United Nations' Regulatory Policy under Changing Advocacy Coalitions: The Case of The Maritime Transport of Renewable Primary Products

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Abstract: *Coastlines and birds blackened by mineral oil are an icon for the risks involved in the transport of mineral oils. Regulations governing such transport have been developed since the end of the 19th century. In the 1970s, international environmental protection standards were introduced through Annex I of the International Convention for the Prevention of Pollution by Ships and it's Amendments (MARPOL 73/78) for mineral (black) oil tankers. Regulation of the maritime transport of other bulk liquids, such as chemicals, in special tank ships (chemical tankers) has also been developed since that time (as Annex II to MARPOL), thus leaving the transport of vegetable oils more or less unregulated. Today, about a third of the tank ship capacity non-licensed for mineral oils is used for vegetable (white) oils. Volumes are increasing. Marine environmental protection became an issue when floating vegetable oils coated birds and European coastlines in the early 1990s. As this damage to birds were caused by operational discharge and not by accident, no press pictures of oiled animals appeared in the media. The revision of the environmental regulations was advocated only by experts in maritime affairs and pollution prevention. It took the maritime community several years to acknowledge that white oils produced similar hazards just as the black oils and needed stricter regulations.*

This report starts with the identification of impacts on the coastal environment and a critique of the scientific principles of hazard evaluation. It will end with the final approval of a new regulatory system. The actors and stakeholders, together with the instruments and successful strategies involved, will be identified. The case study will show the complexity of policy instruments, the social and economic interests and the technical maritime standards which need to be taken into consideration, even when amending one specific section of an international treaty. This case report documents and discusses the integration of environmental policy into maritime shipping policy. This paper is a case study on the revision of an international instrument to cope with the risks involved in the transport of renewable primary products. It will demonstrate by using the Advocacy Coalition Approach how comparatively strong rules for environmental protection have been introduced for a fully globalised business under the remit of several United Nations bodies.

Keywords: IMO, Renewables, Shipping, Environmental Policy, Advocacy Coalitions

1. Introduction

The existing global maritime regulatory network including marine environmental protection under the United Nations Convention on the Law of the Sea (UNCLOS) might be classified as a "global regime". Our paper presents a case study on a fundamental revision and strengthening of an existing convention – the International Convention for the Prevention of pollution by Ships (MARPOL). To our knowledge, the basic regulatory framework on tank ships is one of the few regulations that, even in detail, are managed on a global scale by the United Nations´ International Maritime Organization (IMO). Therefore, the political processes for strengthening the rules and enhancing environmental protection are of great interest and scientific studies are relatively rare (see Höfer and Mez 2003, Campe 2004).

Renewable raw materials are one key to conserving our planet's limited resources and avoiding ecological problems. Helped by the sun's energy, plants will grow again and again. When they are processed, they release only the same amount of carbon dioxide they absorb from the atmosphere while growing. Thus, vegetable oils represent renewable energy raw materials which may be used to reduce the greenhouse gas effect. The International Conference for Renewable Energies in June 2004 acknowledged that renewable energies, combined with enhanced energy efficiency, can significantly contribute to sustainable development (ICRE 2004): The use of renewable fuels based on vegetable oils or biomass will let us become less dependent on fossil fuels whose supply is finite by nature. Several studies have been conducted to examine the environmental impacts of using bio fuels for mobility and to estimate their costs, demonstrating both advantages and disadvantages to fossil fuels (e.g. Quirin et al. 2004). The risks involved for the food market when using vegetable oil products for energy production have recently been discussed in public but are not covered here. The transport chain from agriculture to consumption had not been studied in respect to its environmental risks or impacts.

Of particular interest in policy research is the discussion of the roles of the international secretariats, the network of stakeholder representatives within the governing bodies of the international institutions and the integration of environmental policy into this policy setting. This paper will discuss practical challenges and interactions in respect to policy integration when amending an international treaty including technical guidelines

To explain policy changes and learning, the Advocacy coalition framework (AFC), developed by Paul A. Sabatier and Hank Jenkins-Smith (1999) is used. The AFC focuses on the interaction of advocacy coalitions – each consisting of actors, who have the same set of policy beliefs – within a policy subsystem. The analysis will base on IMO documents and the evaluation of primary studies on the topic.

2. The Case

2.1 The Transport of Renewables

Regulating Maritime Transport of Bulk Liquids

A clear example for comprehensive global governance is the maritime regulation of the transport of bulk cargos by the International Maritime Organization (IMO) a specialized agency of the United Nations.

The International Maritime Organization is proud to explain that environmental policy is integrated into the main body of the work done on technical standards for vessels, floating units and the maritime industry products as well as the maritime business including safety and rescue. This UN organisation is dedicated to maritime safety and pollution prevention under its slogan: "Safer Shipping = Cleaner Oceans". The structure of the organisation is based on four main committees. A greater number of subcommittees with specialized working groups prepares the technical and editorial work (see www.imo.org).

The *Marine Environmental Protection Committee* based on the MARPOL Convention for integrating environmental policy into the IMO's work;

1. The *Maritime Safety Committee* based on the SOLAS Convention for integrating safety aspects concerning ship and crew into the IMO's work;
2. The *Legal Committee* on integrating the legal instruments developed with the IMO into maritime global governance based on the United Nations Convention on the Law of the Sea (UNCLOS);
3. The *Technical Co-operation Committee* to enhance and optimize national implementation of IMO's treaties and standards.

