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**Safer ships and cleaner oceans: thirty years'
work of the International Maritime Organization**

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In the thirty years that have passed since the International Maritime Organization came into being as a specialized agency of the United Nations, the world of shipping has changed dramatically. Not only has the world fleet grown in size, but the ships themselves have become more specialized and complex. Throughout this revolution, IMO has had two principal tasks—to promote the safety of shipping and to prevent pollution of the seas from ships.

It has sought to achieve these objectives by adopting a series of international conventions, codes and recommendations which now form the basis of shipping legislation in the Organization's 132 Member States. On the safety side there has been a marked improvement in some areas, and the casualty rate has decreased considerably during the 1980s. But accidents still occur and it is clear that more needs to be done, in particular by devoting more attention to more effective shipboard management. Pollution from ships has declined considerably since the early 1970s, thanks in part to the introduction of new measures by IMO which have reduced pollution resulting from shipping accidents, and that caused by routine operational practices, such as the cleaning of oil cargo tanks. The IMO technical assistance programme, which includes such projects as the World Maritime University at Malmö in Sweden, is helping to increase the effectiveness of the measures introduced by IMO.

1. Introduction

In 1958, when the International Maritime Organization came into being, the world of shipping was not very different from the one that had existed twenty years before. Although a ship was launched that year which exceeded 100 000 deadweight tons for the first time, ships of more than 20 000 tons were still regarded as large. Their design had changed very little, and the old Liberty ships and T-2 tankers—the standard ships of World War II—were still to be seen.

Thirty years on, shipping has undergone a revolution. Where once shipping could be divided into tankers, bulk carriers and dry cargo ships, there are now specialized ships. Container ships, which first made their appearance in the 1950s, are commonplace. Roll-on/roll-off ships dominate short-sea routes in many parts of the world. There are ships designed to carry liquefied gases, and different types of bulk chemicals. Motor vehicles are carried around the world in special transporters. Lighters are towed down rivers, loaded on to purpose-built ships, transported across the oceans, and then towed up another river to their final destination. Ships themselves have grown larger. Barely fifteen years after the creation of IMO, ships were under construction which could carry more than half a million tons of oil, five times the capacity of the world's largest ship in 1958.

The world fleet has grown enormously: in 1958, it totalled 118 million tons, and by 1978 had almost quadrupled to 406 million tons. In 1987, it was 404 million tons. The world's shipyards produced 9.2 million tons in 1958, 18.1 million tons in 1978, and 16.8

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million tons in 1987 (the peak year was 1975 when production topped 34 million tons). Other things have changed, too. In the 1950s, shipping was dominated by the traditional maritime countries. By the 1980s, many other countries were building up their maritime sectors: the world's ships were being built mainly in east Asia rather than in western Europe and shipowning was even more widespread. In short, during the lifetime of IMO, shipping has been revolutionized and IMO's achievements should be assessed in this context.

The Organization was established to promote the safety of international shipping and to combat pollution of the seas from ships but so much has changed since 1958 that the most obvious forms of comparison, for example, a comparison of the number of ships lost in 1958 with 1988, are not really valid. Nevertheless, it is perfectly reasonable that people should ask just what has been accomplished and that, when presented with a list of conventions, recommendations and other instruments which have been developed by IMO over the years, should further ask just what these conventions and recommendations have achieved.

In attempting to answer this question, I should first of all say what IMO is and what it has done over the last thirty years to improve the safety of international shipping and to prevent the pollution of the sea from ships.

2. IMO and its activities

2.1. *The beginnings*

When IMO came into existence, its chief priority was to develop a body of international maritime law. It was generally recognized that shipping could only be made safer through international action, for the industry is so international in nature that effective improvements must be agreed to and implemented by all maritime countries.

The need for co-operation had in fact been recognized for centuries and over the years many agreements had been made between nations. Some of these were the result of formal conferences, an example being the first International Maritime Conference on Regulations for Preventing Collisions at Sea which was held in Washington in 1889. However, there was no formal machinery for arranging conferences or ensuring that deficiencies and gaps in maritime legislation were reviewed and corrected. Action usually depended on the initiative of an individual country and this often depended upon a disaster to provide the necessary impetus.

