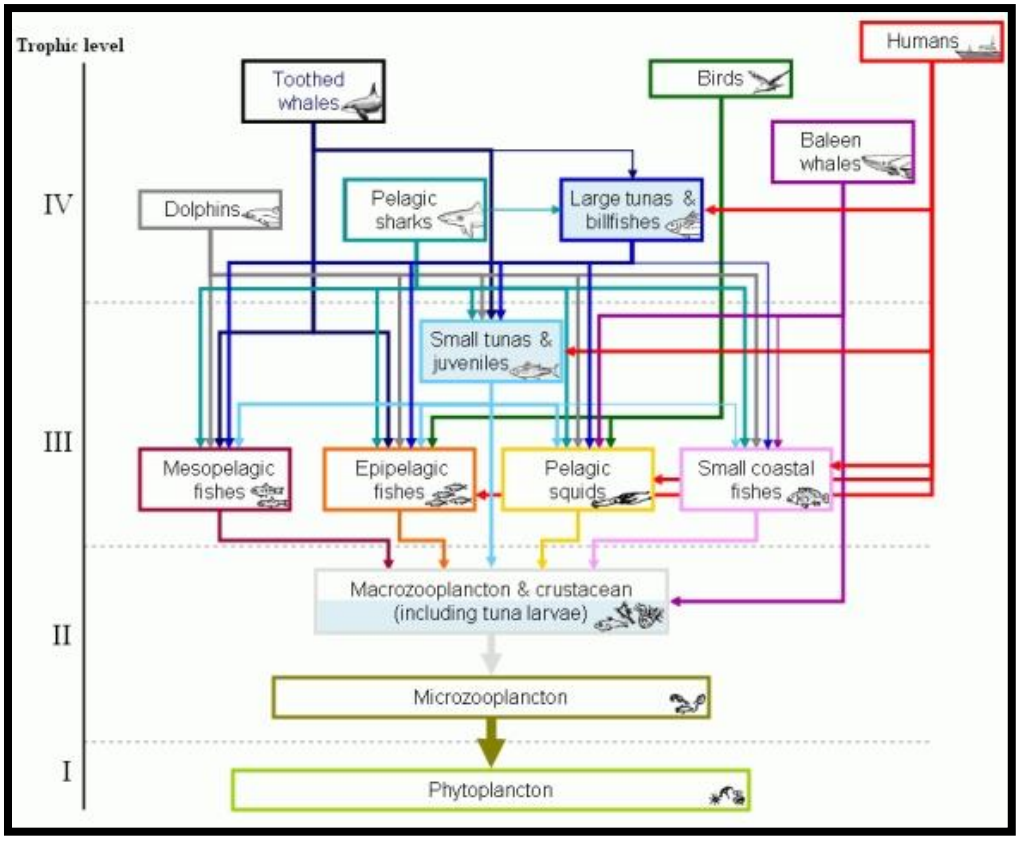

Figure 1: Position of Tunas in the oceanic food web23

[23] Goujon, M., & Majkowski, J. (2012). *Biological characteristics of Tuna.*

The Atlantic Bluefin Tuna locate their pray visually and are insatiable carnivores that feed on fish, squid, and crustaceans. They have to swim long distances to satisfy their food requirements. In general only large predators feed on Bluefin Tunas because of its significant size. These predators are marine mammals, sharks and other large predatory fish.

2.2 Tuna fisheries

In this section of the chapter I will describe different factors of the Tuna fisheries which include the economic importance, the fishing capacity and effort of the Tuna fisheries. I will end this section by describing the history and end of the Northern Atlantic Bluefin Tuna stock.

The desirability of sushi and sashimi of Atlantic Bluefin Tuna might be looked upon as a tragedy because short-term economics and politics have "conspired" against the species survival. Principal marked Tunas are subject of an intensive international trade. These Tunas are of great economic importance to both developed and developing countries.

2.2.1 Economic importance

According to one of Seafoodsource's editors, Chris Loew, the price for Bluefin Tuna in the Japanese market in 2009 was around 980 JPY per 100 grams, which is 9.47591 EUR[24]. The total catch of Atlantic Bluefin Tuna in the Atlantic Ocean in 2009 was 21 680 000 tonnes (figure 2), so the revenue of this volume (if one assume this is the gutted volume) would have been 2 054 377 288 000 EUR (with 2012 currency). If this rough calculation of possible profit is seen in relation with figure 3, which illustrates the relative Bluefin Tuna catch distribution by major fleets in the Atlantic and Mediterranean Ocean, an apprehension of the Atlantic Bluefin Tuna fisheries economic importance to several nations may be achieved. A supplementary and more descriptive overview of the different industrial tuna fisheries operating entirely or partially on the high seas is given in figure 6.

[24] Loew, C. (2009). *Tuna prices in Japan fall on weak holiday demand*

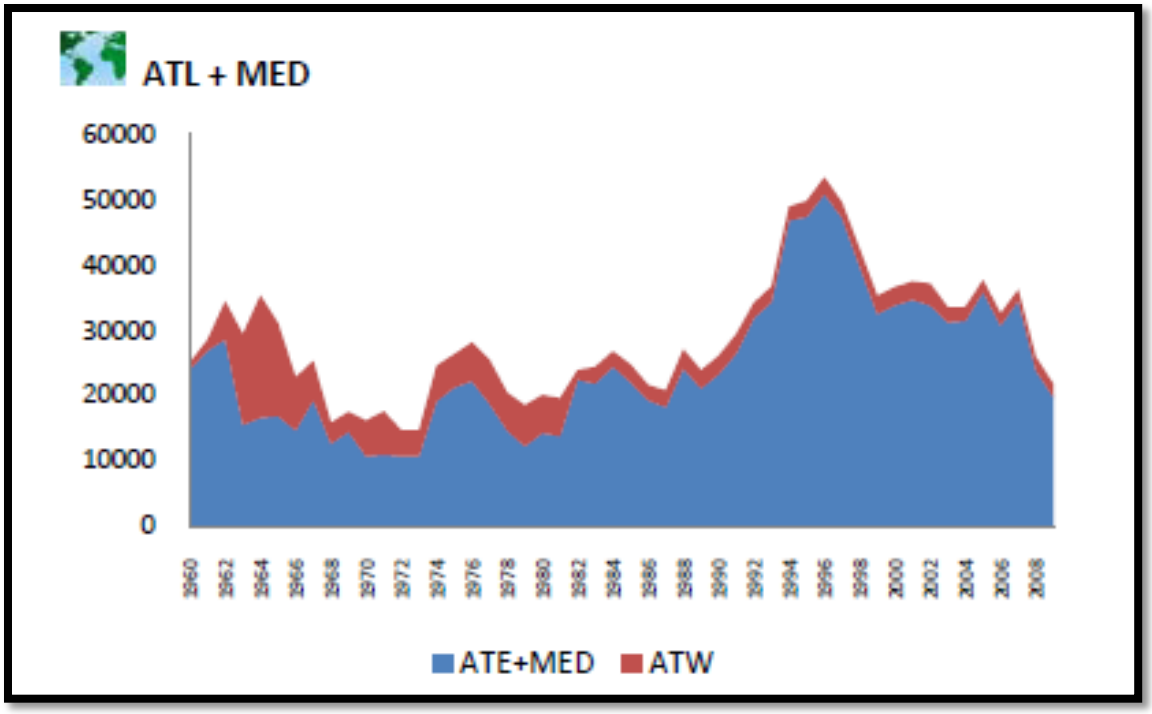

Figure 2: Cumulative BFT catch in 1000 tons from 1960-2009 ((IUU catches are not included) [25]

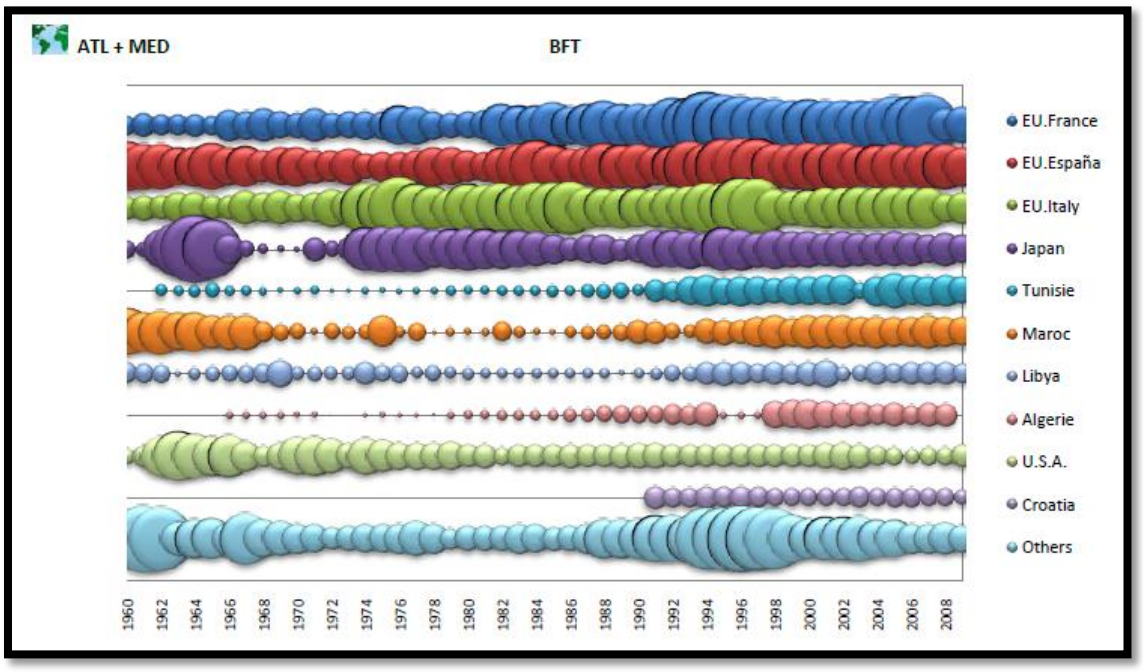

Figure 3: Relative Bluefin Tuna catch distribution by major fleets in the Atlantic and Mediterranean Ocean. (The ranking of catches are based on the average amount of the five previous years)[26]

[25] ICCAT.(2011). Statistical bulletin, vol. 40, 2011 p 89
[26] ICCAT Statistical bulletin, vol. 40, 2011 (1960-2009) p 96

Figure 5 illustrates the combined world catches of major Tuna species by the three most dominant fishing gears: purse seines, bait boats, and longlines. The fishing gear with the largest increase is the purse-seiners, which went from almost nothing in the 1950's to 2.2 million tons in 2000.

71 percent of the annual global catch of principal market Tunas was caught in the Pacific Ocean and constituted over 3 million tons in 2009, which implies that the total global catch of principal market Tunas was over 4.2 million tons the same year.

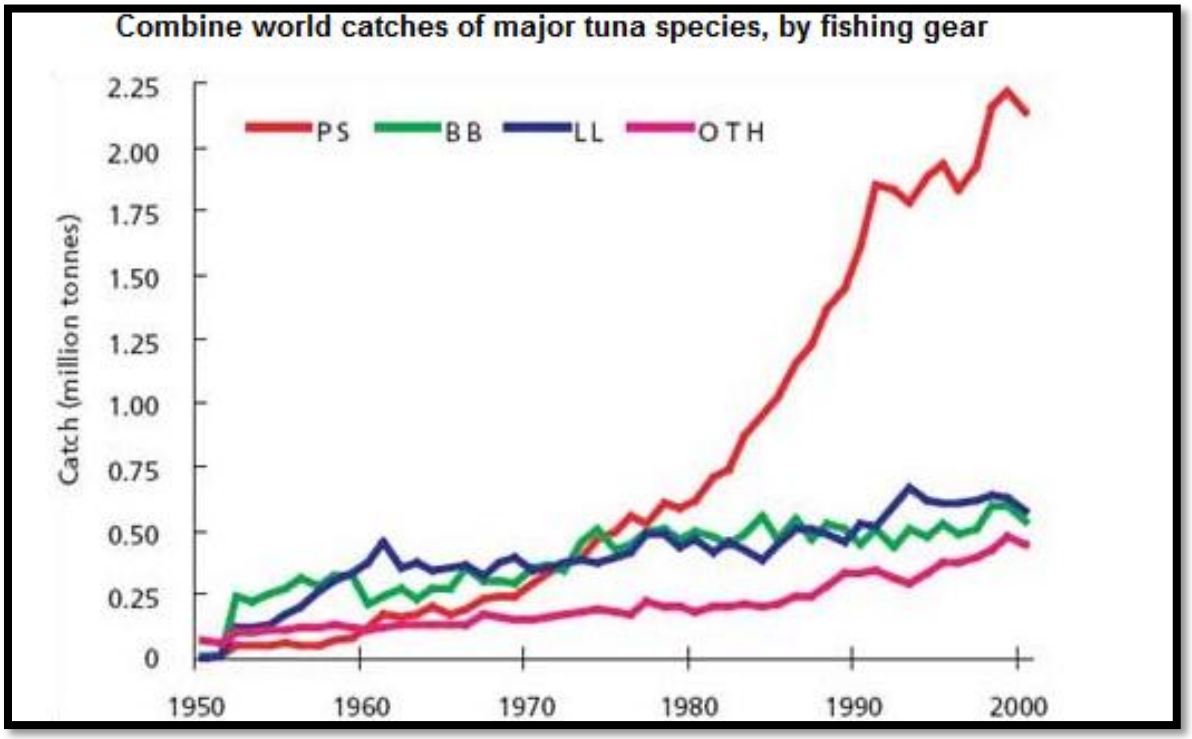

Figure 4: Illustration of the employment of different fishing gear in the world catches of major Tuna species. (Notice the red exponential slope which represents purse seiners.)[27]

2.2.2 Fishing capacity and effort

The need for management of fishing capacity was noted by the 1995 Rome Consensus on World Fisheries, the 1995 FAO Code of Conduct for Responsible Fisheries, and the 1995 Kyoto Declaration and Plan of Action.[28] The term fishing capacity essentially describes the

[27] Miyake, M., Miyabe, N., & Nakano, H. (2004). *FAO FISHERIES TECHNICAL PAPER 467; Historical trends of the Tuna catches in the world*
[28] FAO. (2012). *Fishing capacity*.

ability a fishing vessel or a fleet possess to catch fish. There are many factors that affect fishing capacity: size, equipment and operational characteristics of vessels, including engine power, overall holding and freezing capacity, gear specificities, available fish-finding technology, the distance travelled to fishing grounds and the experience of the captain and crew[29]. To measure the actual fishing capacity of a vessel is a complex calculation, which combines a range of technical characteristics, economic factors and biological factors, but to simplify the calculation gross tonnage and engine power are often used as a rough indicator of fishing capacity. The consequence of this simplification is according to OCEAN2012 an insufficient measure of capacity, which has resulted in inadequate management responses[30].

