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Marine environmental protection training programme for officers specialised in maritime affairs in Chile

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Marine Environmental Protection Training Programme for Officers Specialised in Maritime Affairs in Chile

By

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ABSTRACT

Title of the Dissertation: **Marine Environmental Protection Training Programme for Officers Specialised in Maritime Affairs in Chile**

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The dissertation is a compilation of legal, technical and scientific background associated with the marine environmental protection scope applicable to the Chilean jurisdiction. This background compilation has been included to support the content of a proposed training programme on marine environmental protection for those applicant officers to the specialised degree in Maritime Affairs in Chile.

The proposed training programme has been developed in order to update the content of the present approved course plan, which does not consider, in a global perspective, criteria directly involved in the marine environment management process with the aim of preventing pollution caused by sources other than oil spills.

Therefore, this dissertation is focused on describing briefly the essential aspects related to marine environmental protection management as follows:

- A general description of threats affecting the marine environment on a global basis and how these threats interact within the Chilean maritime jurisdiction is set out in chapter 1 and 2 of the dissertation.
- The most relevant legal framework, at the national and international level, associated with the protection of the marine environment is presented in chapter 3 of this document.

- The main role of the Chilean maritime authority in relation to marine environmental protection is put forward in chapter 4. Also included are the principal enforcement and control mechanisms applicable in this sphere in Chile.

Additionally, through chapter 5, a proposal-training programme, which covers the above aspects, is presented.

The concluding chapter summarises the most relevant aspects set out through the five chapters of the dissertation and points out the convenience of adopting the proposed training programme.

KEYWORDS: Prevention, Pollution, Marine, Environment, Training, and Chile

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Chapter 1

Introduction

1 Background

It is known that oceans cover the earth's planet surface to almost 70%. Also, oceans play a vital and decisive role within the basic biochemical processes of the planet on the local, regional and global scales.

The properties of the oceanic process have a significant and direct influence with regard to climate and weather, hydrological and carbon cycles and the global energy budget, among other aspects.

It is also relevant to emphasise that in terms of the biomass concept, most of the earth's life exists within the vast volume of the oceans. Therefore, it is crucial to take into account this fact and to evaluate causes and effects that generate pollution caused by human activity within the marine environment.

With regard to the development point of view, the oceans not only have traditionally provided a medium for transportation of goods, fishing and recreation but also have provided a medium as a repository for waste.

In this sense, uses of oceans and coastal zones are varied and serve diverse purposes such as the production of food, sources of energy and minerals, a base for tourism and the location for aquatic and semi-aquatic farming.

Moreover, the use of oceans and coastal zones unfortunately has been considered, directly or indirectly, as a free dump service for sewage and waste without the proper inclusion of damage costs.

Taking into account the actual evolution of increasing activities within the marine environment, there are two concrete aspects, which must be pointed out, as follows:

- The physical and ecological degradation of coastal zones
- The increase in pollution coming from land based sources

The coastal zone, which is the interface between the land and the sea, is a band of highly diverse and biologically productive ecosystems and habitats that supports much of the world's population.

The main causes of coastal management problems are related to the distribution, the absolute size and the rates of growth of the human population.

Moreover, rapid growth of coastal settlements, expansion of recreational areas and concentration of industrial development along the coast all result in accelerated coastal degradation.

Chile, as an emergent maritime country, has had deep changes in its productive structure during the last decade. These changes have been generated due to the following factors:

- The openness to international markets
- The export dynamism

These factors have been brought about as a result an intensive use of the coastal zones within the country. The exporter dynamism has been mainly based on the

expansion of the exported volume coming from the mining sector, fishmeal, cellulose, and wood.

As a result of increasing commercial activity, substantial pollutants dumped into the sea through the rivers have affected the natural equilibrium of the marine environment.

The proximity of dense population to the coastal zones is another relevant factor that affects the marine environment. For instance, in Chile the 50% of the littoral urban population are concentrated between the V and the VIII region.

The most important port and industrial activities are also concentrated in the coastal cities located between these regions.

Given that the majority of the most significant activities are carried out within the coastal area of the country, this aspect is of the highest importance to the Chilean Maritime Administration, taking into consideration its function related to the administration of the marine state property.

Basically, this function is ruled through the Maritime Concession Regulation in which the Chilean Maritime Authority must look after the fulfilment of the established requirements to use and exploit rationally the natural resources located in the national maritime jurisdiction.

About the rational exploitation of natural resources provided in the Maritime Concession Regulation, the specific procedure to authorise a maritime concession requires previous compliance with complementary aspects dealing with marine environmental protection mechanisms that are set out in different legal instruments.

1.2 Objectives of the dissertation

The proposal of a Marine Environmental Protection Training Programme has been developed with the aim of adapting and improving the current course plan on the marine environmental protection subject, taking into consideration the following:

- The approved course plan for the maritime affairs specialisation degree for Coastguard officers is based principally on oil pollution and its operational combating procedures, making it somewhat restricted compared to the real competencies that the Chilean maritime authority must comply with in the marine environmental protection scope.

- The Chilean Maritime Administration must comply with various responsibilities according to the marine environmental protection function, in particular those related to the fulfilment of the requirements to use and exploit the natural marine resources in the national jurisdiction, and the preservation of the marine environment free of contamination.

Therefore, the objectives of the dissertation are mainly linked to general aspects as follows:

- To propose a marine environmental protection training programme for officers who will apply to the specialised degree in maritime affairs
- To give an actual overview of the Chilean maritime environment
- To describe the main regulations concerning the marine environment applicable to the Chilean jurisdiction
- To understand the fundamental role of the Chilean Maritime Authority associated with the protection of the marine environment
- To describe the major enforcement and control mechanisms in relation to the marine environment in Chile

1.3 Specific objectives of the marine environmental protection programme.

The proposed training programme on marine environmental protection for Chilean Coastguard officers will contribute towards the following objectives:

- To give an extended overview of principles and sources of marine pollution
- To explain causes and effects of the main threats that are affecting the marine environment on a global basis
- To explain in detail the present legal framework dealing with marine pollution in Chile
- To explain the enforcement and control mechanisms which help to reduce marine pollution in Chile

Chapter 2

General Description of the Chilean Maritime Environment

2.1 Characterisation of the coastal zones

The Chilean continental territory stretches from 18° 20' S to approximately 56° 30' S having as its central meridian 70° W in the northern zone and the 74° W in the southern extreme of the country.

In the South American continent, Chile's length is almost 4200 km, and is never more than 300 km and usually less than 90km in width.

The Chilean coast is under tropical, subtropical, temperate and cold climate influences, owing to its 37° of difference in latitude between the north and the south zone of the country.

In spite of this climate variety, a notable characteristic of Chile's climate is its remarkable thermal similarity and its remarkable pluviometric contrast within the north-south variation.

The main characteristics in terms of temperatures, precipitation, and climate through the country are the following:

Between the north boundary and 20° S, temperatures reach 18° Celsius on average and precipitation is less than 160 mm during one year.

The desert climate is predominant between 20° and 30° south and precipitation reaches 20 mm/year in that zone.

Between 30° and 50° S, the climate is associated with temperate conditions in which meanstemperatures gradually decrease from 18° to 13° Celsius, meanwhile rain increases to 300mm each year on average.

From 50° S towards the southern latitudes, climatic conditions get cold and rainy The temperature average is between 6° and 7° Celsius during a year and precipitation reaches up to 5000mm per year.

The characteristics mentioned in the previous paragraph, create all kinds of climates: warm, tropical, humid, temperate, cold and Antarctic glacial.

Towards the southern part of the above latitude zone, the coastal configuration is very dismembered, with great quantities of islands, channels, blizzards and other geographic anomalies.

A particular characteristic of the Chilean coast is its great vertical movement due to its position within a convergence plate zone, which generates brusque movements of litoral upheaval and downfall.

Another frequent phenomenon on the central coastline in Chile is the development of dunes. The main acres of dunes are situated between 29° S and 42° S. They cover approximately 131.000 hectares (IREN-CORFO, 1966).

With regard to tidal waves, they propagate following the north-south direction along the coast with a speed which is function of the depth.

According to registered antecedents within the Chilean littoral, the characteristic of tides is mixed, in other words, there are two high tides and two fall tides during one tidal day with a difference of level among altitude which is richer in the morning tides and the evening tides.

This kind of difference is known as daytime inequality and it affects particularly to high tide in a proportion of 3 to 1.

The maximum amplitude of tide fluctuates between 1.50 and 1.90 m in the Arica zone and to 10 m in the Magellan region.

2.2 Socio-economic conditions

The political administrative division of Chile considers 13 regions, which are oriented from the north to the south of the country.

The total population of the nation in 1992 was 13.348.401 (Table 1), and the population is strongly concentrated in the central zone between the IV and the X region in which live 92%.

The central zone, the largest cities in terms of high demographic concentration are shown in Table 1.