The need for a permanent maritime organization had first been put forward in the nineteenth century but it was not until the creation of the United Nations at the end of World War II that this dream became a reality. The new organization held a conference at Geneva in 1948 which adopted a convention establishing the Inter-Governmental Maritime Consultative Organization; the convention entered into force in 1958 and in 1982 (when a 1975 IMO Convention amendment entered into force) the somewhat cumbersome and uninformative title was changed to the present one. IMO met for the first time in 1959 and during the first two decades of its existence concentrated primarily on developing conventions, treaties, codes and recommendations. Some of these replaced existing instruments. Others were completely new.

2.2. *Conventions on safety*

In 1960, IMO arranged a conference which adopted a revised International Convention on the Safety of Life at Sea (SOLAS). This came into force in 1965 and

covered a wide range of measures designed to improve the safety of shipping. They include subdivision and stability; machinery and electrical installations; fire protection, detection and extinction; life-saving appliances; radio; the safety of navigation; the carriage of grain and dangerous goods; and nuclear ships. In response to new developments the 1960 SOLAS Convention, as the basic international instrument dealing with matters of maritime safety, was amended several times. However, because of the rather difficult requirements for bringing amendments into force, none of these amendments actually became binding internationally. To remedy this situation, in 1974 IMO convened a conference to adopt a new convention which would incorporate the amendments already adopted to the 1960 Convention as well as introduce other necessary improvements. The new Convention also has a much easier 'tacit acceptance' amendment procedure enabling amendments to enter into force on certain predetermined dates. The 1974 Convention entered into force in 1980. In the meantime a considerable amount of work had been done towards updating it. A Protocol adopted in 1978 entered into force in May 1981 and the first of a series of important amendments were adopted in 1981 and entered into force in September 1984. A second set of amendments adopted in 1983 entered into force in July 1986.

In 1966, a conference adopted the International Convention on Load Lines. It is well known that limitations on the draught to which a ship may be loaded make an important contribution to its safety. An international convention on this subject had been adopted in 1930 and the new instrument brought this up to date and incorporated new and improved measures which came into force in 1968.

The system of tonnage measurement of ships can also affect safety and this has been one of the most difficult problems in all maritime legislation. IMO began work on this subject soon after coming into being, and in 1969 the first international convention on the subject was adopted. It is an indication of the complexity of this subject that the Convention, which had a very high requirement for entry into force (25 States with not less than 65% of the world's gross tonnage of merchant shipping) did not enter into force until 1982.

Other matters have proved less complicated. A Special Trade Passenger Ships Agreement, adopted by IMO in 1971 to safeguard ships and passengers engaged in the 'pilgrim' trade, came into force three years later. A Protocol to this agreement, adopted by IMO in 1974, came into force in 1977.

Among the most common causes of accidents at sea are collisions. Measures to prevent these occurring had been annexed to the Final Act of the 1960 International Conference on Safety of Life at Sea, but, in 1972, IMO adopted a new convention on this subject which included a number of new features. Among these were regulations concerning traffic separation schemes, which had been recommended in several parts of the world where maritime traffic was particularly congested. The Convention entered into force in 1977.

Another convention adopted by IMO in 1972 dealt with containers. These had become an important feature of international maritime trade, and the Convention was designed not only to facilitate this trade but also to maintain a high level of safety in the carriage of containers by providing generally acceptable test procedures and related strength requirements. The Convention entered into force in 1977.

The fact that such a Convention was considered necessary was an indication of the range of changes in shipping: another was the adoption, in 1976, of the International Convention on the International Maritime Satellite Organization (INMARSAT). This resulted in the establishment of an international organization which, by using satellites,

offers greatly improved communications for commercial shipping. The Convention entered into force in 1979.

In 1977, the first international convention dealing with the safety of fishing vessels was adopted. It will apply to new fishing vessels of 24 metres in length and over, but is not yet in force.

Ultimately, safety rests very largely with the crews of ships. For this reason IMO convened a conference in 1978 which resulted in the adoption of the first International Convention on Standards of Training, Certification and Watchkeeping for Seafarers. The Convention entered into force in April 1984. The aim of the Convention is to establish, for the first time, internationally acceptable minimum training standards for crews.

In April 1979, IMO adopted the International Convention on Maritime Search and Rescue. As its title implies, this Convention is designed to improve existing arrangements for carrying out search and rescue operations following accidents at sea. The Convention entered into force in 1985.