One of the most challenging issues of today's fisheries governance is to avoid overcapacity[31]. In both domestic and global fisheries overfishing occur as a consequence of overcapacity. To regulate fishing capacity it is necessary to understand the correlations between the regulation of access to fish stocks, the way stakeholders reacts on different regulation measures, and the effect of subsidies to fisheries.

Some resources are subjects to little or lack of management, which are reckoned as common pool resources. To control or monitor the catch of common pool resources is difficult. The harvest mentality in common pool fisheries relating to restraint of exploitation is that the resources which are preserved will be harvested by others regardless of their conservation attempt, and therefore they justify overuse rather than preserving the resources.

Fisheries excessive effort levels are compounded by improvement in technical efficiency, which makes it possible for fishers to sustain their profits even if stocks diminish. The persistent revenue might be responsible for the continuing interest to enter fisheries. According to the FAO there are relatively few fisheries around the world that are subject to no management at all[32]. Nonetheless, addressing distinct property rights in fisheries management is still an issue. The underlying symptom of overcapacity, overfishing and also overcapitalisation in fisheries is the absence of well-defined property or use rights. Quite a few incentives associated with open access regimes still exist in several fisheries even if the

[29] OCEAN2012. (2012). *Fleet overcapacity is driving overfishing*
[30] OCEAN2012. (2012). *Fleet overcapacity is driving overfishing*
[31] FAO. (2012). *Fishing capacity*.
[32] FAO. (2005). *Regulating fishing capacity*.

number of participants is restricted. In simple words overcapacity occur when too many, major and dominant vessels are chasing too few fish.

Primarily there are two different approaches to fisheries management which are being used. One of these approaches is incentive blocking measures that attempt to restrict the level of fishers' activities for example regulation of the mesh size or type of fishing gear. The second approach is incentive adjusting measures, which attempt to address the property rights issue and often involve limiting the access of participants who hold the rights to a share of a total allowable catch (TAC) in a particular fishery.

MANAGEMENT INSTRUMENTS: INCENTIVE BLOCKING AND INCENTIVE ADJUSTING MEASURES	
Incentive blocking instruments	**Incentive adjusting instruments**
Limited entry Buyback programmes Gear and vessel restrictions Aggregate quotas Non-transferable vessel catch limits Individual effort quotas (IEQs)	Group/community fishing rights (CDQs, etc.) Territorial use rights (TURFs) Individual transferable quotas (ITQs) Taxes and royalties

Figure 5: Management instruments in regulating fishing capacity[33]

The essential management of fishing capacity is a quite complex problem because it affects economic, financial, and food security matters that has impact on the fishermen and the fishing communities. In relation to the available marine resources the maintenance of a grossly exaggerated and powerful fleet is non-economic and often lead to overfishing. Overcapacity of an entire fleet may lead to an increase in the intense competition for limited resources, a higher political pressure to set quotas above the scientific recommended levels, and the impact on the marine resources and their ecosystems. To identify and address the problems of overcapacity in world fisheries is important to ensure a sustainable resource utility. An example of an open access regime in the Atlantic Bluefin Tuna fisheries will be given in the next section.

[33] FAO. (2005). *Regulating fishing capacity*.

Area	Gear	Major vessel flags	Target species
Northeast Pacific	Longline	Japan and Taiwan Province of China	Albacore, bigeye and swordfish
	Troll	Canada and United States of America	Albacore
Southeast Pacific	Longline	Chile and Spain	Swordfish
Eastern Pacific	Purse seine	Costa Rica, Columbia, Ecuador, Mexico, Panama, Peru, Spain, Vanuatu, Venezuela (Bolivarian Republic of) and United States of America	Skipjack, bigeye and yellowfin
	Longline	Japan, Republic of Korea, United States of America and Taiwan Province of China	Albacore, bigeye and yellowfin
Western, Central and South Pacific	Longline	China, Japan, Papua New Guinea, Philippines, Republic of Korea, Taiwan Province of China and Vanuatu	Albacore, bigeye, yellowfin, southern bluefin tuna, Pacific bluefin tuna, and swordfish
	Pole and line	Japan	Skipjack, albacore and yellowfin,
	Purse seine	Indonesia, Japan, New Zealand, Papua New Guinea, Philippines, Republic of Korea, Taiwan Province of China and United States of America	Skipjack, bigeye and yellowfin
Eastern Indian Ocean	Longline	Belize, China, Honduras, Indonesia, Japan, Panama, Republic of Korea and Taiwan Province of China	Albacore, bigeye, southern bluefin, swordfish and yellowfin
	Purse seine	Indonesia, Japan and Liberia	Skipjack and yellowfin
Western and Central Indian Ocean	Gillnet	India, Indonesia, Iran (Islamic Republic of), Maldives and Sri Lanka,	Skipjack and yellowfin
	Longline	China, Belize, Honduras, India, Indonesia, Japan, Panama, Republic of Korea, Réunion, Seychelles, Taiwan Province of China and Thailand	Bigeye and yellowfin
	Pole and line	Maldives and Sri Lanka	Skipjack and yellowfin
	Purse seine	Belize, France, Japan, Netherlands Antilles (dissolved), Seychelles and Spain	Skipjack and yellowfin
Eastern Atlantic	Longline	Belize, China, Honduras, Iceland, Ireland, Japan, Panama, Philippines, Portugal, Republic of Korea, Taiwan Province of China and Spain	Albacore, bigeye, Atlantic bluefin, swordfish and yellowfin
	Pole and line	France, Ghana, Namibia, Panama, Portugal, Republic of Korea, Senegal, South Africa and Spain	Albacore, bigeye, skipjack and yellowfin
	Purse seine	Côte d'Ivoire, France, Ghana, Morocco, Portugal, Spain, Senegal and Vanuatu	Bigeye, skipjack and yellowfin
	Troll	France, Ireland and Spain	Albacore
Western Atlantic	Longline	Brazil, Japan, Spain, Taiwan Province of China, United States of America, Uruguay and Venezuela (Bolivarian Republic of)	Albacore, bigeye, Atlantic bluefin, swordfish and yellowfin
	Pole and line	Brazil, Japan, Taiwan Province of China and Venezuela (Bolivarian Republic of)	Skipjack
	Purse seine	Brazil and Venezuela (Bolivarian Republic of)	Skipjack and yellowfin
Western and Central Atlantic	Longline	China, Japan, Portugal, Spain, Taiwan Province of China and United States of America	Bigeye and Atlantic bluefin
Western Mediterranean (Tyrrhenian and Liguria Seas & Strait of Sicily)	Gillnet	Morocco	Atlantic bluefin and swordfish
	Longline	Cyprus, Greece, Italy, Japan, Libya, Spain and Taiwan Province of China	Atlantic bluefin and swordfish
	Purse seine	Algeria, France, Italy, Spain and Tunisia	Atlantic bluefin
	Handline	Morocco and Spain	Atlantic bluefin
Central Mediterranean (Adriatic & Ionian Seas)	Purse seine	Croatia and Italy	Atlantic bluefin and swordfish
	Longline	Cyprus and Italy	Atlantic bluefin, albacore and swordfish
Eastern Mediterranean (Aegean & Marmara Seas)	Longline	Greece	Atlantic bluefin and swordfish
	Purse seine	Turkey	Bonito and Atlantic bluefin

Figure 6: Industrial tuna fisheries operating entirely or partially on the high seas[34]

[34] FAO. (2011). Review of the state of world marine fishery resources

2.2.3 The history of the Northern Atlantic Bluefin Tuna fishery

In the beginning of the 20th century the Northern Atlantic Bluefin Tuna entered the Norwegian coast from June till September. Capture and distribution of Tuna was tested in Norway for the first time during the 1920's[35]. At that time several fishermen had already established a seasonal fishing by shooting the Tuna with harpoon or by a fishing rod. With the prospect of great economic profit some of the fishermen attempted to catch the Tuna with seines, but unfortunately the Tunas physical strength was too much to handle in the over-dimensioned seines. There was a lot of failing before the Norwegian fishermen got the hang of the Tuna fishing game. Since Tunas depend on maintaining a certain pace to sustain a sufficient oxygen level (see chapter 2.1), they need space to swim in or they would panic. So as long as there was enough space in the seines the Tuna remained calm.

After a couple of years with trial and error the Norwegian fishermen worked out an ideal equipment and catch technique. A single purse seiner consisted of the main vessel, an accompany vessel, two motorboats and also a gut vessel. The foundation of today's construction of purse seine was developed by Johan Warholm in 1946[36]. During 1952 almost every vessel had the new purse seiners, and the total Norwegian fleet was probably over 300 vessels, in addition to convoy vessels and gut-boats. The capacity problems on shore forced the Tuna fishing to pause several times throughout 1952. Throughout this season the best vessel "Sjømann" caught 2800 Tunas[37].

The incredible Tuna fishing season of 1952 was the reason for an increase in number of vessel in 1953, with approximately 500 purse seiners. However, this season the Tunas weren't as numerous. The following seasons of the 1950's was a continuous competition about being at the right place at the right time, and to be faster and more effective than the opponents. The seasons of the 1960's were a continuous rollercoaster: it was a mixture of highlights and depressions where several vessels had to cave in. Nevertheless, in 1967 the vessel "salvøy" sat

[35] Tangen, M. (n.d.). History of the Bluefin Tuna fishery.

[36] Tangen, M. (n.d.). History of the Bluefin Tuna fishery.

[37] Tangen, M. (n.d.). History of the Bluefin Tuna fishery.

a new record with 108, 7 tons in a single throw, and hope was yet regained[38]. In the 1970's and 1980's the Tuna fisheries was imprinted with uncertainty, and more vessels gave up.

The Tuna fisheries in Norway was never regulated nor subjects to concession, so when purse seiners from the Pollock fishing fleet saw an opportunity, they took it. Subsequently the last Northern Atlantic Bluefin Tuna was caught in 1986, and draw a line for the exotic and unpredictable fisheries along the Norwegian coast.

3.0 Theoretical and legal framework of fisheries management

"Ignorance more frequently begets confidence than does knowledge: it is those who know little, not those who know much, who so positively assert that this or that problem will never be solved by science." – Darwin[39]

The intention and objective with this Master Thesis is to explain the complexities of achieving sufficient management measures for the Atlantic Bluefin Tuna, and attempt to specify failure and shortcomings within the management system. Ultimately I wish to achieve an idea to a solution this wicked management problem. To reach the objective I will elaborate the governance theory and the legal theoretical framework of fisheries management, and also the challenges and difficulties within these frameworks.

3.1 The guidance of theory

The word theory originates from the Greek word thorós, which directly translated means spectator, and stresses the fact that all theories are mental models of the perceived reality[40]. I would explain theory as a simplified illustration of reality. Theory is a deductive system of hypotheses, which can be in general form or delimited validity in time and space. The

[38] Tangen, M. (n.d.). History of the Bluefin Tuna fishery.

[39] Darwin, C. (1871). *Introduction to The Descent of Man.*

[40] Business Dictionary. (2012)

objective of a theory is to make it easier for people to explain and predict the correlation and behaviour of different processes, entities and clusters. According to Oxford Dictionary of English, theory is a hypothesis or a system of ideas intended to explain something, especially one based on general principles independent of the thing to be explained[41]. Theory can be explained as a set of principles on which the practice of an activity is based or an idea used to account for a situation or justify a course of action or a collection of propositions to illustrate the principles of a subject.

To achieve an understanding of the problem we are examining we rely on theories and the development of these theories. All theories share the common of being abstracts of concrete phenomena. Theories might differ in form and application. Some theories might be more complex than other. The employment of scientific theory is to discover the structure of the world, the structure of phenomena. Scientific knowledge is absolute, not relativistic according to the "*The Structure of Scientific Theories*"[42].

We often speak of theoretical frameworks instead of theory. A framework is a comprehensive overview, outline, or skeleton of interrelated units which supports a particular approach to a specific objective. The intention of a framework is to function as a guiding appliance. In a research process the choice of a theoretical framework can be a clarifying, which might show the next step in solving the problem at hand. The choice of theoretical framework improves focus and increase clarity to the problem area. It also excludes the view of other perspectives that might have been applied to find a solution to the problem.

3.2 Governance theory

To clarify or define the different concepts in this thesis I will go through the following subjects: governance (interactive governance), governability and wicked problem, and also the relationship between these. How governance actually work and what we perceive governance to be might not always be in correspondence. Social constructions are often based on our mental images and assumptions on how the world works and how it must be tended.

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[41] Oxford Dictionary of English (2012)

[42] Suppe, F. et al. (1977). *"The Structure of Scientific Theories"*

Differences between management, policy and governance do exist, but culture- and linguistic variances complicates this. How the different concepts are interpreted depends on how state's functions are perceived. What is called policy in one political culture may be equivalent to governance or management in another culture.

Basically fisheries governance is a relationship between two systems which are called the "governing system" and the "system to be governed"[43]. This is the reason why it is often named "interactive governance" because it emphasizes an integrated, communicative and political informed approach.

The "governing system" is a man-made social system which consists of institutions and steering mechanisms. The "system to be governed" consists of both natural and social factors. The natural part of the "system to be governed" includes an ecosystem and the resources that it contains, while the social part consists of a system of users and stakeholders who form political coalitions and institutions. The interaction between these two systems defines what governance is and how it functions. The system's interplay is according to interactive governance theory diverse, complex and vulnerable[44]. The objective of the "governing system" is to affect the interplay between the social and the natural regime which ought to be governed.

In order for governance to function, these systems have to be mutually responsive. This indicates that the "governing system" and the "system to be governed" have to be in conformity with each other. To "fit like a glove", it is vital that interplay between societal actors such as legislative bodies, planning agencies and civil organisations are vital. Even unpretentious and marginal matters may be significant because they may form a part of a larger whole, and therefore it is essential for the "governing system" to be sensitive. Recognition of which minor matters that may play a part is difficult. To be able to deal with governing concerns like ecosystem health, economic efficiency and social justice, the "governing system" has to be inclusive. A flexible governing system is task oriented and

[43] Jentoft, S. (2007). Limits of governability: institutional implications for fisheries and coastal governance. *Marine policy*.

[44] Kooiman, J. et al. (2008). *Interactive governance and governability: an introduction.*

pragmatic, it has the will and ability to adapt when issues or possibilities so require. Many fisheries system is being governed on the basis that the fisheries system is controllable and that variations can be evened out. In our indefinite world, insufficient knowledge requires cautious action and critical feedback both before and after the information.

