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The implications of climate change upon the concept of *force majeure* and its use in marine environmental policies.

being a Thesis submitted for the Degree of MSc Biological Sciences in the University of Hull

By

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Abstract

Seventeen environmental laws include provisions on *force majeure* or natural causes, the clause acts to except States from their commitments if failure to meet the commitment is due to factors outside their control and adequate proof can be provided. The European Union Marine Strategy Framework Directive (MSFD) has a pivotal role in managing EU marine waters and contains such a clause. This research analyses the role of *force majeure* provisions within marine environmental law. Climate change is an exogenic pressure emanating from outside the area being managed, yet management must respond to its affects and consequences instead of the source of pressure, for example sea level rise. It has been previously suggested that Member States may plea *force majeure* in circumstances where climate change prevents them from achieving legislative targets or obligations (Elliott *et al*., 2015).

An interdisciplinary analysis suggests that any Member State plea would have to meet certain criteria in order to constitute a claim: unforseeability, irresistibility, externality or control and the burden of proof, there is limited consensus through the literature as to what extent these criteria are applied by a court due to lacking clarity in many key issues; climate change litigation, state responsibility, GES Descriptors and managing climate change as a pressure in the marine environment. Courts may centre a defence on the knowledge that climate change is an anthropogenic pressure with typically foreseen consequences and therefore could not constitute a *force majeure* event as an entire pressure, this has not yet been legally tested and requires precedent.

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Chapter 1- Introduction

1.2 Background

Force majeure is an established doctrine of French law which has the ability to relieve a promisor from a responsibility due to non-performance under certain circumstances (Swalding, 1995). *Force majeure* is now regarded as a common principle within many legal systems and is recognised as a general principle of International law. Within this framework it operates as a potential defence to liability for failure to perform obligations, precluding wrongfulness. The International Law Commission (ILC) has defined *force majeure* as the occurrence of an irresistible force or an unforeseen event which is beyond the control of the state, creating a situation of material impossibility in which the obligation cannot be fulfilled (International Law Commission, 2001). This defence to wrongfulness is not applicable if the situation of *force majeure* can be attributed, alone or in combination with other factors, to the conduct of the state invoking it or if the state had assumed the risk of the event arising (International Law Commission, 2001).

On a European Level *force majeure* is recognised within two contexts: the primary and most established area concerns private actors and exceptions to liability for breaching obligations under EU law (Schmers and Waelbroek, 2001); the second and presently more relevant context relates to the exception of a Member State from a legal commitment. The doctrine of *force majeure* has been subjected to unique political and practical forces within the European legal arena; this is largely due to the strict requirements placed upon traders and Member States through the EU Directives (Lombardi, 1997). The political imperative of securing the success of the EU has led to the European Court of Justice (ECJ) defining the concept of *force majeure* narrowly with a counterbalancing factor being undue hardship or sacrifice (Lombardi, 1997).

This research aims to develop this concept and explore the role of *force majeure* within marine environmental law as so few have previously done (Tol and Verheyen, 2004; Kristl, 2010;

Elliott *et al*., 2015), by developing an understanding of the role that the doctrine plays within environmental law and analysing the challenges that climate change poses to marine environmental legislation. It is aimed that conclusions can be drawn regarding the future of *force majeure* as an exclusion clause within the field. The current research is pertinent to not only marine environmental law but aims to relate to all fields of environmental law as many terrestrial and inland water legislations also encompass the doctrine and face the increasing pressures that climate change entails.

1.2 Climate change

1.2.1 IPCC Findings

The Intergovernmental Panel on Climate Change (IPCC), established in 1988 by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO), is the international body for assessing science within the field of climate change. The IPCC corroborates the scientific findings on the environmental, socio-economical and technical aspects of climate change, providing a probabilistic assessment of an events outcome and provides a consensus (IPCC, 2016). Climate change is the largest and most complex threat facing the global environment with evidence that human activities, particularly greenhouse gas emissions, combined with natural variability have altered climatic patterns (IPCC, 2013a). The IPCC has stated that each of the last three decades have been consecutively warmer at the global surface than any previous decade since 1850; changes in extreme weather and climate events have also been noted (IPCC, 2013a). The upper 75m of the ocean have been recorded to have warmed 0.09ºC – 0.13ºC per decade over the period 1971-2010 (IPCC, 2013b).

In 2013, Working Group I of the IPPC found that radiative forcing, the quantification of changes in energy fluxes, was positive for the year 2011 relative to 1750. This led to an energy uptake by the climate system; both natural and anthropogenic processes and substances have the ability to alter the global energy budget and are classified as drivers of climate change

(IPCC, 2013b). The largest contribution towards the total radiative forcing is the increase in the concentration atmospheric CO_2 since 1750 (IPCC, 2013b). The concentrations of the greenhouse gases- carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) have all increased since 1750 levels, they surpassed pre-industrial levels by 40%, 150% and 20% in 2011 respectively (IPCC, 2013a). The IPCC has stated that each of the last three decades have been consecutively warmer at the earth's surface than any previous decade since 1850; changes in extreme weather and climate events have also been noted (IPCC, 2013a). The upper 75m of the ocean have been recorded to have warmed 0.09ºC – 0.13ºC per decade over the period of 1971-2010 (IPCC, 2013b). The increased levels of atmospheric CO_2 and altered climate regime have led to physicochemical water changes in the oceans.

1.2.2 Ocean Acidification

The pH of the oceans has decreased by 0.1 units since the beginning of the industrial era (IPCC, 2013a). Approximately more than 60% of the net energy increase within the climate system is stored in the first 700m of the ocean with a further 30% being stored below 700m. Concern over the current rate of ocean acidification is related to the speed in which it will occur and the impacts upon ocean ecosystems as a whole net process, the latter is not well known although a wide range of processes and species are susceptible (Blackford and Gilbert, 2007). Kroeker *et al*., (2010) found that acidification has negative effects upon biological processes such as growth, reproduction, survival and calcification, it was also noted that there were markedly significant variations amongst marine species in their sensitivity to acidification. Asnaghi *et al*., (2013) conducted laboratory studies on the effects of acidification on intertidal rocky shore communities; the research highlighted the direct effects of acidification upon coralline algae (*Corallina elongata*) and also the defences of sea urchins (*Paracentrotus lividus*) against predation.

1.2.3 Altered temperature regime

Alterations to temperature regimes also have varied effects throughout the ocean such as the redistribution of species (Elliott *et al*., 2015). The North Sea stocks of both sole (*Solea solea*) and plaice (*Pleuronectes platessa*) have undergone distributional shifts, sole have shifted southwards whilst plaice have moved into deeper northern waters. Engelhard., (2011) found that a distributional shift within the sole stock owed to climate change rather than overfishing, whilst however, changes in the plaice distribution could be contributed to both. Occhipinti-Ambrogi, (2007) emphasises the importance of scientific knowledge and prediction regarding the spread of non-indigenous species as an effect of climate change, competitive interactions between natural fauna and non-indigenous species may increase due to various factors such as the onset of new thermal optimums and new carbonate chemistries.

1.2.4 Physiological effects of climate change

The Physiological effects of climate change are important both ecologically and economically, as demonstrated by Jansen and Gislason, (2011). Research into the effects of temperature upon the North Sea mackerel (*Scomber scombrus*), a socially and politically important stock, found that there was a significant relationship between the timing of mackerel spawning and the ocean surface temperature. This suggests that an increase in ocean temperature will affect the timing of spawning and growth within the species alongside their recruitment and migration (Janson and Gislason, 2011). Further physiological effects have been categorised by Hofmann and Todgham, (2010) in a review focusing upon the mechanisms of physiological plasticity and how they may affect an organism's ability to respond to global changes. It has been suggested that for species level evolution to arise, novel mutations or new gene complexes would have to emerge allowing a response to selection; however, due to much research consisting on an individual scale, the theory is still observational (Parmesan, 2006).

1.2.5 Physical effects of climate change

The physical environment is highly susceptible to climatic changes and this is widely documented throughout the literature. The climatic system may see many changes including increased storminess and storm surges which will affect marine hydrodynamics alongside increased relative sea level, loss of polar ice cover, changes to both coastal and estuarine hydrodynamics and an increased rate of storm surges (Kennedy, 1990). Vulnerability to climate related sea level rise is often amplified in low coastal zones (below 10m) due to anthropogenic stressors such as ground subsidence and reduced sediment supply. Relative sea level rise (RSLR) can be attributed to three major causes; (a) the thermal expansion of sea water due to warming climate, (b) increasing water mass input from land ice melt and land water reservoirs (Nicholls and Cazenave, 2010), and (c) isostatic rebound and subsidence (Elliott *et al*., 2014). It has been stated that by 2080 approximately 22% of global coastal wetlands could be lost directly from sea level rise, this increases up to 70% when combined with the projected losses from other anthropogenic stressors (Nicholls *et al*., 1999). The effects of increased sea level rise include the reduction or alteration of habitats leading to trophic shifts, distributional shifts, complete loss of habitat and potentially a loss of productivity from the intertidal area (Elliott *et al*., 2015). Zhang *et al*., (2004) further stresses the link between coastal erosion and rising sea- level with the conclusion that impacts seen within the 20th Century will be further exacerbated in the 21st Century.

1.2.6 Polar regions

It has been suggested that warming conditions are currently overriding both the Arctic and North Atlantic Oscillation in determining ice cover within the Arctic; primary production is high within these areas and it has been predicted that continued loss of polar ice could have large-scale impacts upon Arctic ecosystems (Comiso *et al*., 2008). The diatom *Neodenticula seminae* has re-colonised the Labrador Sea, the species had not been recorded within the area

for 800,000 years (Reid *et al*., 2007). Evidence suggests that the species was transported through the Canadian Arctic Archipelago and that this successful introduction marks a change in the circulation between the North Pacific and the North Atlantic (Reid *et al*., 2007). Krabill *et al*., (2000) suggest that results from their research indicates that there is a net loss of 51 km^3 of ice lost from the Greenland ice sheets each year, it is also proposed that this is sufficient to raise the sea by 0.13mm per year; this is approximately 7% of observed rise. The IPCC also attribute 75% of the observed global mean sea level rise since 1970 to glacier mass loss and thermal expansion, in the period 1901 -2010 the global mean sea level has rose by 0.19m (IPCC, 2013a).

1.2.7 Climate change research

The effects of climate change on both the terrestrial and marine environment are well documented throughout scientific literature; much of the published research contributes to the IPCC assessments. Within the marine environment, climate change has many consequences at a biological, chemical and physical level, they generally occur in a cascade with physical and chemical alterations leading to trophic and distributional shifts within the fauna and flora (Elliott *et al*., 2015). The primary drivers and consequences of climate change can be seen within **Figure 1**, as previously created by (Elliott *et al*., 2015), with the addition of the relevant supporting literature.

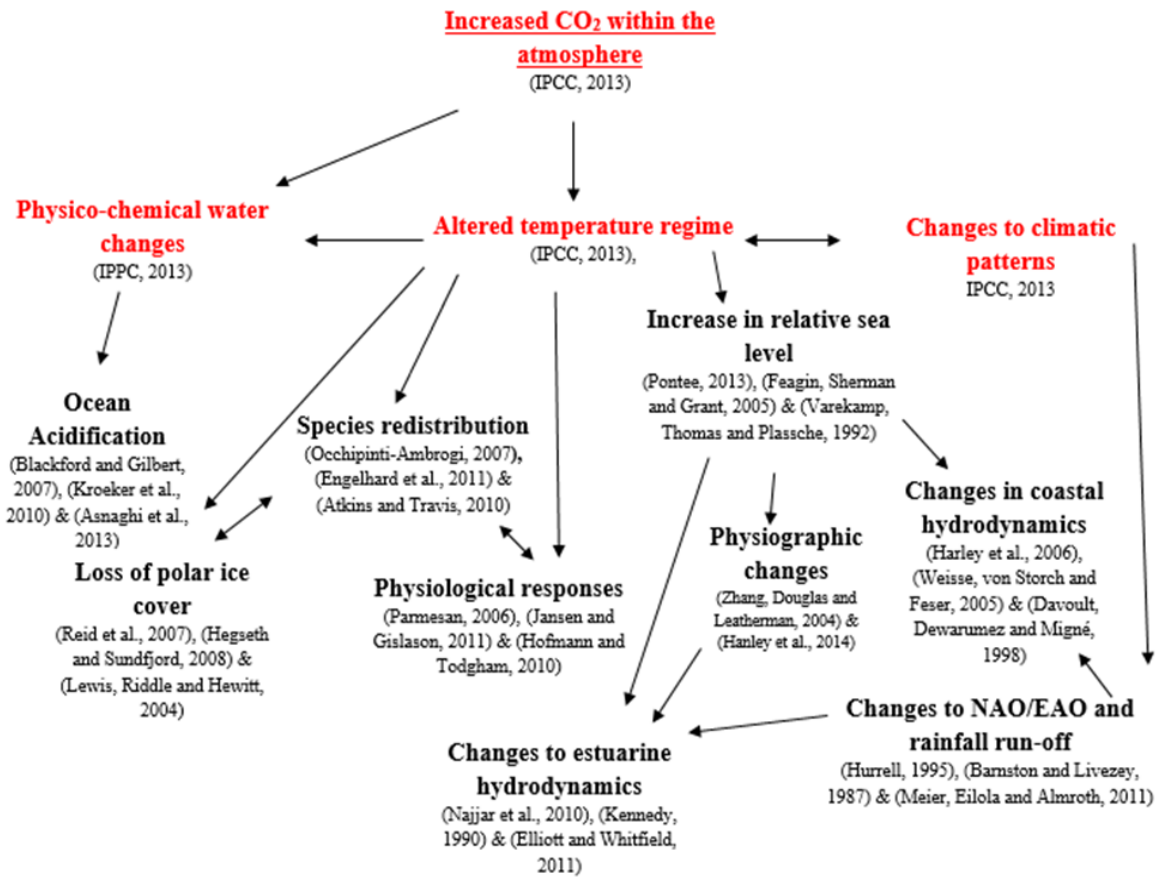

Figure 1. The primary drivers (red) and secondary effects (black) of global climate change in the marine environment demonstrated with the relevant literature that describes the cause or consequences of its effects, modified from Elliott at al., (2015).

Early research regarding the effects of climate change upon the marine environment appears to have focused upon the primary effects of climate change, mainly temperature changes within the oceans and how they will affect species abundance and distribution at an individual level, there was minimal focus on the larger levels of organisation such as community (**Figure 2**), (Harley *et al.*, 2006). It is suggested that this outlook provides limited advancements as temperature is not the only climate variable affecting the marine environment and recent studies on population and community systems suggest that the individual responses do not always

translate directly into changes in abundance and distribution (Harley et al., 2006). It has been noted by McDowell *et al*., (2016) in their assessment of research in the field of community level climate change vulnerability that future research needs to engage more with the relevance of vulnerability research for decision making and the interdependencies between ecological systems and the social and economic systems that rely upon them. It was also noted that during the period they examined (<25y) that there was limited network analysis on aquatic environment, yet Brook and Fordham (2015), have found that there is an increased interest in the resilience of marine organisms to ocean acidification and also altered nutrient flows; their assessment studied trends in climate change literature between the years 2012- 2014, it is possible that the smaller data set (amount of papers) provided a narrower outlook on current trends.

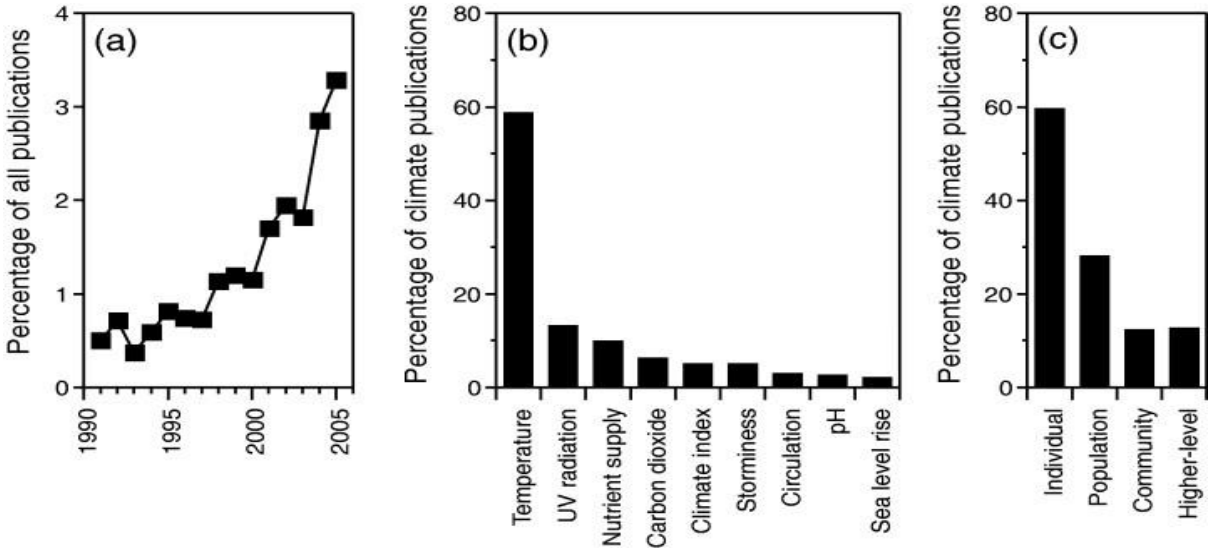

Figure 2. Climate related publication trends from 1990 – 2005. (a) demonstrates the rate of publication, this is expressed as a percentage of all marine ecological publications, (b) demonstrates trends in the abiotic response considered and (c) expresses the level of biological response considered**,** (Hartley et al., 2005**).**

There are many social risks that need to be considered with regard to climate change such as food production, water supplies, damage to settlements and human well-being (IPCC, 2014). The complexity of climate change and its trans-boundary effects means that varying legal approaches are required across a large range of activities (Bell *et al*., 2013). There has been a large focus by the international community upon controlling atmospheric pollution. One method in doing so is the creation of policy such as International agreements (*United Nations Framework Convention on Climate Change, 1994*), regional agreements (*European Climate Change Programme, 2000*) and national legislation (*United Kingdom Climate Change Act, 2008).*

1.3 Marine Policy

Environmental law is a relatively new field and it creates a substantial and complex legal branch, many laws and policies within this specific field are created instead to achieve set objectives through adopting measures to do so (Kiss and Shelton, 1997). The protection of the environment can be noted as one of the largest contemporary issues, particularly regarding climate change (Bell *et al*., 2013). Historically the marine environment has been faced with large amounts of anthropogenic pressure from various activities such as fishing, waste dumping, pollution and tourism; these activities are now regulated via environmental law (Sunkin *et al*., 2002; Elliott *et al.*, 2017). This field generally relies on the cooperation of Nation States to effectively manage pressures within their jurisdiction and on a regional and global scale (Sunkin *et al*., 2002.). Many pressures within the marine environment have a transboundary impact, meaning that an activity in one Nation State can cause threats to the environmental health and societal gains of another. It is the transboundary effects and the large social and economic stakes in the marine environment that make this field of environmental law particularly complex (Bell *et al*., 2013).