2.3. Conventions on pollution

IMO's first priority was (and is) safety, but by the 1960s, it was becoming clear that pollution, especially oil pollution was becoming a threat to the oceans of the world. IMO had become responsible for a convention adopted in 1954 which attempted to control pollution by limiting the amount of oil which could be discharged into the sea as a result of routine shipping operations such as tank cleaning.

This Convention was amended by IMO in 1962 but, in 1967, the *Torrey Canyon* disaster showed just what a threat the booming oil trade posed to the environment. Several new treaties were adopted as a result, including the International Convention for the Prevention of Pollution from Ships of 1973 which dealt not only with oil but chemicals, garbage, sewage and other harmful substances. In 1978, this treaty (which had not entered into force) was considerably modified by means of a Protocol which greatly strengthened the provisions of the first annex, dealing with oil pollution, and eventually entered into force in 1983. It is usually referred to as MARPOL 73/78.

2.4. Other measures

In addition to the conventions described above, IMO has adopted literally hundreds of codes and recommendations. The difference between these and conventions is that the latter are mandatory instruments: a Government which ratifies a convention must ensure that it is enforced through national law. A recommendation or code is a voluntary instrument. It may be implemented by Governments in whole or in part—or not at all. Nevertheless recommendations are extremely effective and some have had a greater impact than some conventions.

I have omitted from this presentation the various conventions and other treaty instruments dealing with liability and compensation and other related matters, many of which were adopted during the 1970s, but it can be seen from the above summary that IMO's work in building up a comprehensive body of international conventions was at a peak during that decade. Indeed, the most recent IMO safety convention (on maritime search and rescue) was adopted in 1979.

2.5. *The effectiveness of conventions*

The next task was to make sure that these instruments entered into force as quickly as possible. It is a tribute to the pragmatic way in which the safety and pollution conventions were developed and the concern for safety and pollution prevention shown by the IMO Member States that all but one of these instruments were in force by 1985. By then several of them had been amended, to keep them up to date, and the 'tacit acceptance' procedure used in the 1974 SOLAS Convention was also incorporated into most of the more modern IMO instruments. This ensured that changes in regard to technical matters could be made within a reasonable period.

This record in establishing international legislation is impressive. But the key question is not how much legislation has been adopted but how effective has that legislation been? In attempting to answer this question I examine the statistics relating first to safety and secondly to pollution prevention.

3. Safety

At the start of this paper I referred to the tremendous changes which have taken place in shipping since the 1950s and it is worth mentioning this again when discussing statistics. In 1958, the year that IMO came into being, the statistical tables issued by Lloyd's Register of Shipping show that there were 35 202 ships in the world totalling 118 million gross tons. In 1986 there were over 75 000 ships of nearly 405 million gross tons. The difference is so great that any comparison of ships or tonnage lost in those two years would inevitably be misleading.

A more accurate way of assessing progress is to use some sort of percentage, such as the percentage of ships totally lost each year out of the world fleet. The reports issued by the Liverpool Underwriters' Association show that during the 1950s under 0.30% of world gross tonnage was lost annually. This rose during the 1960s to 0.40% in 1969, dropped to 0.31% in 1977 and then rose sharply to a peak at the end of the decade (0.56% in 1979). Since then the total loss rate has declined substantially and by 1986 was down to 0.30%.

A similar pattern emerges if one examines the statistics produced by IMO's own Steering Group on Casualty Statistics which, since 1978, has been examining accidents to sea-going tankers. The Group, using Lloyd's Register statistics, analyses serious casualties, which in addition to total losses also includes breakdowns, pollution incidents, heavy weather damage, explosions, fires, etc. The analysis—which only goes back to 1968—shows that the casualty rate dropped in the early 1970s, then increased in the latter half of the decade to a record high of 3.11% in 1979. Since then there has been a substantial decrease in the rate and for the last five years (to the end of 1986) the annual rate has been substantially below average. In 1986, it was 1.83%.

Both figures show that there was a marked rise in accidents during the 1970s to a peak in 1979 and that there has been a general improvement since then. It is much more difficult to explain exactly why this happened, because of the great changes which have occurred in shipping, but there is evidence of the beneficial effect of IMO measures on safety. This is shown most clearly in the case of collisions.