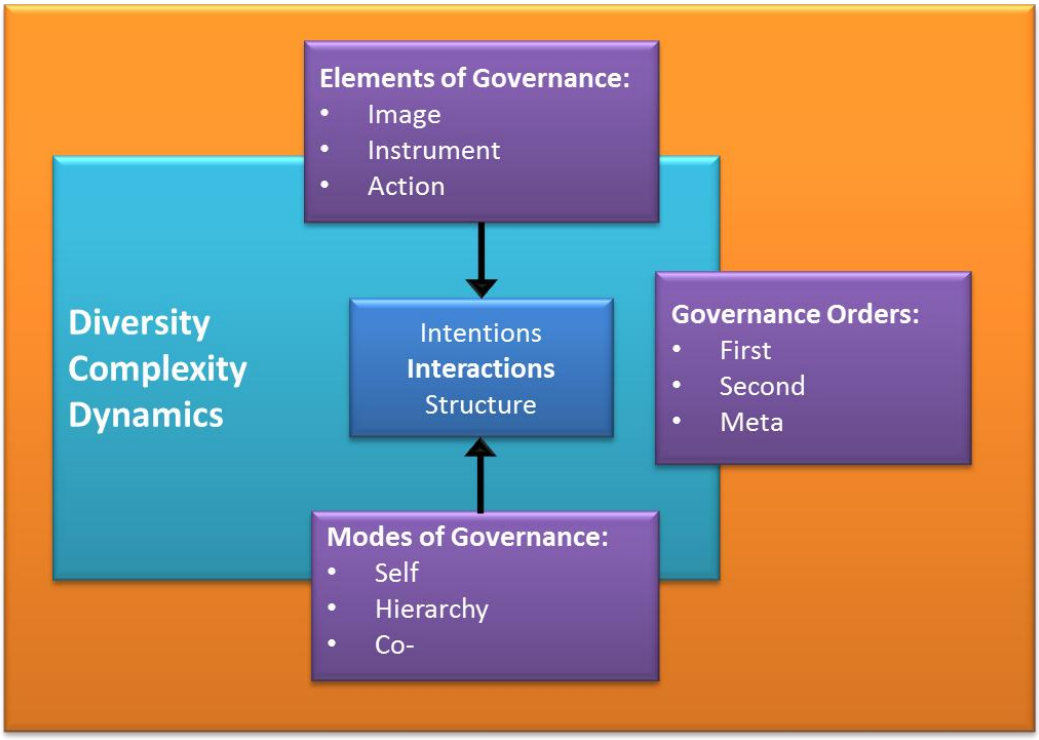

Figure 7: Components of the interactive governance-model[45]

According to the book "Fish for Life" it is important for fisheries- and aquaculture industry to develop an interactive perspective on governance[46]. The explanation for this is that the users think the challenges of the industry cannot be solved by conventional methods. As a result there is a need for creative thinking, which involves diminishing the limits between disciplinary considerations and routine-methods. This implies a change from a problem-solving approach to a method that accentuates creation of opportunities and effective handling of tension. Interactive governance emphasizes solutions to societal problems, and to create possibilities for society through interactions between the civil, public and private actors. The perspective interactive governance comes from the assumption that societies are ruled by a combination of "governance efforts". This perspective is the answer to perpetual increase of

[45]Kooiman, J. et al. (2008). *Interactive governance and governability: an introduction.*

[46] Kooiman, J. et al. (2005). In *Fish for life - Interactive Governance for Fisheries.* Amsterdam University press.

society's diversity, dynamics and complexity, and answers essential societal issues as poverty and climate change. Interactive governance distinguish from other methods by focusing on applicability and performance on different societal levels, from global to local with overlapping authority and responsibility. In the article "Governing as Governance" Interactive governance is defined as "the totality of interactions implemented to solve societal problems and to create opportunities"[47]. This includes formulations and applications of principles that guide interactions and maintain institutions that enable and controls them.

In compliance with the guidebook "Interactive fisheries governance: a guide to better practice": "the only way to cope with complexity, diversity and dynamics on the one hand, and with hard choices on the other, is through creating governance systems that are inclusive and adaptive through learning, with a solid foundation of principles to help with navigation"[48]. The guidebook perceives governance as "the whole of public as well as private interaction taken to solve societal problems and create societal opportunities. It includes formulation and application of principles, guiding these interactions and care for institutions that enable them"[49].

Like all man-made social systems there are limitations to what the system possibly can achieve. For instance there might be an insufficient knowledge base, there might be a lack for proper tools, tools may not be available, or the "system to be governed" may not allow itself to be governed. Where the limits are or where to stop stretching a specific limit is seldom obvious. In order for fisheries governance to act responsible they have to be aware of, and recognize that limits do exist.

Governability may be described as political and institutional stability and efficiency in decision-making and administration. It relates to continuity of rules and institutions, and to the pace/velocity, solidity and intensity of determinations/resolutions. Governability is the total capacity of governance regardless of societal entity or system. Governability depends on

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[47] Kooiman, J. et al. (2003). *Governing as Governance.*

[48] Bavinck, M., Chuenpagdee, R., Diallo, M., Heijden, P., Kooiman, J., Mahon, R., et al. (2005). *Interactive fisheries governance: a guide to better practice.* Centre for Maritime Research (MARE)Amsterdam.

[49] Bavinck, M., Chuenpagdee, R., Diallo, M., Heijden, P., Kooiman, J., Mahon, R., et al. (2005). *Interactive fisheries governance: a guide to better practice.* Centre for Maritime Research (MARE)Amsterdam.

governance: the level of maturity in an organized society and its capacity for demanding collective responsibilities in the implementation of determinations and in the art of managing well. Governability is a system's ability to address the most severe difficulties. According to interactive governance theory, governability is a function of the "governing system", the "system to be governed and the interactions between these. In the article "Limits of governability: Institutional implications for fisheries and coastal governance", Svein Jentoft argues that the diversity demands that the "governing system" has to be sensitive, while complexity demands inclusiveness. In addition the article argues that there are indications that dynamics logically leads to the need for flexibility, and that vulnerability indicates the need for execution of cautiousness. The principles of Governability requests that governance has limitation. For example fisheries and coastal systems may be too diverse, complex, dynamic and vulnerable to be under total control by the "governing system". This causes significant questions about how governable the "governing system" is, and what makes these systems governable or not. There are several governing principles for fisheries and coastal governing systems. The Precautionary principle, the UN fish stock agreement, the Convention on Biodiversity and the FAO Code of Conduct for responsible fisheries will be further elaborated in the next section of this chapter.

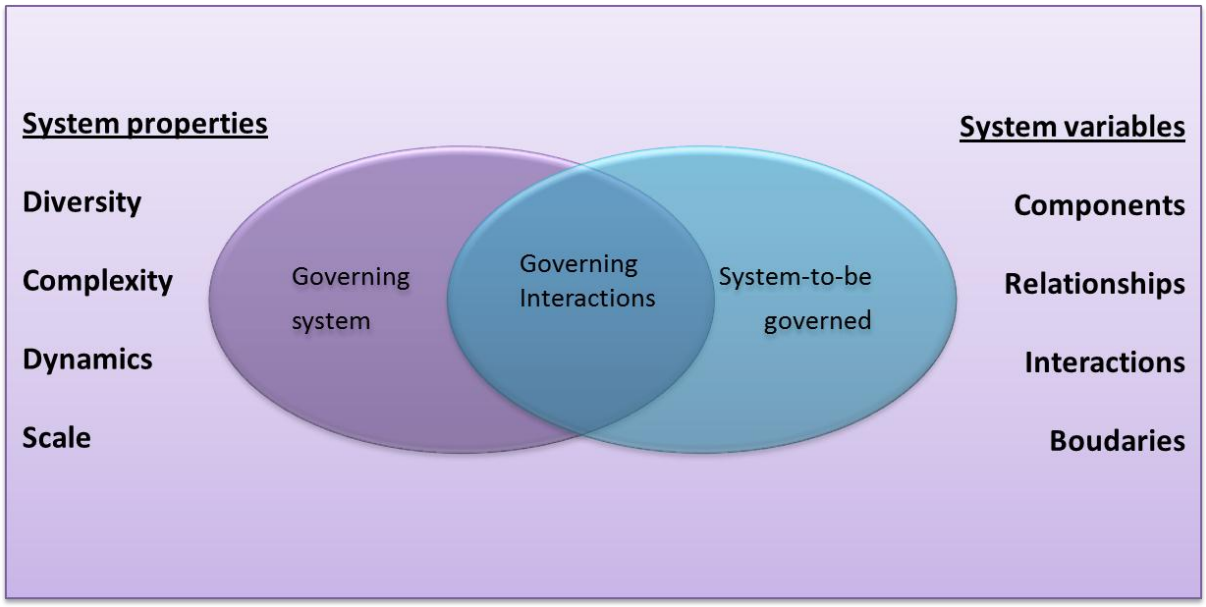

Figure 8: governing interactions50

[50] Kooiman, J. et al. (2008). *Interactive governance and governability: an introduction.*

When describing the dimensions of governance and governability the explanation of the concept "wicked problems" is practically expected. A "wicked problem" is a problem that doesn't necessarily have an apparent solution. Such problems are often of social nature, and how such a problem is perceived is therefore individual and will influence a possible solution[51]. "Wicked problems" are complex and often a symptom of a greater problem, and in addition difficult to separate from other problems. These problems are not solved once and for all, but constitute a continuous challenge, partly because it is not known for certain when or if they are solved, and partly because a possible solution can't be determined scientifically. In fisheries and coastal governance the formulation of a "wicked problem" is a problem. When the problem is defined of identified, an idea to a solution is already formed.

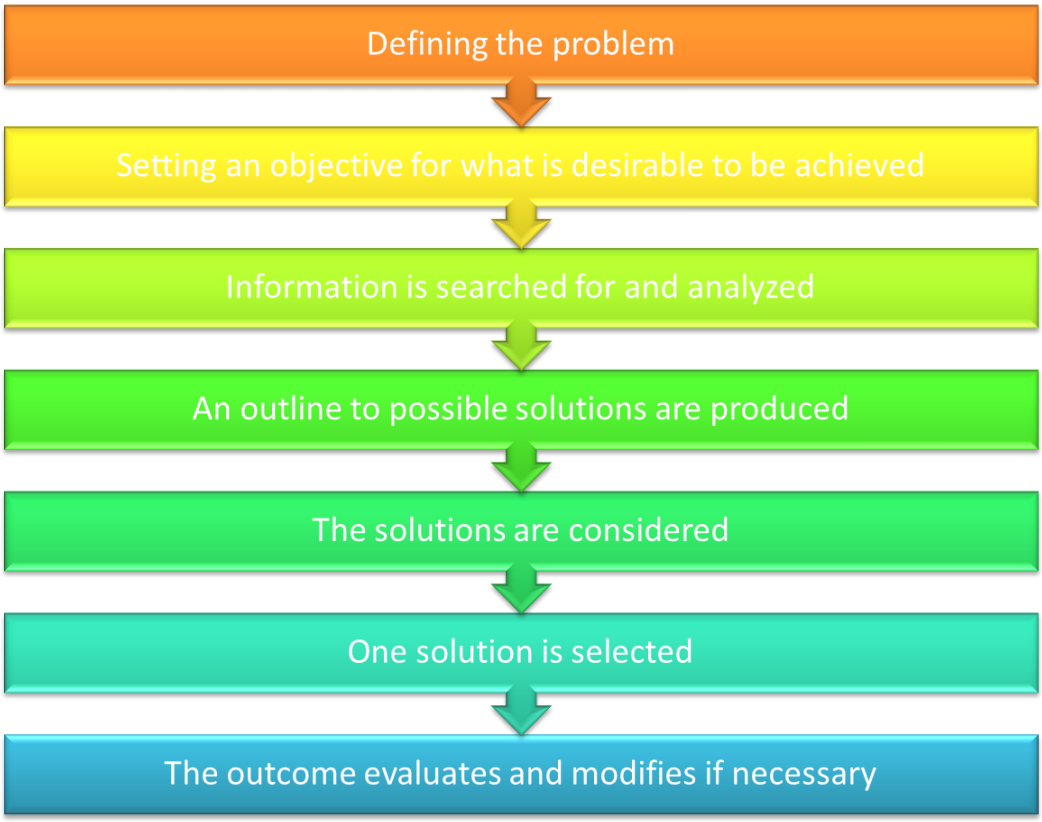

Figure 9: Conventional planning: the common approach to solve a management problem, which assumes a process with an obvious beginning and end. Unfortunately the same process is used to solve wicked problems[52].

To find a solution to this kind of problem there is important that each context and uniqueness of the problem is considered. The solution to "wicked problems" doesn't have to be technical,

[51] Jentoft, S., & Cuenpagdee, R. (2008). Fisheries and coastal governance as a wicked problem
[52] Jentoft, S., & Cuenpagdee, R. (2008). Fisheries and coastal governance as a wicked problem

but institutional, political and philosophic. These problems demand governing interactions which are participatory and communicative, and imply "stakeholder" partnerships and co-management arrangements where the problem solving process is experimental, interactive and consultative. There are limitations to how systematic, effective and rational fisheries and coastal governance can be, and therefore a "wicked problem" can be identified as a governability problem according to interactive governance theory[53]. The outcome of a selected problem-solution might not give the desired or intended result, and can be perceived as a consequence of governance limitations. These limitations do not only apply to the nature of the governance system, but also to the nature of the problem. The nature of the problem should determine the nature of the solution[54]. So what is the nature of the problem? To detect every complexities of the nature of the problem is a wicked problem. The management of fisheries is a part of a governance system. Because the problem of this thesis deals with management of a specific fishery, I find governance theory to be applicable.

Governance is all public and private interplay which is executed to solve problems or create opportunities in society. The problems and opportunities of the marine resources might be endless. Fisheries management is the governing institutions way to deal with these problems and opportunities. Governance includes formulation and allocation of principles which guide interactions and affect the institutions that enables them. The principles which guide fisheries management is embedded in a legal framework. In the next section of this chapter I will give an introduction to the central conventions and agreements that constitute rights and obligations to the governors and the governing system, and how the legal framework came to existence.