The IMO handles the policy level for decisions, technical approvals as well as time-limited authorisations. Some tasks include yearly hazard evaluations of cargos (e.g. IMO 2003), circular letters listing all cargos licensed to be carried in special tank ships (IMO 1993b) and additives allowed to be used as tank cleaning agents (IMO 1994a, IMO 1999b). The basic technical standards for ships are set by the International Convention for the Safety of Life at Sea (SOLAS) and also MARPOL 73/78 which sets into consideration the regulations for introduction of double hulled tankers and phasing out of single hull vessels.

The instrument governing the carriage of bulk liquids is part of the International Convention for the Prevention of Pollution from Ships, MARPOL, from 1973/1978. Annex II to the main body of the treaty, contains Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk (IMO 2002d). This annex was more or less a by-product of the prevention of oil pollution by tank ships (for the history of MARPOL: Mitchell 1994, Höfer & Mez 2003). In 1970, during the preparation for the International Conference on Marine Pollution, maritime experts realized that not only oil tankers but also other tank ships could pose a risk to the environment and health. Because the United Nations Environment Programme (UNEP) did not exist at that time and the World Health Organization (WHO) had no specific expertise in this respect, the IMO turned to GESAMP (Höfer 1999b). GESAMP, the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection, is an interagency expert group created during the preparation of the first International Conference for the Environment in Stockholm in 1972 to advise and co-ordinate marine environmental pollution matters within the UN system. With the finalization of MARPOL´s Annex I on oil pollution, a second annex on chemical pollution hazards was created to regulate shipments of non-mineral oil liquids in tank ships. However, when defining the hazards to the marine environment, GESAMP scientists did not start with the well known hazards of oil slicks but asked experts in the field of aquatic toxicity to write down criteria for the hazards of chemicals diluted in the water (IMO 1989). They concentrated on effects of soluble chemicals ignoring the hazard of floating oils, which they thought would be regulated by Annex I to the planned Convention. The oily properties of vegetable and animal fats were not rated as risks to the marine environment. With a classification as non-hazardous, such products could be carried in every tankship discharged into the sea in nearly unlimited volumes.

About Renewable "Environmentally Friendly" Oils

With the rise of environmentally friendly products and the agricultural industry needing forage for the ever increasing numbers of farm animals, increasing volumes of liquid vegetable products were produced and carried in sea-going tank ships. Whereas chemicals were carried under strict regulations for chemical tank ships in relatively small tanks of several hundred tons each, the vegetable oils were carried in the bottom tanks of cargo vessels and single hull tankers with the capacity to carry 10,000 to 40,000 tonnes in just a few separated tanks. The simple pumping technique, the relatively low value of cargo (compared to chemicals) and a lack of technical discharge requirements in general posed a clear risk to the environment because of the possibility of significant spillage. However, this risk factor was not identified by regulators during the 1970´s and 1980´s. Vegetable oils were not transported under IMO´s International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk that defined the minimum carriage requirements for bulk liquids to protect the marine environment.

Sources of vegetable raw materials include soybeans, rapeseed and sunflowers; vast plantations in the Philippines and Malaysia supply coconut and palm oils (see Figure 1). Oils are used for direct use in the food industry for animals as well as for human consumption). However, ever increasing volumes are used for further chemical treatment resulting in biodegradable surfactants (household cleaning liquid) and fuel for engines (eco-diesel). Producing countries expect a strong increase in demand based on soon to be enacted EU legislation on the addition of renewable oils to common gasoline for use in car engines. Such vegetable oils represent about a third of all non-mineral oil cargo in seagoing tank ships. About 40 million tonnes of vegetable and animal oils and fats are shipped by sea, with palm oil representing about 50% of shipments (IMO 2002b, USDA 2002). There is an increase in production and transport volume every year.

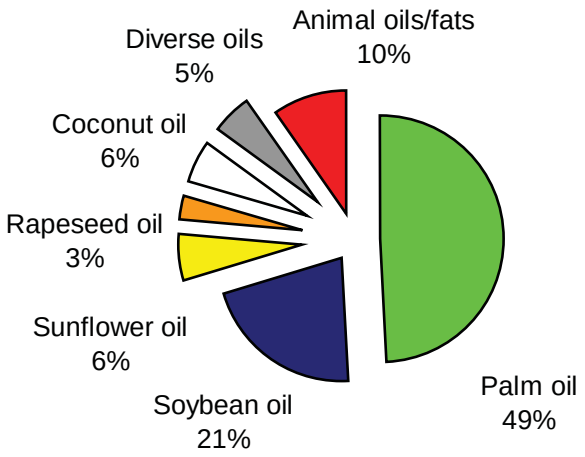

Figure 1. *World movements of vegetable and animal oils (IMO 2002b)*

2.2 The Issues for Environmental Policy

Environmental effects: Contaminated Marine Birds Died

In the winter of 1988-1989, a significant number of oiled sea birds were washed onto Dutch and German shorelines. Although such an occurrence had happened on a regular basis before, scientists then realized that these animals were not coated with mineral oils but with some other sticky material. After laboratory analysis, it became clear that toxic chemicals were involved. Further research revealed the origin of the substances involved: For tank washing purposes, strongly acting surfactants were used to clean the large tanks of residues after the unloading of edible fats in the ports of Rotterdam and Hamburg. Biologists assumed that the sea-birds were poisoned by these cleaning agents or their degradation products, which are known to be toxic. Reports submitted to the Marine Environmental Protection Committee of the International Maritime Organization by the Netherlands were alarming (IMO 1990).