Table 1

The Chilean Population in 1992: Percentage of Distribution, Surface and Density per Region

Region	Population	Percentage	Surface(km)	Density(inhab/km2)
I	339.579	2,5	58.698,1	5,8
II	410.724	3,1	126.443,9	3,2
III	230.873	1,7	75.573,3	3,1
IV	504.387	3,8	40.656,3	12,4
V	1.384.336	10,4	16.396,1	84,4
M.R.	5.527.937	39,4	15.348,8	342,6
VI	696.369	5,2	16.365,0	42,6
VII	836.141	6,3	30.301,7	27,6
VIII	1.734.305	13,0	36.929,3	47,0
IX	781.242	5,8	31.858,4	24,5
X	948.809	7,1	66.997,0	14,2
XI	80.501	0,6	109.024,9	0,7
XII	143.198	1,1	132.033,5	1,1
Country	13.348.401	100,0	756.626,3	

Source: Statistic National Institute, September 1993

Its main features are the following:

Metropolitan region with 5.527.937 inhabitants and a density of 342,6 inhabitants per square kilometre

V region (Valparaíso-Viña del Mar), with 1.384.336 inhabitants and a density of 84,4 inhabitants per square kilometre

VIII region (Concepción-Talcahuano), with 1.734.305 inhabitants and a density of 47 inhabitants per square kilometre

The climate conditions have been an important factor in respect of population distribution. For instance, it can be noticed that in the northern part of the country the climate conditions are characterised by an aridity stream, while in the southern part the main characteristic is related with excessive dampness and low temperatures.

Also, other important factors that have affected the population distribution are those related with topographic and stability factors and availability within the exploitation of resources.

In view of Chilean geographical characteristics, Chile must be considered a coastal country due to the following reasons:

There are many activities that are carried out in other areas, not considered coastal zones. However, these activities have a tremendous impact on the coastal area. About this respect, within the central and south zone of the country, the pollutant contribution in short and fast flowing rivers has a major expected influence compared with those countries which have more continental geography.

Another aspect in which Chile is characterised as a coastal country is that related with the proximity of dense population to coastal areas. This aspect produces a major mobility of people towards the coast, mainly due to tourist activity.

The main coastal cities of the country are 21, with a total of 2.180.046 inhabitants in 1992. Cities with more than 100.000 inhabitants predominate in the north and the central region of the nation. This means that the 50% of the littoral urban population are concentrated between the V region (Valparaíso-Viña del Mar) and the VIII region (Talcahuano-Concepción). These cities also concentrate the most important port and industrial activities, according to figures which are shown in Table 2.

The Chilean economy has had deep changes within its productive and institutional structure during the last decade. In accordance with this reality, the economic policy has been framed within the Social Market Economy, which has privileged the individual initiative, free competition and the openness to international trade.

As consequence of this economic policy, the marine environment has been affected by the intensive use of the coastal zones, especially through the port activities (exports and imports).

The main sectors of the product activity of goods (excluding services), were the industrial sector with 18% of the total of national gross geographic product. The other sectors were the agro-sector (7,8%); mining industry (7,3%); forest (3,2%) and fishing (1,2%). The service productive sector, in which are included the trade, transport and communication sectors among others, generated almost 50% of the national gross geographic product (Aguilera et al., 1992).

Table 2

Principal Coastal Cities and their Urban Population in 1992

City	Population
Arica	171.472
Iquique	160.220
Antofagasta	228.806
Tocopilla	24.597
Chañaral	12.076
La Serena	110.371
Coquimbo	110.499
Valparaíso	255.301
Viña del Mar	314.562
Quintero	13.626
San Antonio	74.167
Constitución	27.556
Talcahuano	241.344
Tomé	38.118
Penco	40.951
Coronel	84.285
Puerto Montt	96.109
Castro	19.698
Ancud	25.645
Puerto Natales	15.200
Punta Arenas	115.463
TOTAL	2.180.046

Source: Superintendence of Sanitary Services 1993. National Recompilation of Discharges of Liquid Industrial Residues.

2.3 Uses of coastal resources

The main Chilean coastal resources are made up by the following activities:

Fishing and Aquiculture
Maritime transport
Tourism

2.3.1 Fishing activities

The most important fisheries in Chile are the following:

Pelagic fishery. This activity is concentrated on the I, II and VIII region of the country in which the main captures are anchovy, jurel and sardine
Demersal fisheries. This activity is carried out within the central zone among the IV, V and VIII regions. The main extractions in this areas are common hake, prawn and crawfish
Demersal fishery of the Austral zone. Within this area, the capture activity is centred on the southern hake and the glue hake.

The total unload of captured species was 7.232.679 tons during 1996, in which the VIII region contributed 55% of the total unloaded. It was followed by the I region (14%) and the V region (11,8).

The total industrial fishing plants with different treatment plants are 438. They are distributed within the major regions of the country.

Also, the fishing fleet in 1996 was composed of 524 ships with 170.195 gross tonnage. The greatest quantity of fishing vessel registry is located in the I and VIII regions.

2.3.2 Aquiculture

The Aquiculture harvest has grown spectacularly since 1990, especially due to fish harvest.

In 1996 there were 1161 centres of cultivations and the major concentration of them (80%) were located in the X region according to the figures shown in Table 3.

2.3.3 Maritime transport and port activities

In connection with maritime transport it is possible to mention that in 1996 there were 59.224000 tons transported by this means.

The port system is made up as follows:

12 principal ports of general cargo

5 mining ports

35 small ports

Ports with major cargo handling are located in the north and central zones of the country. Ports which had over one million tons of transported cargo during 1996 were Iquique, Tocopilla, Antofagasta, Huasco, Quintero, Valparaíso, San Antonio, Lirquen, Talcahuano, San Vicente, Coronel and Puerto Montt.

Through the last 10 years, cargo exported by maritime transport has been doubled and cargo import has been tripled.

Table 3: Data related with fishing activity in Chile, 1996

Total Unload, 1996	7.232.679 tons.	I Region	14,0%
		V Region	11,8%
		VIII Region	55,0%

Industrial Unload	5.879.157 tons.	524 ships
Artisan Unload	752.763 tons.	12.619 small crafts
		40.574 fisherman

Treatment Plants	438	
Utilisation of Unloaded Products		87,0% fishmeal
		9,9% preserved food
		2,9% not processed

Aquiculture	323.115 tons	3,2% seaweed
		62,0% salmons
		6,0% molluscs
Centres of Cultivation	1.161	80,0% in the X Region.

Source: Annual Fishing Statistics, 1996. National Fishing Service, Chile.

2.3.4 Tourist activity

Tourism is another important activity related with the seashore, which has different characteristics depending on the region where it takes place. Beaches located in the I region and the II region are utilised during all the year due to the good weather conditions.

Beaches which belong to the IV region have acquired a notable significance during the last 5 years due to the development of an infrastructure focused towards tourism, which is carried out along the seashore.

The V region has beaches in the cities of Viña del Mar and San Antonio, which concentrate the major tourist activity in the country. Tourist activity comes from the Metropolitan region and from Argentina principally.

To sum up, the different productive areas of the country are concentrated principally within the following regions:

Diversified agriculture……..From VI to IX regions.
Vegetables…….Metropolitan and V regions.
Cattle trade……IX, X and XII regions.
Forestry…….X and XI regions.
Fishery……...I, II and VIII regions.
Aquiculture……X and XI regions.
Mining……II, III, IV and XI regions.
Industry……..Metropolitan, V and VIII regions.
Petroleum refineries…….….V, VIII and XII regions.
Tourism (beaches)…….I, II, IV and V regions.

2.4 Factors affecting the marine and coastal environment

The Social Market Economy, whose main characteristics are individual initiative, free competition and openness to international markets, has affected the state of the marine environment.

The openness to the external markets has brought as a result an intensive use of the coastal zone, especially through port activity, which generates a major volume of waste.

Also, the increase of productive activity has generated major pollution being carried out to the sea through the short routes of rivers.

Moreover, the exporter dynamism has been based on the expansion of the volume exported from the mining sector, as well as fishmeal, cellulose, wood, fruits and other products which also generate, directly or indirectly, substantial pollutants dumped to the sea through the rivers (Cabrera, 1994).

The land-based discharges have an important effect within the marine environment. Pollutants generated by domestic, industrial and mining discharges are the most important in terms of volume and continuity.

Other sources of significant pollutant are those related with agricultural activities which generate erosion and those which utilise pesticides, drilling places, terminals of discharge and chemical discharges or petroleum refineries.

The total discharge in the country has reached around 670.000 cubic metres per year. This total discharge associated to organic discharge in terms of biochemical oxygen demand (BOD 5) is around 180000 tons per year of which 79% is generated by

hydrographical basin and the other 21% is generated by direct discharges to the sea (Cabrera, 1994).

Chapter 3

The Legal Framework within the Marine Environment

The marine environment management process in Chile has basically only one legal Framework, which is composed of national and international regulations as follows in Figure 1.