Previous approaches to environmental law have led to a 'piecemeal' and extensive range of legislation creating a large and complex system, this seen in the form of the 'horrendogram' created by Boyes and Elliott (2014), **Appendix II**. This legislation primarily focuses on one 'problem' without encompassing the catchment or region as a whole (Boyes and Elliott, 2014). This approach pays little attention to the wider impacts of the pressure and may fail to account for any transboundary impacts. Under the international principle of sustainable development and the ecosystems approach, environmental law now aims to be integrated and holistic, this approach focuses primarily on improving a catchment or region and accounts for all pressures within it (Boyes and Elliott, 2014). The European Union (EU) has adopted a holistic approach to environmental law with the development of environmental directives that target specific catchment areas rather than specific pressures, e.g. The Marine Strategy Framework Directive, 2008 and The Water Framework Directive, 2000 (Borja et al., 2010). The various implementation strategies of such Directives aim to manage the marine, coastal and inland waters from both endogenic and exogenic pressures.

Marine management is centred on one big idea: to protect and preserve the ecological structure, functioning and ecosystem services that the natural environment provides, the ecosystems approach to sustainable development (Ecosystem Approach, 2016; Elliott *et al*., 2017). There are numerous pressures and activities within the marine, coastal and estuarine environment requiring management (Borja *et al*., 2013; Elliott *et al*., 2017) and these activities and pressures infer hazards and risk to society (Elliott *et al.*, 2014). Activities, pressures, risks and hazards within the catchment area requiring management are termed 'endogenic pressures', exogenic un-managed pressures are pressures from outside the catchment area that also require addressing. Endogenic pressures are generally managed at a local scale whilst exogenic pressures generally require a regional or international approach (Elliott, 2011; Scharin *et al*., 2016); an example of an endogenic

pressure can be found within point source pollution. This pressure can be managed at a local level through the introduction of fines (Polluter pays); however, exogenic pressures are normally large scale regional or global pressures, climate change is regarded as an exogenic pressure. Climate change impacts not only the biological functioning of the marine environment but also its physical and chemical state on extremely varied spatial and temporal scales (IPCC, 2014; Elliott *et al*., 2015)

Due to increased concern over environmental issues is also an increased concern regarding the protection of the global commons, this is one of the most pressing topics requiring international action (Xue, 2003). In environmental law there can be situations where it is not within a nation states benefits to cooperate with international law, although, cooperation may ultimately benefit the state. This has been named the 'prisoner's dilemma' and can be witnessed within the difficulties achieving effective agreements on issues such as overfishing or climate change (Bell *et al*., 2013). A variation of this theory is Hardin's 'Tragedy of the Commons', the main argument within this theory is that common or open access resources will be continually prone to overexploitation (Hardin, 1968). The solution suggested by Hardin, (1968) was to privatize common resources where possible, this can be seen within the *United Nations Convention on the Law of the Sea, (1982)*. The convention privatized as much as 90% of the known living resources within the sea (Bell *et al*., 2013) however, as the continued decline of world fish stocks demonstrates this may have been insufficient. The global commons are not the only shared resources to face environmental problems; transnational seas also face many pressures which require addressing from within and without of the Exclusive Economic Zone.

International law defines the legal responsibilities of a Nation State, international and Intergovernmental Bodies and Non-Governmental Organisations (United Nations, 2014). International law plays an important role in environmental protection as it provides precedence on transboundary and global problems; international agreements may also

generate standards that are enforced further into regional or national law (Bell *et al*., 2013). Finally, the international arena is important for the development of key principles such as the 'precautionary approach' and the 'ecosystem approach' (Bell *et al*., 2013). Owing to the complexity of the problems requiring attention, international environment law is typically characterised by negotiation and the need to gain consensus across a large range of nations before action can be taken (Bell *et al*., 2013). Conventions are a typical form of international legislation, they are normally broad in the coverage of the problem and include articles requiring the 'sharing of knowledge' and 'exchange of information'; this in turn creates improved knowledge and leads to the generation of further agreements under the convention termed protocols (Bell *et al*., 2013). International law is only a part of national law once it has been given effect by parliament or national government; this is usually done through an enabling act, the act expresses the willingness of the nation to undertake the legal rights and obligations residing in the convention (United Nations, 2014).

The EU has created a system of environmental governance within Europe; its policy base is broad in scope, extensive in detail and is often rigorous in effect (Bell *et al*., 2013). The protection of the environment was codified within the *1986, Single European Act*, the provisions found within this Article have been noted as 'forward-looking' due to the high level of protection and the preventative and precautionary approach it suggests (Kiss and Shelton, 1997). Environmental law is in fact one of the EU success stories (Institute for European Environmental Policy, 2012). The EU uses regulations and directives as methods of creating community action; regulations are a form of 'true' community law, they are binding in all elements and are directly applicable to all Member States and impose duties upon private persons without the need for national law (Kiss and Shelton, 1997). Directives are perhaps currently the most used form of EU environment law as they

bind each Member State to achieve a specific result. In order to effectively implement and achieve such judicial requirements Member States often have to adapt or create national legislation, administrative structures and procedures to ensure that the comply with the relevant piece of legislation.

The EU has progressed from its original inward outlook on policy to take on a leadership role in environmental governance (Institute for European Environmental Policy, 2012), particularly within the field of climate change (Oberthür and Roche Kelly, 2008). This can be exemplified by the EU's role in championing the need for 'environmental integrity' within the Kyoto Protocol and its role in launching post-2012 climate negotiations (Oberthür and Roche Kelly, 2008). It is widely recognized that EU environmental policies have successfully reduced some of the pressures upon the environment through the use of stringent policy; it has also helped to stimulate investment in sustainable economic growth, 'green technology'. Policy dimensions between the EU and its Member States include the loss of exclusive domestic control over environmental priorities; a more transparent decision making process allowing stakeholder engagement; improved negotiating positions for environmental ministries due to the need to achieve policy goals or face infraction and finally the narrowing of environmental standards within Member States through the introduction of quality standards e.g. WFD, MSFD, *Bathing Water Directive, 2006* (BWD) (Institute for European Environmental Policy, 2012).

There is uncertainty regarding whether the stringent quality standards established by marine environmental directives can be successfully achieved against a background of natural variability and global climate change (Elliott *et al*., 2015; McQuatters-Gollop, 2012). It has long been noted that there is a "growing problem of compliance" across all sectors of EU law (Krislov *et al*., 1986). The poor implementation of policies was again noted by Jordan, (1999) who noted that the success of the policies should be judged

accordingly against the tangible effect they have within the environment. Without full implementation and limited tangible effects within the target area, environmental policy risks becoming a 'paper exercise' of limited use or effect (Jordan, 1999). The EU is unmistakably good at producing large amounts of ambitious policy (Rometsch and Wessels, 1996) such the MSFD and WFD. Both the MSFD and the WFD have been at the centre of debate regarding the implementation of the Directives. Achieving quality standards such as those desired by the two Directives requires measuring them against a baseline condition or reference (Borja *et al*., 2012); in a highly variable marine environment detecting changes from anthropogenic stressors is increasingly difficult due to moving baselines and 'unbounded boundaries' creating an issue of signal-to-noise ratio (Elliott *et al*., 2015). This difficulty will increase alongside the transboundary effects of climate change. In such instances, it may be assumed that Member States will come to rely upon the Doctrine of *force majeure* as a 'get out of jail free card'.

1.4 Aims, Objectives and Hypothesis

This research aims to consider the importance and prevalence of *force majeure* within marine environmental law, in particular it aims to address whether a Member State will, in coming decades, be able to successfully claim *force majeure* due to climate change or its specific consequences.

1.4.1 Objectives

To successfully achieve the desired aim, these objectives will be addressed:

1. Complete a thorough literature review into all relevant aspects of the research with a particular focus upon *force majeure* and climate change;
2. Generate a table that includes all instances where *force majeure* is written or implied within legislation;
3. Provide a case study on the role of *force majeure* within the MSFD;

4. Analyse the three criteria of *force majeure* (foreseeability; impossibility; externality) against climate change scenarios;
5. Complete a significant case law search, focusing primarily on environmental law but which may have to use other examples from other areas of law;
6. Analyse all relevant information from the previous objectives, contrast and compare for similarities in court findings to see if there is any precedent.

1.4.2 Hypothesis

In circumstances where climate change has prevented or decreased a Member States ability to achieve its obligations, the doctrine of *force majeure* will no longer excuse non-performance within marine environmental law.

Chapter 2 - *Force majeure*

2.1 Defining *force majeure*

In French law *force majeure* appears within Articles 1147 and 1448 of the Code Civil (**Table 1**), formerly Code Napoleon (Nicholas, 1995). The term *'force majeure'* refers to 'superior or irresistible power' and '*cas fortuit'* as used within Article 1148 translates as a 'fortuitous event' or 'inevitable accident'. These terms have many similarities to previously used Roman legal concepts, *custodia* and *vis maior*, of which *vis maior* can be seen defined in **Table 2**. Many have stated that the Code Napoleon built upon them (Nicholas, 1995; Wright, 2003). The role of *vis maior* within Roman law was to set limit on the strict liability imposed upon certain Bailee's or equivalent (Swalding, 1995), for example, the strict liability imposed upon a ship's captain did not extend to any losses occurring due to shipwreck or seizure from pirates, as this was a *vis maior* or *force majeure* event (Lombardi, 1997).

Table 1. Articles 1147 and 1148 from the Code Civil, relating to *force majeure* within the law of contracts (Nicholas, 1995).

Article	Legislative text
1147	The debtor is condemned, where appropriate, to the payment of damages, whether for non-performance of the obligation or for delay in its performance, whenever he does not show that the failure to perform derives from an extraneous cause (*cause etrangere*) which cannot be imputed to him, even though there is no bad faith on his part
1148	There is no place for any damages when. As a result of a *force majeure* or an accident (*cas fortuit*), the debtor has been prevented from conveying or doing that to which he was obliged or has done what was forbidden to him

There is no uniform set of events that constitute *force majeure* in the law of contracts however, it was developed to encompass government decrees, acts of war, strikes and extreme or rare weather events such as floods or hurricanes (Wright, 2003). There are three requirements of a *force majeure* clause in all legal contexts although the application of such criteria may vary: (1) the breach of obligation must be the result of an irresistible force or unforeseen event; (2) the event must be beyond the control of the party concerned, and (3) the event must render performance materially impossible to perform the obligation (Nicholas, 1995). In both international and EU law *force majeure* has two elements; an objective element which is the occurrence of an event that is not influenced by the party wishing to use the defence, and a subjective element, the party wishing to claim must have exercised all the reasonable efforts to avoid the consequences of the event *(European Commission v Federal Republic of Germany, 2014 para 48-9,* International Law Commission, 1978); this suggests that the burden of proof is on the party pleading the defence.

The three criteria of *force majeure* are of major importance to determining a case. The criterion of foreseeability is determined on a case-by-case basis (Wright, 2003). However, it has been stated by Lombardi (1997) that nothing is unforeseeable, yet courts test this criterion on the basis that it should not have been foreseeable by a 'reasonable' person at the time of the contract. Irresistibility applies to not only the event but its consequences, if the event itself or its consequences could have been avoided or overcome, this criterion is not met (Lombardi, 1997). The element of externality requires that the event was outside the control of the debtor or State, overall if non-performance can be related to the fault or negligence of the debtor, State or persons acting on their behalf it cannot constitute *force majeure* (Lombardi, 1997).

2.2 Varying legal principles

There are various legal principles that can be stated as synonymous with *force majeure,* two of which are briefly described here with definitions for all provided within **Table 2**. English Contract Law has typically dealt with circumstances precluding *force majeure* with the doctrine of Frustration. Due to the belief that *force majeure* is applicable to continental law, however, its application within English law has increased (McKendrick, 1995). The increase in the use of *force majeure* within English Contract Law is likely due to the narrow confines that the doctrine of Frustration provides. Although Frustration acts within a similar context to the French doctrine, discharging contracts where unforeseen events have occurred rendering the obligations impossible or drastically altering the terms of contract. The doctrine cannot be invoked due to more onerous conditions than those in which a contract was agreed. This can be seen within the case of contract regarding the building of 78 houses within an 8-month period. However, due to a lack of skilled labour the build took 22 months and cost an additional £21,000 *(Davis Contractors Ltd. V. Fareham U.D.C., [1956]).* The plaintiffs claim of Frustration was rejected on the terms that there were no significant alterations to the obligations within the contract and hardship, inconvenience and material loss would not initiate Frustration alone *(Davis Contractors Ltd. V. Fareham U.D.C., [1956*]). The strict interpretation of Frustration can provide insight as to English contracts are increasingly including *force majeure;* it provides the opportunity for parties to provide for events that may not be sufficient within the common law to frustrate the contract (McKendrick, 1995).

The 'Act of God' defence has been used for over three centuries in cases of negligence and strict liability; the cultural notion behind the Act of God defence relates to the concept that weather and its consequences are divine and beyond the control of humans (Kristl,

2010). There have been limited efforts to define the Act of God defence, although, Lord Justice James stated that the event must be directly and exclusively natural in its cause with no amount of foresight or reasonable care by the party being able to prevent the consequences of the event (*Nugent V. Smith, [1876]).* Typically storms, hurricanes and lightening were provided as examples to which a defendant could be shielded from liability, today the doctrine is present in common law, admiralty, contract and modern environmental law (Kristl, 2010). This doctrine has many similarities with *force majeure;* definitions of the two doctrines are highly similar with the difference being focused upon human interference or negligence. *Force majeure* now commonly includes human induced circumstances, as long as they are not related to the party relying on the clause causing case for negligence (Nicholas, 1995). In comparison, the Act of God defence as stated by many should be purely natural in its root (*Nugent V. Smith, [1876]; Bradford V. Stanley, [1978]).*

Table 2. Terms and Doctrines that are similar in both definition and concept to the doctrine of *force majeure*, references provided within table.

Terms and doctrines with similar definitions to *force majeure*	Definition	References
Cas fortuit	*Cas fortuit* translates as a 'fortuitous event', it is often used interchangeably with *force majeure* however the former does not require externality only that a fortuitous event occurs.	Clarke, M. (1976) Aspects of the Hague rules. The Hague: Nijhoff.
Vis maior	"*Vis maior* included disasters such as floods, storms, earthquakes; also violent theft, i.e. robbery" "*Vis maior* is often described as 'act of god' but, in view of the inclusion of robbery, 'overwhelming force' would be a more accurate and theologically less objectionable translation"	Borkowski, J. (1997) *Textbook on Roman law*. London: Blackstone Press.

Act of God	"An act occasioned exclusively by violence of nature without the interference of any human agency. It means a natural necessity proceeding from physical causes alone without the intervention of man. It is an act, event, happening, or occurrence, due to natural causes and inevitable accident, or disaster; a natural and inevitable necessity which implies entire exclusion of all human agency which operates without interference or aid from man and which results from natural causes and is in no sense attributable to human agency. It is an accident which could not have been occasioned by human agency but proceeded from physical causes alone"	*Lea Co. v. North Carolina Bd. of Transp.*, 304 S.E.2d 164, 308 N.C. 603 (1983).
Frustration of Contract	The discharge of contract due to supervening events, irrespective of the type of event that which has caused the discharge, this includes; supervening destruction of the subject-matter, temporary unavailability, frustration of purpose or by supervening illegality.	Treitel, G. (1994) *Frustration and force majeure*. London: Sweet & Maxwell.

2.3 *Force majeure* as an International principle

Within international law, there is a series of Primary Rules which are intended to regulate the occurrences of events that are partly or wholly due to *force majeure*; this series of primary rules can be found within international obligations such as the *1968, Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects launched into Outer Space* (United Nations, 1968). Within the context of this treaty if due to reasons of accident, emergency or unintended landing, *force majeure* circumstances, the State within which they land must promptly take all possible steps to rescue them and must render them all possible assistance (Article 2). Personnel found in such circumstances found within the high seas or an area under no state jurisdiction must be safely and promptly returned to a representative of their launching authority (Article 4). The creation of such primary rules ensures cooperation with regard to the safety of citizens in *force*

majeure circumstances. These primary rules however are not where *force majeure* plays an important role within international law, its foremost role is with regard to the rules governing responsibility for non-performance of obligations provided for within the primary rules (United Nations, 1978).