Within a few years, a new regulation and approval procedure for cleaning additives was developed and implemented by the IMO (IMO 1994a). However, further studies carried out in the Netherlands indicated that not the cleaning agents, but the layers of oily substances were fatal to birds (IMO 1991). More and more reports came in as beach cleaners and police in Germany, Denmark and the Netherlands started to have a detailed look at the oiled birds on the beaches. Regularly, dead birds were collected on the beaches of the islands Amrum, Sylt, Helgoland and along the coast of the North Sea and sent for further examination to competent laboratories. Studies confirmed that the coating effect led to death even without the involvement of cleaning agents. Reports showed that similar effects on birds were also observed on the North American coast (Smith 1989) and that the vegetable oils did not biodegrade on the beach, but instead transformed into a gum like material (Mudge 1997, Gloria Pereira 2002). For sea-birds, any substance affecting the plumage means a serious health risk. The plumage acts as an isolating coating between the bird's body and the environment. For thermal isolation, flying ability, etc. it is essential that the natural water repellence of the feathers is not diminished. Substances that make a film on the water surface are therefore, although edible and non toxic in nature, fatal to many marine animals. Edible oils thus produce the same effects as mineral oils on marine birds.

Inadequate Marine Environmental Protection Standards

As early as 1994, the IMO circulated to all member states guidance and warnings concerning the transport of vegetable oils and their effect on birds after discharge (IMO 1994b). The organization urged governments and port state administrations to bring the information to the attention of all ship operators to reduce the discharge or emission of such substances in spite of missing specific regulation.

The Netherlands proposed the inclusion of "lipophilic" properties in the evaluation and classification of pollution hazards of cargos. IMO experts developed preliminary regulative drafts. This resulted in an outcry from the agricultural industry, as it realized that the new transport requirements would effectively force them to switch their cargos from non standardized simple tank ships to double hull special tankers. In 1993, the industry explained (IMO 1993a): The edible oils were shipped especially to feed animals, some were even for human consumption; thus, the shipments were generally recognised as safe, never as hazardous. The producing countries in Asia and Latin America argued that any strict regulation by IMO against these environmentally friendly products would not be in the interest of global sustainable development.

Once it was realized that not only renewable vegetable raw materials but also lipophilic chemicals (oily substances) created floating liquids, further investigations were started e.g. by the European chemical industry (ECETOC 1990). In contrast to the situation surrounding oil tankers, large volumes of mineral oil products like lubricating oil additives were transported in chemical tank ships without any appropriate evaluation of the hazards created by these liquids when floating after accidental or operational discharge.

United Nations Conference on Environment and Development: Sound Management of Chemicals
In 1992, the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro discussed the protection of the marine environment and the management of toxic chemicals (UN 1992). Whereas the discussion under Chapter 17 on the protection of the oceans only touched upon on-going issues and projects of the International Maritime Organization, Chapter 19 on chemicals presented new challenges for the IMO. When discussing the sound management of toxic chemicals, the conference noted that a world wide valid hazard classification and labelling system was not available to promote the safe global management of chemicals. The conference decided to develop a globally harmonized hazard classification and a compatible labelling system, including material data sheets, the so-called GHS.

With that decision, the classification systems in general were on the international political agenda. Any revision of cargo related regulation by the IMO could not ignore these developments. In 1993/94, proponents of new stricter rules for the transport of bulk liquids referred to the ongoing work in this respect. They argued that a revision would be necessary because of the outcome of Chapter 19 in 1992. It was then that all hazard classification criteria were open for discussion. Risks of floating oil were hidden by a large number of classification issues such as the cut off values for toxicity.

The Globally Harmonized System: Implementation without Ratification
Within the following eight years, a Harmonized Integrated Hazard Classification System for Chemical Substances and Mixtures was developed under the co-ordination of the Organisation for Economic Co-Operation and Development OECD (OECD 2001) for health and environmental protection issues. Once completed in 1999, all work was transmitted to a newly established United Nations Committee on the Globally Harmonized System of Classification. Some years later, the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) was published by the UN (UN 2003). Although the model system did not become part of any international convention and therefore lacked ratification, the international organizations involved like the IMO pushed the project and urged member states of organisations concerned to follow the principles. The IMO bodies were forced to align their proposals with the criteria prepared for this global project. Arguments to re-write the regulations for special tank ships were strengthened. From 1993 to 2003, the IMO experts involved had to align with the OECD and UN expert meetings on the development of the GHS. During this time, in a flexible approach, scientists collected all safety data for bulk liquids listed or derogated in the IMO regulation and developed specific criteria for hazard classification in line with the ongoing discussions at the OECD and UN level. They re-evaluated about 800 chemicals. The work was done by the interagency expert group GESAMP (IMO 2002c) financed by the IMO and those members that were strongly involved in the revision of the Annex to MARPOL: the Netherlands, Norway, the USA and the United Kingdom. The hazard evaluation of vegetable oils became a side issue for some years.

2.3 Reaction and Strategy at the Policy Broker

Policy Learning through Technical Discussion
The bodies of the IMO as the policy broker involved reacted according to their rules of procedure by taking the issue as one topic besides others on the agenda of the competent Marine Environmental Protection Committee. A technical sub-committee was asked to look into the matter. The terms of reference decided upon (IMO 1993c) were clearly written in a technical style to refrain from any early controversial debate that might block progress because of impacts on the shipping or producing industry. The terms of reference sounded clearly maritime:

- Simplification of present requirements and editorial amendments,
- Adaptation to technical progress,

- Inconsistencies with mineral oil tanker requirements,
- Categorization of noxious liquid substances.

The proponents for marine environmental protection used these technical maritime terms to integrate marine environmental policy:

- Simplification through a reduction of classification categories covering all bulk liquids under the regulations,
- Introduction of improved cargo tank emptying technologies for all bulk liquids and better enforcement procedures,
- Assimilation of discharge standards for oil-like substances in all tank ships based on strict mineral oil tanker regulation,
- Principal change of existing criteria for the categorization of liquid cargoes.