In 1981, the International Association of Institutes of Navigation (IAIN) submitted to IMO the results of a study analysing the causes of collisions around the world. It particularly studied the impact of traffic separation schemes, which had first been recommended by IMO in the late 1960s. These measures were strengthened through the adoption of mandatory rules concerning their use in the 1972 Convention on the

International Regulations for Preventing Collisions at Sea, which entered into force in 1977. The main purpose of traffic separation schemes is to separate shipping moving in opposite directions, thus minimizing the risk of a head-on collision.

Traffic moving along the Channel towards Rotterdam, for example, keeps to the French side: that moving out to the Atlantic keeps to the English, the two lanes being separated by a 'no man's land' which serves the same function as the central reservation of a divided highway. The Dover Strait was the scene of the first traffic separation scheme (it began in 1967) and is one of the busiest sea-lanes in the world.

The IAIN study showed that in 1956-61 there were 51 collisions in the Dover Strait, 43 of them involving ships moving in opposite directions. By 1961-66 the total had risen to 62, 52 of them involving ships moving in opposite directions. But during the next five years (during which traffic separation was introduced on a voluntary basis) the number of head-on collisions was cut by half and during 1976-81 was down to four (out of a total of 11 collisions). These figures are a remarkable testimony to the effectiveness of traffic separation schemes and are even more interesting when compared with collision statistics from areas where traffic separation schemes have not been introduced.

The IAIN study showed that the annual reported incidence of collisions world-wide in 1956-60 was 359 compared with 369 in 1976-80. Not much of a change, it would seem: yet the figures show that where traffic separation schemes existed, as in north-western Europe, the number of collisions had dropped dramatically (to only 10% of the earlier figure). In other areas, the number of collisions had gone up: off the coasts of Japan and Korea, for example, the number of collisions rose from five in 1956-60 to 125 in 1976-80.

These figures are in many ways very encouraging—but they should not be allowed to hide other statistics which cause much concern. In 1986, more than one million tons of merchant shipping were lost as a result of accidents—a total of 230 ships. Of these seven disappeared without trace. One accident led to the deaths of 423 people, another of 199.

The news in 1987 was no less disappointing. It was dominated first by the capsizing of the ferry *Herald of Free Enterprise*, with the loss of at least 193 lives, and towards the end of the year by an even more distressing and gruesome tragedy, the *Doña Paz* disaster in which over 3100 lives are said to have been lost. There were also several other tragedies which were less widely reported. A 180 000 dwt bulk carrier disappeared in the Atlantic in January, with 30 crew members on board. A few days later 18 crew members died when a freighter capsized in the Mediterranean. Less than a month later another 21 seafarers died when a bulk carrier vanished off the Philippines. In October a 62 000 dwt bulker sank in the Black Sea: only two members of her crew of 18 survived.

There were many other sinkings, many other lost lives, but those listed above will be enough to make the point that the accident rate is still too high and that too many ships are being lost. It is surely unacceptable in these days of almost miraculous technological change that ships not only sink within minutes but that they can disappear almost without being noticed.

So why are ships lost at sea? Why do accidents still occur at a rate which is widely regarded as unacceptable? There is clearly no lack of international regulations. Indeed as described herein it is widely recognized that there now exists a comprehensive international framework of regulations and supporting codes and recommendations in particular related to the construction and equipment of vessels. These regulations have been widely accepted by Governments. The most important of IMO's conventions are

indeed practically universal in their application, e.g. the Load Lines Convention applies to 97% of the world fleet, SOLAS 1974 to 96% and the Collision Regulations to 95%. Within IMO there exists a framework of sub-committees manned by the best Government and industry experts in the world which continually review the effectiveness of IMO's regulations as well as their technical and scientific basis. This structure has been shown able to respond very quickly to converting the lessons learned from marine casualties into concrete action for specific improvements in IMO's regulatory framework.

There is no doubt that in recent years much greater emphasis has rightly been placed on the effective implementation of international standards by IMO Member States. Although the onus for ensuring that ships meet IMO requirements lies primarily with the flag State, more and more Governments are exercising port state control under IMO conventions thereby improving enforcement through rigorous inspection programmes. Some 14 countries in Western Europe, for example, have signed the Paris Memorandum of Understanding by which they agree to inspect at least 25% of foreign ships visiting their ports to ensure that they comply with international conventions (all but one of them adopted under the auspices of IMO). Several other important maritime countries have also strengthened their inspection programmes and the result is that sub-standard ships are finding it increasingly difficult to escape detection.