3.3 Legal framework

Since the 17th century the oceans were subjects to the freedom-of-the-seas doctrine[55]. This limited the national rights and jurisdiction over the oceans to a narrow belt of sea surrounding

[53] Kooiman, J. et al. (2008). *Interactive governance and governability: an introduction.*

[54] Kooiman, J. et al. (2008). *Interactive governance and governability: an introduction.*

[55] Division for Ocean Affairs and the Law of the Sea, Office of Legal Affairs, United Nations. (1998). *The United Nations Convention on the Law of the Sea - a historical perspective*

nation's coastline. This signified that the resources of the oceans were free to all: a common. The marine fishing activity occurred mostly in coastal areas until the industrialisation of fisheries during the middle of the 20th century[56]. As the development in the fishing industries improved it generated a growing concern of the spreading of pollution and wastes from transport ships and oil tankers and the competing demand for lucrative fish stocks. This was just some of the factors that were threatening to transform the oceans to another arena for conflict and instability. Due to an extreme increase in the world's population after the Second World War, the need for a massive food supply was crucial, and there was optimism considering the marine fisheries possibilities. This implicated a higher pressure on the marine resources.

Over a period of 20 years from the 1950's until the 1970's the world's total catch increased from 21 million tons, to 65 million tons[57]. This was possible because of the progression in fishing technology and mobility. The high pressure on important fish stocks lead to overexploitation, and crisis in fisheries all over the world. As a result there was an increasing attention on better resource management, with the purpose of creating order and generating harmony and goodwill among conflicting Nations. This was the background for the development towards a new international management regime which among other things gave the coastal states sovereignty over the marine resources within a 200 nautical mile zone (EEZ). The Exclusive Economic Zone was internationally recognized during the third United Nations Convention on the Law of the Sea (UNCLOS) in 1982.

During the 1980s and 1990s the fishing industry where making progress in the regulation of fisheries to ensure sustainable use[58]. For a long time there had been an assumption that target species existed in isolation from the rest of the ecosystem, or at least could be modelled as if they did, and so the approach only had focus on single species. When the interdependence and connection between single species were recognized, the need for planning was necessary to ensure sustainable use.

[56] Hallenstvedt, A. (2011). *Fishery – "Major Norwegian Encychlopedia"*

[57] Hallenstvedt, A. (2011). *Fishery – "Major Norwegian Encychlopedia"*

[58] FAO. (2005). *Putting into practice the ecosystem approach to fisheries*

UN's Convention Law of the Sea of 1982 establishes the fundamental international regulations for all maritime activity[59]. The Convention constitutes the superior legal framework for activities and measures of the oceans. It determines rights and obligations for coastal nations when it comes to attendance of environmental considerations, executions of authority with regard to vessel traffic as well as the utilizations of the living marine resources and petroleum- and energy resources.

Figure 10: Relevant international agreements and frameworks[60].

The Law of the Sea also constitutes the fundamental international law that stipulates the territorial limits of 12 nautical miles from the sea boundary and the 200 nautical mile economic zones. In accordance with the convention on the Law of the Sea the states are

[59]Division for Ocean Affairs and the Law of the Sea, Office of Legal Affairs, United Nations. (1998). *The United Nations Convention on the Law of the Sea - a historical perspective.*

[60] FAO. (2012). *The ecosystem approach to fisheries management.*

obligated to protect and conserve the marine environment. For this purpose the states shall make all necessary measures they are in disposal of which is in compatibility with the convention. The convention particularly calls upon global and regional cooperation for the formulation of international rules, standards and recommendations to protect the marine environment. The Convention on the Law of the Sea gives the coastal states access to sustain the economic zones and gives them sovereign rights over natures resources within the zone. What management principles to follow and which considerations to make are specified in the convention. The coastal states is obligated to assure that management and conservation of the fisheries resources are based on the best available scientific knowledge and that the resources are not in danger of being overexploited.

As the awareness of the interrelation between global and oceanic issues increased, the United Nation recognized the necessity to regard these problems in an integrated perspective. The UN Conference on environment and development in Rio de Janeiro in 1992 (UNCED) was exceptional in relation to size and extent of concerns[61]. With this convention the UN wanted to contribute to the re-evaluation of the economic development and discover possible ways to prevent destruction of irreplaceable natural resources and pollution of the earth. During the conference five essential international documents were adopted, which includes the Rio declaration, Agenda 21, Forest principles, the Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD).

The UNCED emphasized protection and preservation of the oceans' environment in harmony with the coherent utilization and development of living resources, and in this manner established the concept of "sustainable development" which was formulated in Agenda 21. One of the persistent issues in the implementations process of the Agenda 21 has been the need for opposing degradation and depletion of fish stocks. This is valid for both nations' economic zones and the high seas where overfishing, excess fishing capacity, by-catch and discards are essential issues to be solved.

The concept "precautionary principle" was adopted by UN's secretary-general in 1982[62]. The principle originates from German environmental politics where it is referred to as

[61] United Nations. (1997). *United nations conference on environment and development 1992*

[62] Norwegian Ministry of Health and Care Services. (2000). *GMO-food*

"Vorsorgeprinzip". Since then the precautionary principle has been implemented in different international conventions where the ambition are to protect the environment. During the Rio convention the precautionary principle was inscribed in its declaration and verifies in article 15: "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capability. Where there are threats of serious or irreversible damage, lack of full certainty shall not be used for postponing cost-effective measures to prevent environment degradation"[63]. According to the article "Limits of governability: Institutional implications for fisheries and coastal governance": "the precautionary principle stresses that insufficient scientific knowledge is no excuse for reckless behaviour and that there should be built-in safety margins to allow for uncertainty, as well as the need to shift the burden of proof from the governing system to the system to be governed, whether fisheries are ecologically sustainable or not".[64]

The statement of the precautionary principle is not legal binding for states prospective politics. Nevertheless the precautionary principle as defined in the declaration has great impact on national and international level and also throughout environmental questions. The precautionary principle is applied by the management authorities, and it is clear that the principle has to be exerted on the basis of research and science based knowledge. The principle requires an integrated balance of critical points and uncertainty. The principle applies when management authorities suspect that a certain series of events might have destructive effects, but is uncertain of the causality and possible dimension. Consequently the precautionary principle requires a more research-founded decision-making processes, and results in greater need for scientific research.

[63]Centre for International Sustainable Development Law (CISDL). (2004). *The Principles of International Law Related to Sustainable Development*

[64] Jentoft, S. (2007). Limits of governability: institutional implications for fisheries and coastal governance

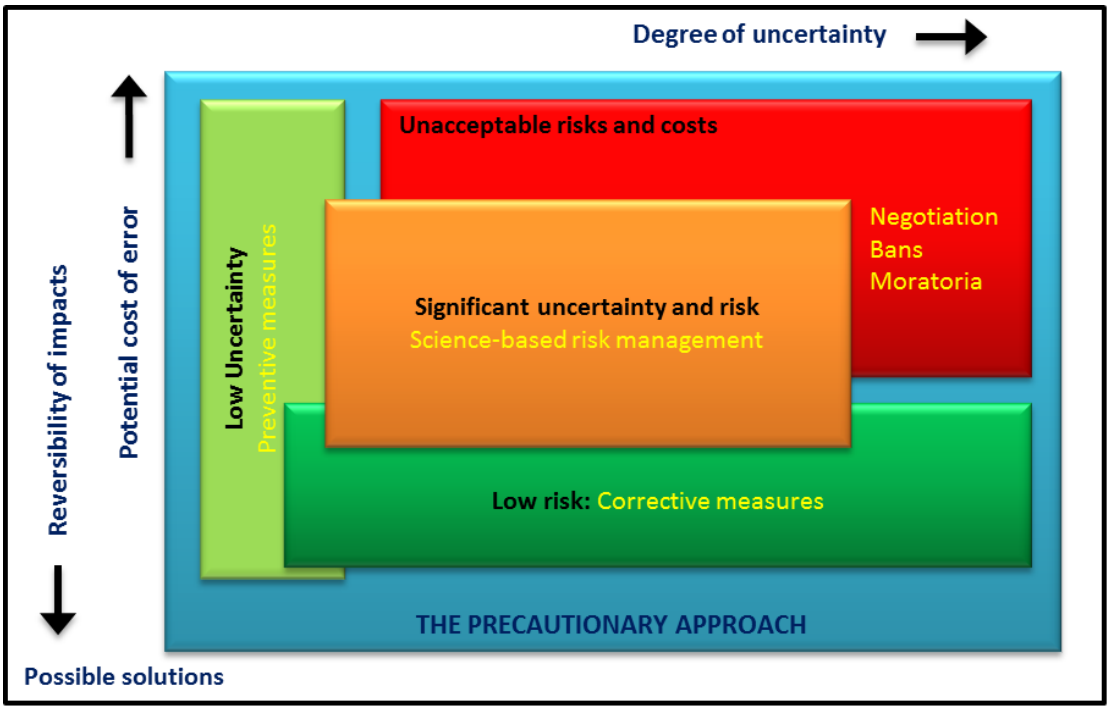

Figure 11: diagram of the precautionary approach to fisheries (FAO)[65]

Among the most important outputs of UNCED were the adoption of The UN fish stock agreement of 1995 (UNFSA)[66].The agreement supplement the UNCED and gives a framework for conservation and management regimes pertaining to international law. The agreement stipulates the conformity between management on the high seas and the adjacent economic zones. Through the agreement the precautionary principle gets an international legal foundation regarding management of fisheries, and determinations regarding the follow-up of the principle. Relating to environment and resource protection the agreement oblige the member states to adopt a precautionary approach to fisheries utilization, and also extended authority to coastal states to enforce proper management of fisheries resources. The agreement also deposit obligations to regional cooperation considering fisheries management, and the provisions of measures that can be applied from the coastal state to promote sub-regional, regional and global conservation and management measures, examples of such cooperation are ICCAT and NEAFC.

[65] FAO. (2012). *Precautionary approach to fisheries management*
[66] Division for Ocean Affairs and the Law of the Sea, Office of Legal Affairs, United Nations. (1998). *The United Nations Convention on the Law of the Sea - a historical perspective.*

The Convention on Biological Diversity (CBD) was signed during UN's Convention on Environment and Development in Rio de Janeiro (UNCED 1992), with effect from 1993. The agreement has three primary objectives, which is to conserve the earth's biological diversity, to promote sustainable utility of the resources and to righteously share the goods of genetic resources.[67]

The CBD aims at conservation of biological diversity, sustainable utility and righteous sharing of goods. The Jakarta mandates recommendation in national plans and programs, states shall as far possible make sure that:

- Management decisions are based upon the precautionary approach and the best possible scientific knowledge, research and information with regard to impacts on the ecosystem.
- Local societies, users and indigenous people shall be involved i conservation and management of resources.
- National legislation ensures conservation and sustainable utilisation of living marine and coastal resources, which is corresponding with CDB, UNCLOS and agenda 21.
- The regulation of FAOs Code of Conduct for Responsible fisheries is pursued.
- Countries endorse/comply with existing international agreements which deal with overfishing and conservation of marine and coastal resources, and entirely implement these especially the agreement on straddling and highly migratory fish stocks.

The member states are obliged to enforce the objectives in their own laws and regulations. The Convention on Biodiversity was one of five essential international documents that were adopted during UNCED. These vital documents shall create "fertile soil" and stimulate to further work with sustainable utilization with the global resources. This indicates action by stopping pollution, it implies a long-term way of thinking and utilization of the resources with an approach that does not lead to devastated resources for future generations. In similarity to other important documents from UNCED the CBD is quite universal, and set few demands for the member states. The language used in the agreement articles is formulated with caution, for example:

[67] Globalis. (2012). *Convention on Biological Diversity*

Article 11. Incentive Measures

Each Contracting Party shall, as far as possible and as appropriate, adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity.[68]

The formulation "…shall, as far as possible and as appropriate", certainly makes the article open to interpretation, and these vague words are repeated throughout parts of the agreement-text. There are of course articles that set definite demands, where the words are firm and determined. For example:

Article 18. Technical and Scientific Cooperation

1*. The Contracting Parties shall promote international technical and scientific cooperation in the field of conservation and sustainable use of biological diversity, where necessary, through the appropriate international and national institutions.*

2. *Each Contracting Party shall promote technical and scientific cooperation with other Contracting Parties, in particular developing countries, in implementing this Convention, inter alia, through the development and implementation of national policies. In promoting such cooperation, special attention should be given to the development and strengthening of national capabilities, by means of human resources development and institution building.*

3. *The Conference of the Parties, at its first meeting, shall determine how to establish a clearing-house mechanism to promote and facilitate technical and scientific cooperation.*

4. *The Contracting Parties shall, in accordance with national legislation and policies, encourage and develop methods of cooperation for the development and use of technologies, including indigenous and traditional technologies, in pursuance of the objectives of this Convention. For this purpose, the Contracting Parties shall also promote cooperation in the training of personnel and exchange of experts.*

5. *The Contracting Parties shall, subject to mutual agreement, promote the establishment of joint research programmes and joint ventures for the development of technologies relevant to the objectives of this Convention.*[69]

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[68] United Nations. (1992). *Convention on Biological Diversity.*

[69] United Nations. (1992). *Convention on Biological Diversity.*

The intention with few demands is that the main objective of the Convention is to constitute a common basis, and later on adopt more mandatory agreements. During the World Summit on Sustainable Development in 2002 the main objectives of the UNCED was resumed, and established the starting point of specific objectives concerning intense/vigorous decelerated decrease of the planets biological diversity within 2010. These objectives were incorporated in UN's millennial-objective nr 7, which deal with securing environmental and sustainable development. Nations that has signed and ratified the agreement is obligated to create national strategies and action plans for preservation of biological diversity. This includes establishment of conservation areas, abatement of invasive species, preservation of endangered species, and promote cooperation on biodiversity with other nations. The CBD is statutory, and the involved countries are committed to achieve the agreement demands, and this requires frequent rapports on their follow-up on the convention. In conclusion the CDB is an international agreement that attempts to achieve global objectives and arrangements to attend to/take care of nature and its values in a future prospective. One should not expect too much from CDB, it takes political determination to execute actions.

As a result of the 1986-94 Uruguay Round negotiations and earlier negotiations under the General Agreement on Tariffs (GATT), the World Trade Organisation (WTO) was established in January 1995[70]. With the establishment the regulations of the GATT was fortified and further upgraded. The WTO deals with the rules of trade between nations, and has been signed and ratified by 155 member states governments. The agreements of WTO provide the legal principal rules for international commerce. These documents are essentially mandatory contacts which oblige the member governments to retain their trade policies within agreed limits, with the purpose of helping producers of goods and services, exporters, and importers conduct their business, while allowing governments to meet social and environmental objectives. With the trade of commodities tension and conflicting interests may arise. The regulations provided by WTO, its settlement of dispute and the fact that all settlements are based on unanimous determination process makes the multilateral trading system to the most binding and effective example of institutional international cooperation. Central intentions of the WTO are increased standard of living, complete employment, increased real income and carrying out resource utilization based on sustainable development.