Within the field of international commercial law, a party may be excused from non-performance if they can provide an adequate burden of proof, this includes proving that non-performance was due to circumstances or 'forces' beyond their control and that were not foreseeable at the time of contracting (Bonell, 2006). When the circumstances ensuing *force majeure* are temporary, the party may be provided with a period of time deemed reasonable to complete the contract, the period of time granted is dependent upon the nature of the circumstances and the effects upon the progress of the contract (Bonell, 2006). In Article 7.1.7 of the UNIDROIT Principles of International Commercial Contracts, that contracting parties may further refine their definitions of *force majeure* (UNIDROIT, 2010), this provides for the expansion or refining its scope for the benefit of parties or a party. A party wishing to claim *force majeure* within this context must also provide notice of failure to perform and reasons why within a period of due notice, failure in providing this may entitle the other party to damages (Bonell, 2006).

In its primary international role, *force majeure* is considered alongside the constituent elements of an 'internationally wrongful act'. A breach of international law by a State entails its international responsibility, an internationally wrongful act may consist of either an action or omission by the state leading to a breach of the law, or a combination of both (International Law Commission, 2001). The acts or the omissions of the state resulting in a breach of international obligations need only be attributable to the State, this is termed the subjective element, the breach itself is termed the objective element although the International Law Commission (ILC) avoids such terms within its Articles (International

Law Commission, 2001). International law recognizes several circumstances which may preclude the wrongful act of the state in failing to comply with its international obligations, one such circumstance is *force majeure* (International Law Commission, 2001). The 'wrongful' conduct of a State is precluded as long as the situation of *force majeure* persists; the criterion of impossibility is key within international cases as the event must render performance materially impossible not simply more onerous (International Law Commission, 2001). There is no exhaustive list on what constitutes a *force majeure* claim, however, the ILC do provide illustrations which stress weather, floods, earthquakes or drought. This raises the question as to whether climate change constitutes a claim or is better regarded as the cause of certain events that may constitute *force majeure.*

Although a Nation State cannot rely upon 'self-induced' *force majeure*, the event precluding the claim must be due to the State wishing to invoke it; this can suggest some degree of intention and can mean that a State may rely upon *force majeure* as a defence in situations where it has 'unwittingly contributed to the occurrence of material impossibility by something which, in hindsight, might have been done differently but which was done with good faith and did not itself make the event any less unforeseen' (ILC, 2001). With regards to the assumption of risk of *force majeure*; States or groups of
States may explicitly agree to accept the risk of specific *force majeure* event in advance.

2.4 *Force majeure* as a European principle

The most pertinent use of *force majeure* in EU law is where Member States may be excused from legal commitments due to *force majeure* circumstances. Strict
interpretations of *force majeure* also prevail within this context, for example within the Statistics of Road Transport Case *(European Commission v Italy, [2012])*. Italy was not permitted to rely upon the doctrine for failure to implement a directive, the Member State claimed that a bombing of a statistical processing centre which took place several years

prior to the case had created difficulties in implementing the directive; the court held that the situation could have been remedied within that period *(European Commission v Italy, [2012])*. The Commission recognised that the bombing attack may have been typical *force majeure* case, yet, the Commission attributed Italy's failure to achieve the Directive to the Member State's failure to react with the degree of diligence required by a public administration to remedy the situation (*European Commission v Italy, 2012*). The Commission went on to state that a Member State should not plead *force majeure* to indefinitely postpone their legal obligations (Lombardi, 1997). A Member State can only plead *force majeure* for the time period necessary to resolve the situation (*European Commission v France, 2001*).

The *Fleischhandelsgesellschaft* case relates to a private party wishing to claim *force majeure* due to legislative changes preventing the completion of a prior contract; the doctrine received limited recognition during the case and the court rejected its application. The application was rejected due there been no case of non-fulfilment, the legislative changes merely made performance more onerous (*Interkontinentale Fleischhandelsgesellschaft mbH & Co. KG v Commission of the European Communities [1978], ECR 370*). Following the case, the Commission adopted a narrow interpretation of *force majeure* which can be seen within *Commission Notice C (88)* regarding agriculture law. It was considered whether *force majeure* was considered a general principle of law; it was considered as an exception to the general rule of scrupulous compliance, it was also observed that the same results could be achieved through the principle of proportionality. Within the *Erpelding v Secrétaire d'État à l'Agriculture et à la Viticulture*, ([1988], ECR 2647) it was stated that *force majeure* 'can never create for the benefit of that operator a right not provided for in the relevant rules', this has led to *force majeure* being termed as a shield not a sword (Parker, 1995).

It has also been noted by the courts that the application of *force majeure* varies according to context; the concept is not identical within the different branches of law and its various fields of application; therefore, the importance of the doctrine must be determined on the premise of the legal framework in which it is to have effect (*Firma Schwarzwaldmilch GmbH V. Einfuhr-und Vorratsstelle für Fette, 1968*). This infers that although the general parameters of *force majeure* are transferable between contexts, they must also be applied contextually. Applying *force majeure* contextually requires looking at the overall objectives of the legislation and the role provided to *force majeure* as an exception for performance within it.

Chapter 3 – Methodology

An extensive literature review has already highlighted the increasing effects of climate change upon the marine environment, it has also highlighted how it may continue to amplify and alter the pressures within this sector. The aim of this research is to determine not how climate change effects the natural environment but how it will influence the application of *force majeure* within marine environmental law. The interdisciplinary approach of this research requires methods not usually associated with the biological sciences, the legal nature of the research subject requires that legal analysis methods are used to address and analyse the question. This analysis aims to determine how *force majeure* is applied within environmental law and how this will alter as the effects of climate change become more prominent. To do so two forms of analysis are used:

3.1 Macro analysis

Enright (2011) has defined the method of macro analysis in law; it is defined as gaining the 'bigger picture' or an overview of the system. It includes looking at the boundaries set by the legal system and how they work together. In the context of this research conducting the macro analysis means identifying all accounts of *force majeure* within marine environmental legislation, this includes international, European and National (UK) legislation. Data collected within this analysis are organised within a table and will provide a key overview of the legal system, the level of jurisdiction, the title of the legal document, the date and the relevant passage from the document.

3.2 Micro analysis

A micro analysis of the *Marine Strategy Framework Directive, (2008)* will also be conducted providing a detailed case study of one key piece of legislation. The legislation selected has a holistic approach to managing the marine environment and is complex in nature with many scientific papers aiming to determine its application (Borja *et al*., 2010,

2013). Some of the examples used within this analysis will be hypothetical, based upon the IPCC predictions for the future, due to the fact that there are limited situations in which climate change has currently created *force majeure* events. This analysis will be divided into three sections and linked via the legislative protocol:

(i) Elements– Enright (2011) notes elements as a required fact, these facts must be present for the legal precedent to apply, they depict a 'type' of fact and are satisfied by a set of facts. Within this analysis, the elements or required facts will be the 'Qualitative Descriptors for determining good environmental status' as laid out in Annex I of the *MSFD, (2008).* Only 2 will be examined.

(ii) Consequences - The consequences of the legal rule also require assessment, in terms of this research both the legal consequences of the written law and the biological impact will be assessed. For example, in criminal law, the elements are met by the fact and therefore the defendant is guilty and must serve a sentence.

(iii) Consequences of *force majeure*- The consequences of claiming *force majeure* will be assessed to determine the impact of the doctrine, this will include cross comparison with case law.

Chapter 4 – Analysis and Case Studies

4.1 Macro-analysis, table of law

The results of the macro analysis, **Table 3**, show that out of the 17 legal provisions found to contain *force majeure* only 6 expressly use the exact terms of the doctrine within the legal text. This is very few considering the extent of legislation and policy covering the marine environment **(**see **Appendix I**). This is split between 3 international provisions and 3 European, with no National legislation's including the written doctrine. Of those policies which include the written doctrine, 3 contain the phrase more than once, and 1 European Directive [2003/87/EC] contains the term 3 times. The first use of *force majeure* within the legislation is to state that allowances may be made in *force majeure* cases, the second to state that the Commission shall determine when *force majeure* is demonstrated successfully, and the third is to state that the Commission will be providing provisions on when *force majeure* is applicable and the date this will be provided. Further provisions on this legislation provide a list of circumstances that the Commission may consider to be *force majeure.* This includes natural disasters, war, threats of war, terrorist attacks, revolution, riot sabotage or acts of vandalism (Commission of the European Communities, 2004). It is clear from the list provided within this provision and the legislation itself that *force majeure* will be held under a strict interpretation by the Commission in terms of that legislation.

The remaining 11 legal provisions do not expressly include the term '*force majeure'* they do however imply that the doctrine is applicable through similar terminology such as those expressed within the *Civil Liability Convention, 1969* (see **Appendix I**). This Convention, although not directly listing *force majeure* as an exclusion states that no liability will occur for pollution due to "acts of war, hostilities, civil war, insurrection or a natural phenomenon of an exceptional, inevitable and irresistible character". Acts of war and

hostilities are now commonly covered within the concept of *force majeure* and the language used in the latter part of the statement can be clearly linked to common descriptions and definitions of a *force majeure* event. It is likely that the concept of *force majeure* does not appear in national legislation due to English law favouring the concept of frustration. Frustration operates in a similar manner to *force majeure* but is much more limited and confined in the way it operates. Nevertheless, as a Member State of the European Union it is likely that UK legislation falling within the scope of EU Directives will follow the general principles of *force majeure*. The text of the United Kingdom's *Marine and Coastal Access Act, (2009)* appears to suggest that some level of both unforeseeability and irresistibility will excuse a defendant. Article 141,4(b) states that a defendant may be exempt from charges if the effect of the act in question upon a protected feature could not have reasonably been avoided, implying the element of irresistibility and to an extent foreseeability.

Table 3. Extracts from the macro analysis documenting accounts of *force majeure* within legal provisions, both written and inferred. The full table can be viewed in Appendix 1.

Jurisdiction	Statute	Wording in legal provision
International	**UNCLOS III**	Article 18 – meaning of passage 2. Passage shall be continuous and expeditious. However, passage includes stopping and anchoring, but only in so far as the same are incidental to ordinary navigation or are rendered necessary by *force majeure* or distress or for the purpose of rendering assistance to persons, ships or aircraft in danger or distress. Article 39: Duties of ships and aircraft during transit passage 1. Ships and aircraft, while exercising the right of transit passage, shall: (c) refrain from any activities other than those incident to their normal modes of continuous and expeditious transit unless rendered necessary by *force majeure* or by distress;

European Union	**MSFD** 2008/56/EC	Article 14 1. A Member State may identify instances within its marine water where, for any reasons listed under points (a) to (d), the environmental targets or good environmental status cannot be achieved in every aspect through measures taken by that Member State, or, for reasons referred to under point (e), they cannot be achieved within the time schedule concerned: (a) action or inaction for which the Member State concerned is not responsible; (b) natural causes; (c) *force majeure*; (d) modifications or alterations to the physical characteristics of marine waters brought about by actions taken for reasons of overriding public interest which outweigh the negative impact on the environment, including any transboundary impact; (e) natural conditions do not allow timely improvement in the status of the marine waters concerned
National United Kingdom	**Marine and Coastal Access Act, 2009**	141 Exceptions to offences under section 139 or 140 (d) was necessary in the interests of national security or the prevention or detection of crime, or was necessary for securing public health; (e) was necessary for the purpose of securing the safety of any vessel, aircraft or marine installation; (f) was done for the purpose of saving life. (2) Subsection (1) (e) does not apply where the necessity was due to the fault of the person or of some other person acting under the person's direction or control. (3) A person is not guilty of an offence under section 139 by reason of doing anything that is an offence under section 140. (4) It is a defence for a person who is charged with an offence under section 140 to show that— (a) the act which is alleged to constitute the offence was— (i) an act done for the purpose of, and in the course of, sea fishing, or (ii) an act done in connection with such an act, and (b) the effect of the act on the protected feature in question could not reasonably have been avoided.

4.2 Micro analysis of the MSFD, (2008)

The Marine Strategy Framework Directive aims to protect the natural environment through the achievement of Good Environmental Status (GES) by 2020, each Member State must develop a programme of measures under the Directive and this establishes the quality of the area at the time of assessment; the environmental impact and socio-economic analysis of human impacts and what GES means for national waters. It also works to establish environmental targets and indicators and establish and maintain monitoring programmes for the ongoing assessment and development of programme of measures designed to achieve or maintain GES by 2020. There are 11 Descriptors outlined in the Directive that can be used to determine GES, they can be divided into state and pressure Descriptors in line with the DPSIR Framework. The DPSIR Framework assesses the causes, consequences and response to complex changes in the environment through the creation of structure (Atkins *et al*., 2011). By assessing the problem in a holistic way, the change can be split into sections ((D)drivers, (P) pressures, (S) State, (I)impact and (R) response), providing a simpler view of a complex problem (Elliott *et al.*, 2017). The descriptor and indicator framework used by the Directive allows Member States to select which indicators are the most applicable to their waters and correspond with regional targets and pressures.

4.2.1 Descriptor 2 – non-indigenous species introduced by human activities

Figure 3 is a hypothetical example of a future case which may be brought to the European Court of Justice (ECJ). Whilst the case itself is hypothetical, as there are no reported claims of *force majeure* for such situations, the circumstances precluding the claim are already occurring within the Mediterranean Sea. The diagram depicts a case in which a highly mobile invasive species, the nomad jellyfish (*Rhopilema nomadica*), leaves a Member State unable to achieve GES for the area or region affected. The diagram outlines the reason the Member State has not achieved GES, the biological consequences and possible

reasons a plea of *force majeure* may stand or be overturned by the ECJ. To perform detailed review of the possible claim, the case will be analysed within the structure of the three elements of *force majeure*, acknowledging the legal analysis procedure as described by Enright (2011), (**Figure 4)**.

In the scenario depicted, the nomad jellyfish *(Rhopilema nomadica)* enters the waters of the Member State through the Suez Canal enabled by the increased temperatures of the receiving waters due to climate change and the possible transportation of polyps via slow moving vessels (Galil, 2000). The nomad jellyfish is native to East Africa and the Red Sea, with the first sighting of the species within the Mediterranean in the 1970's. It appears in vast swarms along the coasts of Lebanon, Israel, Turkey and Greece (Galil, 2000). Lotan *et al.,* (1994) found that the optimum temperature for the metamorphosis of polyps into strobila is between 18^{o}C – 20^{o}C, this coincides with spring ocean temperature rise in the Levantine basin. The ecological impacts of this species include the displacement of the species *Rhizostoma pulma* from the Levantine coast (Öztürk and İşinibilir, 2010) and alterations to the trophic system through its effective grazing in an oligotrophic environment (DAISIE - Species Factsheet, 2016). Social impacts include potential harm to humans through coming in contact with the organism's nematocysts; fisherman struggling to haul in catches during swarming periods and economic losses due to the contamination of catches (Öztürk and İşinibilir, 2010).

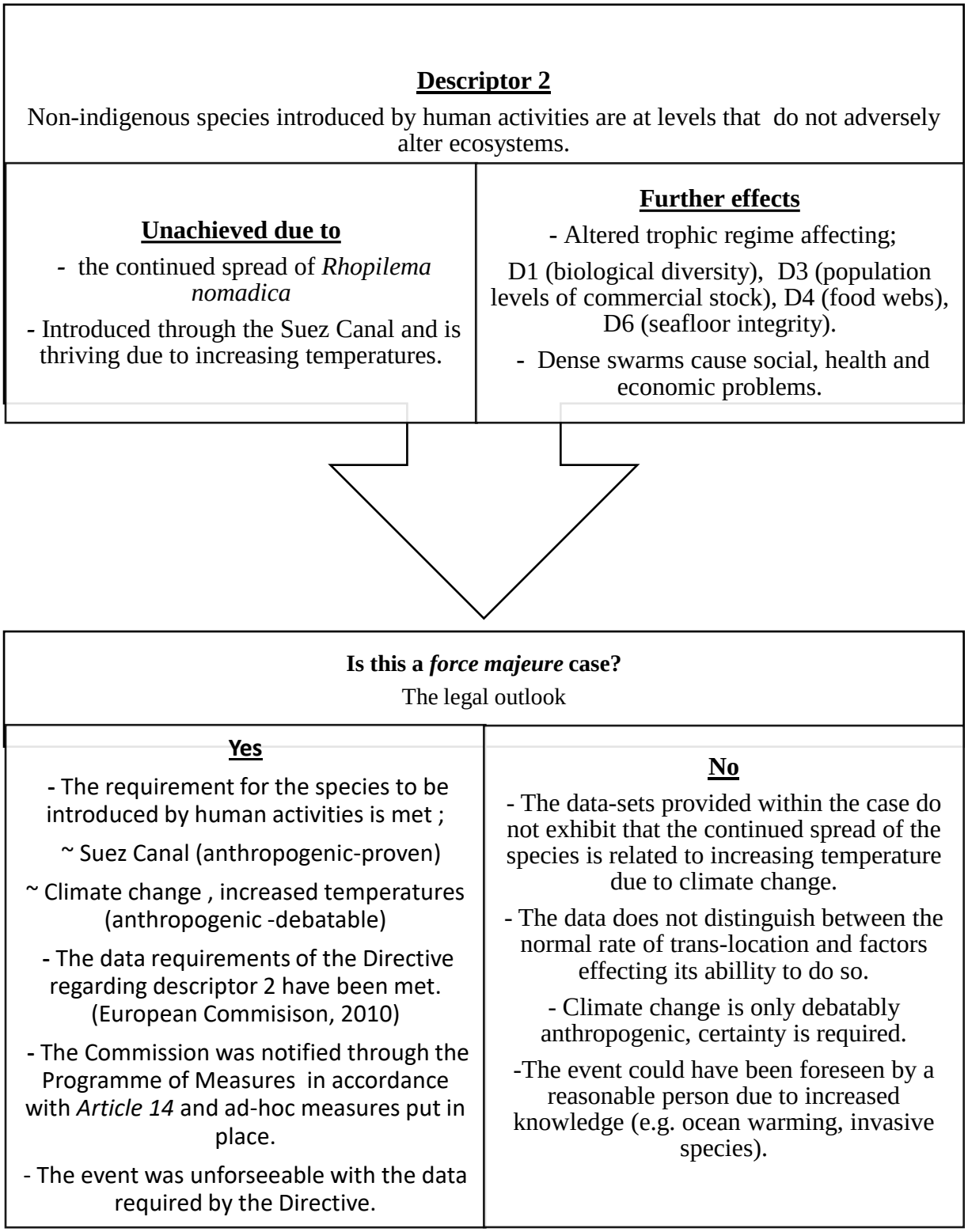

Figure 3 Micro analysis of Descriptor 2 of the MSFD. The scenario used exaggerates an already occurring phenomenon within the Suez Canal. The table shows the reasons which the Descriptor may be unachieved, the further effects of the introduction upon the Directive and also how courts may assess the proof provided by a Member State who has adhered to the data requirements of the Directive (Yes/ No).