All of this is good but obviously there is still a major gap in the present arrangements. When maritime casualties occur, inquiries are instituted. The inquiry reports show that a thread of human error is woven into almost every accident. We must now examine this phenomenon carefully and deeply. Is there a need for much greater attention to management and operational details? My own answer to this question is in the affirmative. I do believe that we must focus attention on shipboard management.

At its fifteenth session in November 1987 the IMO Assembly recognized the importance of shipboard management by deciding that the theme for World Maritime Day in 1988 would be 'Shipboard Management for Maritime Safety and Pollution Prevention'. This theme has been adopted because it has been recognized that for maritime safety and pollution prevention to be achieved, focus needs to be placed on actual shipboard management by shipping companies, ship personnel and maritime administrations. For its part IMO will seek to promote more effective implementation by means of developing, where necessary, on-board manuals, guidelines and other measures. Governments will continue to increase their efforts to ensure that standards remain high and regulations are rigidly enforced, e.g. through effective flag and port state control procedures and increased ship inspections. However, as is always the case, it is the shipping industry itself which will bear the greatest burden if dramatic reductions in the loss of ships and lives are to be achieved. I believe industry should be encouraged and assisted in ensuring that there is an unbroken chain of safe and efficient operations from top management to crew member.

4. Pollution

4.1. The challenge

In 1958, very few people saw maritime transportation as being a threat to the environment. Ten years later few people were in any doubt that it was—the *Torrey Canyon* disaster of 1967 had made sure of that. The *Torrey Canyon* went aground off the coast of Cornwall and spilled more than 120 000 tons of oil into the sea, causing the

biggest marine pollution disaster ever known up to that time. It was clear that, with the oil trade booming, the threat would only get worse in the years ahead. IMO responded to this challenge immediately and within the next few years adopted a series of conventions and recommendations designed to tackle the pollution threat. These measures dealt with pollution by oil, chemical and other substances and are summarized below.

4.2. *Operational pollution*

When a tanker discharges its cargo of oil, a certain amount of sediment is left behind on the tank sides. This has to be cleaned off before fresh cargo is loaded. In the early days of tanker traffic, this sediment was removed by means of high-pressure water jets. The resulting mixture of oil and water was then pumped overboard into the sea. Various other wastes, such as those from the engine room, were disposed of in the same way, including the water pumped into some of the cargo tanks as ballast.

Pollution of this type, resulting from routine shipping operations, is known as operational pollution and in terms of overall pollution is a far greater threat to the sea than pollution resulting from accidents. IMO therefore concentrated its early efforts on reducing operational pollution.

One method adopted was to prohibit the discharge of oil into certain sea areas (such as enclosed seas and within 50 miles of land). Later the amount of oil which could be dumped into the sea at all was limited and the rate at which it could be discharged was carefully controlled. Encouragement was given to a system known as load-on-top, under which the mixture of oil and water resulting from tank cleaning was pumped to a special slop tank. It was left to separate as the ship proceeded to the loading port and, when it had done so, the water was pumped out, leaving the oil behind. The new cargo of oil was then loaded directly on top of it.

Later still encouragement was given to the complete separation of oil and water. Modern tankers have to be built with separate tanks for oil cargo and water ballast. As a result the ballast water is not contaminated. Instead of water, modern tankers use crude oil (the cargo itself) for cleaning the sediment of tank sides: it is more effective than water and does not cause pollution since it is then pumped ashore with the rest of the cargo. Finally, any oil-contaminated wastes which do remain have to be disposed of into special reception facilities on shore, not into the sea itself.

4.3. *Accidental pollution*

Although accidents cause only a fraction of total oil pollution, the fact that the effects are concentrated in a small area means that the consequences can be disastrous. Clean-up costs alone can come to hundreds of millions of pounds. IMO therefore introduced various measures to prevent accidental pollution and also to mitigate the consequences if an accident does occur.

One method was to bring in requirements for tankers to be fitted with an inert gas system. Normally the gas from the ship's boiler flue is cleaned and pumped into the ship's empty cargo tanks. This gas is non-explosive and prevents explosions in the tanks. The size of cargo tanks is now limited. This means that if a ship is grounded or involved in a collision, the amount of oil which can pour into the sea from a damaged tank is limited. The tanks used for the carriage of ballast water must also be protectively located—that is, they must be positioned in such a way that they afford maximum protection to the cargo tanks in the event of an accident.