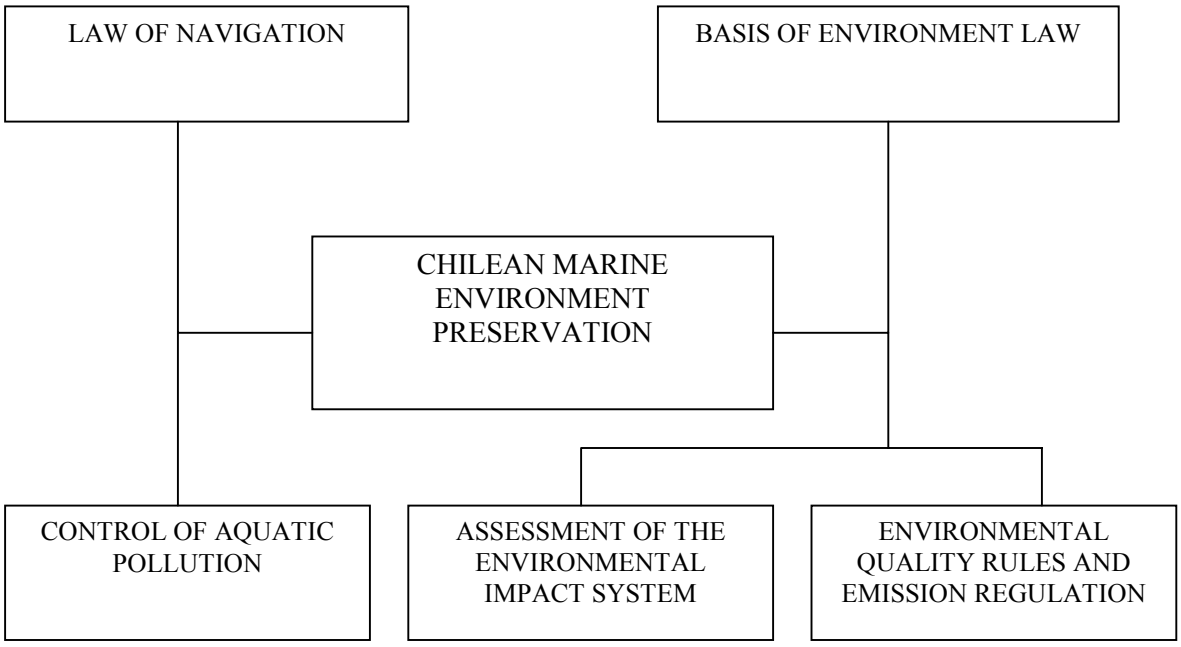

Figure 1: The Chilean marine environment legal framework

Through the present chapter, a description will be developed of the main national and international regulations associated with the marine environment scope in the country.

3.1 Description of national regulation

3.1.1 National Constitution of the Chilean State

The Chilean Constitution, which is the fundamental chart of the country, sets out in its Article 19, Number 8, the right of its national citizens to live within an environment free of contamination.

Based on this principle, the Chilean State has produced some specific regulations in order to comply with the requirement of this legal instrument.

Within the maritime scope, there are five principal regulations associated with marine environment preservation as follows:

- Basis of Environment Law.
- Law of Navigation.
- Control of Aquatic Pollution Regulation.
- Assessment of the Environmental Impact System Regulation.
- Environmental Quality Rules and Emission Regulation.

3.1.2 Basis of Environment Law

The Law of Basis of Environment, which entered into force the 9th of March 1994, is considered the principal environmental legal instrument of the country.

This legal instrument considers among other aspects the following:

- The Assessment of the Environmental Impact System must be applied to all those projects or activities within the public or private sector, in order to guarantee the economic development of the nation, considering within all its processes the social equity and environmental protection.
- The educational process, through the different levels, must ensure the transmission of knowledge linked to modern concepts of environmental protection, with the aim of understanding environmental problems.

3.1.3 The Law of Navigation.

The Law of Navigation, which entered into force the 21st of May 1978 and was passed by Supreme Decree Number 2222, considers in its Title X the contamination of the aquatic environment at sea and navigable rivers and lakes under national jurisdiction in accordance with Articles 142 to 163.

With regard to Article 142, it is important to emphasise its content, because in this section was set up the prohibition of throwing ballast and scraps and spilling petroleum or its derivatives or waste products. Also, it is forbidden to throw mineral waste or other harmful substances which may cause damage or detriment to waters under national jurisdiction and in ports, rivers and lakes.

The Law of Navigation also establishes the function of maritime authority with the General Director of the General Directorate of Maritime Territory and the Merchant Marine.

As maritime authority, the General Director must supervise, apply and enforce all the national and international regulation that the Chilean State has adopted in relation to the aquatic environment, through the different organs set up within the organisation.

Also, the General Director has to sanction the contravention committed against the law.

3.1.4 Control of Aquatic Pollution Regulation

The Control of Aquatic Pollution Regulation, passed by Supreme Decree Number 1 and entering into force the 6th of January 1992, considers six principal parts which are dedicated to general regulations, vessels, maritime and terrestrial terminals, industrial works, nuclear ships and transport of radioactive substances and fines. It also considers other measures which are applicable in case of violation to this regulation.

This legal instrument not only considers the main problem on board ships in relation to aquatic pollution but also considers through its legal text the land sources of pollution, particularly in its Article 135 which establishes the following:

"The regulations of the present title will be applicable to those establishments, works or" "activities, whenever products or goods are extracted, obtained, gathered up, processed," "elaborated, manufactured, exploited, etc., in which material or energy discharges," "coming from these functions may be dumped, directly or indirectly, into waters under" "national jurisdiction".

Finally, the same legal instrument establishes within its Title VI the sanctions and fines applicable according to the following criteria:

- Minor spill, discharge or dump:

  It is considered as such, when there are less than 5 cubic meters of hydrocarbons or mixture of hydrocarbons.

  It is also considered as such, when the situation is related with other different substances and when the situation is considered as a slight danger, which means that the harmful effects derived from the contaminated waters can be eliminated in a period of less than 12 hours of when the situation started.

- High spill, discharge or dump:

  It is defined as such, when there is more than 500 cubic meters of hydrocarbons or mixtures of hydrocarbons.

  It is also considered as such, when there is another different substance and its effects are considered as a serious danger, which means that the harmful effects coming from the contaminated waters are connected to the following factors:

High toxicity
Fire risk or exploitation
Proved destruction of the fauna and flora
Damages within the littoral
Harmful effects occuring in a protected or special area

3.1.5 Assessment of the Environmental Impact System Regulation

The Assessment of the Environmental Impact System Regulation, passed by Supreme Decree Number 30 which entered into force the 27th of March 1997, is a regulation derived from the Basis of Environment Law.

The present regulation validates the Paragraph 2, Title II of the Basis of Environment Law in the sense of defining projects which are sensitive to causing environmental impacts in relation to their nature and dimensions.

Also, it establishes norms about the environmental impact declarations in each case, according to the effects, characteristics and circumstances of each project.

Moreover, this regulation rules about the mitigating measures and compensations that must be considered within the project in relation to the adopted actions against the negative environmental impacts.

3.1.6 Environmental Quality Rules and Emission Regulation

The Environmental Quality Rules and Emission Regulation, which also comes from the Basis of Environment Law, set up procedures that must be followed to generate, validate or update the technical norms in connection with environmental quality aspects.

These environmental quality aspects are required from the competent sectarian authorities in order to carry out an efficient control work of the discharges or emissions of contaminated substances in sea, air and earth which come from different sources.

In relation to the marine environment, the application of the present regulation has permitted the establishment of the so-called “Discharge of Liquid Residues to Superficial Waters Rules”emission rules.

The Discharge of Liquid Residues to Superficial Waters Rules establish the maximum limits of concentration of the different pollutant parameters that normally are discharged into the aquatic environment such as oil, lead, mercury, and cadmium.

3.2 Description of international regulations

The international regulations dealing with marine environmental management are represented in Figure 2.

3.2.1 Global agreements

3.2.1.1 The United Nations Convention on the Law of the Sea

The most important measures to prevent, reduce and control the pollution of the marine environment are established within the Part XII, Section 1 of this convention.

In particular, Section 1 of the convention refers to, among others, measures to minimise the impact of pollutants coming from the following sources:

- The release of toxic, harmful or noxious substances from land based sources, through the atmosphere or by dumping.
- The direct or indirect transfer of damages or hazards from one area to another or transforming one type of pollutant to another.
- The use of technologies or the intentional or accidental introduction of species, alien or new, to the marine environment which may cause significant and harmful changes.

Furder more, the adopted measures include those necessary to protect and preserve rare or fragile acosystems and the habitat of marine species.

In connection with monitoring and environmental assessment, Section 4 sets up the need to observe, measure, evaluate and analyse, by scientific methods, the risk or effects of the pollution within the marine environment. In that sense, states have to keep under surveillance the effects of any activity that is likely to pollute the marine environment.