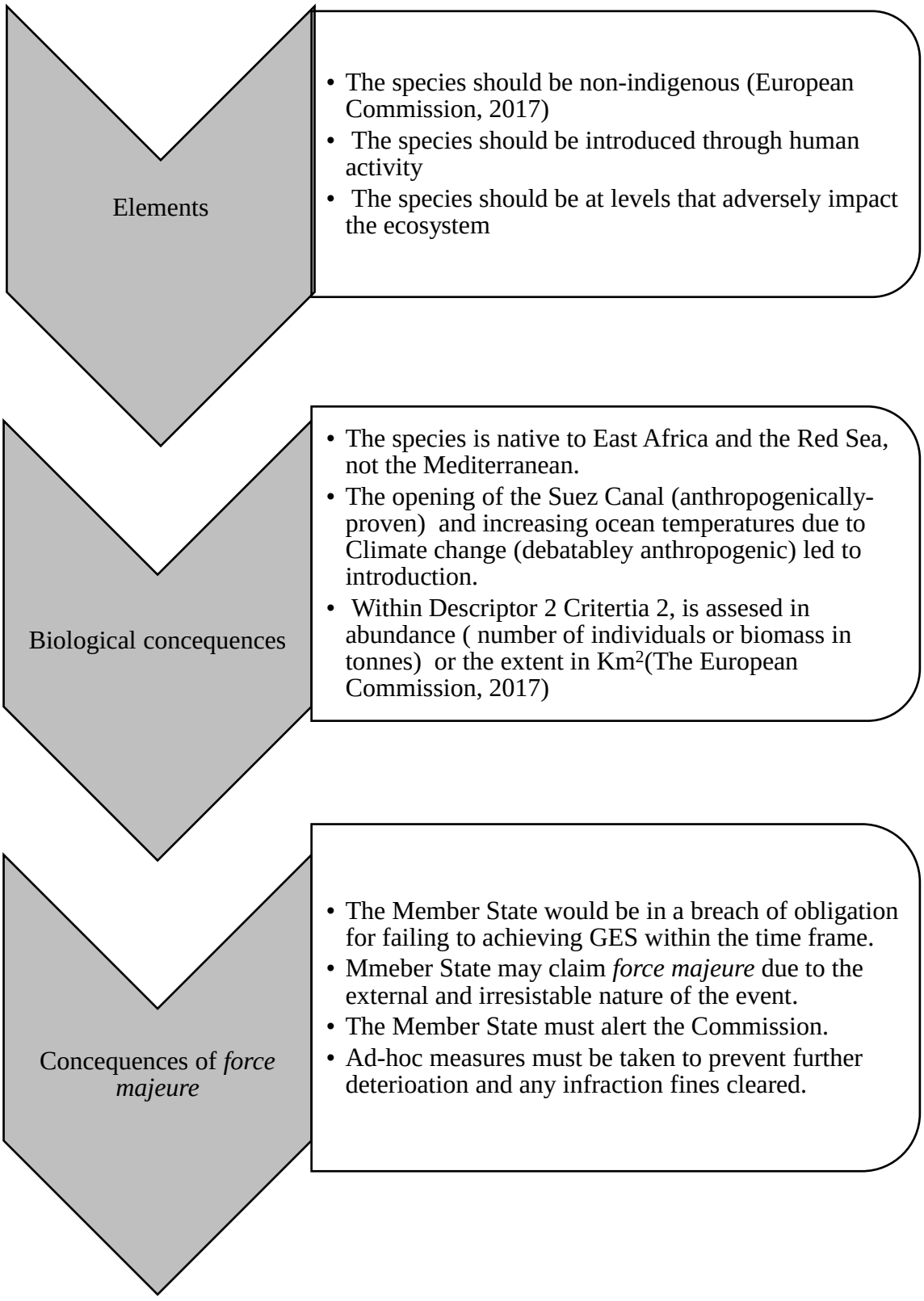

Figure 4. The elements and consequences of the case, defined using an adaption of Enright's (2011) description.

Wright, (2003) noted that a court may find one event foreseeable or unforeseeable dependent upon the line of enquiry they take. In this case a general enquiry might find that the information available to the scientific community points towards the assumption that this invasive species will continue to spread with the increasing climate. The IPCC has reported with a 'very high confidence' that distributional shifts are occurring amongst species, alterations to ecosystem compositions in all ocean basins have also been noted on a multi-decadal timescale with a 'high confidence' (IPCC, 2014).

There is also much information on species distributions within both the primary literature (Öztürk and İşinibilir, 2010; Lotan *et al.*, 1994) and on various databases (Invasive Species Compendium, 2016; WoRMS - World Register of Marine Species - *Rhopilema nomadica*, 2016; DAISIE - Species Factsheet, 2016). With such information readily available to a Member State, it could be concluded as highly unlikely that a court would deem this event unforeseeable, particularly due to the importance placed upon coordinated and detailed monitoring by the legislation (e.g. MSFD, 2008). The European Commission Decision (2017) stipulates that information regarding the spatial distribution and abundance should be collected for species that are a known to be nonindigenous to the area, and this must be coordinated on a regional and Sub-regional basis (European Commission, 2017).

A specific enquiry into the events and its consequences may conclude that whilst the event itself was reasonably foreseeable the specific consequences of the event upon the Member State were not. The economic and social impacts due to the introduction of this species can be extensive; the species congregates in large swarms causing damage to both tourism and inshore fisheries (Galil *et al*., 1990). The effects on inshore fisheries are regarded as extensive, both coastal trawlers and purse seine fisherman have been recorded discarding large hauls due to the jellyfish entangled in their nets (Öztürk and İşinibilir, 2010). The mass swarming of the species is often associated with sea surface temperatures reaching

upwards of 26ºC and temperatures such as this are common averages for the summer months of many European Member States (Greece, Malta, Italy) and they are likely to increase with climate change as are heat waves and drought periods (IPCC, 2014). The impacts upon tourism are also associated with the very large blooms occurring close to shore, and increasing knowledge regarding the nomadic jellyfish is deterring tourists away from once popular tourist destinations (Öztürk and İşinibilir, 2010). If a Member State cannot reasonably foresee the blooms being pushed close inshore by increased temperatures and ocean current, is it reasonable to assume that they should have taken precautionary measures to subsidise both the inshore fisheries and tourist regions that are affected?

In order for a Member State to successfully claim *force majeure* in the event of a noninvasive species affecting its ability to achieve GES, the event must not have been within the 'reasonable' control of the State (Wright, 2003). Within the case in question, scientific evidence will be key to a Member State proving externality. Many instances of species introduction are the result of transport through ballast waters or are the subject of an accidental or purposeful release (Bax *et al*., 2003); a purposed release is of no doubt within the control of the Member State as is the transport of species through ballast water. There are many conventions and legislative instruments at all levels of jurisdiction that aim to tackle the issue of invasive alien species (e.g. *Ballast Water Management Convention, 2004; Convention on Biological Diversity, 1992; EU IAS Policy, 2014*) and most environmental legislation now contain provisions relating to invasive species (Bax et al., 2003). *The Ballast Water Management Convention* (BWM), (2004) outlines provisions in which all vessels must treat their ballast water and must maintain a record of when water is taken on board, circulated or treated, discharged into the sea and instances of accidental release or release into a reception facility. If a Member State can provide

evidence to suggest that vessels entering their ports comply with such legislation and could provide evidence suggesting that a species was not present in the ballast water of such vessels, the event could be deemed external. It is unlikely, however, that such evidence could be acquired as the Convention does not require vessels to identify or record specific species present only quantities of viable organisms and microbes (International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM), 2017).

A Member State could attempt to claim externality to the case because climate change and its related pressures have enabled the species to colonize areas. Descriptor 2 of the MSFD requires that the non-indigenous species must be introduced via 'human activities'. For the Member State to be successful with this claim, it could be assumed that the burden of proof must not only provide evidence of how the species inhabited the area but also that the conditions allowing its successful colonization were due to anthropogenic climate change. If such evidence is provided, the Member State then relies upon the bounds and limits of State responsibility and the current lack in clarity surrounding climate change liability (Tol and Verheyen, 2004). All States emit greenhouse gases which are widely accepted as contributing to climate change (IPCC, 2014); by acknowledging that the introduction of non-indigenous species is one of the many biological effects of climate change and that climate change is an anthropogenic pressure, it could be viewed by a court as though the Member State is acknowledging their contribution to event. The issue of climate change liability is heavily contested throughout primary literature (Tol and Verheyen, 2004; Iverson and Perrings, 2012; Oberthür and Roche Kelly, 2008) and it is unclear as to what extent a Member State is liable for the actions of private persons within its jurisdiction so long as it is exercising 'due care' (Tol and Verheyen, 2004). The ILC Articles on State responsibility infer that whilst a Member State cannot rely on 'self-induced' *force majeure*,

the situation must be due to the conduct of the State invoking it; therefore, in an instance such as this where the Member State may have unknowingly contributed to the occurrence of their inability to achieve legislative targets, may rely upon *force majeure* (ILC, 2001).

Nicholas (1995) states that the event and its consequences must also have been unavoidable and insurmountable. This criterion of a *force majeure* claim could pose future challenges in events relating to climate change due to its objectiveness (Saul *et al*., 2016), with the doctrine stating that a 'reasonable' person/ actor should have in those circumstances been unable to avoid the event (Nicholas, 1995). The difficulty with this is to what standard of 'reasonable' is a Member State held and what measures are deemed 'reasonable' when facing a large exogenic threat such as climate change? The matter of whether this specific case can be considered 'irresistible' could be dependent upon the circumstances precluding the event. For example prior to the opening of the Suez Canal there was no link between the Red Sea and the Mediterranean, but once opened, the canal allowed species to pass through the Canal into receiving waters (Galil, 2000). There is no known eradication method for the *Rhophilema nomadica* and its management involves the placing of fixed nets or barriers around common tourist beaches (Invasive Species Compendium, 2016). By implementing such measures around popular tourist destinations, the economic consequences of the event to the tourism industry may be avoided and those within inshore fisheries. There are worries amongst scientists and managers that nets may lead to stray tentacles bearing nematocysts being carried inshore towards the public with the current (Invasive Species Compendium, 2016). The placement of such extensive measures may also incur excessive economic sacrifice for a Member State, as noted in the *Interkontinentale Fleischhandelsgesellschaft mbH & Co. KG v Commission of the European Communities., [1978]* "where the consequences of which in spite of the exercise of all due care could not have been avoided except at the cost of excessive sacrifice".

Hewitt *et al*. (2006) suggested that an environmental barrier such as a salinity block could be used to prevent invasions through the Suez Canal. However, the salinity of the canal has been altered throughout its construction by alterations to the high salinity Bitter Lakes that used to form a natural barrier. Por (1971) suggested it was species from these lakes which made the earliest migrations. The increase of invasive species passing through the Canal can be directly linked to the decline in salinity of the Bitter Lakes and a rise in salinity of the northern half of the canal since the damming of the Nile River (Hewitt *et al*., 2006), the effect of such measures upon this *Rhophilema nomadica* is yet to be studied. The nomad jellyfish is versatile and can live in temperature variances from 16ºC – 31ºC with a known salinity tolerance of 39.5. It is therefore highly likely that it could have spread despite increased surface water temperatures (26ºC – 31ºC) (Volosciuk et al., 2016). As much of the Mediterranean has temperatures regularly reaching over 16ºC, the species would over time continue its spread throughout the Mediterranean (Invasive Species Compendium, 2016). This is not something that a Member State could be reasonably expected to overcome, especially as *force majeure* must be understood in terms of the sense of the unusual circumstances, the doctrine is applicable so long as all due care regarding the event and its consequences was exercised and its avoidance would incur excessive sacrifice (*Interkontinentale Fleischhandelsgesellschaft mbH & Co. KG v Commission of the European Communities., [1978]).*

This *Rhopilema nomadica* case appears to be dependent upon the extent of data that a Member State can provide to support their claim. Within each criterion, there appears to be a heavy dependence on data to ascertain both the origin of the introduction (all criterion), the Member States role in its introduction (externality, Irresistibility) and if the event itself or any of its consequences could be avoided (Irresistibility). From this analysis it difficult to determine what a Court may decide, however, it is clear that as long as a

Member State has not breached all relevant legislations surrounding the issue including: monitoring programmes, ballast water management, regional coordination, and has alerted the Commission of instances such as this where it may fail to perform its obligations, this state could not be placed with disrepute as it has performed no wrongful act and the case would be solely dependent upon the strength of evidence. The evidence required within the case would need to support the elements and biological consequences described in **Figure 4.**

The main points that can be drawn from this case are:

- The line of enquiry taken by the Court may affect the findings of the case (Wright, 2003).
- *Rhopilema nomadica* will likely continue to spread due to heightened ocean temperatures (climate change), whether a Member State could claim *force majeure* under such circumstances will rely heavily on defining climate change as anthropogenic.
- A Member State is expected to take all precautions to avoid the event and consequences apart from where it incurs excessive sacrifice.

4.2.2 Descriptor 7 – Permanent alteration of hydrographical conditions

Descriptor 7 of the MSFD addresses a wide range of pressures that are faced by coastal waters, including human pressures such as infrastructure, aggregate extraction, riverine and point-source inputs (Elliott and Whitfield, 2011; Elliott *et al*., 2017). These pressures greatly influence the hydrographical conditions of an area including but not limited to: salinity, temperature, depth, current and wave action. These pressures upon the marine environment can be further intensified by exogenic pressures, particularly climate change (Elliott *et* al., 2017). According to the MSFD advice documents provided by the OSPAR Commission (2012) Descriptor 7 addresses permanent alterations to the environment that

may arise from new or large-scale developments; the aim of this Descriptor creates a direct link to the Environmental Impact Assessment Directive (EIA) [2014/52/EU]. The OSPAR advice documents consistently suggest that EIA can be used to assess any permanent alterations to the hydrographical conditions within the initial assessment, meeting the requirements of the Descriptor (OSPAR Commission, 2012). Small scale activities are not considered under the Directive as they are 'sufficiently' covered under existing legislation (OSPAR Commission, 2012). Member States are judiciary organs and perform activities through Government Authorities, organisations and companies. The inclusion of EIA assessments under this Descriptor may indicate a link to State responsibility with the Member State ensuring that the relevant procedures (EIA) are followed and can be held liable where they are not.

The hypothetical case defined in **Figures 5** and **6** outlines the circumstances in which a Member State may claim *force majeure* due to the negative impacts of climate change upon the hydrographical conditions its coastal waters. The scenario in question is one in which the effects of small or large-scale pressures upon hydrographic conditions are heightened by increasing sea level rise leading to coastal adjustment and squeeze. Relative Sea Level rise poses a threat to coastal areas and lowlands on a global scale, although global sea level rise can be mainly attributed to thermal expansion and glacier run-off; regional variation in RSLR arises due to circulation patterns, spatial and decadal variability and local pressures (IPCC, 2014). Under both the MSFD and supporting documentation (European Commission, 2008; OSPAR Commission, 2012; European Commission, 2010; European Commission, 2017) climate change is not listed as a pressure requiring monitoring under this Descriptor, however, as this case suggests it can have large repercussions on the Member State's ability to achieve the target of GES.