[70] WTO. (n.d.). *Understanding the WTO.*

To ensure predictable framework conditions and that no trading partner country is discriminated is a carrying principle of the agreements. However exceptions do exist in GATT's article XX:

Article XX: General Exceptions

Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures:

(a) necessary to protect public morals;

(b) necessary to protect human, animal or plant life or health;

(c) relating to the importations or exportations of gold or silver;

(d) necessary to secure compliance with laws or regulations which are not inconsistent with the provisions of this Agreement, including those relating to customs enforcement, the enforcement of monopolies operated under paragraph 4 of Article II and Article XVII, the protection of patents, trade marks and copyrights, and the prevention of deceptive practices;

(e) relating to the products of prison labour;

(f) imposed for the protection of national treasures of artistic, historic or archaeological value;

(g) relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption;

*(h) undertaken in pursuance of obligations under any intergovernmental commodity agreement which conforms to criteria submitted to the CONTRACTING PARTIES and not disapproved by them or which is itself so submitted and not so disapproved;**

(i) involving restrictions on exports of domestic materials necessary to ensure essential quantities of such materials to a domestic processing industry during periods when the domestic price of such materials is held below the world price as part of a governmental stabilization plan; Provided that such restrictions shall not operate to increase the exports of or the protection afforded to such domestic industry, and shall not depart from the provisions of this Agreement relating to non-discrimination;

(j) essential to the acquisition or distribution of products in general or local short supply; Provided that any such measures shall be consistent with the principle that all contracting parties are entitled to an equitable share of the international supply of such products, and that any such measures, which are inconsistent with the other provisions of the Agreement shall be discontinued as soon as the conditions giving rise to them have ceased to exist. The CONTRACTING PARTIES shall review the need for this sub-paragraph not later than 30 June 1960[71].

The exceptions of Article XX empower governments to act on trade in order to protect human, animal or plant life or health, provided they do not discriminate or use this as disguised protectionism.

Furthermore, in 1995 more than 170 members of the Food and Agriculture Organization of the United Nation (FAO) adopted the Code of Conduct for Responsible Fisheries[72]. The argument for the foundation of the Code was the significance of the entire food chain which fisheries and aquaculture constitutes. The food chain of these industries provides an important food source, employment, income and recreation all over the world.

The Code of Conduct consists of a collection of principles, goals and elements for action, which was elaborated by representatives from members of FAO, inter-governmental organizations, the fishing industry and non-governmental organizations. Since the Code is a result of cooperation between different groups involved in fisheries and aquaculture it represents a global consensus or agreement on a wide range of issues within the industries.

[71] NFC. (2010). *Compendium in international fisheries law*.
[72] FAO. (n.d.). *What is the Code of Conduct for Responsible Fisheries?*

Implementation of the Code is not compulsory, but voluntary. Governments in collaboration with their fishing industries and communities are responsible for implementation of the Code, while FAO's role is to give practical and technical advice to ensure that the Code is implemented as it was intended. The Code will probably be most effective when it is applied in government's national fishery legislations and policies.

The Code of Conduct stresses that cooperation among nations to conserve and manage fish resources and habitats are crucial in order to sustain the best possible supplies of fish for future generations. Each country's fishing activities should be planned so they may achieve a long-term sustainable use of the resources to assure conservation of the resources, maintained/continuous food supply and hopefully poverty alleviation. This fishery design or level of catch is called maximum sustainable yield (MSY). To explain MSY I will quote Ola Flaaten's "Fisheries Economics and Management": "If the natural growth of the stock is harvested, the maximum harvest is achieved for stock level *XMSY* and this harvest is called the maximum sustainable yield".[73] Technical guidelines in the code explain that MSY should be used as a point of limitation instead of target reference point in fisheries management. The overall purpose of the Code of Conduct is to assist fishery nations in achieving stocks that are able to maintain MSY.

The General principles of the code stress that:

- The right to fish comes with the obligation to conserve and manage living marine resources
- Fisheries management should promote preservation of the quality, diversity and availability of fish resources in sufficient quantities for todays and the futures generations in the context of food safety, poverty alleviation and sustainable development. Management measures should not only assure conservation of single species, but species belonging to the same or the associated ecosystem.
- States should prevent overfishing and excessive fishing capacity, and should implement management measures to assure fishing effort in correlation with the productivity capacity of the resource and their sustainable utilization.

[73] Flaaten, O. (2011). *Fisheries Economics and Management.* Norwegian College of Fishery Science.

- States should carry out measures to rehabilitate populations as far as possible, when it is possible.
- Conservation and management decisions for fisheries should be based upon the best scientific evidence available.
- The precautionary approach should be carried out in terms of conservation, management and utilization of living aquatic resources.
- Selective and environmentally save fishing equipment/gear and practices should be developed further and introduced, if it is practical, to sustain biodiversity and to conserve/protect population structures, aquatic ecosystems and protect/secure fish quality.
- Critical habitat should be safeguarded.
- States should introduce control of fishing vessels to assure that the code if followed.
- States should cooperate to avoid conflicts.

Several important international agreements including the FAO's Code of Conduct for Responsible Fisheries represented the need for an Ecosystem Approach to Fisheries Management (EAF). The purpose of an EAF is according to the Fisheries and Aquaculture Department "to plan, develop and manage fisheries in a manner that addresses the multiple need and desires of societies without jeopardizing the options for future generations to benefit from the full range of goods and services provided by marine ecosystems"[74]. With the recognition of the necessity for an EAF 57 countries accomplished the Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem[75]. The Declaration includes a statement of the nation's intention to work on incorporation of ecosystem considerations into fisheries management. To ensure sustainable development of the oceans the 2002 Plan of Implementation of the World Summit on Sustainable Development called for the application of the Reykjavik Declaration by 2010. Unfortunately regardless of good intentions and progress in implementing an EAF there are limits because of insufficient ecosystem research and institutional development which is essential before the implications of the approach are fully comprehended and reliable management strategies are adopted and effectively applied.

[74] FAO. (2005). *Putting into practice the ecosystem approach to fisheries.*

[75] FAO. (2012). *The ecosystem approach to fisheries management*

The FAO's Technical Guidelines on EAF from 2003 define EAF as "An ecosystem approach to fisheries strives to balance diverse societal objectives, by taking into account the knowledge and uncertainties about biotic, abiotic and human components of ecosystems and their interactions and applying an integrated approach to fisheries within ecologically meaningful boundaries."[76]

The Law of the Sea was developed before biodiversity and ecosystem management approach reached legal status. An ecosystem management approach goes further than the fundamental principles in the Law of the Sea and demand that a state assess interactions between stocks and predators, competitors and pray, environment factors and the impact fishing activities has on these factors. An EAF presents a more complex approach to fisheries management, and this might create difficulties along the way.

3.4 Challenges and difficulties of the Law of the Sea

For centuries humankind has exploited the resources of the sea, which has led to a chain of conflicts[77]. The basic issue of conflict has been to find an answer to whom the sea actually belongs to. Is the sea international territory where all nations are free to use it, or can an individual state claim property rights to the sea? To achieve a solution to the property rights issues the international community created a comprehensive framework for legal governance of the seas with the adoption of the UNCLOS. Over time UNCLOS has evolved to a powerful body of law, although it cannot provide answers to every issue that arises. There are limitations to what a man-made system possibly can achieve, even if it is created with the best intentions.

Since the thesis concerns the management of the Atlantic Bluefin tuna, is important to understand the laws regulating management of nations EEZ's and on the high seas. The location of the highly migratory species most certainly complicates the steps to reach the most reasonable management design or measures.

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[76] FAO. (2012). *The ecosystem approach to fisheries management*

[77] Bollmann, M. et al. (2010). *World Ocean Review 2010*

Coastal states have sovereign rights and obligations to explore, utilize, conserve and manage the natural resources within their EEZ. In addition to the sovereign rights over living and non-living resources and the economical fruits that it carries, coastal states has jurisdiction over the establishment and utilization of artificial islands, installations and structure, marine scientific research and protection and conservation of the marine environment. The need for capacity to limit access to stocks was one of the fundamental assumptions for the total concept of EEZ's. International law has not delegated unlimited authority to regulate EEZ's within coastal states. Certain conservation demands is imposed on the coastal states and their rights and obligations shall be executed in respect of the rights and obligations of other states and in quasi be in correlation with other regulations in UNCLOS[78]. This forms the vital balance of interests entrenched in the Law of the Sea. The legal zones defined by UNCLOS are illustrated in figure 12.

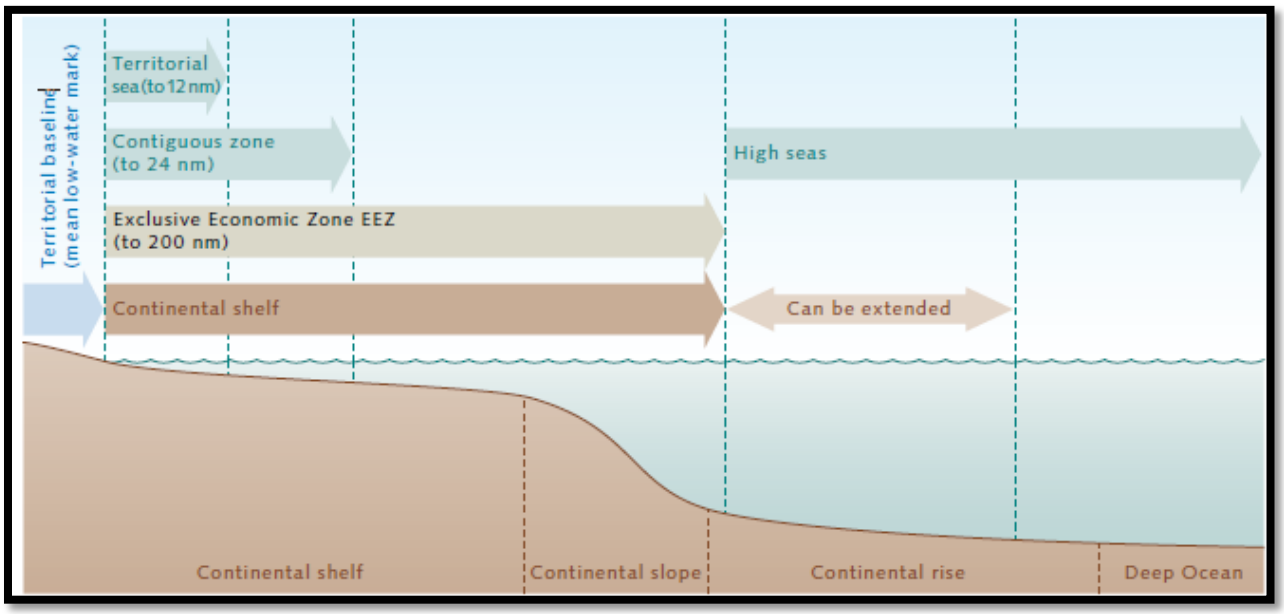

Figure 12: Illustration of the legal zones embedded in UNCLOS[79]

It is a common, unofficial criticism of international law that there is a lack of effective mechanisms to ensure that states maintain their international obligations. This systematic failure is especially acute in regard of regulating fisheries where the impact of poor or deficient management can cause irreversible effects which are exclusively limited to coastal

[78] Freestone, D., Barnes, R., & Ong, D. (2006). *The Law of the Sea: Progress and Prospects.*

[79] Bollmann, M. et al. (2010). *World Ocean Review 2010*

states ocean areas. Despite the fact that a law seems feasible in theory or as written, does not necessary imply that it works as intended in practice. Although adoption of legal frameworks are achieved, there is no guarantee that sufficient implementation has been carried out. How and who controls state's or RFMO's implementation of the legal framework? Even if the framework is adequately implemented, the use of language in the agreement texts gives room for interpretation. Particularly when regulations allocate rights and obligations, the obviousness of articulation is vital. The ambiguous language and the lack for specific obligations makes it difficult, if not impossible to identify whether an obligation allow a state maximum flexibility to adapt suitable measures for their needs. The fact is that for most fisheries little has been done to prevent states from continuing careless and indefensible (non-sustainable) fisheries policies.

Article 61 in UNCLOS sets 5 demands, one of which states that the coastal state shall determine the total allowable catch (TAC) within its EEZ[80]. This fundamental demand establishes the maximum quantity of fish that can be harvested and is supported by a range of conservation measures. The second demand is to consider the "best scientific evidence available" when conservation measures is set. This demand might be too vague since a standard for the best scientific evidence does not exist, or a decision-making body that may determine the best scientific evidence. The third demand obliges the member states to ensure that the preservation of the living resources is not in danger of overfishing. This is supplemented in a commitment to cooperate with a competent regional or global organisation. The member states are obliged to restore and sustain fisheries on a level which can produce MSY. This can be qualified by relevant environment and economic factors, including the economic needs for coastal fisheries, special necessity demands for developing countries, fishing patterns, correlation between fish stocks and minimum standards. Coastal states are also obliged to share scientific data which deal with conservation of fish stocks with competent organisations and states which it applies.

1th paragraph of article 62 in UNCLOS demands that coastal states promote objectives of optimum utilization of living resources within its EEZ[81]. To accomplish this, states shall determine its own harvesting capacity, and if the TAC is not obtained the state is bound to give other states access to the "excess" through agreements or other arrangements. Nations

[80] Freestone, D., Barnes, R., & Ong, D. (2006). *The Law of the Sea: Progress and Prospects.*
[81] Freestone, D., Barnes, R., & Ong, D. (2006). *The Law of the Sea: Progress and Prospects.*

fishing in others EEZ has to follow the laws of the coastal state. UNCLOS's Article 61 paragraph 2 establish an obligation to ensure that living resources within EEZ is not exposed to a risk of overfishing, but the methods to accomplish this is up to a coastal states decision-making right. The convention does not specify exactly what to enforce - stock, species or biomass. It rather does not indicate to what level it should be sustained at. This article also refers to the "best scientific evidence available" which make it even more obvious that science plays a critical role in the decision-making process. Yet again the use of language in the article gives room for interpretation. It does not demand the coastal state to obtain data actively, nor is it detailed compared to use and retention of such data.

According to the 1995 Fish Stock Agreement cooperation among nations is necessary to ensure conservation and development when dealing with stocks that migrate through two or more coastal states EEZ's. Since straddling stocks and highly migratory species is non-exclusive to coastal states by nature, cooperation with regard to determining management measures is crucial. Nations fishing for these stocks on the open sea should agree upon necessary measures to conserve the resources. However it does not require an actual agreement, which probably may limit the efficiency of stock regulation[82].