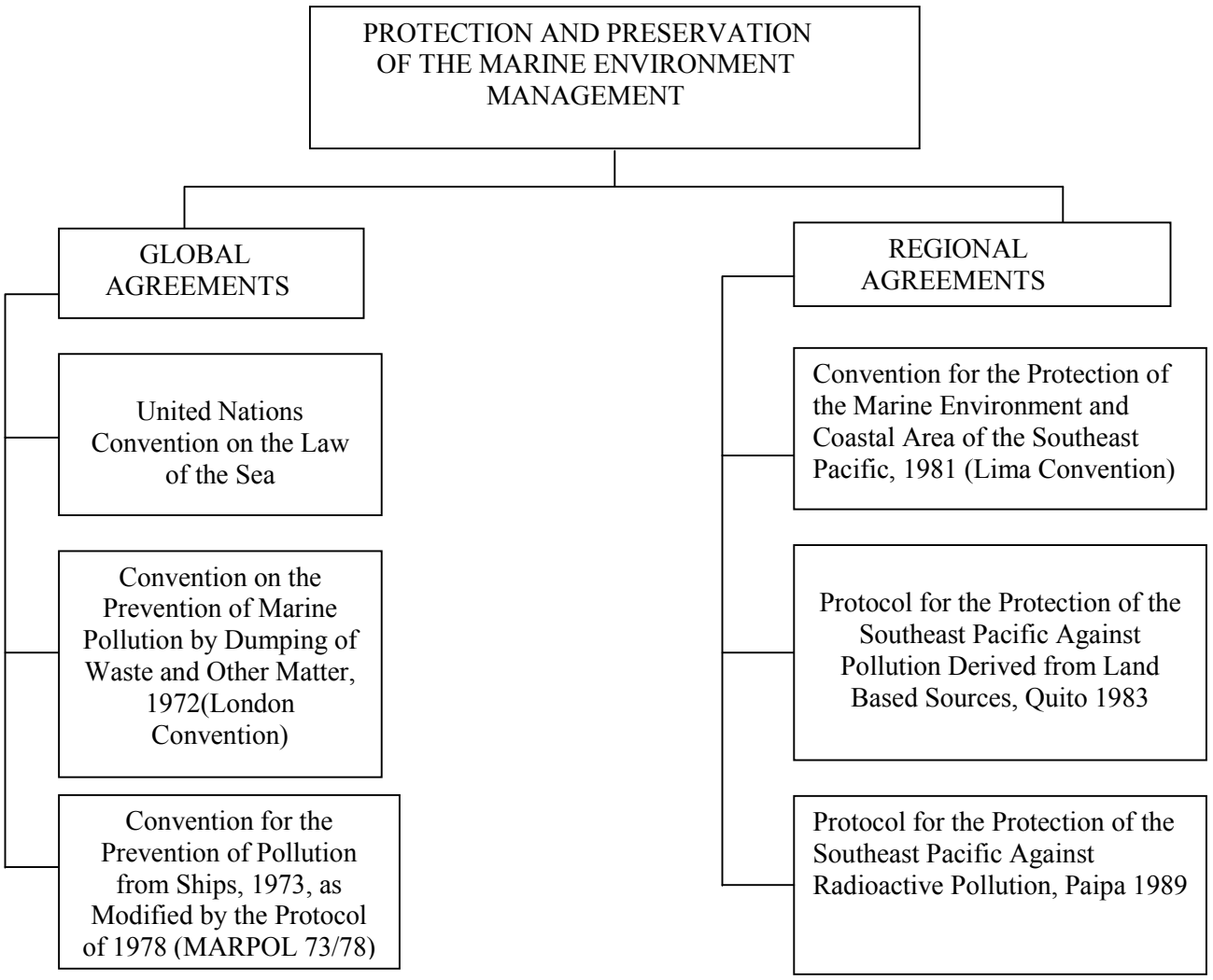

Figure 2: Global and regional agreements on protection and preservation of marine environment

3.2.1.2 Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Matter, 1972 (London Convention)

The Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter is considered the first global convention dealing with the control of marine pollution caused by a wide variety of substances. In this sense, the convention establishes a control mechanism that is based on the following criteria:

- The complete prohibition of the dumping at sea of particular harmful substances
- The establishment of licensing systems for the dumping at sea of all other substances

Moreover, the basic rules on constraints on dumping are included in Article IV of the convention. In this article is contained a general prohibition against dumping of any "waste or other matter in whatever form or condition, except as otherwise specified".

Also, the same article in its second part refers to specific substances and type of wastes or other matters.

About the special and general permit, it has to be granted by an authority taking into account the detailed criteria that are contained in Annex III of the convention.

Among other requirements, the authority has to deal with permits, keep records and monitor the condition of the sea.

3.2.1.3 Convention for the Prevention of Pollution from Ships, 1973, as Modified by the Protocol of 1978 (MARPOL 73/78).

The International Convention for the Prevention of Pollution from Ships is a combination of two treaties, which were adopted in 1973 and 1978 respectively.

This international instrument deals with the technical aspects of pollution from ships and applies to ships of all types. The disposal of wastes into the sea by dumping and pollution arising out of the exploration and exploitation of seabed mineral resources they are not included in this convention.

Also, the convention contains two protocols which refer to reports on incidents associated to harmful substances and the arbitration process.

Furthermore, it has five annexes dealing with regulations for the prevention of pollution as follows:

- Annex I: Pollution by oil
- Annex II: Pollution by noxious liquid and harmful substances
- Annex III: Pollution by harmful substances carried by sea in packaged form
- Annex IV: Pollution by sewage from ships
- Annex V: Pollution by garbage from ships

With regard to the scope of this work, there are three aspects which are relevant, and these refer to noxious liquid substances, sewage and garbage.

In connection with noxious liquid substances, they are covered in Annex II of MARPOL 73/78. The relevant aspects associated with this regulation are the following:

- The noxious liquid substances are evaluated for their hazard to the marine resources, human health or amenities
- The noxious liquid substances have been grouped into categories A, B, C and D, which recognises the wide diversity in physical and biological properties of these substances, category A being the most toxic

The pollution caused by sewage is covered by Annex IV of MARPOL 73/78. In this annex was set up the prohibition of ships to discharge sewage within four miles of the nearest land, unless they have in operation an approved treatment plant. It was also established that between four and twelve miles from land, sewage must be disinfected before discharge. The status of this annex is optional, and it is not in force.

Regarding pollution generated by garbage, this matter is covered by Annex V of MARPOL 73/78. The most relevant characteristics of this annex are the following:

- The total prohibition of the disposal of plastics into the sea
- The severe restrictions on discharges of other garbage from ships into coastal waters and special areas

Finally, it is also pertinent to mention Annex VI, which is not in force, and the proposed new Annex VII.

The Annex VI of MARPOL 73/78 contains rules about the prevention of air pollution from ships. The proposed regulation establishes the following restrictions:

- It sets limits on sulphur oxide and nitrogen oxide emissions from ship exhaust
- It prohibits deliberate emissions of ozone depleting substances
- It also prohibits the incineration on board ship of certain products, such as contaminated packaging materials and polychlorinated biphenyl (PCBs)

About the proposed new Annex VII, it will deal with the environmental damage caused by the introduction of unwanted aquatic organisms in ballast water.

In general, the problem of the introduction of unwanted aquatic organisms in ballast water is linked to the following aspects:

The ballast water taken by ships may contain aquatic organisms such as dinoflagelates, which may cause harm to the local marine life after their release

Also, pathogens such as the bacterium vibrio cholera, which causes cholera, have been transported with ballast water.

The consequences derived from the survival rate of species carried in ballast tanks have increasingly affecting new locations with consequences to local ecosystems.

3.2.2 Regional Agreements for the Southeast Pacific

3.2.2.1 Historical antecedents.

The United Nations Environment Programme, through its board of directors, has established the oceans as a priority area of action. Also, this organ has set up an special regional focus with regard to pollution control and marine and coastal control.

In 1974 it began the Regional Seas Programme that was supported by the United Nations Environment Programme. Actually, the Regional Seas Programme covers 12 different sea areas in which is included the Southeast Pacific, whose Action Plan was adopted by the governments of Chile, Colombia, Ecuador, Panama and Peru the 12th of November 1981.

At that time, these countries subscribed the Convention for the Protection of the Marine Environment and Coastal Areas of the Southeast Pacific and the Agreement on Regional Co-operation to Combat Marine Pollution Caused by Hydrocarbons and Other Harmful Substances in Emergency Situations in the Southeast Pacific.

Also, on that occasion, the state parties designated a permanent commission as regional co-ordination unit.

To implement the Action Plan, the Southeast Pacific Permanent Commission, supported by the United Nations Environment Programme, elaborated programmes of regional

interest which were approved by an intergovernmental meeting carried out in 1983. One of the resolutions adopted at this intergovernmental meeting was that related to the subscription to the Protocol for the Protection of the Southeast Pacific Against Pollution Derived from Land Based Sources, which was subscribed in Quito, Ecuador the 22nd of July 1983.