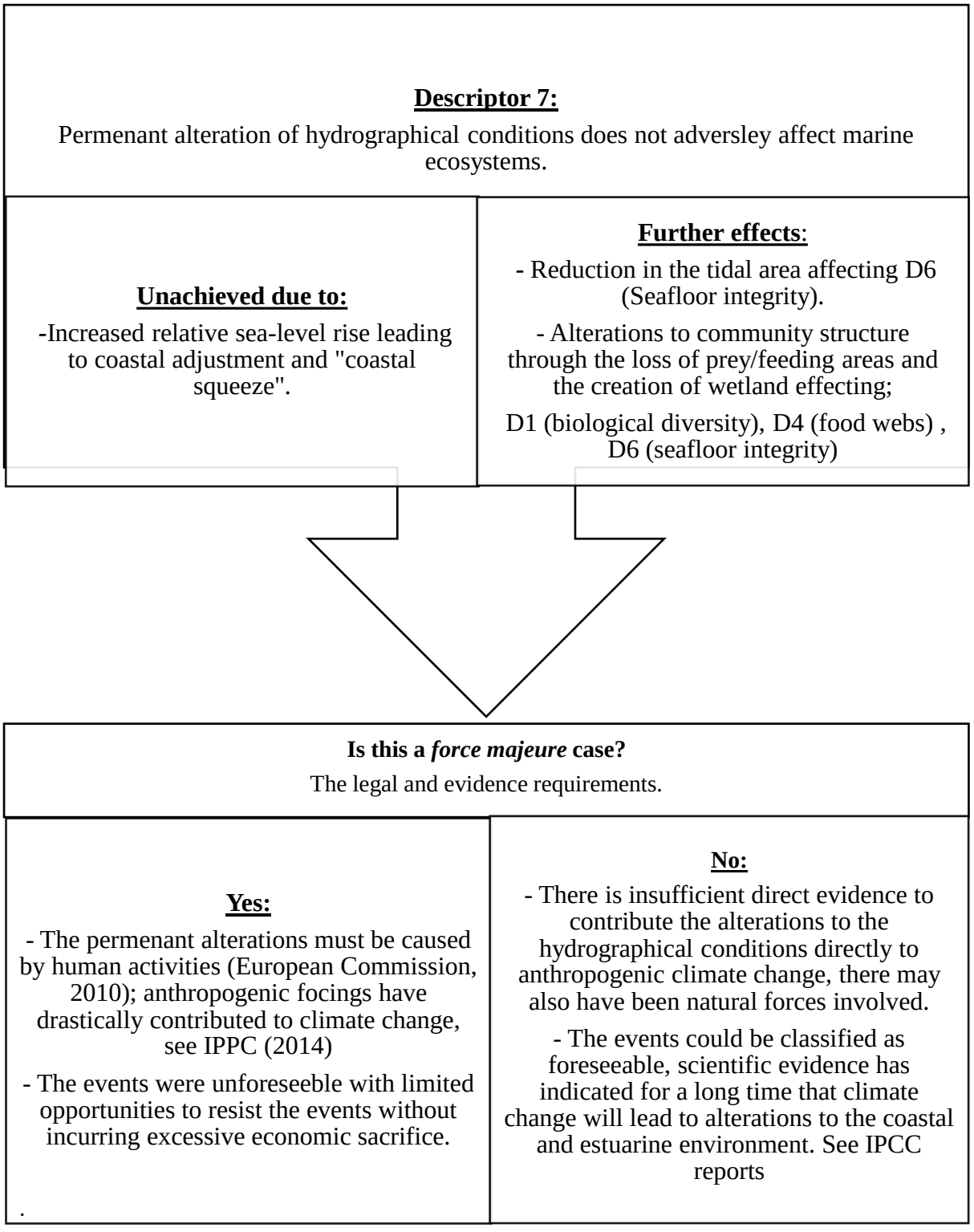

Figure 5. Micro analysis into Descriptor 7 of the MSFD, the hypothetical scenario assesses how a court may analyse a Member States claim that anthropogenic climate change has caused hydrographical changes that are adversely affecting the marine region**.**

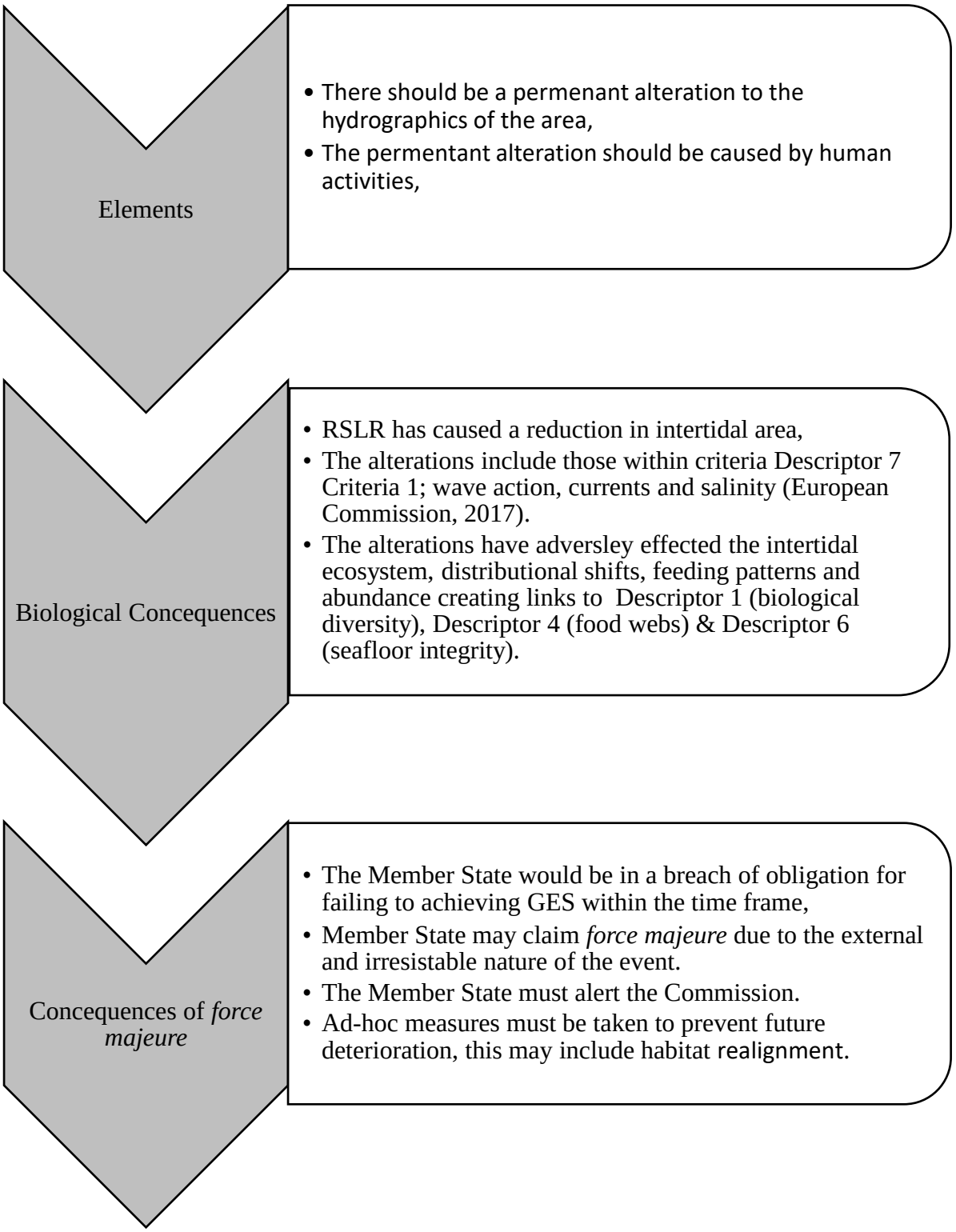

Figure 6. The elements and consequences of the case, defined using an adaption of Enright's (2011) description.

The foreseeability of the scenario provided in **Figure 5** can be directly linked to the Descriptor itself. As previously noted the Member States are required to perform EIA's upon all large-scale plans for an area before commencement, it also requires that monitoring is performed in the light of such activities (OSPAR Commission, 2012). The MSFD does not require Member States to monitor the hydrographical conditions of all areas within their jurisdiction and it is noted that monitoring efforts should not be focused upon the extensive changes in benthic fauna but should aimed at determining the extent of human activities upon current and wave regimes (OSPAR Commission, 2012). Relative Sea Level rise is also omitted from the lists of pressures and Annexes within the Directive and supporting documents, and it therefore could be construed from this that Member States are under no obligation to monitor the rates of erosion or sea level rise for their coastal areas under the MSFD making the event unforeseeable to a Member State following the letter of the law. A holistic approach to management such as that used by the MSFD; the Ecosystem Based Management System (EBMS), should account for all endogenic and exogenic pressures. It is also noted within the OSPAR advice document that although climate change is considered a 'prevailing environmental condition' and is therefore not further addressed through the MSFD, the effects of climate change need to be considered for the interpretation of monitoring data (OSPAR Commission, 2012). It could be assumed from the extensive data collection and management required by the Descriptor that this event is likely to be deemed foreseeable.

The IPCC's probalistic outcome assessment may also provide that this event is generally foreseeable by a 'reasonable person' within marine management. The European Commission (2010) outlined that 'hydrographical conditions' may consist of the tidal regime, sediment and freshwater transport, current and wave action leading to the modification of the physical and chemical characteristics outlined in Table 1, Annex III of

the Directive (**Table 4**). The IPCC has stated it 'very likely' therefore >90% probable that the rate of mean sea level rise along the northern European coastline has accelerated since the 1800's and this has continued into the 21th century (IPCC, 2013a). It has also been stated that it is 'very likely' the global mean sea level rise will continue to rise an accelerated rate to that observed from 1971 – 2010 (IPCC, 2014). From these observations made by the IPCC, who provide a scientific basis for Governments on all things related to climate change, it could be assumed that the relevant government departments and scientific bodies involved with all stages of the marine strategy (initial assessment, determination of GES for the region, monitoring programmes and the programme of measures) are aware of the general ecological and social risks associated with RSLR therefore making them foreseeable to a 'reasonable person' in that position.

Table 4. The physical and chemical features outlined in Table 1, Annex III of the MSFD (2008).

Physical and chemical characteristics outlined in Annex II, Table 1
• Topography and bathymetry of the seabed
• Annual and seasonal temperature regime and ice cover, current velocity, upwelling, wave exposure, mixing characteristics, turbidity and residence time
• Spatial and temporal distribution of salinity
• Spatial and temporal distribution of nutrients (DIN, TN, DIP, TP, TOC) and oxygen
• pH, pCO_2 profiles or equivalent information used to measure marine acidification

A more specific enquiry into the events within **Figure 5** may find that due to the data requirements of the Directive and the difficulty in determining the signal-to-noise ratio within the data required, that the event was in a general sense 'unforeseeable'. The IPCC states with a 'high confidence', that without any adaptation to RSLR, beaches, sand dunes,

and cliffs will continue to erode as at present but at increased rates; it also suggested within the IPCC report that various types of coastline will be affected differently and even the same physical components of the shoreline such as a rocky shore composed of limestone may react differently to one of the same nature in a different area (IPCC, 2014). This is due to the many other natural and anthropogenic factors (e.g. sediment composition, extraction rates, storm rates, wave energy and development) that can alter the rate of erosion and sea level rise (IPCC, 2014). Since Descriptor 7 is directly linked to the various anthropogenic pressures affecting RSLR, it could be assumed that within an EIA assessment for a large-scale government project such as improved flood defences, RSLR must be considered as a exogenic factor and the activities effects on both the natural and improved coastline regarded within the scoping and impact assessment stage of the EIA. This should ensure that the area achieves GES under the Descriptor if the development continues.

The irresistibility of the event in question and its consequences could be critical to the case. It was noted within the previous criterion that the IPCC (2014) has stated that it is very likely (>90%) probable that the mean sea level rise along the Northern European coastline has increased since the 1800's and will continue to do so into the 21st Century. In addition to this statement, there are numerous scientific organisations, research institutions and articles relating to RSLR, coastal squeeze and erosion (Varekamp *et al.*, 1992; Fankhauser, 1995; Nicholls and Cazenave, 2010). Relative sea level rise is now considered an irresistible event, due to continued emissions and temperature rise the sea level will continue to rise into the 21st Century (IPCC, 2014). With this information, the initial event of continued sea level rise is 'irresistible' although its effects and consequences may not be.

Whether this case is ‘irresistible’ is strongly associated to whether it was foreseeable. Had the relevant authorities known that this area was highly susceptible to coastal erosion, due to its lithology or previous incidents of erosion, then the consequences of the event could be deemed as avoidable through the correct use / improvement of coastal defence systems and the exercise of due diligence within the required EIA process and regular monitoring. A Member State may attempt to claim that the economic expenditure involved with such coastal protection can incur excessive economic sacrifice; Fankhauser (1995) suggested the use of optimum protection levels, to be used to account for the evaluations of the dry and wetland to be lost in comparison with the costs associated with its protection, therefore land with limited economic value will receive less protection then land with a higher value. If this method is used by a Member State who then claims *force majeure*, their claim is not likely to be accepted, as *force majeure* does not consider economic or technical difficulties (*Commission of the European Communities V Kingdom of Belgium, [2000]*).

There is limited room within this element for a Member State to claim that the event itself was outside of their ‘control’ and therefore external. Global sea-level rise has received large amounts of international attention due to the pressure it places on natural and human environments (Lewis, 1990; Fankhauser, 1995; Feagin *et al.*, 2005; Harley *et al*., 2006; Hanley *et al*., 2014). Due to the plethora of scientific research and media attention received by the issue, it is unlikely that a Member State would be able to simply state that they were unaware of the issue threatening their coastline. Hence the more that is known about climate change and the more it is accepted as being human-mediated then the less that *force majeure* can be claimed. The document created by the European Commission (2010) providing guidance on the criteria, Descriptors and indicators used to determine GES within the MSFD focuses directly on alterations due to human activities.

It is due to this specific notion of ‘human activities’ that a Member State may attempt to use a *force majeure* clause claiming that RSLR and coastal squeeze are not ‘human activities’ but ‘exogenic pressures’ and therefore were not regarded as part of the assessment. However, the IPCC (2014) report notes with a high confidence that since observations began in 1971 thermal expansion and glacier melt, excluding Antarctic glaciers surrounding the ice sheet, can account for 75% of an observed global sea-level rise. This could result in the Member State engaging in a direct discussion regarding the nature of climate change as anthropogenic, similarly to the previous case of Descriptor 2, if the Member State claims climate change and in turn RSLR as an anthropogenic pressure, it is then faced with the issue as to what extent it is responsible for that pressure (Tol and Verheyen, 2004).

Regional sea level changes may differ greatly from the global average, with the regional distribution of sea level change associated with various physical and anthropogenic factors (IPCC, 2014). These regional variations infer that a Member State or regulatory bodies within that State need to be aware not only of global changes but also of the regional changes within their own territory. Stressors upon a Member States coastal protection include the destruction of natural tidal barriers such as seagrass beds, mudflats, mangroves and coral reefs with these habitats are threatened by agricultural development, tourism, industry and recreation leaving the coastline prone to erosion and coastal squeeze (IPCC, 2014). Effective planning and risk assessments can provide insights into such risks and therefore provide a Member State with the opportunity to assess risk areas and provide defences (natural or man-made) or conduct a cost-benefit analysis on the value of the area to both the natural ecosystem and societal services (Atkins *et al.*, 2011). These analyses can then be used to inform the European Commission of any instances where Descriptor 7 may not be achieved through the ‘Programme of Measures’ as stipulated within Article

14 and to show that the Member State exercised its duty of care but that the event was beyond its control.

There appears to be limited room within this Descriptor for a claim of *force majeure*, owing to the focus of the Descriptor upon large-scale developments and its link with the EIA process creating State Responsibility over large-scale developments on its coast (OSPAR Commission, 2012). A Member State exercising due diligence over large scale projects that have the ability to permanently alter the hydrographical conditions of the marine ecosystem should be following an ecosystem-based approach to management with the possible inclusion of methods such as DPSI(W) R(M) to identify all possible pressures including exogenic ones such as RSLR (Borja *et al*., 2010; Elliott *et al*., 2017). The DPSI(W)R(M) method is a suggested expansion upon the existing DPSIR Framework, the expansion incorporates the impacts of state change (S) upon human welfare (W) and the measures (M) by which the response (R) will be carried out (Elliott *et al*., 2017). Although not directly addressed through the Descriptor, supporting documentation and advice regarding the Descriptor convey that climate change is a pressure that needs to be monitored in coordination with this Descriptor as it may affect many of the characteristics outlined within Annex III, Table 1 of the MSFD (2008).

The main conclusions from this case are:

- Descriptor 7 focuses on large-scale developments which require an EIA to be performed under the EIA Directive. This places responsibility on the Member State, or Government body, to ensure that the EIA is performed and will be in-line with the achievement of GES.
- As with the previous case (4.1) clear guidelines and definitions need providing on determining anthropogenic pressures.

- Contradiction between the MSFD and its supporting documentation do not provide a clear guide as to whether RSLR is a pressure that needs monitoring under the Directive.

Chapter 5 – Discussion

5.1 The criterion of foreseeability

For an event to constitute *force majeure* it must have been unforeseeable to the parties involved, however the requirement of unforseeability is not an absolute definition of the term (Nicholas, 1995). Nicholas (1995) states that by requiring complete unforseeability would risk converting the case from one of strict liability to absolute liability. Strict liability is the assignment of liability without the need for dependency on negligence or intent to harm, only *force majeure* or 'Act of God' can excuse liability (Kiss and Shelton, 1997). In most instances of environmental law within Europe the notion of strict liability is followed (Kiss and Shelton, 1997).

The ILC (2001) outlined in their Draft Articles that the event must be unforeseeable by any 'reasonable person'. As an example, flooding during a period of heavy rain is generally foreseeable to a 'reasonable person' and consequently would not constitute a *force majeure* case. At a general level, most natural events are foreseeable such as the previously mentioned flooding, therefore in practice the issue of foreseeability within a *force majeure* case becomes an issue of probability and likelihood. The IPCC uses a probalistic outcome assessment to indicate the likelihood of climatic events noted within their reports occurring (**Table 5**). The flooding example above details *force majeure* events that are likely to affect contract law; it becomes increasingly difficult to tackle the issue of foreseeability within the field of statuary environmental law. This problem arises from the fixed but general conditions of the doctrine, the natural variability of the environment and altering dynamics in knowledge sharing between Nation States.

Table 5: The confidence and likelihood terminology used by the IPCC, displayed with the associated degrees of confidence and probability, (Saul *et al.*, 2016).