In addition to these measures, IMO has introduced many other requirements designed to improve the safety of tankers—thereby minimizing the risk of accidental pollution. Special deep-water routes have been established in many parts of the world, for example, and the Collision Regulations also recognize the difficulties faced by large ships in manoeuvring in confined channels.

4.4. *The effectiveness of IMO measures*

Just how effective have these and other IMO measures been? Although a precise answer is again very difficult, the evidence seems encouraging. Pollution of the seas from ships is far less than it was in the early 1970s and the indications are that it will continue to decline in the future. Among the main reasons for this are IMO's anti-pollution legislation and the manner in which that legislation has been enforced by Governments.

The most widely quoted statistics relating to oil pollution are those produced by the United States National Academy of Science which estimated that in 1971 around two million tons of oil entered the sea as a result of marine transport. Between then and 1980 world oil consumption rose from 49 million barrels to 61 million. The world tanker fleet increased from 170 million deadweight tons to 324 million. Yet by 1980, the Academy estimated, oil pollution from ships was down to 1.47 million tons. Of this it was estimated that 400 000 tons resulted from accidents, mainly collisions and groundings and about 700 000 tons from routine tanker operations, such as ballasting and tank cleaning.

The NAS said this decline was due to greater accuracy in gathering data and because 'positive steps have been taken to reduce operational and accidental release of petroleum into the sea'. The evidence is that this improvement has continued during the 1980s. The International Tanker Owners' Pollution Federation (ITOPF) reported in 1986 that the trend of oil spills alone had gone down by as much as 70% since 1980. It reported that from 1974 to 1979 there were roughly 26 spills a year of more than 5000 barrels. From 1980 to 1985 the number had dropped to around eight a year.

The decline in world trade in oil must be taken into account when considering these figures. In 1986, according to figures published by British Petroleum, world oil imports amounted to 26.2 million barrels a day, compared with 34.3 million in 1976. Nevertheless, this decline cannot account for the whole improvement and IMO measures are generally given much of the credit. Commenting on the ITOPF report the newspaper *Lloyd's List* wrote: 'It is generally felt that the application of the International Maritime Organization's treaty on oil pollution prevention has been a major force in reducing spills. Tanker owners have had to meet more stringent standards and find these enforced not only by shipping nations but traders too, in their ports.'

As mentioned earlier in this paper, tanker accidents have declined from the peak-year of 1979. There is every reason to believe that operational pollution has also gone down during this period and that the general improvement in the marine environment will continue. MARPOL 73/78 was not in force until 1983, yet things had begun to improve even before that date. Now that the Convention is in force—and already applies to more than 80% of the world fleet—we can expect its effects to be even more widespread.

Notwithstanding the demonstrated improvement in the prevention of operational discharge of oil from ships and the decline of tanker accidents oil pollution disasters of

the magnitude of the *Torrey Canyon* and *Amoco Cadiz* are still a very real possibility. It is for this reason that IMO has devoted considerable efforts in promulgating oil spill combating manuals and guidelines as well as encouraging the development of regional arrangements for co-operation in dealing with major marine pollution emergencies. An initiative taken within IMO in co-operation with the United Nations Environment Programme (UNEP) has led to the decision to establish a marine pollution combating equipment stockpile and training centre to enhance the capabilities of the countries bordering the Gulf of Aden to respond to such incidents. Also within IMO new methods on board ships to minimize the escape of oil in cases of accident are currently under study.

5. Conclusion

I have sought to illustrate in this paper the way in which IMO seeks to achieve its objective of 'Safer Ships and Cleaner Oceans' and to indicate some of the factors which continue to contribute to maritime casualties. Although changing conditions always make it difficult to make meaningful comparisons I believe that the overall evidence does indicate that IMO's regulatory framework in the fields of marine safety and environmental protection have had a positive impact. Continued diligence by IMO Member States and the shipping industry in ensuring that regulations are properly enforced will yield beneficial results in the form of reduction in the frequency of marine casualties and loss of life at sea. As previously mentioned, IMO's work more recently focused on the implementation and enforcement of its regulations, codes and recommendations. One of the principal ways this is achieved is through IMO's Technical Co-operation Programme and active co-operation with regional organizations whose objectives frequently coincide with IMO primarily in the field of environmental protection.