This strategy included a competent development of technical regulation, often with two alternatives explaining the pros and cons, and presenting practicable technical regulations based on best quality science and technology. This enabled responsible tank ship owners to get a feeling for upcoming environmental protection standards for ships and invest in new shipping technology accordingly. The strategy ultimately proved successful.

*Demonstrating the Feasibility of the Policy Projec*t
The simplification of the maritime regulation and the new criteria led to a reclassification of all 700 listed cargoes and the more than 1000 liquids regulated specifically by IMO circular guidelines. To illustrate the benefits and problems associated with proposed amendments, about six versions of different classification systems covering the base set of 700 chemicals were prepared between 1998 and 2004. Five product types, which include 33 code entries accounting for about 80% of the world's seaborne trade in chemicals and vegetable oils and an estimated 75 Million tonnes of cargo per year, were to be re-categorized in particular for these different versions. During the two years of political debate at the IMO, it was often discussed whether any surplus of regulated cargo could be taken up by the predicted surplus of "to-be-built" ships or existing abundance tonnage. The results of stronger classification had significant effects on the fleet: About 25% of all liquid cargo volume (outside mineral oils) was to be shifted from non licensed tankships to regulated chemical tankers. It was essential to identify the implications for the industry and the feasibility, as many chemical tankships are specialized regarding route, size and cargo type, and any new ship design and construction need significant investments and take many years.

Attaining the Majority for the Policy Project
The strategy led to a final political debate at the end with only weak opposition organized by the leading exporter of palm oil, namely Malaysia. The long process of integrating environmental issues allowed for the identification of regional and technical problems as well as tailored solutions for e.g. the small Pacific Islands´ trade of vegetable oils. In the fall of 2004, all important stakeholders including the European Union states, the USA, Japan, India and the open registers presenting delegations of Panama and Liberia, voted for stricter rules on the transport of bulk liquid cargo (IMO 2004c).

3. Analysis

3.1 The Stakeholders: Political and Economical Interests

European Nations
According to the IMO meeting reports of 1993-1997, the work was particularly driven by the Netherlands representing the world's largest port for unloading vegetable oils and being affected by contaminated beaches. Dutch experts were then nominated as chairmen for the regulatory as well as the scientific work within IMO working groups. Most European nations were not actively involved. Specific submissions to the IMO on the issue in the 1990s were restricted to:

- Greece, representing a large tanker fleet ownership (e.g. IMO 1996a),
- Norway, representing a large modern chemical tanker fleet ownership (e.g. IMO 1994c),
- Germany, representing the world's largest producer of natural source oleo chemical base stocks and being effected by contaminated beaches (e.g. IMO 1996b).

The non-active role of most European delegations in introducing hazard criteria for white oils had a

regulatory background: In the European directive on chemicals (EU COM 1976) as well as in regulations for the transport of dangerous goods on inland waterways, criteria on hazards of floating liquids were and are still missing. Even principally strict national regulations such as ones or those based on the German "Wasserhaushaltsgesetz" or the proposal for a new EU chemicals policy "REACH" (EU COM 2004), still ignore the risks. Thus the national environmental legislators did not support the position of the European delegations at the IMO meetings. However, European countries had an interest in including parts of their legislative approaches into the chemical tanker regulation, e.g. the criteria connected to the biodegradability of chemicals (IMO 1996b).

The USA

The USA is one of the players in the trade of vegetable oils. The delegation from the USA observed the progress carefully, asking for a thorough evaluation of the potential consequences of stricter environmental regulation for shipping. It was not before the late 1990s that this delegation realized the impact of the national Oil Pollution Act, as the US Environmental Protection Agency published a regulatory rule making statement (USEPA 1997). The report included a list of edible oil spillages (see Table 1) that resulted in heavy environmental effects like the fouling of beaches, the destruction of recreational areas as well as breeding grounds, and the killing of birds. The agency concluded that the environmental effects of such "white" oils are as devastating as those produced by mineral "black" oils. They should be treated the same way in respect to environmental protection laws. It was then during the late 1990s that the USA backed the introduction of stricter rules for the transport of vegetable oils. Based on their national policy (defined by the Oil Pollution Act OPA), they opted for double hull tankship technology.

Ship owners and Flag of convenience States

The tankship owners represented by organizations like Intertanko and the International Parcel Tanker Association IPTA as well as by important flag states such as Panama and Liberia observed the developments carefully during the first years and switched to positive backing in the late 1990s. At that time, the impacts on the fleet and the business as well as the time schedule for enforcement of new regulations became clear (e.g. IMO 1999a, IMO 2002b, IMO 2004a). There was also a window of opportunity for new regulations as there had been a boom in chemical tanker production during the early 1980s. Being older than 20 years in 2005 – 2010, these ships were now at the end of their lifetime for good quality management. Ship owners engaged in IMO meet-

Table 1. List of Edible Oil Spillages reported by the US EPA (USEPA 1997).