Confidence terminology	**Degree of confidence in being correct**	**Likelihood terminology**	**Likelihood/probability of the outcome**
Very high	>9/10	Virtually certain	>99%
High	Approx. 8/10	Extremely likely	>95%
Medium	Approx. 5/10	Very likely	>90%
Low	Approx. 2/10	Likely	>66%
Very low	<1/10	More likely than not	>50%
		About as likely as not	33-66%
		Unlikely	<33%
		Very unlikely	<10%
		Extremely unlikely	<5%
		Exceptionally unlikely	<1%

The element of foreseeability can only be tested on a case-by-case basis as the circumstances of each case brought to Court will vary dependent upon the event (Wright, 2003). Wright (2003) stated that the test for foreseeability used by courts is complicated due to the level of uncertainty when seeking to apply the element of unforseeability to the event. The line of enquiry taken by the court can determine whether the event is viewed as foreseeable or unforeseeable; a general line of enquiry regarding the event can lead to a *force majeure* event being viewed as foreseeable, whereas specific questions regarding the build up to an event and the effects of the event on the obligation may find that it is unforeseeable (Wright, 2003). The ambiguity of such enquiries can only increase when the event in question is related to climate change; the increased frequency of climatic events such as storms and storm surges may make them generally foreseeable and less likely to fall within the scope of the doctrine. Similar suggestions have also been made by Kristl (2010) who found that the increasing knowledge surrounding serious climatic events

has created challenges for the 'Act of God' defence. Pall *et al*. (2011) was able to attribute the large-scale flooding experience throughout England and Wales in 2000 to global greenhouse gas emissions. The framework they used generated thousands of climate models under varying scenarios. Whilst this method was hindcasting it is plausible that methods similar to this can be used to predict weather scenarios under increasing pressures (Pall *et al*., 2011).

It is well documented throughout the scientific literature (Paerl and Huisman, 2009; Hallegraeff, 2010) that increased temperature of the oceans in relation to climate change will increase the rate of harmful algae blooms and result in the redistribution of harmful microbes such as those responsible for cholera (IPPC, 2014). A rise in harmful algae blooms could result in EU Member States failing to comply with the WFD and MSFD. Failure to comply with the MSFD could arise from a number of Descriptors (e.g. D5(human-induced eutrophication), D8 (contaminant concentration) and D2(non-indigenous species). A Member State may plead that this exogenic pressure (warming water; climate change) caused a sudden bloom of toxic algae which has resulted in the uptake of toxins by shellfish and the resultant effects on higher predators. However, the IPCC stated these specific events with a 'medium confidence' (5/10, >90%) and therefore it may have been reasonably foreseen within a holistic approach to management.

5.2 The criterion of Irresistibility

The element of irresistibility requires that a *force majeure* event and its consequences must be unavoidable; a 'reasonable' person should not be able to overcome the event and the circumstances following it (Nicholas, 1995). In a paper prepared for the ILC by the Secretariat, it is detailed that a major difference between *force majeure* and a 'fortuitous event' is that there should be no human force capable of withstanding the circumstances (International Law Commission, 1978). This interpretation of 'irresistibility' infers a very

strict approach to the element. It is suggested from this that *force majeure* will only be successfully claimed if there was no alternative to avoiding the circumstances. This criterion holds regard for the element of 'impossibility'; the principle has been held that the event must make performance impossible not merely more onerous (Nicholas, 1995). It has also been stated in contrast that there is room for proportionality, if applied, the party may be expected to exhaust their finances to avoid an event and complete the contract, but they are not expected to endanger their life (Nicholas, 1995). The ILC (2001) document that *force majeure* does not include circumstances in which performance of an obligation has become more difficult, for example due to a political or economic crisis, yet it does not state absolute impossibility.

Environmental risk management incorporates three distinct techniques; cost- benefit analysis, EIA and risk assessment (O'Riordan, 1979). It has been noted as unlikely that even with sophisticated studies that all relevant risks associated with an area or project will be identified (O'Riordan, 1979). However, due to the many data sets available and the economic interests relating to climate change it could be regarded as unlikely that it would not be accounted for. The scope for the element of irresistibility may be limited in cases where sophisticated modelling and management techniques have been used to address the issue of risk, when a risk is considered within a risk assessment it is assumed by that party (Maskow, 1992). Referring to contract law Maskow (1992) stated that risks can be assumed expressly through the contract, derived from the contracts nature or otherwise implied; following this approach to assumed risk a legislative text may only need refer to or imply the associated risks with climate change in order for them to be assumed.

In a case similar to that regarding Descriptor 7 (**Section 4.2.2)**, the legislation and supporting documents express the need for a Member State to conduct or analyse risk management principles such as an EIA when assessing Descriptor 7. This is due to its

focus on large scale developments affecting the hydrography of an area (European Commission, 2008; OSPAR Commission, 2013). Both the MSFD and its supporting documentation note climate change as a continuous pressure; although the MSFD does not expressly note that it requires monitoring, it is suggested within the supporting documentation (OSPAR Commission, 2012). A Member State that fails to encompass climate change (general pressure or its individual effects) within a risk assessment and consequently fails to achieve its targets under the Directive due to the effects of climate change, may have assumed the risk of such events occurring. A *force majeure* claim may still be successful dependent upon the steps had been taken to manage and mitigate the impact of an event before it occurs if adequately provided for within an assessment.

The element of 'irresistibility' has a level of opinion regarding its fulfilment, the courts require evidence as to whether the case could have been 'reasonably' avoided (ILC, 2001). Thus, creating the need for the understanding of what a 'reasonable' person should do in such circumstances. Legal scholars define the 'reasonable person' as the justified person; the 'reasonable person' is called upon in court when an issue regarding the actions of a party need to be judged objectively (Gardner, 2015). The standard 'reasonable' person is justified in their actions, intentions and beliefs; alternatively, there is a specialized standard of the 'reasonable' person (e.g. the 'reasonable' environmental manager) (Gardner, 2015). This specialized standard creates a more difficult case for anyone wishing to fulfil the element of irresistibility as the specialised standard now regulates the occasions in which the specialist standards (defined by the 'Trier-of-fact') are used and how they are applicable to given roles (Gardner, 2015). Within the case discussed previously (**Section 4.2.1**) the 'reasonable person' is likely to be a specialist standard due to the specialist nature of the case; it could be assumed that the specialist standard within this case would be that of the relevant Governmental Body/ Authority or Organisation completing

assessments and monitoring on the Member States behalf. The relevant Organisation/ Authority would be held to the particular customs and guidelines of that profession; On clarification, the actions or inactions of the Organisation/ Authority would be held accountable to what is expected as 'reasonable' responses or decisions within their defined field. In terms of Descriptor 2 (**Section 4.2.1**), the Authority or Organisation performing monitoring assessments and coordinating management for invasive species such as *Rhopilema nomadica* would be held accountable as a 'reasonable environmental consultancy'. The evidence required to determine the irresistibility of the event and its consequences are much higher and harder to achieve than that of the customary 'reasonable person' (Gardner, 2015).

Ocean acidification could affect a Member States ability to achieve multiple Descriptors (D1, D3, D4 and D6) of the MSFD, and it is undoubtedly an irresistible event due to continued emissions and limited mitigation methods (Doney *et al*., 2009). A Member State may claim *force majeure* in such instances where they are able to prove that an acidification event is prohibiting them from achieving GES. The MSFD requires that a Member State wishing to claim *force majeure* should first inform the European Commission of the event preventing fulfilment of the Directive and also that the Member State takes the appropriate ad-hoc measures to prevent further deterioration of the environment and mitigate any adverse impacts of the event (European Commission, 2008). This approach to instances where GES is unachievable is beneficial where there are practical approaches to preventing further damage to the environment, an issue such as acidification has no practical measures. Acidification is caused by the uptake of atmospheric carbon dioxide by the ocean, emissions such as these are regulated through the combination of national and international regimes and frameworks; leaving little management to be conducted on a local scale (Saul *et al*., 2016). Other mitigation options

include the addition of alkaline minerals into the ocean, this is only economically feasible on a small scale and the wider effects of the method are unknown (Harvey, 2008). These combined factors make this option for mitigation a risk as it may further deteriorate the environment. In circumstances such as this it is assumed that a Member State must provide a substantial body of evidence for how acidification is preventing the achievement of the various Descriptors. The evidence requirements in circumstances such as these will be onerous, however, it is unclear what a court would deem as reasonable (specialised standard) as there are very limited measures a Member State could take without exhausting their finances.

5.3 The criterion of externality/control

The requirement of externality within a *force majeure* case creates two difficult questions. the first relates to the meaning of 'control' when discussing complex systems such as these; the second concerns the nature of climate change as a phenomenon that may be deemed within human control (Saul *et al*., 2016). The viability of a *force majeure* case may potentially be determined by the debate regarding the cause of climate change, anthropogenic factors or natural variability. Any event constituting *force majeure* must not be within 'reasonable' control of the Member State wishing to claim *force majeure* for the non-performance of legislative objectives (Wright, 2003). The ILC (2001) state within Article 23 that a Member State may not rely upon *force majeure* if it was owing, alone or in combination with other factors to the State seeking to invoke it. The element of externality is linked with the concept of control; the element of control in this context is understood to be a systemic mechanism, it is reinforced through the requirement within international law to exercise due diligence (Saul *et al*., 2016). A Member State that is exercising due diligence takes actions to prevent or minimise significant damage that is foreseeable in nature.

Following on from the *Stockholm Declaration (1972)* the *1992, Rio Declaration* contains the rule of 'no harm' within Principle 2.This states that Member States are within their rights to exploit their resources in line with their own regulations, but also have a responsibility to ensure that such activities do not cause harm or damage to areas outside of their jurisdiction (United Nations, 1992). It has been postulated by Tol and Verheyen (2004) that climate change may fall within this rule of no harm. The rule of no harm forms the basis of many international environmental laws; including the 1992 United Nations Framework Convention on Climate Change (UNFCCC). Member States are legal actors; however, they can only perform tasks through human agents, governmental or private and that States have legal responsibility or control is undisputed as a matter of international law although the limits to this are uncertain (Tol and Verheyen, 2004). Under EU legislation a Member State is responsible for implementing and fulfilling Directives; they must also exercise due diligence over the actions of citizens and industries within their jurisdiction and a failure to do so incurs infraction proceedings for the Member State who must then seek remedial action (Boyes and Elliott, 2014).

The boundaries and elements of control are not clearly defined creating difficulty when determining what may be attributable to a Member State (Tol and Verheyen, 2004). The difficultly lies in knowing to what extent the acts of private persons may be attributed to the Nation State. The Rio Declaration (1992) fails to distinguish between the acts of the State and those of private persons thus creating arguments for and against State Responsibility (Tol and Verheyen, 2004). The ILC Articles further indicate that the acts of private persons cannot always be attributed to the State and within Chapter II it is noted that this approach is avoided and only actions taken by organs of government or those acting under direction may be attributed to the State (ILC, 2001). This infers that not all environmental actions and pressures as a consequence of human interference may be

considered under State responsibility; the introduction of target driven conventions such as the Kyoto Protocol (1997), and Paris Agreement (2016) and the similarly target based European Directives (MSFD, 2008 and the WFD, 2000) may alter the liability. These legislations either account for all emissions (Kyoto, 1997; Paris Agreement, 2016) or all pressures within a given water body (MSFD, 2008; WFD, 2000); although the Member State is not responsible for the acts of private persons it is now deemed responsible for managing such pressures. Furthermore, most industrial activities are licensed under domestic law; here the Member State incurs the liability in cases where it has failed to implement a system of control (Tol and Verheyen, 2004).

In the hypothetical case regarding Descriptor 7 (**Figure 4),** it is unclear as to whether the element of externality and control could be met. It appears that this case and any of a similar nature would depend upon the specific circumstances and consequences of the event. Increasing RSLR could not be plausibly attributed to one State; a causal link should be established between the activity and the damage (Voigt, 2008). Whilst it is plausible to attribute the occurring damage to RSLR, it is unlikely that RSLR could be attributed to just one Member State. Not only is there high natural variability within the system and natural forces also contributing (Comiso *et al*., 2008; Nicholls and Cazenave, 2010), but the anthropogenic forces are due to multiple States where single emitters could not be identified to the extent of their effect (Voigt, 2008). Nevertheless, under various climate change legislations (UNFCCC, Kyoto & COP21) a Member State must control their emissions to remain within certain targets and therefore must have some regard to monitoring. Future scenarios may have advancements that are capable of extrapolating sufficient data to create the required causal link and provide the burden of proof in such a case.

5.4 The burden of proof and State responsibility

The burden of proof in contract law varies from that in which a Member State may stand trial; within contract law the party receiving goods must prove that the contract has been breached (Nicholas, 1995). In some circumstances, the plaintiff also must prove that there was a failure to show due care with regard to the contract, it then falls to the defendant to prove a *force majeure* case (Nicholas, 1995). Similarly, in international and community law, a Member State wishing to use the exception *force majeure* must provide the burden of proof (Swalding, 1995). The United Nations (2012) note that in many instances only the Member State in question is aware of the events that lead to a breach of obligation. Climate change will undoubtedly affect all oceans, global effects are generalised by the IPCC however regional and local scale assessments are required to determine the effects at such a specific scale (IPCC, 2014).

As previously introduced within **section 3.2** the ILC Articles on state responsibility provide a definition of *force majeure* within the scope of an internationally wrongful act, the Articles themselves seek to formulate the basic rules of international law regarding the responsibility of the state for any internationally wrongful acts (ILC, 2001). Although the notion of State responsibility is a general principle within international law, it is not frequently relied upon by States wishing to make claims of international liability (Bell *et al*., 2013). An example of such is the Chernobyl accident, in which there was significant harm caused to many Northern European countries, but due to political restraints and legal uncertainty no claims where brought forward (Voigt, 2008). In claim scenarios involving climate change the situation is exacerbated due to the uneven distribution of impacts between states that have contributed; this scenario is common between the varying impacts of developing and undeveloped countries in carbon emissions (Voigt, 2008). Developing

countries undoubtedly emit the most emissions yet undeveloped countries emit the least and have limited capacity to adapt to the varied effects of climate change.

The issue of state responsibility within the context of a *force majeure* case becomes difficult due to the function of a Member State as a legal actor. As previously noted within **section 5.3**, there are uncertainties surrounding what can be held attributable to a Member State, basic principles such as the 'no harm rule' can be found throughout human culture (Nanda and Pring, 2013). The Christian 'Golden Rule' (do to others what you want them to do to you), and the general principle of 'good neighbourliness', although the 'no-harm rule' is a specific manifestation aimed at setting limits to States sovereignty (Nanda and Pring, 2013). Under the principle, a Nation State has its sovereign right to exploit their own resources in accordance with their own regulations but also have a responsibility to ensure that such activities to do not cause harm to an area beyond their jurisdiction (Nanda and Pring, 2013). The renowned case of the Trail Smelter Arbitration (1941) became the first ruling on the principle providing the concluding remarks in **Table 6**. The early statement implicitly rejects the existence of the sovereign 'right' to engage/allow any activities that may create harmful transboundary effects (United Nations, 2006). It further denotes that this is applicable to both the action and inaction of the relevant government, making its application viable for the actions of private actors and creates a duty not only to the victim state but properties and persons therein (United Nations, 2006).

Table 6. The definition of the 'no harm' rule as defined in the 1938 Trail Smelter Arbitration (United Nations, 2006).

Trail Smelter Arbitration (US V Canada)
"No State has the right to use or permit the use of its territory in such a manner as to cause injury . . . in or to the territory of another or the properties or persons therein. When the case is of serious consequence and the injury established by clear and convincing evidence"

As stated in the Trail Smelter Arbitration (1941) the case must be of 'serious consequence' for the 'no harm' rule to apply; in contrast to customary international law the rule as provided within the Rio Declaration is an absolute and does not specify that the event must be of 'serious consequence' (Nanda and Pring, 2013). Nanda and Pring, (2013) outline many of the unanswered questions regarding the principle in relation to real cases such as: what level of harm is required? Is there a standard of care that the offending Member State must meet to be absolved (due diligence/ reasonable care)? These uncertainties will create difficulties for Member States when claiming *force majeure* in circumstances where another Member State has caused the failure of obligations, its incorporation into the *Nuclear Weapons Advisory Opinion, (1996)* infers that it applies to all elements of Nation State Interactions.

In 1995, O'Riordan and Jordan stated the precautionary principle as a poorly defined and unstable concept that challenges the status quo of political power; they described it as a means of "challenging the authority of science, the hegemony of cost-benefit analysis and the powerlessness of environmental victims". The modern principle underpins environmental law within the European Union, yet, it is noted that decision on whether to apply the precautionary principle is still poorly defined and ambiguities remaining surrounding the level of uncertainty and significance of hazard needed (O'Riordan and Jordan, 1995). A 'weak' application of the precautionary principle entails a higher demand for evidence of a causal link, whereas, a stronger application infers a shift within the burden of proof (O'Riordan and Jordan, 1995).

A shift in the burden of proof places the responsibility upon the proponent of the activity to prove it is 'safe', this is generally performed through EIA analyses such as those required under Descriptor 7 of the MSFD. In a *force majeure* case, it is highly likely that a 'weak' application of the precautionary principle has been applied apart from such cases

involving, extreme disasters. If the precautionary principle is applied to its fullest extent there should be minimal claims due to the application of maximin, maximin is the application of the optimal response to the worst-case model therefore minimising threat, but incurring a higher cost (Iverson and Perrings, 2012). The extent of concern when using the maximin model is centred on the span of uncertainty in the model, a small model equals a small uncertainty, which is generally true in local and regional issues such as point source pollution and the regulation of specific activities (Elliott *et al*., 2014).