Finally, another important legal component of the Action Plan is the Protocol for the Protection of the Southeast Pacific against Radioactive Pollution, which was subscribed in Paipa, Colombia the 12th of September 1989.

3.2.2.2 Convention for the Protection of the Marine Environment and Coastal Area of the Southeast Pacific, 1981 (Lima Convention)

The Convention for the Protection of the Marine Environment and Coastal Area of the Southeast Pacific has been in force in Chile since 1986, and it was passed by Supreme Decree Number 296.

The state parties of this convention and the dates of deposit of its ratification instruments are according to the following antecedents:

State Party	**Ratification**	**Subscription**
Chile	20 March 1986	12 November 1981
Colombia	06 August 1985	12 November 1981
Ecuador	26 October 1983	12 November 1981
Panama	23 July 1986	12 November 1981
Peru	27 December 1988	12 November 1981

Within the present regional instrument, the state parties adopted an agreement based on measures for preventing, reducing and controlling the pollution of the marine environment and coastal area of the Southeast Pacific and ensuring suitable environmental management of the natural resources in this zone.

The most relevant adopted measures for preventing and controlling pollution of the marine environment include, among others, the following:

Managerial of control of discharges of toxic substances, especially those which are persistent and generated by land-based, atmospheric and dumping sources

Surveillance of the marine pollution in this area of responsibility

Assessment of the marine environmental impacts, preparing technical guidelines in order to facilitate the planning process of projects with the aim of reducing, to minimum level, possible consequences

Co-operation in case of pollution resulting from emergency situations

Interchange of information, in particular that related to research programmes oriented to finding new methods and techniques to avoid marine pollution

Scientific and technological co-operation

The implementation of the Lima Convention has generated the establishment of important projects and organs which have been necessary to support the objectives of this international instrument. The most relevant achievements of this convention, among others, are the following:

1 The Environmental Ordering Plan

Environmental ordering is a process of organising the human activities within the environment in direct relation to the socio-economic development and the conservation of nature.

The present plan was approved in the fourth intergovernmental meeting in 1989, its purpose being to establish suitable policies in order to regulate the use of coastal

areas within the Southeast Pacific. The main achievements of this plan are related to the following issues:

The establishment of a regional working group

The establishment of marine areas in the Southeast Pacific with the aim of implementing a pilot plan

The establishment of national working groups

2. The Chilean Coastal Profile Project.

The objective of this project is to prepare a synoptic description of the coastal areas, which presents eroded zones in order to evaluate impacts affecting the marine environment.

3.2.2.3 Protocol for the Protection of the South-east Pacific Against Pollution Derived from Land Based Sources, Quito, 1983

The Protocol for the Protection of the Southeast Pacific Against Pollution Derived from Land Based Sources has been in force in Chile since 1986, and it was passed by Supreme Decree Number 295.

The subscription, ratification and in force dates of this protocol are shown in the following antecedents:

State Party	**Subscription**	**Ratification**	**In force**
Chile	22-07-1983	20-03-1986	23-09-1986
Colombia	22-07-1983	06-08-1985	23-09-1986
Ecuador	22-07-1983	12-11-1987	11-01-1988
Panama	22-07-1983	27-07-1986	23-09-1986
Peru	22-07-1983	27-12-1988	12-02-1989

The scope of application of this protocol covers the Southeast Pacific area inside the maritime zone of soverignity and jurisdiction to 200 miles. It also covers the international waters until the fresh water boundary.

In particular, the protocol in its Article II defines marine pollution derived from land based sources, which cover the following sources:
Emissaries and coastal discharges
Discharges of rivers, channels or other watercourse, including the subterranean waters
Furthermore, Article III includes general obligations for the state parties of the protocol. The obligations are linked to the adoption of suitable measures for preventing, reducing and controlling the marine environmental pollution derived from land based sources when they produce or may produce dangerous effects, such as:
damage to living resources,
health risks,
obstruction of maritime activity,
detriment to sea water quality,
damage to sightseeing areas.
Also, Articles IV and V set up obligations with regard to Annexes II and I respectively. The land based sources generated by substances enumerated in Annexes II and I need to be treated according to established programmes and measures previously.

These programmes and measures must take into account the adaptation capacity of the actual installations.
Finally, in both articles it is declared that the substances enumerated in Annexes I and II will be subject to a surveillance and control system.
With regard to Article VII, it covers practices and procedures in connection with the following:

- Analysis to determine the length, depth and position of coastal emissaries
- Special instructions for effluents which need a separate treatment
- The required quality of marine water to generate the preservation of human health, living resources and the ecosystem
- The products, installations and industrial process control, which cause, in a significant way, the pollution by land based sources

The specific analysis related to discharged quantities with the aim of controlling the concentration of substances within the effluents and the discharge methods of the substances enumerated in Annexes I and II in order to fulfilthe required standards.

3.2.2.4 Protocol for the Protection of the Southeast Pacific against Radioactive Pollution, Paipa, Colombia 1989

The Protocol for the Protection of the Southeast Pacific Against Radioactive Pollution was ratified by the Chilean Government the 30th of April 1992. This instrument is not in force, because it is required that three state parties ratify the protocol according to its Article XV

The following table shows the actual situation of this international legal instrument:1

State Party	Subscription	Ratification
Chile	21-09-1989	30-04-1992
Colombia	21-09-1989	
Ecuador	21-09-1989	
Panama	21-09-1989	18-02-1991
Peru	21-09-1989	

The main involved principle of this protocol, which is derived from the Convention for the Protection of the Marine Environment and Coastal Area of the Southeast Pacific, is the following: the necessity of adopting measures to prohibit all kinds of dumping and/or burying of radioactive waste or other radioactive substances in the sea and/or the seabed and its subsoil.

Also, general obligations were set up in Article II of the agreement, prohibiting all dumping of radioactive waste and other radioactive substances to the sea and/or its seabed. The same kind of agreement is applicable to the burial of radioactive waste.

In addition, within the same legal body, the term dumping was defined as follow:

"All deliberate evacuation at sea of radioactive wastes or other radioactive substances," "carried out from ships, airships, platforms and other constructions at sea and all" "deliberated sinking at sea from ships, airships, platforms or other constructions in the" "sea which contain or transport such wastes or other substances".

Moreover, through the other articles of the protocol were established other different kind of measures in order to ensure the main principles contained in this legal instrument. The most relevant of them are:

- Measures for avoiding contamination
- Enumeration of radioactive wastes or other radioactive substances
- Scientific and technological co-operation
- Interchange of information
- Surveillance programmes
- Co-operation in case of emergency
- Training programmes

- Measures in case of force majeure.
- Announcing of law and regulation
- Sanction measures

Chapter 4

The Chilean Maritime Authority and Its Main Role in Marine Environmental Protection

4.1 The Chilean maritime administration

4.1.1 The Maritime Authority

According to the national legislation, the Maritime Authority, which is the General Director of the General Directorate of Maritime Territory and the Merchant Marine, represents the Chilean government's interests in national and international maritime affairs.

The General Directorate of the Maritime Territory and Merchant Marine is under the responsibility of the Ministry of Defence, through the Chilean Navy.

4.1.2 Features as a public administration

The General Directorate of Maritime Territory and the Merchant Marine is a decentralised organ of the state because it has its own legislation, which has set up the legal authority and responsibility to manage maritime matters within the country.

Also, the General Directorate has its own budget, according to the Law of Navigation, for maritime safety and environmental protection purposes principally. Moreover, the maritime public service is the main administrative role that is carried out by the Chilean maritime administration.

4.1.3 Institutional co-ordinations

At the ministry level, the maritime authority is closely related in its work to the Ministry of Transport and the Ministry of Economy.

The former is responsible for the general policy and the Law of the Promoting and Protecting of the National Merchant Marine. In this legal framework, maritime authority personnel have to control the enforcement of the Charge Reciprocity Agreement that the Chilean government has set up with other foreign countries.

The latter has a special department named "Subsecretary of Fishery", and its principal function is to co-ordinate fishing activities in the maritime jurisdiction in accordance with national and international regulations. The national regulation is based on the Law of Fishing. The international regulation is according to the Law of the Sea.

4.1.4 Legal framework

The principal laws that give the legal authority to the Chilean Maritime Authority within the maritime field are the following:

- The Law of Navigation, passed by Law Decree N° 2222 in 1978
- Organic Law, passed by Law Decree N° 292 in 1953
- International Conventions and Codes related to the safety of life at sea, safety of navigation and preservation of the marine environment

With regard to international conventions related to maritime safety and environmental protection, these instruments have been adopted, ratified and implemented within the Chilean legislation.

The process by which Chile has converted international conventions into national laws is based on the dualistic method of implementation in which some form of legislative action must be carried out previously by the competent authority.