A given requirement for effective fisheries regulation is state's authority to limit access. Successful regulation might be reached by fully cooperation and competent institutional organizations could play an important role in the regulation of a non-exclusive stock. When cooperation among states is required there sometimes arises open access fishing since the resource doesn't entirely belong to a specific state. This is an issue of property rights, and seems to be a perpetual problem for highly migratory stocks and other species in the high seas. Other open access fishing regimes arise because of political decisions which guarantee every member of society access to a resource. This implicates that the high sea fish stocks are continuously under great pressure, and might be seen in relation to Hardin's "Tragedy of the Commons". Problems associated with open-access fishing regimes is a central dilemma of today's management of the Atlantic Bluefin Tuna.

[82] Freestone, D., Barnes, R., & Ong, D. (2006). *The Law of the Sea: Progress and Prospects.*

The UNCLOS provides a normative framework for international legal marine governance, but leaves several difficulties and challenges unsolved. But things have changed during the last 30 years, since UNCLOS was adopted: there have been new discoveries in the seabed, technologies have evolved and issues concerning global warming are a continuous matter. As everything else in this technological focused world our treaties needs an update in response to "new" challenges. Changes in the marine environment due to global warming clearly reveal the limits to UNCLOS in its present form[83]. There has been a new rush for resources as the ice are melting away, showing new accessible mineral deposits in the seabed. The UNCLOS does not regulate to what extent humankind is allowed to interfere with the marine ecosystem in order to deal with climate change. The legal framework faces several challenges with pressure from possible consequences of climate change, species extinction, overfishing and maritime navigation. Sadly, the process of altering such a significant legal framework is time consuming. New fisheries technologies might appear during an alteration process, creating additional challenges. I believe the legal framework should be updated continuously as the development of fishing technologies and our scientific understandings seem to expand in a faster pace than the time it is going to take to alter a comprehensive set of laws.

[83] Freestone, D., Barnes, R., & Ong, D. (2006). *The Law of the Sea: Progress and Prospects.*

4.0 Management of the Atlantic Bluefin Tuna

"The Roots of Violence: Wealth without work, Pleasure without conscience, Knowledge without character, Commerce without morality, Science without humanity, Worship without sacrifice, Politics without principles"

Mahatma Gandhi

In this chapter I will give an overview of the regional fisheries management organization International Commission for the Conservation of Atlantic Tunas and its management of the Atlantic Bluefin Tuna. A description of the management of the Western stock will be given as an illustration of ICCAT's actions. I will also try to describe the development and the current state of the Atlantic Bluefin Tuna.

Managing a marine living species is not an easy task. It demands continuous assessment and planning, political and scientific cooperation between nations as well as on domestic levels and it deals with a wide range of difficult issues and problems to tackle. Atlantic Bluefin Tuna matures later than the smaller Tuna species, are less productive, long-lived and may therefore be more susceptible to exploitation. These are only some of the factors the managers have to take into consideration. Roughly, 10 % of all Tuna catches is harvested within nations EEZs, while the remaining 90% is caught on the high seas[84]. This is the reason why the Tuna fisheries mainly are managed by regional fisheries management organisations (RFMO's), in this case the ICCAT. A RFMO is basically an interactive fisheries governing system (with reference to chapter 3.2). The system-to-be-governed consists of the resources in the competence area of the governing system, and of stakeholders which in this case mainly consist of members of ICCAT.

4.1 The International Commission for the Conservation of Atlantic Tunas and the management of the Western Atlantic Bluefin Tuna stock

The increase of tuna catches as a result of the introduction of commercial longliners and purse seiners, which changed the size selectivity and created the possibility to fish for Tunas all year around, formed the principal motive for the holding of the Symposium of the Commission for

[84] European Commission. (2004). *Fishing in Europe - Tuna: a global fishing activity*

Technical Cooperation in Africa (CCTA) on Tuna in Dakar 12-17 December 1960[85]. The Symposium recommended the CCTA to take the initiative for an appeal to the relevant Specialized Agency of the United Nations to assemble a conference of representatives of all countries with an interest in the development of the Tuna fisheries on the high seas and the long term protection of the resources. The intention was to create an appropriate organization based on the design of the IATTC.

At the 14th meeting of the World Scientific Meeting on the Biology of Tunas in 1963, the FAO Council recognized the concerns of the increased Tuna fishing in the Atlantic Ocean and the absence of coordinated action to study the resources and also the effect of fishing upon them. The general desire for a plan of action concerning the conservation and rational exploitation of the tuna resources of the Atlantic Ocean resulted in the creation of the Working Party on Rational Utilization of Tuna Resources in the Atlantic Ocean, which held its first session at FAO in Rome 25-30th October 1963.

From 2-14th May in 1966 The Conference of Plenipotentiaries on the Conservation of Atlantic Tunas met in Rio de Janeiro[86]. The Conference negotiations resulted in the planning and adoption of the International Convention for the Conservation of Atlantic Tunas (ICCAT Convention). ICCAT formally entered into force in 1969 after a ratification process. During the interim period a Group of Experts on Tuna Stock Assessment concluded that ICCAT should consider substantive action for the regulation and management of some of the Atlantic Tuna stocks. Thus no management measures were adopted at ICCATS first meeting in December 1969 due to uncertain data and insufficient information.

For the purpose of developing a system for the collection and analyses of data and administration of the research programs the Secretariat was established in 1971. This system was required for the Standing Committee on Research and Statistics (SCRS) ability to implement an assessment on the concerned group of species and provide the basis on how management decisions should be made in ICCAT.

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[85] Hurry, G., Hayashi, M., & Maguire, J. (2008). *REPORT OF THE INDEPENDENT REVIEW INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS (ICCAT)*
[86] Hurry, G., Hayashi, M., & Maguire, J. (2008). *REPORT OF THE INDEPENDENT REVIEW INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS (ICCAT)*

ICCATs area of competence is enormous with regards to the scope of species, which consist of approximately 30 species including small tunas and billfish:

- Atlantic bluefin *(Thunnus thynnus thynnus),*
- skipjack *(Katsuwonus pelamis),*
- yellowfin (*Thunnus albacares),*
- albacore *(Thunnus alalunga)*
- bigeye tuna *(Thunnus obesus)*
- swordfish (*Xiphias gladius)*
- billfishes such as white marlin (*Tetrapturus albidus),* blue marlin *(Makaira nigricans),* sailfish *(Istiophorus albicans)* and spearfish *(Tetrapturus pfluegeri);*
- mackerels such as spotted Spanish mackerel *(Scomberomorus maculatus)* and king mackerel *(Scomberomorus cavalla)*
- small tunas like black skipjack *(Euthynnus alletteratus),* frigate tuna *(Auxis thazard),* and Atlantic bonito *(Sarda sarda)*

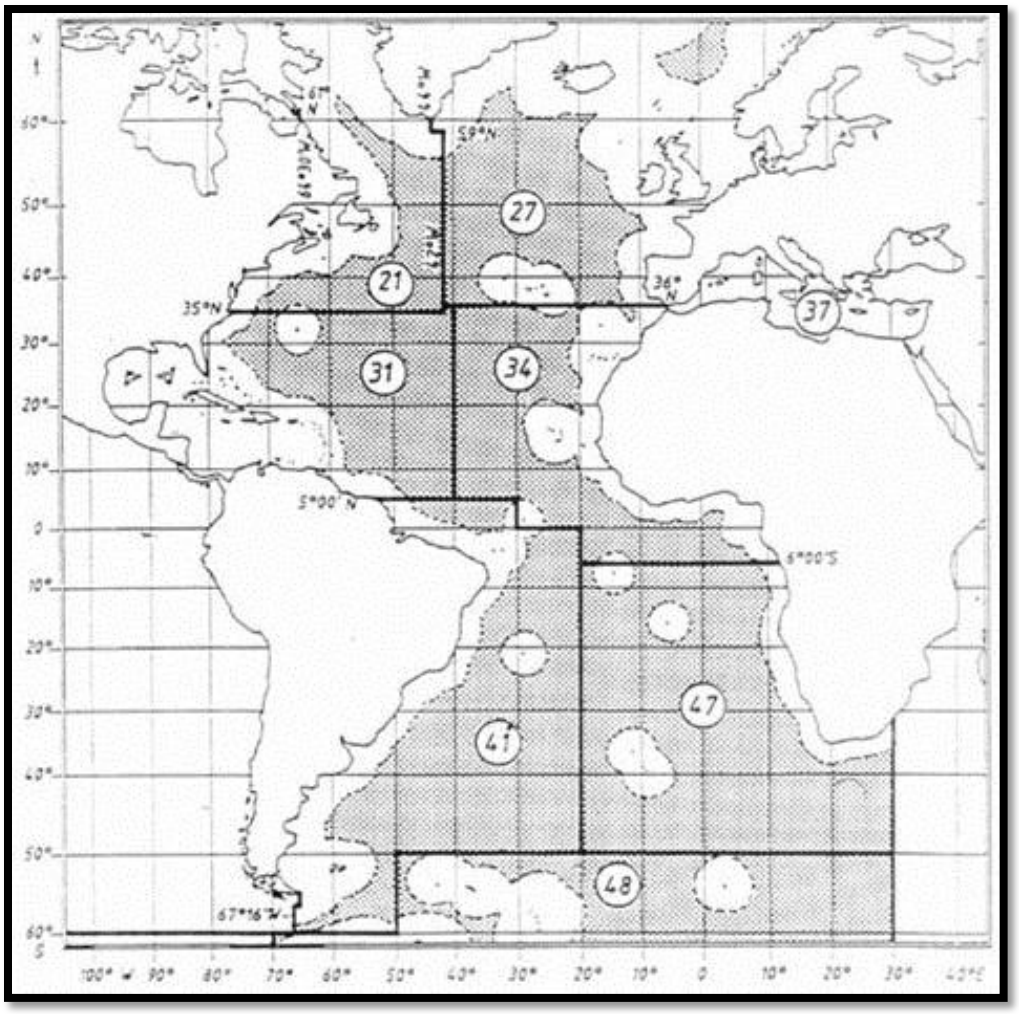

Figure 13: ICCAT's area of competence[87]

[87] Marashi, S. (1996). *Summary information on the role of international fishery and other bodies with regard to the conservation and management of living resources of the high seas.*

ICCAT is responsible for the conservation of Tunas and Tuna-like species in culturally diverse area which includes: the western Atlantic, the eastern Atlantic and the Mediterranean Sea. ICCAT's responsibilities include assembling fishery statistics from its members and from all entities fishing for these species in the Atlantic Ocean, coordination of research as for instance stock assessment, developing scientific-based management advice, providing a mechanism for Contracting Parties to agree on management measures and to produce relevant publications. The development of the states, the capacity to contribute to the concerns of ICCAT and the competition within the industrial fisheries differs significantly within the convention area[88]. The diversity of the 48 contracting parties raises several challenges for ICCAT, for example:

1. How to increase understanding and capacity in all countries in order for them to enter debates on science and fisheries management on equal premises.
2. How to provide fair allocation of resources amongst members to balance the perceived historical rights of the distant water fishing nations and developed countries to harvest the fish stocks, with the aspirations of developing countries to either be able to lease out their fishing opportunities for a fair return or to harvest it themselves.
3. How to manage ICCAT's affairs across the large geographically distributed group of 48 members each year, in such a manner that all the necessary papers, reports, meetings and decision-making processes are addressed.

The necessary annual agenda of meetings and workshops are quite demanding for the members. These annual interactions demand an amount of financial and human resources from both developed and developing countries of the Commission, which includes cost supplementation and provision of technically skilled resources. The annual schedule also constitutes pressure on the Commission Secretariat in regard of ensuring efficient processes.

[88] Hurry, G., Hayashi, M., & Maguire, J. (2008). *REPORT OF THE INDEPENDENT REVIEW INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS (ICCAT)*

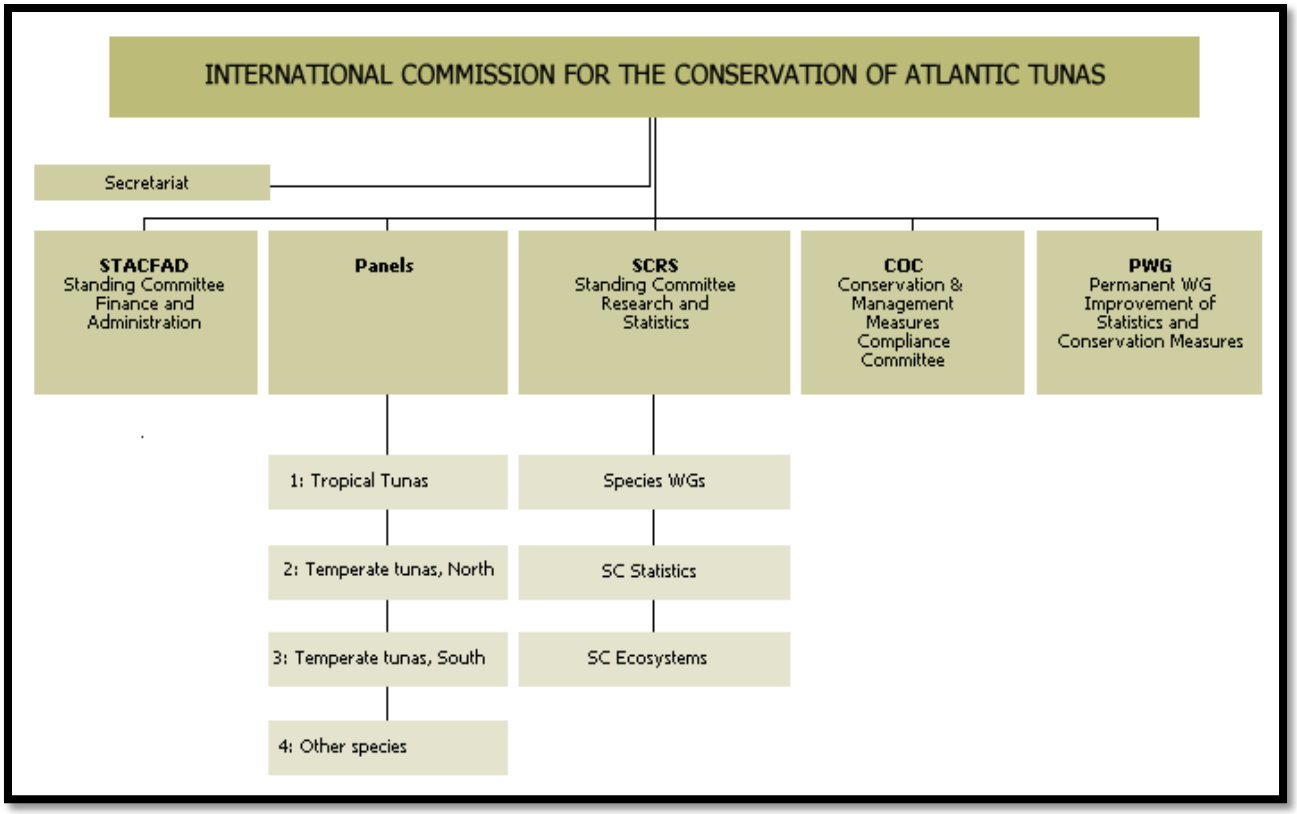

Figure 14: The structure of ICCAT[89]

ICCAT is made up by (figure 15):

- a Secretariat,
- a Standing Committee dealing with finance and administration,
- 4 panels dealing with different Tuna populations,
- a Standing Committee dealing with Research and Statistics,
- Conservation & Management Measures Compliance Committee
- and a Permanent WG Improvement of Statistics and Conservation Measures

4.1.2 Recognized issues of RFMO's

The role of the different inter-governmental fishery organizations as ICCAT is in addition to conservation and management, to facilitate the data collection, collation, processing and dissemination, stock assessment, other research and coordination for their areas of competence. ICCAT's research is limited to the coordination of activities of their members and collaboration with the General Fisheries Commission for the Mediterranean (GFCM). To

[89] ICCAT. (2012). *The International Commission for the Conservation of Atlantic Tunas*

deal with IUU fishing the members of ICCAT has to report the fishing activities of their fleets. An overview list of authorized vessels, and also a blacklist with vessels that has engaged in illegal activities is kept up to date to monitor fishing activities. If a states vessel has been caught in illegal fishing activities, it is prohibited from exporting to all ICCAT member countries. The inspection of catches, authorization and identification of vessels at seaport is an important component. If there is suspicion of illegal activities a vessel may be banned from the landing its catch.