Climate change creates challenges for determining the burden of proof in that it is an exogenic unmanaged pressure; the effects of such pressures are hard to distinguish from 'background noise' (Elliott *et al*., 2015). 'Background noise' in this context refers to the continuance of natural variation and those pressures that are endogenic to an area and are under management (Elliott *et al*., 2015). Detecting the specific effects of climate change upon the natural environment can become difficult when various other pressures may also contribute to a decline in ecosystem health (Elliott *et al*., 2014). Target based legislations such as the MSFD and WFD use Descriptors and Indicators to determine the status of an area; this requires baselines to be established determining the predefined ecological state of the water body (Borja et al., 2013). This initial assessment provides insight as to whether the water body is in the condition expected and if it is likely to change due to the prevailing anthropogenic pressures (Borja et al., 2013). It is argued here that for a baseline to be effective in determining GES it must also account for the cascade effects of climate change and its contribution to changes in the natural environment. Without such information, a Member State may be unable to provide clear and distinct evidence to support a *force majeure* case under the directive.

Within the MSFD Member States must create a Programme of Measures in accordance with Article 13, and the programme must contain the measures that need implementing to

achieve or maintain GES in accordance with sustainable development. These management measures must be kept up to date, the Directive calls for updated reports for every marine region or sub region concerned; every six years the Member State must review and update their reports on four key elements to the legislation; (a) the determination of GES, (b) environmental targets, (c) monitoring programmes, (d) programme of measures. Interim reports must also be submitted within a three-year period from the publication of each programme of measures. Monitoring efforts required by this Directive and the exercise of due diligence by a Member State regarding transboundary damage, coherent regional Frameworks and sustainable development should ensure that any changes to the water body not compatible with on-going pressures within that area are at the least further assessed to ascertain their nature; are the changes natural variability or could they be linked to climate change. The chapeau to the MSFD only addresses climate change twice (para 34+ 42). These paragraphs go as far as to note climate change as a pressure that may cause the determination of GES to alter and that Community level action will be required within the Arctic, they do not note it as a pressure that requires monitoring (European Commission, 2008). It could be understood from the language used within the text; that as the Directive notes the need for flexibility within the determination of GES due to such pressures, it would be pertinent for a Member State acting with due diligence to monitor climate change and therefore adjust its Programme of Measures accordingly (Saul *et al*., 2016). Descriptor 11 relates to the introduction of 'energy' into the environment; it is widely accepted that this Descriptor is emphasising noise and vibration 'energy' rather than energy associated with climate change (Roberts *et al*., 2015).

The MSFD definition of 'GES' **(Table 7)** stipulates that the status of marine waters should be clean, healthy and productive; it is noted that this implies that both ecosystem services and societal benefits are to be delivered even though they are not expressed within the

Descriptors or indicators (Atkins et al., 2011; Borja et al., 2013). The definition provided and the inclusion of services that are not directly expressed within the text may lead a Member State to the conclusion that climate change is a pressure needing to be addressed in compliance with the Directive. Climate change may ultimately affect a Member States ability to provide the ecosystem services required under the definition of GES. The 11 Descriptors listed within Annex I of the Directive can be used to determine the environmental status of an area, yet, none of these Descriptors defines climate change as a prevailing condition to be monitored (European Commission, 2008).

Table 7. The definition of 'good environmental status' as provided by the MSFD, (European Commission, 2008)

Term	**Definition provided by the MSFD**
GES	"the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are intrinsically clean, healthy and productive, and the use of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations" (European Commission, 2008)

The establishment of effective monitoring programmes becomes essential for target-based Directives such as the MSFD; it provides accurate assessments of current conditions and in-turn suitable management measures that can address arising issues and the overall objectives of the Directive (Elliott *et al*., 2015). There are many well-established monitoring programmes within the Europe (Patrício *et al*., 2016); yet there are concerns regarding the ability of such frameworks to adapt both spatially and temporally to detect alterations within the natural environment due to climate change (Elliott *et al*., 2015). Current monitoring systems are designed to detect and address major changes resulting from single or multiple pressures; the detection of the effects of climate change may work cumulatively with such pressures making the 'background to signal' ratio hard to

determine (Kröncke and Reiss, 2010). Patricio *et al*., (2014) revealed that although European monitoring programmes address the relevant biological Descriptors, there are numerous factors that may compromise the ability to detect variations due to climate change such as: sampling intensity, frequency, geographical scale and the standardisation of sampling and analysis techniques. The impacts of climate change upon all stages of the MSFD will have significant effects upon the ability to provide a scientifically sound burden of proof in a case where climate change causes the failure to achieve a target. This is likely to be the case within the Suez Canal example provided (**section 4.2.1**).

As suggested by Borja *et al*., (2013) a Quasi-legal approach, if the expert says its good then its good, may be an alternative method in providing the burden of proof where data cannot be provided. Expert judgement plays a large role within the fields of science and engineering and is increasingly relied upon in the absence of data (Cooke and Goossens, 2004). There are many flaws with the use of expert judgement within the field of marine management as each decision becomes based upon human perceptions of the area, this may vary between generations with each generation having a different concept of what is 'good' and ultimately lead to a decline in the areas quality (Mee *et al*., 2008). This approach is unlikely to hold within the court without sufficient evidence to support the case. In terms of the MSFD, much of the data required to support a case should be assessed against a predetermined baseline 'the good', this again leads back to an element of judgement (Mee *et al*., 2008). It could be argued that in cases such as those relating to highly variable systems which invoke high levels of uncertainty within the data, a court may accept 'best scientific evidence' to excuse performance in a similar manner to UNCLOS accepting 'best scientific evidence' as an indicator for conservation measures (Garcia, 1994).

It is unlikely however that this would be the case. Australia V Japan [2014] regarding the use of whales in the scientific programme JARPA II, is a well-documented version of such an instance. There are multiple instances within the case which refer to the burden of proof. The first regards the calculation of sampling sizes by Japan in relation to achieving the programme objectives; Judge Xue stated that Japan failed to clearly define how lethal sampling was calculated to the satisfaction of the court, going further to state that the technical complexity of the issue did not release the Party from the burden of proof (International Court of Justice, 2014). The second instance is in which Judge Xue claimed that in her opinion, the question of whether activities undertaken by JARPA II are in relation to scientific research is a matter of fact not law, in accordance with her opinion and the established principle of 'the burden of proof laying on the plaintiff', the burden of proof was placed upon Australia to prove that JARPA II does not involve scientific research (International Court of Justice, 2014).

There is still no definitive answer to whether the climate change is strictly anthropogenic or natural forces are also contributing to it. It is however clear from the IPCC reports that anthropogenic pressures are causing increased radiative forcing (IPCC, 2014). The legal challenge regarding the anthropogenic causes of climate change is that they are a matter of accumulation, if one State were to reduce their carbon emissions it is unlikely the risk would be lessened, only a cumulative reduction could cause a decrease in risk (Voigt, 2008). This creates challenges for any Member State wishing to claim *force majeure* in circumstances where climate change has prevented the achievement of environmental targets due to the contribution of the State to the CO^2 emissions (Voigt, 2008).

Voigt (2008) summarised that international law may be ill equipped to tackle such a complex situation, further noting that the vague primary rules, multiplicity of actors, varying forms of damage and non-linear causation all create significant challenges for the

traditional system. A strict court ruling on *force majeure* could find that the circumstances precluding *force majeure* where not external to the party due to their role in CO^2 emissions (Voigt, 2008). The ILC Articles stipulate that the defence to wrongfulness does not apply if the situation of *force majeure* is due either alone or in combination with the conduct of the Member State invoking. In the sense of this research, that is the release of CO^2 emissions into the atmosphere whilst holding the knowledge that it increases radiative forcing and invokes warming. Many international legislations and particularly European Directives now include self-reporting by Member States upon the measures they have taken to implement obligations and achieve targets, could this be monitoring of due care and diligence?

There are various assessment methods such as biophysical models, integrated models and empirical analogues that all aim to identify, monitor and assess the impacts of climate change (IPCC, 1994). There is however a high- level of uncertainty associated with many of these methods; there is uncertainty regarding the estimate emissions used within such models and regarding the variability of observational data (IPCC, 1994; Easterling *et al*., 2000). A Member State acting with due diligence regarding climate change and aiming to prevent significant harm is required to keep abreast of technical advancements and use the best available techniques (BAT) within the field (Voigt, 2008). A Member State wishing to make a claim cannot simply argue that it did not know certain facts regarding the event in question if it could have or should have been aware (Voigt, 2008). This encompasses the best available techniques in all fields relating to climate change; by staying up-to date and using current and accurate modelling a Member State stays within the precautionary principle and compliance of all relevant legislations, whilst avoiding claims of negligence if failing to achieve objectives. Member States failing to keep abreast with the scientific developments within the detection and mitigation fields may find that they cannot find a

causal link to justify their claim and risk converting strict liability into absolute liability through negligence; if the state fails to foresee or mitigate an event due to not using the best available techniques at its disposal, it is failing to act with due diligence (Voigt, 2008).

The management and modelling of climate change generally invokes large data sets and models, increasing the span of model uncertainty (Morgan and Keith, 1995). The extent of resources that could get lost in taking a maximum approach to management could be extensive and it is therefore typically used as an initial criterion that policy makers move towards as they gain confidence in the models, this decreases the potential to waste resources through learning and adaption (Iverson and Perrings, 2012). The issue of proportionality is often raised regarding *force majeure* cases and state responsibility. In terms of contract law, proportionality is normally defined as being required to exhaust one's finances to complete a contract, but one is not usually required to endanger their life (Lombardi, 1997). In international and community law, it is generally inferred that the measures a Member State must take should be proportionate to its national Circumstances and the risk involved (Lombardi, 1997). In determining whether proportionate measures were taken by the State, all previously mentioned requirements (foreseeability, irresistibility, externality/control and the burden of proof) would have to be met.

5.5 Critique of research

The main aim within the research presented has been to address the validity of future *force majeure* claims by Member States owing to climate change effecting their ability to achieve obligations. The large scope of the topic required it to be broken down into individual objectives (**1.4.1**), each objective directly related to a specific concern of the research and aimed to develop an overall picture of the research area. All of the research objectives have been achieved but with varying degrees of confidence in the findings.

Objective 1 was to complete an extensive literature review into all relevant areas of the research, particular focus was paid to *force majeure* and climate change, undoubtedly the main focus of the research. *Force majeure* is a concept common to most legal systems but the focus here was upon its role in environmental legislation. There is a plethora of research regarding *force majeure*, much of this research focuses upon its predominant role within the law of contracts. This posed many challenges for the research as whilst the use of primary literature relating to *force majeure* within the fields of contract and domestic law can provide general context and insight into its application, direct comparisons cannot be drawn across the legal frameworks as the concept is not identical within in all branches of law.

Primary literature by authors such as Wright (2003) and Nicholas (1995) are commonly cited throughout the research, however their primary focus is contract law not legislative. There is limited research surrounding *force majeure* within EU or international legislation, this created many challenges. Within all literature cited, only five relate directly to *force majeure* within international or European law; this provided a limited information base for the topic allowing for direct comparisons and variances to be drawn. The field of climate change posed very few challenges in the way of literature review, the IPCC corroborates the findings of key researchers within the field and links them with likelihoods and probabilities. This also provided a solid basis for hypothetical analysis also. There is an extensive amount of literature surrounding climate change (**section 1.2.7**), however, until recently the majority of publications focused upon the effects of climate change upon the individual species and not the whole system. When addressing issues such as this a holistic approach is required to address the whole system.

Objectives 2, 3 and 4 focused primarily upon the synthesis and analysis of findings; objective 2 required the creation of a 'table of law' as part of a macro analysis. The

theoretical basis behind this table is to provide an overview of the system or as described by Enright, (2011) the 'bigger picture'. In order to define the role of *force majeure* in marine environmental law the extent of its use must be examined. The table collates the varying jurisdictions and the exact wording of the text for analysis. There were limitations to this as manual searches had to be conducted, reading each legislation for possible terms and citing's relating to *force majeure*, although thorough it is possible that some may be missed. The method used for the micro- analysis is a variation upon those stated by Enright (2011). The premise for Enright's (2011) methods are that the elements of a policy apply to facts leading to consequences; within the context of the MSFD there are multiple elements laid out in both the Directive itself and its Annexes of Descriptors and indicators. By applying these methods, a simplified view of the legal elements that need to be met by facts, the biological consequences which will provide those facts and the consequences of the *force majeure* claim. Whilst this method provides a significantly clearer view of the claim is does not provide for any of the varying difficulties associated with determining the elements required by the policy and establishing sufficient evidence to support the claim/ defence. These have been analysed separately following the diagrams with corresponding literature providing two hypothetical studies (objective 3) and an in-depth assessment of the three criteria of *force majeure* within a climate change scenario (objective 4).

Objective 5 provided that a significant search of the case law should be conducted to find any pre-existing court verdicts or precedents set. The cases found where used to support observations and assumptions within the analysis of the hypothetical scenarios and discussing the criterion of *force majeure*. As previously noted there is significant research on the likelihood climate change is affecting the ability to achieve legislative objectives, nevertheless, there is limited research in both the biological and legal field of what will

happen when these scenarios do occur. In this instance a legal scholar would turn to case law to assess the pre-existing court cases and opinions and generate an opinion based on such findings. This was intended within this research, however there appears to be few documented cases relating to *force majeure* within the field of environmental law. Cases that have been cited relate mainly to contract law and therefore run the risk of being out of context within this field. Opinions of the Court on *force majeure* and documents prepared by the ILC and United Nations have been used instead to provide alternative insights as to an official verdict in future claims. Climate change liability also posed many questions that require clarification though courts and officials before any clear answers can be provided. This in turn means that although the research can analyse possible scenarios and previous court and official opinions, it cannot provide a definitive answer to the research question due to the lack of clarity surrounding the topic itself. Overall the research has achieved its objectives and does provide insight and clarity of concepts in some areas, but further research is required to achieve a full comprehension of the field.

Chapter 6 – Conclusions and Recommendation for future work

6.1 Conclusions

The aim of this research was to consider the importance and prevalence of *force majeure* within marine environmental law and address the issue of whether a Member State, would in years to come, be able to claim *force majeure* due to climate change. The research also expands upon the published article (Saul *et al.*, 2016), (**Appendix III**), through the adaption and use of Enright's (2011) methods to expand upon concepts raised in the research article. This was undertaken using an interdisciplinary approach; conducting a legal analysis with an environmental approach. Whilst this research has indeed considered the importance of *force majeure* within this legal field and has also addressed the issue of future claims, it falls short of providing a definitive answer for Member States and environmental managers. For an answer to be provided on whether claims will be successful in the future it is argued here that precedents must be set by relevant Courts. There are many conclusions however, that can be drawn from the research.

Whilst not yet legally tested, as a pressure climate change may not constitute *force majeure.* One aspect of this is that the Member State itself may appeal to the court that climate change cannot form a 'pressure' under the MSFD as it is not defined within Annex III of the MSFD, following this the Member State may also argue that climate change cannot be prevented and only the secondary and tertiary effects are under their 'control'. With only the individual and cascade effects of climate change under the Member States control only the mitigation and remediation measures under Annex VI of the MSFD could be used to limit the effects of climate change given that it is already limiting their ability to achieve GES. The second aspect concerns individual and cascade effects of climate change; improved technologies make the various effects of climate change on the environment foreseeable therefore limiting a Member States ability to meet the criterion

required for a claim. Supporting evidence can be seen within the work of Kristl (2010) and within the micro analysis (**section 4.2**). However, some of the individual or cascade effects and events of climate change may still constitute a claim, the event must still meet the three criterion (foreseeability, externality and irresistibility). Events capable of still constituting a claim are likely to be those that are rare or have insufficient data sets to predict the effects of the event on the environment. The micro analysis (**section 4.2**) supports such findings although due to its hypothetical nature it is not a definitive conclusion, for an answer to be provided a case would need to be taken before the court setting a direct precedent.

In most cases the Member State must provide the burden of proof in *force majeure* case, it is likely that the courts judgement may be heavily dependent upon the evidence provided by the Member State and their 'specialist standard' (International Law Commission, 1978; International Court of Justice, 2014). The evidence provided to the court must be substantial, as shown within Australia V Japan [2014], Judge Xue stated that Japan failed to clearly define their evidence to the court, the complexity of the evidence required did not release them from the burden. This requires Member States to adopt a holistic approach to management to ensure there is sufficient data to support a case; placing an increased reliance on the key tools of management (risk assessment, cost benefit analysis, monitoring networks, prediction and forecasting models). This conclusion is founded on previous cases (International Court of Justice, 2014) but also the bounds and limitations of the system (**Chapter 2)**. A failure to provide a clear and concise burden of proof can lead to the dismissal of the case (International Court of Justice, 2014).

There is also a burden of proof placed upon the European Commission to provide evidence suggesting that GES was not achieved due to the negligence of the Member State and not *force majeure.* Again, Australia V Japan [2014] provides substantial evidence of how a

Court may exercise these principles, Judge Xue noted that based upon established 'burden of proof' principles Australia had the burden to provide evidence suggesting that JARPA II did not involve scientific research. If this was to be implemented in an environmental *force majeure* case the European Commission would have to provide evidence suggesting negligence on behalf of the Member State, this could encompass a lack of compliance with the Directive.

The final conclusion that may be drawn from this research is that *force majeure* may become narrower in application to claims within environmental law. Climate change will continue to occur (IPCC, 2014) and will continue to infer challenges for managing water bodies due to the plethora of changes and pressures it places on the ecosystem (Elliott *et al*., 2015). An increased frequency of irresistible events could lead to the list of events that currently qualify as *force majeure* becoming shorter due to their increased foreseeability. Events such as those assessed within **section 4.2** are likely to occur at heightened rates leading to multiple Member States making claims of *force majeure* under similar circumstances. The more that *force majeure* is claimed the more direct precedents can be set by the courts regarding the handling of claims and the verdicts based on the evidence provided, this in turn may lead to a narrower application of the doctrine.