The particular procedure to implement national laws coming from maritime international sources is based on the following steps:

- The state becomes party of the convention by signing it. The subscription at that instance is subject to ratification by the Chilean Congress.
- Once the Chilean Congress has made the pertinent analysis in order to adapt those relevant aspects stated in the international instrument to the national interests in that particular field, the convention is ratified by the national government through a supreme decree.
- After the last step, the Chilean Foreign Affairs Ministry sends the instrument of ratification to the Secretary-General of the International Maritime Organisation.
- Finally, the legal instrument approved by the Congress and the Chilean government is published in the official bulletin during three consecutive days.

4.1.5 Mission and main functions

The General Directorate of Maritime Territory and the Merchant Marine has defined its mission, which is derived from the legal framework, according to the following statement:

"In order to contribute to the development of the maritime power of the country, to" "look after the safety of maritime navigation; the protection of the human life at sea," "goods and resources of the national maritime zone; its coast and coastal area, and" "take care of the maritime interests of the nation"

Based on the national and international legal framework and the mission statement of the organisation, the General Directorate covers the subsequent functions as follows:

- Safety of life at sea, and in rivers and lakes
- Safety of navigation
- Marine environmental protection
- Administration of maritime state property
- Order, safety and security and discipline on board ships and in port areas
- Technical and professional control of the merchant marine
- Support to fishing activity control
- Scientific research activities
- Nautical sport activities control
- Inspection of maritime divers and diving equipment
- Marine casualties and law violations
- Representation of the Chilean government

In connection with the marine environmental protection function, the General Directorate carries out the following specific tasks:

- To promote the adoption of national standards to preserve the marine environment from contamination.
- To apply and inspect the fulfilment of all national and international standards regarding the marine environment
- To fight pollution, if any, within its national jurisdictional waters

4.2 Enforcement of control mechanisms for the marine environment

4.2.1 The National Plan of Research, Surveillance and Control of Marine Pollution

The Chilean maritime administration has developed a dynamic policy about marine environmental preservation, which is based on the concept that the earth and the sea are part of the same major system on the planet.

From this perspective, it is considered that the sea will normally be the final recipient of the alterations, effects or impacts that human beings may produce through their varied activities affecting therefore other ecosystems.

According to above statement and taking into account the Law of Navigation, the Chilean maritime administration prepared in 1997 the National Plan of Research, Surveillance and Control of Marine Pollution, with the aim of protecting, promoting and developing the national marine resources in its jurisdiction.

The objectives of this plan are the following:

- To evaluate the condition and quality, in a permanent way, of the water bodies in relation to the environmental impacts caused by the different uses or activities carry out at sea, in the coastal zone or in other marine areas under national jurisdiction
- To support the development of those national legal instruments that promote effective control and protection mechanisms for the marine environment within the national jurisdiction
- To draw up suitable strategies with the aim of contributing to national awareness in connection with the preservation of the marine environment

In order to achieve the objectives of the national plan, Chilean maritime administration has developed four main programmes (Fig.3), which are the spine of the marine environmental management.

4.2.2 The Control of the Marine Pollution Programme

In 1987 the Chilean Maritime Administration began, through this programme, to generate resolutions and guidelines oriented to the establishment of concrete control measures of the marine pollution within the country.

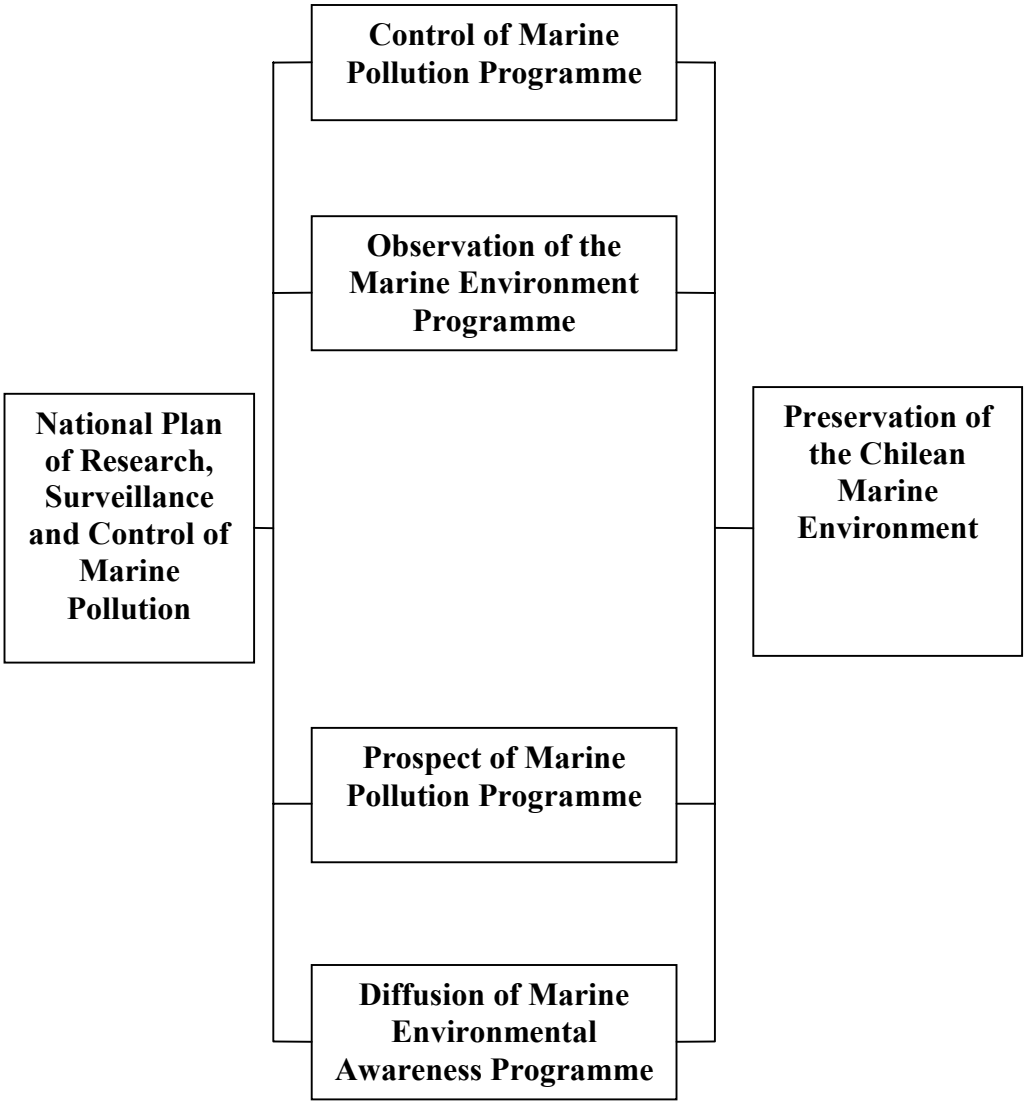

Fig.3. The National Plan of Research, Surveillance and Control of the Marine Pollution in Chile.

The control measures were mainly focused toward the following issues:

- To require information on aquiculture activities
- To select dumping waste zones for dredge material
- To regulate the discharge of liquid waste pollutants into the marine environment

- To set contingency plans on oil spillage and other harmful substances in the maritime jurisdiction
- To set preventive measures to avoid transmission of harmful species and epidemics through ballast water

The Control of Aquatic Pollution Regulation set up in its Article 141 that the activities carried out in the marine ecosystem of national jurisdiction shall be preceded by an environmental impact assessment.

The objective of this article was to establish a base in order to formulate a statement of the ecological conditions of the activities at that time and the basic characteristics of the area in which the activity was carried out.

The main purpose of this rule was to have concrete data in order to verify the generation of eventual changes within the marine environment caused by dumping liquid waste and to propose suitable mitigating measures according to the actual situation.

Today, the requirements of environment assessment and the faculty to give environmental authorisation by the Chilean Maritime Authority are incorporated from Articles 66 to 71 of the Assessment for the Environmental Impact System Regulation.

Taking into account the Basis of Environment Law, the Chilean Maritime Authority is part of the Regional Environmental Commissions (COREMAs) in which its principal role is based on direct competency in giving environmental permission to authorise discharges of liquid wastes or other substances in its marine jurisdiction, derived from different operational activities or uses of the coastal zone.

In this context, the Chilean Maritime Authority has environmental competency like other public organ with respect to revising the environmental impact assessment linked to investment projects under this technical requirement, which is carried out jointly with the Regional Environmental Commissions.

In particular, the Chilean Maritime Authority has competency to require, if it is necessary, additional assessment studies or mitigating measures, monitoring processes or other complementary steps before giving environmental permissions.

Also, within the Environmental Quality Rules and Emission Regulation framework, the objective of the Control of Marine Pollution Programme is oriented to elaborate internal and external regulations which are necessary for the control of marine pollution. In this sense, the contribution of this programme is oriented to give technical and scientific information in order to support rules related to the following issues:

- Quality of seawater, with the aim of protecting specific uses
- Regulations on industrial liquid waste pollutants discharged into sewer systems
- Regulations on liquid waste pollutants discharged into shallow waters

Finally, the purpose of this Control of Marine Pollution Programme is to develop a data base which principal orientation will be to comply, identify and process the information from the principal emission sources with the purpose of adopting preventive measures, knowing the marine environmental performance and evaluate its tendencies in relation to the environmental quality rules.