IMO's Technical Co-operation Programme is a practical one, the primary aim of which is to enhance the capability of developing countries to participate safely and efficiently in international maritime transport and to protect the marine environment from pollution from ships. Particular emphasis is given in this programme to training which is achieved through seminars, workshops and fellowships on every subject covered by IMO's conventions and codes.

The flagship of this programme is the World Maritime University which was established in Malmö, Sweden in 1983. The University, which receives tremendous support from the host State, Sweden, the host city, Malmö, the United Nations Development Programme (UNDP), and many other IMO Member States, is a unique educational institution. It does not cater for conventional students who have just left school, but for mature men and women who have already achieved some success in their careers but who could benefit from intensive high-level training that is not available in their own countries. The students are drawn from maritime administrations, shipping companies, training colleges and similar institutions.

Since 1983 the University, which offers two-year courses, has grown until it now takes around 100 new students each year (giving a maximum student body of around 200). Many of the students who have graduated so far have already gone on to achieve considerable success in their professions, with several actually coming back to IMO as delegates to meetings on behalf of their Governments.

At the same time, personnel standards around the world should continue to rise, thanks in part to the implementation of the 1978 Convention on training, certification

and watchkeeping for seafarers. This is now used as the basis for training in most of the world's maritime colleges and is designed to raise the competence of ships' personnel to a standard acceptable to all countries. Although it only entered into force in 1984 it already applies to countries the fleets of which comprise nearly three quarters of the world total.

Through these and other measures, the ability of Governments and other parties to enforce IMO measures is steadily being improved. At the same time, standards of construction and equipment have also greatly improved and will continue to do so.

As I have clearly indicated in this paper, there does exist room for improvement in IMO's quest for safer shipping and cleaner oceans, particularly with respect to human error in maritime casualties. The human factor is always the most complex variable in any equation and consequently a determined and creative effort will be required by IMO, its Member Governments and perhaps most importantly the shipping industry if human error as a cause of maritime casualties is to be reduced. Looking back at the programme achieved within IMO over the past thirty years I am confident that the world maritime community will be able to meet this challenge.

Foreign summaries

Trente ans se sont écoulés depuis la création de l'Organisation Maritime Internationale, en tant qu'agence spécialisée de l'ONU. Entretemps, le monde maritime s'est profondément transformé: les flottes ont grandi en taille, et les navires sont devenus plus spécialisés et plus complexes. C'est dans ce contexte que l'O.M.I. a travaillé à ses objectifs principaux: la sécurité maritime et la prévention de la pollution d'origine maritime

Pour les réaliser, elle a fait adopter une série de conventions internationales, de codes et de recommandations qui constituent maintenant la base de la législation internationale en la matière pour les 131 pays membres de l'organisation. Sur le plan de la sécurité, on a pu observer une très nette amélioration; le taux d'accidents a décliné considérablement depuis 1980. Mais il y a encore des accidents, et il reste des choses à faire en particulier sur le plan de l'organisation du commandement des navires. La pollution est en déclin sensible depuis 1970, grâce notamment aux règles introduites par l'O.M.I. en relation avec les accidents maritimes et par les restrictions apportées à des pratiques jadis courantes, telles que la nettoyage en mer des pétroliers. Le programme d'assistance technique de l'O.M.I. (avec des projets tels que l'Université Maritime Mondiale à Malmö en Suède) a contribué à l'efficacité de l'action de cet organisme.

In den 30 Jahren seit Aufnahme der Arbeit durch die International Maritime Organization, einer Unterorganisation der UNO, hat sich die Welt der Schifffahrt dramatisch verändert. Nicht nur die gesamte Weltflotte ist gewachsen, auch die Schiffe selbst sind immer weiter spezialisiert und komplexer geworden. Während dieser Umwälzung hatte die IMO zwei Hauptaufgaben: sich für die Sicherheit der Schiffe einzusetzen und die Verunreinigung der Ozeane durch Schiffe zu verhindern.