In 2007 RFMO's dealing with Tuna fisheries came together during the Kobe Meeting of Tuna RFMO's[90]. The result of this institutional interplay was a definition of the consistent group of problems and issues that are mutual for the different Commissions, although they vary in importance and magnitude and are as follows:

1. The lack of definition of the concept of "real interest' and hence the difficulty in dealing with membership issues.
2. Poorly elaborated rules concerning "beneficial ownership" of vessels lead to an inability to understand the actual ownership arrangements of vessels; this is important in combating IUU activity and understanding the ownership of fleets by large international companies.
3. The lack of acceptance and application of agreed decisions, recommendations and resolutions adopted in Commissions by member states remains a genuine concern to the global community.
4. Members claim their rights and benefits more willingly than they accept their responsibilities and obligations.
5. Developed states use foreign investment rules to place excess or additional capacity owned by their nationals or companies under the flag of developing Contracting Parties. In many cases these developing countries have inadequate monitoring, control and surveillance (MCS) arrangements in place.
6. Countries that remain non-members of Commissions continue to fish and are not compliant with the rules and measures adopted by them.
7. Failure by members to comply with the requirements for the timely reporting of accurate catch and effort data.

[90] Hurry, G., Hayashi, M., & Maguire, J. (2008). *REPORT OF THE INDEPENDENT REVIEW INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS (ICCAT)*

8. The appropriate allocation of resources between members is a major issue but is an issue that ICCAT has had some success with. This allocation of resources in Commissions is closely linked to the aspirations of developing coastal states and small island developing states.
9. Overcapacity is an ongoing problem in all Commissions with both purse-seine and longline capacity in excess to the harvesting requirements in all Commissions.
10. The costs of supporting the increasing number of RFMOs and associated meetings are an ongoing challenge for both developed and developing countries.
11. The final global challenge for RFMOs is the lack of an internationally sanctioned penalty regime to prosecute in a meaningful way those members and non-members who do not cooperate with the RFMO or are found to be in breach of agreed MCS arrangements.

Setting standards will be important to solve this range of issues. It is important for the different Tuna RFMO's to cooperate and learn from each other. There is no doubt that the management of Tunas would benefit from rapid adaptation and implementation of measures and arrangement that have proven to be effective.

4.1.3 Has ICCAT met its objectives?

The objective of ICCAT is embedded in the preamble of its Convention finalized in 1966. It is worth noticing that ICCAT's convention was established long before UNCLOS took effect. The objective states that: "The Governments whose duly authorized representatives have subscribed hereto, considering their mutual interest in the populations of tuna and tuna-like fishes found in the Atlantic Ocean, and desiring to co-operate in maintaining the populations of these fishes at levels which will permit the maximum sustainable catch for food and other purposes, resolve to conclude a Convention for the conservation of the resources of tuna and tuna-like fishes of the Atlantic Ocean, and to that end agree as follows.."[91]. The objective is therefore to sustain populations of tuna and tuna-like species at levels of MSY.

[91] Hurry, G., Hayashi, M., & Maguire, J. (2008). *REPORT OF THE INDEPENDENT REVIEW INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS (ICCAT)*

As a response to the concerns raised by the international community about the sustainable management of high seas fisheries an independent panel was set to review ICCAT's performance against reaching its objectives in 2008. The panel among others consisted of a respected international fisheries scientist Jean-Jacques Maguire[92]. The panel reviewed the Basic Texts, the status of the stocks and the scientific process, the development and application of conservation and management measures, with an aim of attaining recommendations of approaches which could strengthen and improve ICCAT's performance. A summary of the general observations of the panel are as follows:

- If fully implemented and complied by members and others who fish in ICCAT's convention area, the conservation and fisheries management practices would have been expected to be effective in managing the fisheries.
- To reflect current approaches to fisheries management, the Convention should be reviewed and modernized.
- The contracting parties continuously fail to provide accurate data, and despite these significant difficulties the SCRS provides sound advice.
- The dimensions of the fundamental issues regarding the accomplishment of sustainable fisheries are not unique. However the quantity of ICCAT's contracting parties creates more difficulties when dealing with the general challenges and issues of RFMO's (as mentioned in the previous section).

Up until now ICCAT has not achieved its objectives for several species, as a number of species are below MSY, and include albacore in the North Atlantic, albacore in the South Atlantic, Bluefin tuna in the West Atlantic, Bluefin tuna in the East Atlantic and Mediterranean, blue marlin, white marlin and swordfish in the Mediterranean according to the "Report of the independent review on the international commission for the conservation of Atlantic tunas" [93]. ICCAT's ability to manage The Atlantic Bluefin Tuna fisheries is widely regarded as an international disgrace. The international community which has entrusted ICCAT with the important task of managing this significant species deserves better

[92] Hurry, G., Hayashi, M., & Maguire, J. (2008). *REPORT OF THE INDEPENDENT REVIEW INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS (ICCAT)*
[93] Hurry, G., Hayashi, M., & Maguire, J. (2008). *REPORT OF THE INDEPENDENT REVIEW INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS (ICCAT)*

performance. It would definitely be easier to achieve if the contracting parties developed the political will to fully implement the recommendations of ICCAT.

At its present form ICCAT does not comply with or reflect existing approaches to fisheries management which is regulated by UNCLOS. Because the convention of ICCAT was founded before UNCLOS, UNFSA and other important conservation instruments the Basic Texts of the Convention are not based on these instruments. It is startling how long such an important organization can go without updating its fundamental text in conformity with current laws. It has been 30 years since the establishment of UNCLOS. ICCAT has based its convention on the "freedom of the seas doctrine" far too long. It is comparable with an apparition from the past, which is difficult to get rid of. The scarcity of the Commissions Basic Texts among other things concern inadequate provision on conservation and management measures regarding the ecosystem approach, precautionary approach, fishing allocations and opportunities, flag state duties, port state duties, cooperative mechanism to detect and deter non-compliance, market-related measures and so on.

4.1.4 The Western stock of the Atlantic Bluefin Tuna

To describe to what extent mismanagement has occurred in the Atlantic Bluefin Tuna fishery, I will use the western population as an example. This population is considered by the World Conservation Union as critically endangered. In 1964 the catches of Bluefin Tuna in the western Atlantic reached its peak with a reported catch of 18 679 tons[94]. This is quite the contrast to the reported catch in 2005 which was 1 523 tons.

The 1960's was a successful decade for Tuna fishing vessels. Japanese boats annually caught 5-12 000 tons of mature South Atlantic Bluefin Tuna off the coast of Brazil. Currently the population appears to be eradicated. Soon after the Southern populations disappearance the Northern Bluefin population collapsed, which will be described in the next chapter section. This was a wakeup call regarding the Atlantic Bluefin Tuna's future, and so the need for an international comanagement was evident. This was the beginning of the International

[94] Safina, C., & Klinger, D. (2008). Collapse of Bluefin Tuna in the Western Atlantic. *Conservation Biology*, pp. 243-246.

Commission for the Conservation of Atlantic Tunas (ICCAT), which was established in 1966. Today ICCAT has 48 member states, yet the commission has never met its main objective which is to maintain fish populations at levels allowing "maximum sustainable catches".

In 1981 ICCAT's scientific committee recommended a TAC as close to zero as possible for the western population. Nonetheless the commission managers authorized a catch limit of 1160 tons in 1982. The following year the catch limit was 2660 tons, and so it continued for years to come. The spawning biomass of the western population was estimated to be 22% of the 1975 reference level in 1991. As a consequence ICCAT was confronted by a listing of the West Atlantic Bluefin Tuna by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). ICCAT had to agree to phase in a 50 % quota over several years, otherwise it would have led to prohibition of all the products of the western Tuna population from international trade.

When the U.S. National Research Council review endorsed the need for more research results on the western population in 1994, ICCAT abandoned the quota. The need for more research was used as an excuse to increase the quota in 1995 and further in 1997, but this was incompatible with regard to the precautionary approach which states that cautiousness should be executed where uncertainty exists. Consequently the decline of the West Atlantic Bluefin Tuna population continued.

Statistics from the population of the 1970's showed large breeding populations that occasionally spawned large cohorts of juveniles. A new model that omitted 1970's spawner-reproduction data was introduced by a consultant hired by U.S Tuna exporters, and suggested that ICCAT's scientific commission should re-evaluate the population[95]. The new model assumed that the annual number of juvenile fish entering the fishery could not increase beyond the 1981–1994 average which implies that fewer adults were needed to produce a lower estimated potential yield. This was the basis for establishing a lower recovery goal.

The new model's enthusiasts justified this by proclaiming that the reproductive potential of western Bluefin Tuna had changed since the 1970s due to less favourable environmental

[95] Safina, C., & Klinger, D. (2008). Collapse of Bluefin Tuna in the Western Atlantic. *Conservation Biology*, pp. 243-246.

conditions. The relationship between spawning and reproduction in the 1970's was now considered to be irrelevant. The commission concluded that there was no need for drastic changes in the management of the population because of the assertion that the lower catches of recent years were equivalent to a new lower potential yield. The conclusion was built on the basis that there was no relevant data that indicated that the Bluefin Tuna's carrying capacity had changed, although the reported catch data was contradictory. Despite of unprecedented population lows the commission ignored the historical endeavours of the Bluefin Tuna fisheries and chose the new model. The new model made it acceptable to increase the catch quota to 2500 tons in 1998. But the actual catches in the western Atlantic was 3200 tons[96]. They increased the quota yet again in 2003 to 2700 tons. A multiannual approach to stock management was introduced by the European Union in the ICCAT, and since 2002 the management of Tuna stocks has been on the basis of a four-year plan that integrates quotas, minimum sizes, closed seasons and areas.[97]

4.2 The development and state of the Atlantic Bluefin Tuna fisheries

During the 1980's management measures was introduced to the Tuna fisheries, until this point the Tuna fisheries on the high seas had been free to all, a common[98]. The new measures had impact on fishing patterns and the state's share of catches. The fishing capacity increased extensively during the 1990's, so to ensure proper management of the Tuna resources further measures were introduced. Unfortunately these measures resulted in an increase in illegal, unreported and unregulated (IUU) fishing. Several coastal states started new Tuna fishing fleets by chartering boats with flag of convenience throughout the 1980's and 1990's. The decline in the fishing effort of traditional long-line fishing fleets may be seen as a possible consequence of this "legal loophole".

The Tuna farming industry which was established during the 1990's resulted in an increased demand for specific species and sizes, and also an increase in the fishermen's profit. Vessels

[96] Safina, C., & Klinger, D. (2008). Collapse of Bluefin Tuna in the Western Atlantic. *Conservation Biology*, pp. 243-246.

[97] European Commission. (2004). *Fishing in Europe - Tuna: a global fishing activity.*

[98] FAO. (2005). *Review of the state of world marine fishery resources*

involved in Tuna farming have to transfer their catches into fattening pens immediately. Then the pens are moved to its location, where the fish is bred to an appropriate market size. With this farming or fattening-pen process, the relatively small Tunas which normally were sold for canning, are now being sold for the sashimi market. The Bluefin Tuna farming is continuously expanding, and is widespread in countries of the ICCAT's competence area (Croatia, Italy, Malta, Morocco, Spain, Turkey, etc.).

The industrialized purse seiners and longliners are quite mobile, and especially distant water fleets can react quickly to changes in stock size or market conditions. For example several French and Spanish purse seiner s form the Atlantic moved to the Indian Ocean, and this resulted in a doubling of the Indian Ocean Tuna catches during the 1980's. The largest purse seiner vessel is according to Greenpeace the "Albatun Tres" from the Spanish fleet, and with its 150 meters it can accommodate up to 3000 tons of fish in one single trip[99]. With numerous large fishing vessels with similar capacity as the "Albatun Tres", there is most certainly an overcapacity in the Tuna fleets.

Long-lining has in general been declining, while purse seiner fleets are continuously being expanded. With the purse seiner's adoption of fishing around Fish Aggregating Devices (FADs) in the early 1990's the fishing efficiency changed. This implicated alteration in species composition, size of fish taken and in incidental catch. The purse seiners are less selective in correlation to size. The Tunas caught with purse seiners are in general smaller (juvenile), which changes the combination of age within the Tuna stocks.

Temperate Bluefin Tuna, which are especially desirable for the sashimi market, are overexploited. According to FAO's Fisheries Technical paper 457, the "Review of the state of world marine fishery resources", both the Western Atlantic Bluefin stock and the Southern Atlantic Bluefin are depleted[100]. The yield-per-recruit could be increased if the small Tunas caught by the purses seiners are reduced.