Real-world Spills	**Reported Effects of Spills**
More than 4,000 tonnes of soybean oil discharged from storage facility in Minnesota (1962/63).	Killed thousands of ducks and other water birds and formed rubbery masses of slick, as well as hard crusts of soybean oil with sand.
Animal fat and vegetable oil pollution in New York State waters in the late 1960s (reported 1967) from a variety of sources.	Shoreline grease balls floating; material killed waterfowl, coated boats and tainted fish.
Cargo ship with coconut oil, palm oil and other edible liquids ran aground at Fanning Atoll (1975).	Killed fish, crustaceans, molluscs; effects on marine community continued for 11 months.
Releases from fish factories at St. Helena Bay in South Africa (1973).	Reported killing of 10,000 lobsters and about 100,000 other smaller crustaceans like clams.
Three rapeseed oil spills of about 5.5 tonnes in total (1974-1978).	Killed 500 birds.
Spill of fish oil mixtures near Bird Island, South Africa (1974).	Killed about 6,000 animals including penguins and cormorants.
Discharges from tankship in front of Netherlands and German coastline 1988-1989) as reported to IMO	Washed thousands of oiled sea birds ashore.
Discharge of sunflower oil from ship at the North Wales coast (1991).	Oil polymerized and covered bottom. Remains still detected six years later as concrete like aggregates of oil and sand on the beach.
Soybean oil spill in Lake Lanier, Georgia, USA (1996).	Rancid oil weathered, adhered to boats and docks; rapid response prevented significant damage.

ings had started financing a new fleet capacity based on the proposed future ship standards, in particular modern double hull special tankers.

Some of the largest ship operators are based in Norway. Large vessels of this kind are priced at about 40 million US Dollars each (HCB 2004). The large volume of vegetable oils, representing more than a third of all non mineral oil bulk liquids carried in ships, would have to be transported in such ships. Relevant ship owners wanted to have appropriate cargo space available when the proposed regulations were enforced. New shipyard and company data on building contracts clearly indicate that the industry responded very well to the regulatory developments by ordering new tanker tonnage to enable contracts for the transport of about 25-40% more cargo per year in chemical tankships.

Stakeholders in the Vegetable Oil Business

During the debate at the IMO, important exporters and importers of vegetable oils were identified (Table 2). It was in particular, an Asian and Latin American dominated coalition. It was Malaysia, on behalf of some other vegetable oil producing countries, who questioned the hazards of floating oils for some products (like palm oil) arguing that these liquids could solidify and thus not harm marine life. Furthermore, Malaysia identified a shortage of suitable tanker tonnage, thus leading to a shortage of renewable oils after 2006 (IMO 2004b). Between the lines of the papers submitted over the years, it was made clear by the producing agricultural industry that stricter transport regulations might influence the competitive position of these renewable raw products in a negative way and might have impacts on developing countries in the south.

However, important members in the Asian advocacy group broke away as the full economical impact of stricter rules became clear: Forcing single hull tankships, (a significant share of the fleet) out of business would ask for ship breaking as these ships could not be used anymore for any kind of oil, either of vegetable or of mineral origin. This ship recycling industry, including the wreckage on beaches and steel-works, is dominated by India, Bangladesh and China. South Korea is home of some of the largest ship yards in the world. These countries stopped opposing the revision of the regulations after accepting the environmental risks of vegetable oils but also in light of their potential ship recycling interests.

Regulatory Interests

During more than two decades of experience with controlling marine pollution by ships, it became clear that regulations based on procedural requirements are not effective because the enforcement of compliance on sea is nearly impossible. With some weak maritime administrations, in particular those of open registers and flags of convenience, history showed that under these circumstances, compliance control in harbours, the so called port state control is the best way to keep standards and fight against negligent behaviour onboard ships (for background on port state control and its efficiency see Höfer and Mez 2003). Furthermore, expected penalty costs can be increased by retaining ships with deficiencies in port due to their significant leasing rates, whereas actual penalty costs based on national laws do not deter offenders. Therefore, the arguments brought forward by strong port state control administrations such as the Netherlands and the United Kingdom during the discussions were important and in general, convinced the coastal state delegations. With financial contributions from the USA, the United Kingdom and the Netherlands (all with well established port state control regimes) performed a study on the perspectives, benefits and challenges connected with any revision of the regulatory system for bulk liquids including the database on properties of several hundreds of cargoes to investigate the implications of amended classification of cargoes (IMO 1995).

Table 2. Major stakeholders' vegetable oils business (IMO 2002b).

No.	Type of Oil	Exporters	Importers
1	Palm oil	Malaysia and Indonesia (89%)	China (12%), EU (17%), India (20%)
2	Soybean oil	Argentina and Brazil (60%), EU (16%)	India, Bangladesh and China (28%)
3	Sunflower oil	Argentina (55%)	India (23%)
4	Rapeseed oil	Canada (46%), EU (25%)	USA and China (54%)
5	Coconut oil	Philippines and Indonesia (87%)	EU (40%)

3.2 The Policy Process

Phased Process
The political process from the identification of the environmental risk up to the implementation of regulation can be structured into distinctive periods. The policy process is shown in Table 3.

1st period: Before any political or regulatory debate, scientists already wrote scientific articles about the risks to the environment (as discussed in paragraph 2.2) in the 1970s and 1980s. However, it were the reports from coast guards and beach control agents about cases of pollution and oiled birds in 1989 that induced political activity at national levels.

2nd period: The process at the IMO level could be separated into three periods representing different processes with different advocacy groups: start of debate, development of proposals, and finalization of convention text.

The time consuming part concerned, the transfer of scientific knowledge to policy makers (1st period) up to the start of the regulatory developments (2nd period). It should be noted, that the writing of technical regulation itself was limited by the number of regular meeting sessions. Once per year is common and delayed the finalization furthermore.

Advocacy Coalitions Changing
When the discussion at international level started, the coalition advocating the revision of rules was small. According to submissions and reports brought forward by the Netherlands and confirmed by Germany, counter arguments were presented by Norway only. However, as Norway is the home of important special tanker operators, this position was important and noted by other maritime delegations at the IMO. Most delegations, including the large vegetable oil exporters and importers (see Table 2), accepted a compromise, opting for some editorial work on the existing convention only. Arguments from classification societies and some port state control experts backed that perspective (see Para. 2.3). Table 4 shows an overview of the advocacy coalitions through the political process.