IMO hat diese Ziele durch eine Reihe von internationalen Abkommen, Gesetzen und Empfehlungen, die heute die Grundlage für die Schifffahrtsgesetzgebung in den 131 Mitgliedsstaaten der Organisation sind, zu erreichen versucht. Was die Sicherheit anbetrifft, so hat es deutliche Verbesserungen in einigen Bereichen gegeben; die Unglücksrate hat während der achtziger Jahre erheblich abgenommen. Aber es geschehen weiterhin Unglücke, und es ist vollkommen klar, daß mehr getan werden muß; insbesondere muß dem Management an Bord mehr Aufmerksamkeit gewidmet werden. Die Meeresverunreinigung durch Schiffe ist seit den frühen siebziger Jahren merklich zurückgegangen, teilweise aufgrund neuer Maßnahmen der IMO, durch welche Verunreinigungen nach Schiffsunglücken oder durch Routine-Arbeitsabläufe, wie beispielsweise dem Reinigen von Öltanks, vermindert wurden. Das technische Unterstützungsprogramm der IMO, das Projekte wie die World Maritime University (Weltseefahrts-Universität) in Malmö (Schweden) umfaßt, hilft weiterhin die Wirksamkeit von Maßnahmen der IMO zu steigern.

En los treinta años que han transcurrido desde que nació la Organización Marítima Internacional (OMI) como una agencia especializada de las Naciones Unidas, el mundo naviero ha cambiado en forma dramática. No sólo ha aumentado el tamaño de la flota a nivel mundial, sino que los buques mismos se han hecho más especializados y complejos. Durante esta revolución, la OMI ha tenido dos tareas principales: promover la seguridad naviera y prevenir la contaminación marítima causada por los buques.

Para lograr estos objetivos la OMI ha adoptado una serie de convenciones internacionales, códigos y recomendaciones, que actualmente forman la base de la legislación naviera de los 131 estados miembros de la organización. Por el lado de la seguridad ha habido una marcada mejoría en algunas áreas y las tasas de accidentes han disminuido en forma considerable durante los 80. Sin embargo siguen ocurriendo accidentes y es claro que se necesita hacer aún más, en particular respecto a dedicar mayor atención a una gestión naviera más efectiva. La contaminación debida a buques ha declinado considerablemente desde principios de los 70, en parte gracias a la introducción de nuevas medidas por parte de OMI que han reducido tanto la contaminación causada por accidentes marítimos, como la debida a prácticas operacionales de rutina tales como la limpieza de tanques para el carguío de petróleo. El programa de asistencia técnica de OMI, que incluye proyectos tales como la Universidad Marítima Mundial en Malmö, Suecia, está ayudando a incrementar la efectividad de las medidas introducidas.

Editorial suggestions for further reading

GLANSDORP, C. C. (1986) Quantification of navigational risk in European waters, *Journal of Navigation*, 39 (1), pp. 90-96.

This paper explains the development of a method to quantify the risk of collision and strandings in European waters. The work was carried out as part of the EEC's COST 301 project to increase marine safety and prevent pollution by means of shore-based aids to navigation. The method is based on analysis of data on traffic volumes and composition and the number of casualties.

(Author)

OTTER, R. J. (1986) Developments in international legislation, *Water Pollution Control*, 85 (2), pp. 216-24.

This paper considers the lessons to be learnt from experience in implementing existing European legislation on the control of water pollution, the pressures put on Britain by its international partners, and concerns which might form the basis of future legislation. The review looks at the European Community's legislation on water quality and the discharge of dangerous substances to ground or surface waters, the Paris and Oslo Commissions on pollution of the sea, the OECD's views on the fresh and marine water environment, and the North Sea Conference.

(Author)

MEEK, M., BROWN, W. R., and FULFORD, K. G. (1985) A shipbuilder's view of safety, *Maritime Policy and Management*, 12 (4), pp. 251-262.

The authors consider the history of marine safety, and draw comparisons with the aviation industry. They assess how far the proliferation of safety-related regulations has been successful and conclude that the answer to the shipbuilder's wants is internationally standardized, rational, cost-effective legislation.

(Authors)

SOHMEN, H. (1986) The concerns of shipowners in today's market and regulatory environment, *Maritime Policy and Management*, 13 (1), pp. 1-15.

This paper examines the commercial situation, characterized by over-capacity and growing protectionism, and the legal situation, characterized by a plethora of regulations on such things as pollution prevention and liability. It considers how shipowners have responded by attempts to reduce operating costs.

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