Clarification is needed from the relevant authorities (European Union, ILC) regarding the use of *force majeure* in climate change scenarios. There is already a multitude of literature assessing the liability for climate change damages and this has direct ramifications upon *force majeure* claims (Tol and Verheyen, 2004; Voigt, 2008; Nanda and Pring, 2013). If a Member State can be held accountable for climate change damages can it then rely on a claim of *force majeure* to excuse non-performance? This research has highlighted the need for increased attention within this field as climate change continues to alter ecosystems. The current hypothesis remains unanswered as there is no prior precedent and a lack of

court judgement surrounding the topic to provide a consensus on the subject from within the legal discipline and a lack of scientific consensus surrounding climate change.

6.2 Recommendations for future work

The importance of this research within marine environmental management is paramount. If a Member State is unable to claim *force majeure* in scenarios that it cannot reasonably foresee or overcome, the relevant governing bodies and authorities responsible for managing the environment should be aware that there is no 'scape goat' for failing to achieve legislative objectives and targets. With such prior knowledge they may be able to adapt strategies or mitigate the effects of the events and minimise impacts upon factors that may invoke a claim, as stated previously this will not be possible in all circumstances. Whilst this research provides answers to some questions posed, it also provides many more questions which may require future attention.

One factor that appears to have a clear importance for defining a case is the evidence. This research has highlighted the importance of a strong evidence base for determining the claim, yet it does not attempt to quantify or presume to what extent it is required. Future work could attempt to ascertain how much evidence would be required to support a case and if this is possible with the current monitoring and analysis of data. This would build upon this research in providing Member States with a clear indicator of what quantity and quality of evidence may be required if a claim was to be made. It could also be suggested that the role of forecasting and prediction requires further attention within this field to further define the role of foreseeability; as mentioned within the conclusive chapter, improved technologies and forecasting methods may make the effects of climate change foreseeable, therefore limiting claims.

The major aspect of this research that will require future attention is the need for guidance and precedent to be set by the relevant authorities. Whilst this work focused upon mainly

a European viewpoint, it also included international and national legislations and concepts. Each level of jurisdiction appears to have a varying construct of *force majeure* with overlapping similarities, yet, due to the variability of the natural system it is challenging to apply. Future work could aim to collaborate with relevant authorities within each level in proposing a framework approach to *force majeure* within the environmental field. This could provide the required precedent on when a claim can be made and how a court will examine it, potentially providing the desired clarity within the area.

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Appendices

Appendix I

Table 3. Relevant legislation to the management of the marine environment accounting all instances of *force majeure* (written or implied).

The table shows the level of jurisdiction, the Statute and the specific wording of the text shown in context

Jurisdiction	Statute	Wording in legislation
International	**UNCLOS III**	Article 18 – meaning of passage 2. Passage shall be continuous and expeditious. However, passage includes stopping and anchoring, but only in so far as the same are incidental to ordinary navigation or are rendered necessary by *force majeure* or distress or for the purpose of rendering assistance to persons, ships or aircraft in danger or distress. Article 39: Duties of ships and aircraft during transit passage 1.Ships and aircraft, while exercising the right of transit passage, shall: (c) refrain from any activities other than those incident to their normal modes of continuous and expeditious transit unless rendered necessary by *force majeure* or by distress;
	MARPOL 73/78	Regulation 11 a. The discharge into the sea of oil and oily mixture necessary for the purpose of securing the safety of a ship or saving life at sea; or b. The discharge into the sea of oil or oily mixture resulting from damage to a ship or its equipment

		(I)Provided that all reasonable precautions have been taken after the occurrence of the damage or discovery of the discharge for the purpose of preventing or minimizing the discharge; and (II)Except if the owner or the master acted either with intent to cause damage, or recklessly and with knowledge that damage would probably result
	Basel Convention: Protocol on liability and compensation for damage resulting from transboundary movements of hazardous wastes and their disposal	Article 4: Strict liability 5. No liability in accordance with this Article shall attach to the person referred to in paragraphs 1 and 2 of this Article, if that person proves that the damage was: (a) The result of an act of armed conflict, hostilities, civil war or insurrection; (b) The result of a natural phenomenon of exceptional, inevitable, unforeseeable and irresistible character; (c) Wholly the result of compliance with a compulsory measure of a public authority of the State where the damage occurred; or (d) Wholly the result of the wrongful intentional conduct of a third party, including the person who suffered the damage.
	London Convention The 1996 Protocol to The prevention of marine pollution by dumping of waste and other	Article 8: Exceptions 1. The provisions of articles 4.1 and 5 shall not apply when it is necessary to secure the safety of human life or of vessels, aircraft, platforms or other man-made structures at sea in cases of *force majeure* caused by stress of weather, or in any case which constitutes a danger to human life or a real threat to vessels, aircraft, platforms or other

	matter,1972	man-made structures at sea, if dumping or incineration at sea appears to be the only way of averting the threat and if there is every probability that the damage consequent upon such dumping or incineration at sea will be less than would otherwise occur. Such dumping or incineration at sea shall not be conducted so as to minimise the likelihood of damage to human or marine life and shall be reported forthwith to the Organization.
	Civil Liability Convention, 1969 **ILC Articles on the Responsibility of States for International Wrongful Acts 2001**	Article III(2): 'No liability for pollution damage shall attach to the owner if he proves that the damage: (a) resulted from an act of war, hostilities, civil war, insurrection or a natural phenomenon of an exceptional, inevitable and irresistible character…' Article 23 Force majeure: 1. The wrongfulness of an act of a State not in conformity with an international obligation of that State is precluded if the act is due to force majeure that is the occurrence of an irresistible force or of an unforeseen event, beyond the control of the State, making it materially impossible in the circumstances to perform the obligation. 2. Paragraph 1 does not apply if: (a) the situation of force majeure is due, either alone or in combination with other factors, to the conduct of the State invoking it; or (b) the State has assumed the risk of that situation occurring.
	Convention on the Non-navigational Uses of Watercourses, 1997	Article 27 Prevention and mitigation of harmful conditions

		Watercourse States shall, individually and, where appropriate, jointly, take all appropriate measures to prevent or mitigate conditions related to an international watercourse that may be harmful to other watercourse States, whether resulting from natural causes or human conduct, such as flood or ice conditions, water-borne diseases, siltation, erosion, salt-water intrusion, drought or desertification Emergency situations 1. For the purposes of this article, "emergency" means a situation that causes, or poses an imminent threat of causing, serious harm to watercourse States or other States and that results suddenly from natural causes, such as floods, the breaking up of ice, landslides or earthquakes, or from human conduct, such as industrial accidents. 2. A watercourse State shall, without delay and by the most expeditious means available, notify other potentially affected States and competent international organizations of any emergency originating within its territory. 3. A watercourse State within whose territory an emergency originates shall, in cooperation with potentially affected States and, where appropriate, competent international organizations, immediately take all practicable measures necessitated by the circumstances to prevent, mitigate and eliminate harmful effects of the emergency. 4. When necessary, watercourse States shall jointly develop contingency plans for responding to emergencies, in cooperation, where appropriate, with other potentially affected States and competent international organizations.
EU	**Water Framework Directive**	(32) There may be grounds for exemptions from the requirement to prevent further deterioration or to achieve good status under specific conditions, if the failure is the result of unforeseen or exceptional

	2000/60/EC	circumstances, in particular floods and droughts, or, for reasons of overriding public interest, of new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, provided that all practicable steps are taken to mitigate the adverse impact on the status of the body of water. Article 4 6. Temporary deterioration in the status of bodies of water shall not be in breach of the requirements of this Directive if this is the result of circumstances of natural cause or *force majeure* which are exceptional or could not reasonably have been foreseen, in particular extreme floods and prolonged droughts, or the result of circumstances due to accidents which could not reasonably have been foreseen, when all of the following conditions have been met:
	Bathing Waters Directive 2006/7/EC	Article 3 7. During abnormal situations, the monitoring calendar referred to in paragraph 4 may be suspended. It shall be resumed as soon as possible after the end of the abnormal situation. New samples shall be taken as soon as possible after the end of the abnormal situation to replace samples that are missing due to the abnormal situation. Article 7 Management measures in exceptional circumstances Member States shall ensure that timely and adequate management measures are taken when they are aware of unexpected situations that have, or could reasonably be expected to have, an adverse impact on bathing water quality and on bathers' health. Such measures shall include information to the public and, if necessary, a temporary bathing prohibition

	Shellfish Directive 79/923/EEC Repealed by Directive 2000/60/EC	(8) Certain natural circumstances are beyond the control of the Member States and it is therefore necessary to provide for the possibility of derogating from this Directive in certain cases. <u>Article 11</u> The Member States may derogate from this Directive in the event of exceptional weather or geographical conditions.
	Habitats Directive 92/43/EEC	<u>Article 16</u> Provided that there is no satisfactory alternative and the derogation is not detrimental to the maintenance of the populations of the species concerned at a favourable conservation status in their natural range, Member States may derogate from the provisions of Articles 12, 13, 14 and 15 (a) and (b): (a) in the interest of protecting wild fauna and flora and conserving natural habitats; (b) to prevent serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property; (c) in the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment; (d) for the purpose of research and education, of repopulating and re-introducing these species and for the breedings operations necessary for these purposes, including the artificial propagation of plants; (e) to allow, under strictly supervised conditions, on a selective basis and to a limited extent, the taking or keeping of certain specimens of the species listed in Annex IV in limited numbers specified by the competent national authorities.
	Environmental liability	<u>Article 4</u>

	2004/35/CE	(20) An operator should not be required to bear the costs of preventive or remedial actions taken pursuant to this Directive in situations where the damage in question or imminent threat thereof is the result of certain events beyond the operator's control. (1) This Directive shall not cover environmental damage, or an imminent threat of such damage caused by: (a) an act of armed conflict, hostilities, civil war or insurrection; (b) a natural phenomenon of exceptional, inevitable and irresistible character.
	MSFD 2008/56/EC	Article 14 1. A Member State may identify instances within its marine water where, for any reasons listed under points (a) to (d), the environmental targets or good environmental status cannot be achieved in every aspect through measures taken by that member State, or, for reasons referred to under point (e), they cannot be achieved within the time schedule concerned: (a) action or inaction for which the Member State concerned is not responsible; (b) natural causes; (c) *force majeure* modifications or alterations to the physical characteristics of marine waters brought about by actions taken for reasons of overriding public interest which outweigh the negative impact on the environment, including any transboundary impact; (e) natural conditions do not allow timely improvement in the status of the marine waters concerned
	Urban waste-water treatment	Article 8

	91/271/EEC	1. Member States may, in exceptional cases due to technical problems and for geographically defined population groups, submit a special request to the Commission for a longer period for complying with Article 4. 2. This request, for which grounds must be duly put forward, shall set out the technical difficulties experienced and must propose an action programme with an appropriate timetable to be undertaken to implement the objective of this Directive. This timetable shall be included in the programme for implementation referred to in Article 17. 3. Only technical reasons can be accepted and the longer period referred to in paragraph 1 may not extend beyond 31 December 2005. 4. The Commission shall examine this request and take appropriate measures in accordance with the procedure laid down in Article 18. 5. In exceptional circumstances, when it can be demonstrated that more advanced treatment will not produce any environmental benefits, discharges into less sensitive areas of waste waters from agglomerations of more than 150000 p.e. may be subject to the treatment provided for in Article 6 for waste water from agglomerations of between 10000 and 150000 p.e. In such circumstances, Member States shall submit beforehand the relevant documentation to the Commission. The Commission will examine the case and take appropriate measures in accordance with the procedure laid down in Article 18.
	2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the	<u>Article 29</u> 1. During the period referred to in Article 11(1), Member States may apply to the Commission for certain installations to be issued with additional allowances in cases of *force majeure*. The Commission shall determine whether *force majeure* is demonstrated, in which case it shall authorize the issue of additional and non- transferable allowances by that Member State to the operators of those installations.

	Community and amending Council Directive 96/61/EC,	The Commission shall, without prejudice to the Treaty, develop guidance to describe the circumstances under which *force majeure* is demonstrated, by 31 December 2003 at the latest.
National	**Marine and Coastal Access Act, 2009**	141 Exceptions to offences under section 139 or 140 (d) was necessary in the interests of national security or the prevention or detection of crime, or was necessary for securing public health; (e) was necessary for the purpose of securing the safety of any vessel, aircraft or marine installation; (f) was done for the purpose of saving life. 2. (2) Subsection (1) (e) does not apply where the necessity was due to the fault of the person or of some other person acting under the person's direction or control. 3. (3) A person is not guilty of an offence under section 139 by reason of doing anything that is an offence under section 140. 4. (4)It is a defense for a person who is charged with an offence under section 140 to show that— 5. the act which is alleged to constitute the offence was— 6. an act done for the purpose of, and in the course of, sea fishing, or 7. an act done in connection with such an act, and the effect of the act on the protected feature in question could not reasonably have been avoided.
	Wildlife and Countryside Act, 1981	Part 1

		(c) any act made unlawful by those provisions if he shows that the act was the incidental result of a lawful operation and could not reasonably have been avoided. (3) Not withstanding anything in the provisions of section 1 or any order made under section 3, an authorised person shall not be guilty of an offence by reason of the killing or injuring of any wild bird, other than a bird included in Schedule 1, if he shows that his action was necessary for the purpose of- (a) preserving public health or public or air safety; (b) preventing the spread of disease; or preventing serious damage to livestock, foodstuffs for livestock, crops, vegetables, fruit, growing timber, or fisheries

Appendix II

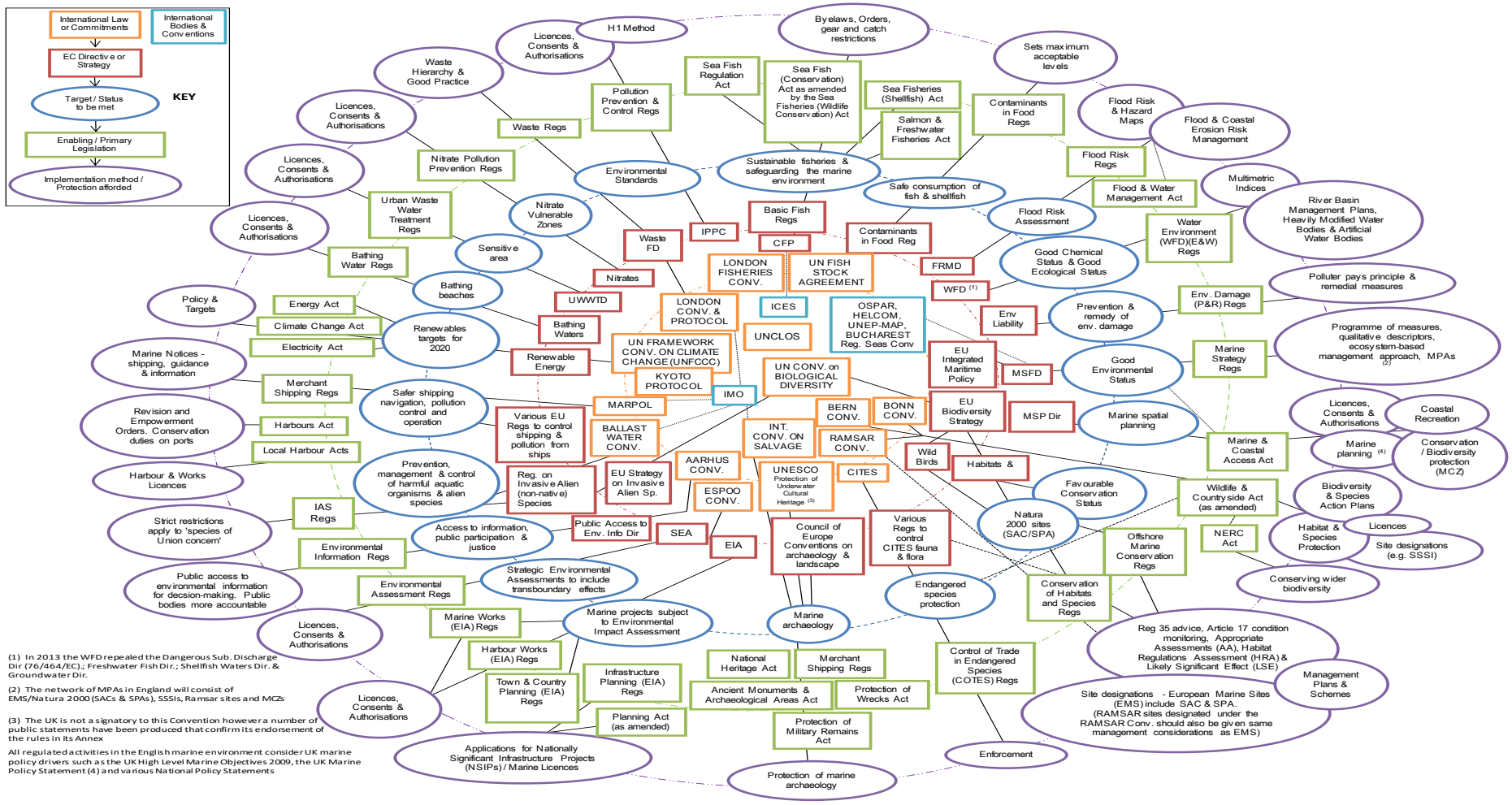

Figure 7. The 'ultimate horrendogram' demonstrates the extent of marine policy and legislation, this provides prospective on the macro-analysis, although there are many legislations including *force majeure* (written or implied), it is only a fraction of all legislation. Extracted from Boyes and Elliott (2014).

Appendix III

The published research article *"Is Climate Change an Unforeseen, Irresistible and External Factor - A Force Majeure in Marine Environmental Law?"* (Saul *et al., 2016)*