Policy Learning Process
During the deliberations at the IMO, the coalition pro revision grew:

- The regulatory statement published by the US Environmental Protection Agency in 1997 changed the position of the USA during the process. From a national policy standpoint, white oils are to be treated similar to black oils during transport. As the existing international maritime regulations did not correspond to this requirement, the US delegates joined the coalition pro new rules.

- The ship owner associations as well as the flag-of-convenience states were heavily influenced by important ship operators running tank vessels. Depending on whether these companies represented low quality or high quality ship tonnage, the positions of these actors were different. High quality operators sent their representatives in a regular mode and were represented more strongly at meetings. These ship owners were interested in

Table 3. Five Phases of the policy process.

1a	1978-1989	First articles on the biological effects of floating vegetable oils published in scientific literature, noted by the scientific community only.
1b	1989-1990	Competent authorities reports on environmental effects reached the policy level in the Netherlands, Germany and Denmark
2a	1991-1993	Policy dispute on choice of action on the IMO policy level; policy decisions on sound management of chemicals by UN Rio de Janeiro Conference influenced policy.
2b	1993-2003	Development of technical regulation in international working groups; impact by US EPA report concerning legal national background changed policy position of the USA; integration of policy development into ship owner investment concepts changed attitude of this stakeholder group.
2c	2003-2004	Finalisation of debate at international level and approval procedure.
	2005-2007	Global implementation and entry into force.

Table 4. Advocacy Coalition (structure acc. to Sabatier & Jenkins-Smith 1999) under the policy broker "IMO bodies".

Policy Learning Phases	**Advocacy Coalition (pro new regulation)**	**Advocacy Coalition (contra new regulation)**
I (starting to early 1990s)	The Netherlands * *** Germany * ** Norway ** Classification Societies ***	Japan ** Malaysia, Indonesia ** Panama ** Liberia ** Greece ** USA ** China ** India ** Ship Owner Ass. **
II (mid and late 1990s)	The Netherlands * *** Panama ** Germany * ** Norway ** USA * Classification Societies *** Ship Owner Ass. **	Japan ** Malaysia, Indonesia ** Liberia ** China ** India **
III (2000s and finalization)	The Netherlands * *** Panama ** Germany * ** Norway ** USA * India ** China ** Classification Societies *** Ship Owner Ass. **	Malaysia, Indonesia **
Points of interest	* environmental protection policy ** economic policy / interest *** regulatory aspects	

receiving the large volume of unregulated vegetable oils onboard their highly sophisticated ships away from cheaper running ships with simple technology. It was the companies represented at the meetings that invested in new, additional tonnage to cover future needs based on stricter regulation. Their representatives from owner associations as well as flag states lobbied for new regulation to secure the amortisation of investment.

- During the last sessions, the Asian coalition of vegetable oil stakeholders broke up. Important influence had the side effect of stricter regulation. Many low quality tank ships would have to be scrapped because they would not comply with the transport requirements for vegetable oils. As the beaches of India, Bangladesh and China are the home of the world's largest ship recycling sites; specific economic interests were identified and influenced the positions.

The policy learning is associated with the policy process phases. Four core beliefs in the debate during the second policy phase are shown in Table 5. As a plus sign stands for the belief, the minus sign indicates disbelief. The policy learning process was restricted on the specific reasoning in environmental risk, but the other core beliefs relevant to the revision of rules stayed and influenced the perspectives and principles for the future regulation.

There is a firm belief in the maritime arena, this is the concept "Freedom of the Seas" introduced about four hundred years ago by Hugo Grotius with the notion "Mare Liberum" (Russ and Zeller 2003). Resulting from this, two core beliefs had been developed in running ships and led to the establishment of the United Nations' International Maritime Organization which stated that ship operators have to follow flag state regulations only and ship management standards should be global. This concept is introduced into the Law of the Sea (UNCLOS) Convention that offers the legal background for any use of the sea. However, regarding

Table 5. Beliefs and common understandings in actors´ scene regarding the policy process.

	Core beliefs	**Policy phases**		
		2a	2b	2c
1	Ship owners have to follow flag state regulations only	+	+	+
2	Ship management standards should global	+	+	+
3	Environmental standards should be global	+/-	+/-	+
4	Edible oils are not environmentally hazardous	+	-	-

standards on marine environmental protection, the areas of the sea are not treated the same way. Some regions have been identified as being more sensitive to the impacts of oil pollution damage than others, with so called Particularly Sensitive Sea Areas on top of the scale. Resulting from these differences, the maritime translation has been that discharge limits and pollution standards for noxious liquids should be much more stringent / restrictive in these regions. However, when the understanding of the environmental hazards of edible oils was established and strong limits were set, this tiered approach to pollution and discharge standards demonstrated its clearly tactical face: The maritime community decided to go for one global environmental standard for chemical tank ships.

3.3 Institutional Setting

Institutional Capacity
Any revision of the MARPOL Convention is embedded in the agenda of the IMO Marine Environmental Protection Committee (MEPC), which can amend the convention at any time based on the IMO tacit acceptance procedure (for "tacit acceptance procedure" relevance see paragraph 4.1). As the rules for chemical tank ships are detailed and deeply embedded into the IMO Conventions, the identification of the hazard to marine birds acted as a kickoff for further deliberations:

The scientific hazard identification procedure had been developed in the late 1960s and early 1970s. Meanwhile, a number of additional biological and toxicological aspects had been identified and tests had been developed. As previously discussed, the discussions on the GHS had an additional effect. Greenpeace strongly criticized the use of acute toxicity data for ignoring the criteria assessing the chronic toxicity to the marine environment (IMO 1994d). This led the IMO to introduce tests and detailed criteria on chronic aquatic toxicity before a respective discussion was started within the development of the GHS.