Because of the mobility of the industrial Tuna fleets and the trade for Tuna on the global scale, cooperation has to extend beyond the scale of single oceans. The issues and problems

[99] www.my-dreamboat.com. (2012). *Biggest Tuna purse seine-vessel*.

[100] FAO. (2005). *Review of the state of world marine fishery resources*

concerning the conservation, management and research of Tunas have resemblance in all oceans, and therefore global collaboration and information exchange is important. The formulation of the 1995 Fish Stock Agreement is an example of an agreement formed in collaboration. Together with the Code of Conduct the Fish Stock Agreement, which entered into force in December 2001, it sets requirements for conservation, management, technology and research concerning Tuna and Tuna-like species. As a result of these requirements the high seas can no longer be perceived as an unrestricted common pool. Embedded in the Fish Stock Agreement is the precautionary approach which calls for cautious action when information is uncertain, unreliable or inadequate. Absence of adequate scientific information should not be a reason for postponing or failing to take conservation measures. Sadly these instruments have not been applied in ICCAT's Basic Texts.

There are insufficient control over many Tuna fishing fleets fishing capacity, effort and catches. The depletion of the Bluefin Tuna stocks is one of the main concerns for fishery bodies dealing with conservation of Tuna and Tuna-like species. There is necessary to assure adequate management measures in order for the Atlantic Bluefin Tunas survival, but for some stocks there might already be too late due to several years of overfishing.

The possible yield from the Atlantic Bluefin Tuna depends on the combination of fishing technique and effort. The different fishing methods differ in efficiency and selectivity when targeting various age groups. Purse seiners fishing around FAD's often result in catches of small fish, which is an increasing concern. By protecting juvenile fish and targeting adult fish there might be possible to achieve improvements in the yield. But the present size regulations from ICCAT create problems for the Atlantic Bluefin Tuna.

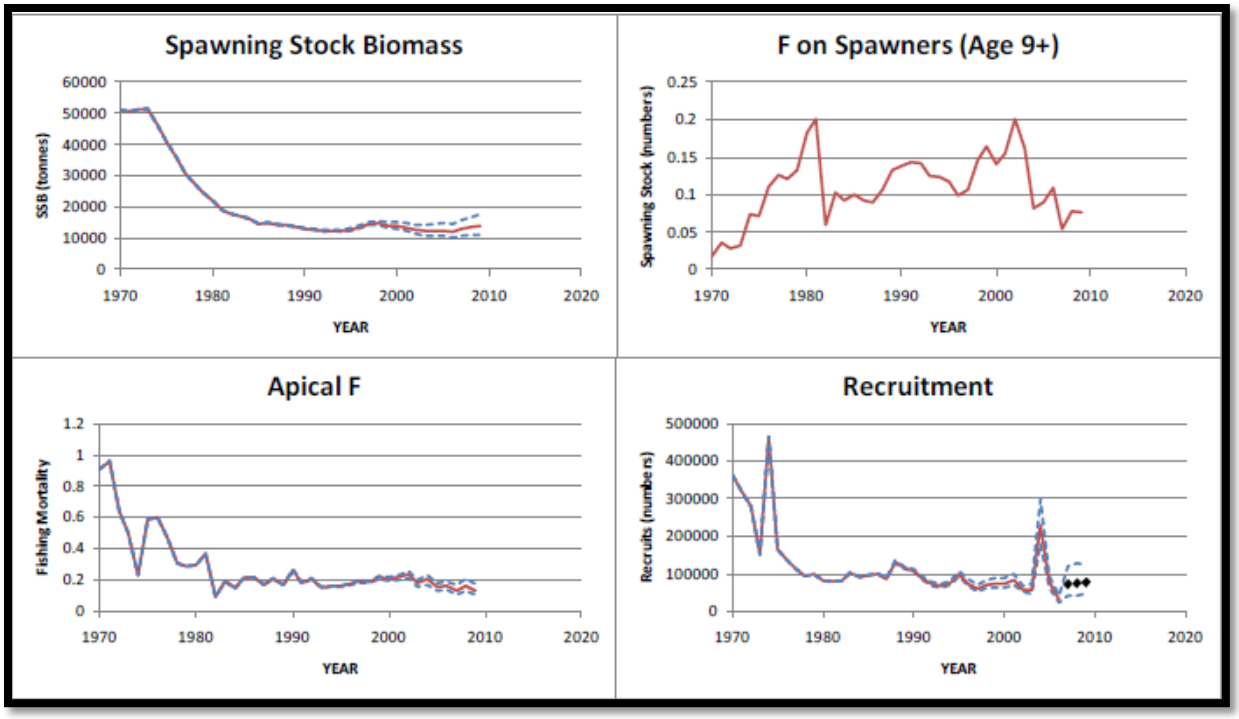

Figure 15: Median estimates of spawning biomass (age 9+), fishing mortality on spawners, apical fishing mortality (F on the most vulnerable age class) and recruitment for the base VPA model. The 80% confidence intervals are indicated with dotted lines. The recruitment estimates for the last three years of the VPA are considered unreliable and have been replaced by the median levels corresponding to the low recruitment scenario[101]

In their 2008 stock assessment ICCAT estimated that the total catches was at least three times more than what their scientists had recommended for sustainability[102]. The assessment also indicated that the spawning stock biomass has been declining rapidly the past few years as illustrated by figure 15. This is raising serious concerns for the survival of the Tuna stocks.

The spawning stock of the western population has declined steadily from 1970 to 1992 and has since then fluctuated between 21% and 29 % of the 1970 level[103]. There appears to be a gradual increase in spawning stock biomass from the low of 21% in 2003 to a calculated 29 % in 2009. The fishing mortality (F) has varied over time depending on the size of fish targeted by various fleets.

The Independent Panel of Review found the regulation of Bluefin Tuna farming to be unacceptable and not consistent with the objectives of ICCAT. The Panel therefore endorsed

[101] ICCAT. (2010). *Summary of the Atlantic Bluefin Tuna assessment*
[102] Moffett, M. (2009). *It's open season for bluefin Tuna - How the world's appetite for sushi could outweigh concerns about overfishing.*
[103] ICCAT. (2010). *Summary of the Atlantic Bluefin Tuna assessment*

the suspension of fishing on Bluefin Tuna in the eastern Atlantic and Mediterranean until the members fully comply with their recommendations. They also recommended that the TAC for species should be designed in order to keep fishing mortality under or at the level of F_{MSY}.
It is crucial to develop clear articulated binding provisions or obligations which are nondiscriminatory, which does not give room for interpretation. ICCAT should develop a penalty regime with an executing body that has the authority to suspend or give fines to countries that doesn't follow the given regulations.

5.0 Discussion

The intention and objective with the Thesis was to explain the complexities of achieving sufficient management measures for the Atlantic Bluefin Tuna, and attempt to specify failure and shortcomings within the management system. I still retain the idea that the key to the solution is embedded in man-made governance systems and legal frameworks. In the previous chapters I have introduced and elaborated different systems which constitute the overall system of dealing with fisheries management. In this chapter I will discuss the findings of the previous chapters. In the second part of the chapter I will discuss or reflect upon future prospects and possible solutions in respect of the species of concern.

I try to keep in mind that the nature of the solution should be determined by the nature of the problem that it sets out to solve. So what is the nature of the problem? The nature of the problem is the complexity of different systems both individually and in correlation. As limitations to every man-made systems and frameworks exist, complex problems will always appear in one form or another.

Managing the utilization of the marine resources is a human responsibility. The human impact on these resources has to be managed in a responsible way to endorse protection and to keep fisheries sustainable. The resource utility of today's capitalistic society is no longer based on food security single-handedly, even though the management purpose has been reasonable, the economical part of fishing has always been the incentive. Once the people involved acquire the taste for money – they want more. The rivalry of gaining profit constitutes an increasing pressure on the resources.

Regardless of where they are swimming the Atlantic Bluefin Tuna are exploited severely and the most recent scientific research findings are continuously being rejected in important management decisions. According to FAO 52 % of all stocks is being fully exploited and is producing at maximum sustainable limit, while 25 % is overfished, extinct or recovering from near extinction[104]. The most valuable species are considered to be fully exploited or overexploited. This must be seen in relation with an increasing demand for fish and the pressure on marine resources in general. Effective mechanisms for conservation and management of fisheries within EEZ remain of fundamental significance because over 90% of commercial fisheries are localised within EEZ's, with an exception of the Tuna fisheries where nearly 90% of the catches are located on the high seas. These numbers should at least make us reconsider how well international law frames the regulation of national and international fisheries.

The totality of, and the interactions between the different systems of frameworks, institutions and organisations is complex. Each individual system has limitations. A common problem with man-made systems is that an evaluation of every possible situations or developments that might arise cannot be made in advance. It is technically impossible. It is the complexity that makes the superior issue to a wicked problem. The systems are rather based on "learning by doing", or learning by a trial-and-error method. Therefore it is important for the system to be able to adapt quickly to changes and developments, in order to handle the next challenges even better.

In chapter 3.2 I defined the different concepts of governance theory, and the complexities of these concepts. Since the management of fisheries are made up by governance system s I found this theory relevant. Governability is the totality of interactions implemented to solve societal problems and to create opportunities. A flexible governing system is task oriented and pragmatic, it has the will and ability to adapt when issues or possibilities so require.

The problems and conflicts of fisheries governance are often overlapping and difficult to tell apart. In order to maintain successful fisheries governance these problems and conflicts has to be resolved. These are often defined as wicked problems, which implicates that they are

[104] *Freestone, D., Barnes, R., & Ong, D. (2006). The Law of the Sea: Progress and Prospects.*

complex and a symptom of a greater problem. The solution to wicked problems are not necessary obvious. Such a problem is often of social nature, and how the problem is perceived is individual and might affect a possible solution. To manage the marine resources is important and necessary since fisheries governance is multidimensional and must cope with a number of conflicting concerns, values, principles and goals. There are different concepts and principles that constitute the foundation of an efficient management. The management theory and processes which are used are inseparable from culture, society and politics.

A basic issue of conflict has been to find an answer to whom the sea actually belongs to. Is the sea international territory where all nations are free to use it, or can an individual state claim property rights to the sea? The international community tried to achieve a solution to this issue by creating a comprehensive framework for legal governance of the seas (UNCLOS). Over time UNCLOS has evolved to a powerful body of law, although it cannot provide answers to every issue that arises as I tried to describe in chapter 3.3 and 3.4.

When dealing with fisheries governance and management in a "global" scale conflicting interests often arises. For example developing countries interest in creating their own Tuna fishing industries increase as the awareness of the economic values of the Tuna increases. On the high seas no country has first claim on the "property rights" or in this case the right to utilize common resources.

A regional fisheries management organisation is basically an interactive fisheries governing system, which is responsible for managing a specific species in a specific areas on the high seas. ICCAT is responsible for Tunas and Tuna-like species in the Atlantic Ocean and its adjacent seas. The objective of ICCAT as stated in its preamble is to sustain populations of tuna and tuna-like species at levels of MSY. For an RFMO to succeed there has to be unity among the members, and the conviction that the agreements of the organization represents the best solution in reaching the objectives, has to be strong. Nevertheless it is seldom the case, since it is easier to be egoistic and weak to achieve short-term economic merits.

The remains of an old regime with no reference point to property rights on the high seas are still one of the main issues of ICCAT. The failure of adopting current laws of the sea has been evident for years. But no action has been taken until recently when an independent panel reviewed the performance as elaborated in chapter 4. Up until this day ICCAT has not been

task oriented nor pragmatic, it does not hold the will or ability to adapt when issues or possibilities so require.

The possible future extinction of a key population of a large and economical valuable vertebrate is a tragedy in itself, thus the case of the western Atlantic Bluefin Tuna is only one of several case studies of management failure or mismanagement that highlights the need for alteration. When management ignores crucial advice from scientists wicked problems often worsen, sometimes catastrophically. Why scientific advice continues to be ignored is often due to industry lobbying, inability of political divisions or nations to agree on common goals for shared resources and interference by politicians, such as congressional members who act on behalf of their constituents but in fact work against their constituent communities' long-term interests. ICCAT's clear disregard of the scientific advice of the Western stock of the Atlantic Bluefin Tuna illustrates this.

There has been too much interference or in some cases lack of contributions to scientific processes which are generated in order to keep fisheries sustainable. As a consequence the interferers are witnessing the decline of the Western Atlantic Bluefin population with a catch rate under 10% of the quota. The outcome is economic failure for the fisheries. In theory sustainable catches from a recovered population could give much higher than current landings and at the same time be more economically efficient. But this might not be possible, collapsed populations often do not recover if relief comes too late. The Atlantic Bluefin Tuna faces an uncertain future. The Mediterranean population might still have a chance to recover if the management changes for the better.

With the increase of fishing capacity due to the technological developments during the last decades, humans have eroded the ocean's ability to cope with and mitigate the consequences of change. To aim at a sustainable use of the resources is not a sufficient management strategy, it never was. Fisheries management should protect marine life and keep stocks sustainable in order for future generations to share the same benefits not only as a food source but also in an economical correlation. ICCAT has clearly failed to meet the agreed objectives for the protection of marine species and habitats within its competence area.

5.1 Future prospects of the management of Atlantic Bluefin Tuna

Sometimes history repeats itself, the freedom of the seas doctrine is phantom of the past, which still haunts modern fisheries. What have we actually learned from the past's fisheries crisis and collapses? Why hasn't more been done to solve the problem when the awareness of the problem exists?

To predict the future is impossible, we cannot control every aspect that influence and affects fisheries, but to manage the human impact on the ocean's resources should be possible. When the legislative part of management is functional in theory, it does not imply that the enforcement of the laws work as it should. To accomplish some sort of balance between the legislative, enforcing and the legal power is a necessity. To protect the (up till now incomprehensible) complexity of marine life, limitations are vital.
Political decision-making based on short-term economic interest rather than science-based governance has resulted in failure with regard to ensuring sustainable and profitable fisheries.

Article XX of GATT state that exceptions from GATT's main provisions can be made if it is necessary to protect human, animal or plant life of health and also relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption. This indicates that there is a possibility to implement trade barriers on the Atlantic Bluefin Tuna if there is a possibility of extinction of a natural resource or a necessity to protect animal life. But when and who decides if a trade barrier is necessary to protect the Atlantic Bluefin Tuna? Would it be sufficient if the Atlantic Bluefin Tuna gets listed by CITES? A probable issue that would arise if a trade barrier was introduced in conformity with the exception rule would be implementation scarcity due to tremendous economic impacts on the industry and those who depend on the Atlantic Bluefin Tuna fishery for their livelihood. Yet again the wicked problem of managing the Atlantic Bluefin Tuna reveals itself.

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