4.2.3 Observation of the Marine Environment Programme

The prime objective of this environmental monitoring programme is to determine the concentration levels of the principal marine pollutants.

Also, the main effort on this objective which is centralised in the principal coastal zones where high activities are carried out, is to measure the relevant pollutants (table 4), those which enables having a suitable perception about the environmental quality of waters in those marine areas.

The goal of the Observation of the Marine Environment Programme is to evaluate the quality of the marine environment under Chilean maritime jurisdiction.

The general objective of this programme is to determine the concentration levels of the principal pollutant agents that are present in the water, biota and sediments that are distributed along the national maritime territory.

The specific objectives of the present programme are the following:

- To determine the concentration levels of different kinds of pollutants (organic, inorganic, heavy metals, etc.) which are within the monitored water
- To set up an alerting system in order to detect on time any negative environmental changes with the aim of introducing appropriate corrective measures when they are necessary
- To detect increasing tendencies of pollutant concentrations which may affect human health or hydrobiologic resources
- To generate environmental data which permits and supports the establishment and subsequent supervision of future environmental quality rules with the aim of protecting specific uses

The Observation of Marine Environment Programme has been operating since 1988, in which the first programme step was developed in the Quintero bay in the beginning, while in 1989 and 1990 it was carried out trough activities in Arica, Iquique, Taltal, Chañaral, Coquimbo, Quintero, San Antonio, Talcahuano and San Vicente.

Parameters	Water	Sediment	Biota
Total nitrogen	x	x	
Nitrate	x		
Ammonium	x		
Phosphate	x		
Total phosphorus	x	x	
Biochemical oxygen demand	x		
Chemical oxygen demand	x		
Fats	x		
Polycyclic aromatic hydrocarbons	x		
Total hydrocarbons	x		
Chlorophyllous "a"	x		
Polycloric bifenils		x	
Chloro organic pesticides		x	
Total organic material		x	
Mercury	x	x	x
Cadmium	x	x	x
Lead	x	x	x
Copper	x	x	x
Cinc	x	x	x
Chromium	x	x	x
Aluminium	x	x	x
Total coliforms	x	x	x
Fecal coliforms	x	x	x

Table 4: Sampled parameters through the Observation of the Marine Environment Programme with relation to water, sediment and biota.

In 1991 were added the water bodies of Antofagasta, Tocopilla, Caldera, Puerto Montt, Castro and Punta Arenas in which the coverage was kept until 1992.

In 1993 the Observation of Marine Environment Programme structure incorporated the Ranco, Villarrica and Llanquihue lagoons to the monitoring system.

At the end of 1996, the Observation of the Marine Environment Programme was subjected to an exhaustive analysis and assessment process that generated, as a

result, a complete change in its approach, goals and objectives. In this sense, the effort strongly emphasised the sedimentary mould. The quantity of parameters and the number of sampled stations of the sedimentary mould were modified.

The modification was made considering the actual results obtained from international tendencies in this field in which by using the sedimentary mould, due to its stability over time the best environmental registry can be obtained.

The data generated within the last ten years of measuring is perceived today as a minimum to establish time series analysis, which may give significant results. Through its application it will be possible to forecast the probable evolution within marine environmental performance by determining the increasing or decreasing tendencies shown in the monitored pollutant parameter values.

4.2.4 The Prospects of Marine Pollution Programme

The general objective of this programme is to establish a characterisation system and an environmental management process for the water bodies that are under the national jurisdiction.

With regard to the specific objectives, they are linked to the following aspects:

- To develop, implement and put into practice an environmental database with the aim of giving a dynamic and real sense to the available environmental information
- To comply, in a concrete way, with the specific objectives of the Observation of the Marine Environment Programme
- To utilise and manage the generated data from the application of the Control of the Marine Pollution Programme with the purpose of carrying out the control role of the Chilean maritime authority in this scope

4.2.5 The Diffusion of Marine Environmental Awareness Programme

The present programme is oriented to elaborate suitable diffusion strategies. The purpose is to contribute to the development of national citizen awareness with respect to the preservation of the marine environment.

The general objectives of theprogramme are the following:

- To develop a distinctive symbol in order to represent the marine environment in the national jurisdiction and to promote the connected activities carried out by the Chilean maritime administration in this scope
- To promote, at the national level, the main activities derived from the National Plan of Research, Surveillance and Control of the Marine Pollution and its programmes
- To promote the conceptual scientific elements that are involved in the actual situation of the marine environment in Chile, in particular the sustainable development concept

Chapter 5

The Marine Environmental Protection Training Programme

5.1 Scope of the training programme

The scope of the present training programme is developed taking into consideration the following weaknesses of the course plan for Maritime Affairs specialisation concerning the marine environmental protection subject:

a. The approved course plan takes into consideration that the concerns of marine environmental protection are principally based on oil pollution. Therefore, the effort in academics is more focused on teaching operational procedures in order to combat oil spills within the national jurisdiction than on pollution prevention.

   The above fact makes the approved course plan somewhat limited if the responsibilities that the Chilean State must carry out in preventing maritime pollution in the light of pollution definition implications derived from the national legislation and the sustainable development philosophy are considered.

b. Likewise, the approved course plan for those applicant officers to the specialised degree in Maritime Affairs does not consider the management of marine environmental pollution caused by land based sources which are generated, among other causes, by urban and industrial activities.

c. In addition, the course plan does not consider ships as a source of pollution in their normal operations or when they carry harmful substances at sea. This aspect

is relevant in particular when port state control activities are carried out in jurisdictional waters.

5.2 Objectives of the Marine Environmental Protection Training Programme

Taking into account the foundations set up in the previous paragraphs and the topics described in chapters 1, 2, 3 and 4 of this research paper, in developing the training programme, the following objectives are considered

5.2.1 General objectives

- To give an actual overview of Chilean marine environmental pollution
- To describe the main regulatory framework concerning marine environmental protection that is applicable to the Chilean jurisdiction
- To present the fundamental role of the Chilean maritime authority associated with the scope of protection of the marine environment
- To describe the major enforcement and control mechanisms in relation to marine environmental protection in Chile
- To provide a suitable background related to the principal concepts that are involved in marine pollution issues, in order to prepare personnel who will complete an advanced degree with detailed specialisation

5.2.2 Specific objectives

- To give an extended overview of the principles and sources of marine pollution
- To explain the causes and effects of the main threats that are affecting the marine environment, on a global basis
- To explain in detail the present legal framework dealing with marine pollution in Chile.

- To explain the enforcement and control mechanisms which help to reduce marine pollution in Chile.

5.3 Subject length

The proposal for the subject length has been developed taking into account that the training programme will be incorporated during the second year of the specialised degree according to the following:

Topic	Theory (Hours)	Practice (Hours)
1 Principles of marine pollution	2	1
2 Sources of marine pollution	2	0
3 Threats affecting the atmosphere	2	0
4 Threats affecting oceans and seas	2	0
5 Threats related to marine pollution	2	0
6 The United Nation Convention on the Law of the Sea	4	0
7 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters, 1972.	3	0
8 Convention for the Prevention of Pollution from Ships 1973, as Modified by the Protocol of 1978	6	3
9 Convention for the Protection of the Marine Environment and Coastal Areas of the S. Pacific	3	0
10 Protocol for the Protection of the S. Pacific Against Pollution Derived from Land Based Sources, 1983	3	0
11 Protocol for the Protection of the S. Pacific Against Radioactive Pollution, 1989	3	0
12 The Chilean State Constitution	2	0
13 Basis of Environmental Law	2	0
14 The Law of Navigation	3	0
15 Control of Aquatic Pollution Regulation	2	0
16 Assessment of Environmental Impact System Reg.	2	0
17 Environmental Quality and Emission Rules Reg.	2	0
18 The Chilean Maritime Administration	2	0
19 The National Plan of Research, Surveillance and Control of Marine Pollution	4	2
20 Programmes of the National Plan of Research, Surveillance and Control of Marine Pollution	4	2

5.4 The Marine Environmental Protection Training Programme

The proposal for the following training programme is based on the content treated in chapter 1 to chapter 5 of this dissertation.

Also, it is important to stress that the training proposal project has not considered for the purpose of this research paper the technical academic aspects that are involved in programming and assessing stages. Technical personnel of the General Directorate of Maritime Territory and the Merchant Marine will solve this requirement.