Once a basic revision of a regulatory instrument was started, technical experts from industry and flag states offering modern technology came forward with ideas of the further improvement of technical requirements offering better environmental protection. This is typical for open fora with regulatory organisations and also happened in the IMO during the 1990´s. The pumping efficiency standards from the 1970´s could clearly be improved. Tankships built before 1986 left about 1000-3000 litres of non-regulated bulk liquid in each tank and had to discharge this volume as waste. The technical standards laid down by the IMO required a reduction of this volume to 900 litres, but modern ships could easily get down to 100 litres. It was then decided that any revision of the regulation should aim for a value below 100 litres to reduce operational discharges into the sea or reception facilities in ports.

Regulators, in particular those that undertook port state control, contributed many experiences with control and practical deficiencies with implementation. They asked to stream-line the text and harmonize the regulations between mineral oil tankers and chemical tankers as both ship types carry liquids with similar hazards. An editorial improvement of all 150 pages resulted.

Institutional Structure
It should be recognised that the institutional setting and structure of the institutions involved has a strong influence on the early detection of risks for health and environment not covered by existing regulations. In this case, the transfer of information between the maritime and coastal administrations and the network of experts within the IMO worked fairly well. The official non-scientific reports on oiled birds resulted in first regulatory responses within 1-2 years. The criticism made by Greenpeace

(IMO 1994d) and confirmed by GESAMP scientists, resulted in decisions on criteria that were not even finalized under the GHS (on chronic aquatic toxicity) or not envisaged by the EU legislators (on hazards of floating liquids).

However, there was a lack of transfer from developments in science to regulatory practice (as discussed in paragraph 3.2). Although discussed in scientific journals in the late 1970s (McKelvey et al. 1980, Russel and Carlson 1978), the effects of vegetable oil on sea birds were only realized in 1989 by regulatory experts. At that time, additional effects of accidental spillages on the coastal environment were published (Smith 1989, Mudge et al. 1992). A direct involvement of scientific work within regulatory agencies was lacking, as GESAMP is separated from the IMO. A similar critical development took place in Europe by installing scientific risk assessment including scientific early detection in organisations separated from those agencies that are responsible for risk/hazard management and regulatory affairs. Divided national responsibilities for environmental pollution and public health in some European states created further problems in identifying and assessing risks as well as responding with better risk management. Regulators at the IMO were really surprised to hear that floating properties of bulk liquids were not classified for chemical tank ships' cargoes whilst the hazards were well known even in public, for carrying mineral oils. The EU regulators did not realize this hazard before and there is no EU regulation on floating liquids.

When studying the functions and the effectiveness of international organisations from a political science perspective, the practical limits and capacities of such institutions are generally not evaluated. However, as the effectiveness of international conventions is strongly dependent on their institutional setting, the ignorance can be misleading. In the case presented here, the total amount of work done for the revision of the chemical tanker regulations has been estimated based on interviews and the reports available. There have been about 12 sessions of working groups (ca. 15 delegations; agenda item for 1-3 days), 12 sub-committees (ca. 90 delegations; agenda item for 1-2 days) and committees (ca. 180 delegations; agenda item for ½ day) representing a maximum of 45 working days in total on the revision process, the discussions and the development of amendments and new paragraphs. The extensive part of the revision process was the re-evaluation of environmental, health and safety hazards of about 800 bulk liquid chemicals by scientists based on new criteria and the filing of thousands of new testing data including confidential reports in IMO offices. The scientific work has been done by a GESAMP expert group of 12 scientists meeting once or twice a year for five days each from 1996 to 2004. Comparing this situation with national or European legislation processes on similarly complex issues shows a highly efficient process at the IMO level, limited by the meeting capacity of the organisation that allowed 1-2 meetings a year each, resulting in a consultation process that took several years.

4. Discussion

4.1 Global Governance for Sustainability

The open-ended discussions held in an existing, competent international committee, including non-governmental organisations and managed by an UN secretariat, led to the integration of all existing programs and projects. It was clear from the beginning that any amendment procedure could be developed by majority votes within the committee, limited by the tacit acceptance procedure only.

The amendment procedures contained in the first conventions to be developed under the auspices of the IMO were so slow that some of the amendments adopted have never entered into force. This changed with the introduction of the tacit acceptance procedure, also known as the "passive" acceptance procedure. This means that the competent IMO body which adopts an amendment fixes a time period within which contracting parties will have the opportunity to notify either their acceptance or their rejection, or to remain silent on the subject. In case of silence, the amendment is considered to have been accepted by that party. Amendments enter into force unless more than one third of contracting parties notify the IMO of their objection. Tacit acceptance is now incorporated into most of the IMO's technical conventions. It facilitates the quick and simple modification of conventions to keep pace with the rapidly evolving technology and science. Without tacit acceptance, it would have proved impossible to keep conventions up to date and the IMO's role as the international forum for technical issues involving shipping would have been placed in jeopardy.

The tacit acceptance procedure motivated all stakeholders to get involved in the process. Thus, the organisational setting enhanced the regime effectiveness. Although the speed of reaction and development of new treaty paragraphs seems to be low, the involvement and the interests of pioneers for environmentally friendly technology, in this case the ship owners investing in ship tonnage with best available technology, led to a strong interest by this industry for the revision of rules after some years of discussions and regulatory drafting. The continuous involvement of experts as envoys for important ship owners during the discussions enabled the companies to invest into the appropriate (right) ship types based on the upcoming legislation. During the years, it was no more the question of "what" but "when". Having the appropriate ships available or on order at ship yards, these ship owners and their associations were more than interested to take over business from competitors running older ships.

Based on the open structure of global networks that are in detail often stronger than local ties, scientists are strongly "globalised" actors in environmental protection issues. Under real global environmental governance, science may hold the key. Although news coverage of global environmental protection in media mostly shows politicians, often the international scientific regulatory network behind the scene is the driving force, not looking for personal media coverage, but aiming at solving problems. There is a need, as also shown by this case study, to enhance the speed of bringing scientific studies to the attention of regulatory scientists without the involvement of politically or economically motivated resistance by governmental stakeholders, like specific risk management agencies or ministries which are interested in positive coverage of their work.

Global governance needs competent personnel to keep international organizations prepared for the development of technical regulations. Decades of experience with national federal administrations in Germany showed that agencies with a large and competent workforce are needed to govern environmental and health protection, to develop new policy and to identify environmental and health risks by preparing proposals for policy levels. The local authorities are smaller, but not less important for organizing the enforcement and the identification of local environmental status or impact. Both are essential. However, in global maritime governance, this is not the case. A relatively large workforce exists on the national level, whereas the global level is the smallest entity in the system. For example, of the several hundred persons responsible for the translation and administration of meetings, the IMO employs only about 60 nautical, technical and scientific experts. Without efficient institutions, global governance will not succeed based on strong national institutions only. There has been criticism on the adequacy of the existing organisational framework for global governance for marine environmental protection (for global ocean governance see: Payoyo 1994). There is controversy whether a centralized international institution or decentralized global treaty developments are more effective in environmental protection (e.g. Biermann 2000, Juma 2000). While some authors call for far-reaching reforms to create a world environmental protection organisation, others argue against major changes.

4.2 Integration of Environmental Policy into Shipping Policy

Environmental policy integration is often understood as an element of a process of the ecological modernisation of policy. Such policy will continue to face important barriers because it runs counter to prevailing economic interests. Policy integration strategies need to be understood as learning processes with a focus on developing institutional capabilities (Hertin and Berhout 2001/2003). As shown in our case study, based on institutional structures, environmental policy could be integrated into maritime regulations. It illustrates a good example of how to integrate environmental objectives into sectoral policy. The revised Chemical Tanker Code (based on the SOLAS Convention on safe management of ships) and the revised Annex II to MARPOL are global instruments acting together in harmony to define technical minimum requirements for the carriage of bulk liquids in tank ships.

As policy integration processes are slower than non integrated projects, the latter are often utilized to gain faster results. However, as policy integration aims at win-win solutions (integrating social, economic and environmental benefits) and conflict minimisation (whilst not ignoring disputes as some conflicts will undoubtedly remain), the resulting solutions in theory are more sustainable than the alternatives. Practical experience, comparing the

reported case with other non-integrated regulative maritime projects introducing marine environmental protection, suggests that the entry into force date, the implementation by industry and the enforcement by national regulations comes faster after adoptions of integrated policy. The traditional response on how to integrate an emerging issue in the policy debate has been to create new institutions and treaties (OECD 2002). The same pattern is evident within the IMO in respect to regulating anti-fouling, ballast water and ship wreckage. New treaties need specialized legal implementation (internationally as well as nationally and often also secretariats). Developments of technical framework and standards tend to operate according to closed decision making processes, leading to independent and fragmentised solutions complicating the implementation by industry and the policy for global sustainability. These solutions are labour-intensive for global institutions in the long run. However, it has to be acknowledged that due to limitations in the meeting schedules of international gatherings, policy integration within complex issues can slow down the speed of environmental policy significantly.

5. Perspectives for Further Studies

The interaction of policy projects and regulations in the field of environmental protection can be very complex, thus creating challenges in respect to process management and expert networks. The establishment of a global scientific knowledge network is a challenge but could be managed with the help of the internet and communication technology as well as scientific conferences. The interaction and timing of amendments or the new introduction of global regulations can be even more challenging. Amendments of existing interrelated treaties, regulations and programs that have to be ratified by member countries to allow global implementation simultaneously tends to create time schedules that elongate processes considerably. A real risk is created by fragmented international environmental policy performed by different agencies or treaties. There is a lack of studies evaluating the effects of new, specialized treaties in contrast to the amendment (enlargement) of existing ones in respect to over-all international effectiveness and needs for man-power at the national (delegations) and international (UN secretariats) levels.

From a historical standpoint, the international ship operation is the first fully globalised business on earth. The regulation of this part of the maritime industry in respect to marine environmental protection should be looked at in more detail as it represents the oldest example of a global, environment protection regime for a globalised industry. The Law of the Sea (UNCLOS) defines the legal background for all aspects of ocean governance including national, regional and international levels. UNCLOS strictly refers to the UN marine and maritime regulations that can even limit national legal competence. The most important rules in this respect are created under the roof auspices of the IMO for maritime activities. However, there are only a limited number of studies on environmental protection within maritime policy.

Acronyms Used

UNCLOS	United Nations Convention on the Law of the Sea
IMO	International Maritime Organization
SOLAS	International Convention for the Safety of Life at Sea
MARPOL 73/78	International Convention for the Prevention of Pollution from Ships
GESAMP	IMO / FAO / UNESCO-IOC / WMO / WHO / IAEA / UN / UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection
WHO	World Health Organization
UNEP	United Nations Environment Programme
UN	United Nations
OECD	Organisation for Economic Co-Operation and Development
GHS	Globally Harmonized System of Classification and Labelling of Chemicals

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