The Marine Environmental Protection Training Programme

I. Principles and sources of marine pollution

1. Principles of marine pollution

1.1 Ecosystem
1.2 Pollution
1.3 Conservation philosophy
1.4 Protection
1.5 Rational use of natural resources
1.6 Sustainable development
1.7 Environmental impact assessment

2. Sources of marine pollution

2.1 Industry
2.2 Agriculture

2.3 Maritime transport

2.4 Energy

2.5 Mining

II. Causes and effects of the main threats affecting the marine environment

1. Threats affecting the atmosphere

1.1 Greenhouse gases

1.2 Global warming

1.3 Ozone layer depletion

2. Threats affecting oceans and seas

2.1 Sea level rises

2.2 Eutrophication

2.3 Plankton blooms

2.4 Introduction of exotic species

2.5 Overfishing

2.6 Loss of biodiversity

2.7 Pollution by oil

2.8 Pollution by harmful substances

3. Threats related to marine pollution

3.1 Trans-shipment of toxic waste

3.2 Contamination by chemicals

3.3 Radioactive contamination

3.4 Litter and plastic waste

3.5 Bacterial contamination

III. The legal framework within the Chilean marine environment

1. International regulations

1.1 The United Nations Convention on the Law of the Sea

1.1.1 Measures to prevent reduce and control marine pollution

1.1.2 Measures to protect and preserve fragile ecosystems

1.1.3 Monitoring and environmental assessment

1.2 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (London Convention)

1.2.1 Scope of the convention

1.2.2 Control mechanisms

1.2.3 Special permits

1.2.4 General permits

1.3 Convention for the Prevention of Pollution from Ships, 1973, as Modified by the Protocol of 1978 (MARPOL 73/78)

1.3.1 General background

1.3.2 Special areas

1.3.3 Reception facilities

1.3.4 Harmful substances other than oil

1.3.5 Categorisation of noxious liquid substances

1.3.6 Regulation on discharge of noxious liquid substances

1.3.7 Control of noxious liquid substance discharge

1.3.8 Control of oil discharge

1.3.9 Retention systems for oil on board

1.3.10 Segregated ballast tanker

1.3.11 Inert gas system

1.3.12 Monitoring and control systems for oily water separating equipment

1.3.13 Sewage

1.3.14 Garbage

1.3.15 Exhausting gases from propulsion engines

1.3.16 Volatile organic compound

1.3.17 Alien species in the ballast water

1.3.18 Anti-fouling substances in the paint of ships

1.3.19 Underwater noise from ships

1.4 Convention for the Protection of the Marine Environment and Coastal Area of the Southeast Pacific, 1981 (Lima Convention)

1.4.1 Geographic scope

1.4.2 Definitions

1.4.3 General responsibilities for State parties

1.4.4 Measures to prevent reduce and control the marine environment pollution

1.4.5 Pollution surveillance activities

1.4.6 Scientific and technological co-operation

1.5 Protocol for the Protection of the Southeast Pacific Against Pollution Derived from Land Based Sources, Quito 1983

1.5.1 Scope of application

1.5.2 Sources of pollution

1.5.3 General responsibilities for state parties

1.5.4 Surveillance programmes

1.5.5 Scientific and technological co-operation

1.5.6 Sanction measures

1.6 Protocol for the Protection of the Southeast Pacific Against Radioactive Pollution, Paipa 1989

1.6.1 Geographic scope

1.6.2 General responsibilities for state parties

1.6.3 Measures to prevent pollution

1.6.4 Enumeration of radioactive waste or other radioactive substances

1.6.5 Scientific and technologic co-operation

1.6.6 Surveillance programmes

1.6.7 Co-operation in emergency cases

1.6.8 Training programmes

1.6.9 Measures in case of force majeur

1.6.10 Sanction measures

2. National regulations

2.1 The Chilean State Constitution

2.1.1 General background

2.1.2 The Chilean State's responsibilities

2.2 Basis of Environment Law

2.2.1 General regulations

2.2.2 Environmental impact assessment system

2.2.3 Emission rules

2.2.4 Control mechanisms

2.3 The Law of Navigation

2.3.1 General background
2.3.2 Prohibition of polluting
2.3.3 Functions of the Maritime Authority
2.3.4 Sanctions and fines

2.4 Control of Aquatic Pollution Regulation

2.4.1 General regulations
2.4.2 Scope of application
2.4.3 Preventive measures to reduce pollution caused by dumping

2.5 Assessment of the Environmental Impact System Regulation

2.5.1 General regulations
2.5.2 Requirements in presenting an environmental impact assessment study
2.5.3 Content of the environmental impact assessment
2.5.4 Control mechanisms related to environmental impact assessment
2.5.5 Environmental authorisation

2.6 Environmental Quality Rules and Emission Regulation

2.6.1 General regulations
2.6.2 Procedures for dictating rules of environmental quality and emissions
2.6.3 Special rules

IV. The Chilean Maritime Authority and its main role within marine environmental protection

1. The Chilean maritime administration

1.1 The Maritime Authority
1.2 Features as a public administration
1.3 Institutional co-ordinations
1.4 Mission and main functions

2. Enforcement and Control mechanisms for protection of the marine environment

2.1 The National Plan of Research, Surveillance and Control of Marine Pollution

2.1.1 General background
2.1.2 Objectives of the national plan
2.1.3 Programmes of the national plan
2.1.4 The Control of Marine Pollution Programme
2.1.5 The Observation of Marine Programme
2.1.6 The Prospect of Marine Pollution Programme
2.1.7 The Diffusion of Marine Environmental Awareness Programme

Chapter 6

Conclusions and Recommendations

6.1 General conclusions

6.1.1 Chile, as a maritime country, has had deep changes in its productive structure during the last decade. The causes of these changes are mainly due to its natural maritime geographical position within the South American continent in which the principal route to take its national products to the international commercial markets is made through the sea.

6.1.2 The exporter dynamism that has generated an increasing commercial activity has affected the natural equilibrium of the marine environment adversely. Also, the proximity and concentration of dense population are important factors that have affected the Chilean marine environment.

6.1.3 The function of maritime state property administration is of significant importance to the Chilean maritime administration, because the majority of and the most relevant activities are carried out in the maritime jurisdiction of the country. In this context, there are two guidelines that are mandatory for the Chilean maritime administration as follows:

- To preserve marine environment free of contamination
- To look after the fulfilment of the requirements to use and to exploit the natural marine resources within the natural jurisdiction

6.1.4 The Chilean State during the last 20 years has implemented a suitable legal framework in order to prevent and to reduce adverse impacts caused by different sources of pollution in the national maritime jurisdiction. In that sense, international regulation dealing with the prevention of pollution at sea can be considered as an important contribution towards the development of the Chilean regulation associated with the same scope.

6.1.5 Moreover, the international regional agreements established in the Southeast Pacific represent relevant measures in order to:

- Prevent, reduce and control the pollution of the marine environment and coastal areas and to ensure suitable environmental management of natural resources in this zone;
- Prevent, reduce and control the marine environmental pollution caused by land based sources when they produce or may produce harmful effects to living resources, health risks, obstruction to marine activity, detriment to sea water quality or damage to sightseeing areas; and
- Prohibit all kind of dumping and/or burying of radioactive waste or other radioactive substances in the sea and/or the seabed and its subsoil.

6.1.6 Also, at the national level, the legal framework associated with the National Plan of Research, Surveillance and Control of Marine Pollution has played an important role with regard to the preservation of the Chilean maritime environment.

This national plan has enabled Chile some authority to develop a control mechanism in order to evaluate the condition and quality of water bodies in relation to the environmental impacts caused by the different uses of the sea or activities carried out at sea. Likewise, it has enabled Chile some authority to develop suitable strategies linked to national awareness in connection with the preservation of the national marine environment.

6.2 Specific Conclusions

6.2.1 The proposal Marine Environmental Protection Training Programme for those applicant officers to the specialised degree in maritime affairs is a suitable one which enables Chilean maritime administration to solve the actual inconsistency in the present approved course plan, which is focused on oil spills matters.

6.2.2 Unlike the present approved marine environmental protection subject, the proposed training programme on marine environmental protection considers an integrative perspective on the marine environmental protection management issues that are applicable within the Chilean maritime jurisdiction. In particular, the proposed training programme contributes to the following aspects:

- To give an overview on principles and sources of marine pollution
- To explain causes and effects of the main threats that affect the marine environment on a global basis
- To explain in detail the present legal framework dealing with marine pollution in Chile
- To explain the enforcement and control mechanisms which help to reduce marine pollution in Chile

6.2.3 Also, the proposed training programme enables the Chilean maritime administration to adapt its effort by training its personnel in a massive way, in order to add value towards the national awareness policy on marine environmental protection, in which are involved the public and private sectors of the country.

6.3 Recommendations

6.3.1 The General Directorate of the Maritime Territory and Merchant Marine should consider the adoption of the proposed training programme in order to adapt the actual approved subject on marine environmental protection, taking into consideration the following two aspects:

- The first aspect is to put into agreement the approved course plan with those functional responsibilities in marine environmental protectionassigned to the Chilean maritime administration, in order to promote the adoption of national standards to preserve the marine environment from contamination on a global basis.
- The second aspect that the Chilean maritime administration must consider is to approve a course plan on marine environmental protection according to the proposed training programme. The objective is to apply and inspect the fulfilment of the adopted national and international standards associated with the management of marine environmental pollution caused by human activities, analysing this topic from an integral perspective.

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