Annexes

Annex I
List of contributing authors and organisations

Name	Institution	Country	Field of work
Ulises Munaylla	Plan of Action- CPPS	Peru	Focal Point of GIWA region 64 Humboldt Current
Mario Hurtado	Hurtado and Asociates	Ecuador	Environmental Consultant
Stella de la Torre	Universidad San Francisco de Quito	Ecuador	Environmental Consultant
Nora Cabrera	Sanitary Service Super- intendance	Chile	Wastewater
Mario Herrera Araya	DIRECTEMAR	Chile	Environmental impact assessment, oceanography, environmental politics
Betsabé Hurtado Castro	DIRECTEMER	Chile	Environmental politics, ecology
Hugo Salgado Cabrera	University of Conception	Chile	Environmental and natural resources economics, fishery economics and regulation
Claudio Dagach Contreras	DIRECTEMAR	Chile	Pollution control
Adolfo Acuña	University of Concepción	Chile	Environmental sciences
Rosa Aguilera Vidal	University of Conception	Chile	Economy
Carla Falcón Simonelli	DIRINMAR	Chile	Fisheries
Susana Arciniegas	Military Geographic Institute	Ecuador	Geographic information system
Hernán Moreano Andrade	PMRC	Ecuador	Integrated coastal zone management
Fernando Coello Navarro	Undersecretary of Fishing Resources	Ecuador	Fisheries
Miguel Fierro Samaniego	ESPOL	Ecuador	Socio-economic aspects of coastal management
Elizabeth Flores Abad	University of Guayaquil	Ecuador	Socio-economic aspects of coastal management
Manuel Valencia Touris	INOCAR	Ecuador	Industrial wastewater
Luis Arriaga Mosquera	National Institute of Fisheries	Ecuador	Fisheries, environmental politics
Héctor Ayón	ESPOL	Ecuador	Environment and natural resources, pollution
Hernán Moreano	DIGEIM (adviser)	Ecuador	Environmental politics
Godofredo Cañote	IMARPE	Peru	Environmental politics, fisheries
Sulma Carrasco	IMARPE	Peru	Pollution
Jorge Ponce San Román	Ministry of Foreign Affairs	Peru	Environmental politics
Carmen Conopuma Rivera	Water and Sanitation enterprise of Lima	Peru	Wastewater
Elsa Galarza Contreras	IMARPE	Peru	Environment economy
Guadalupe Sánchez Rivas	IMARPE	Peru	Marine and coastal environmental management
Renato Guevara Carrasco	IMARPE	Peru	Fisheries
Marcia Marques	GIWA	Brazil	Regional Coordinator for Latin-America and the Caribbean
Johnny Chavarría	Hurtado and Asociates	Ecuador	Environmental Consultant
Gustavo Yturralde	Hurtado and Asociates	Ecuador	Environmental Consultant
Fernando Félix	Plan of Action-CPPS	Ecuador	Editor

Annex II
Detailed scoring tables

I: Freshwater shortage

Environmental issues	Score	Weight	Environmental concern	Weight averaged score
1. Modification of stream flow	1	15	Freshwater shortage	1.9
2. Pollution of existing supplies	2	60		
3. Changes in the water table	2	25		

Criteria for Economics impacts	Raw score	Score	Weight %
Size of economic or public sectors affected	Very small – Very large 0 1 2 3	2	30
Degree of impact (cost, output changes etc.)	Minimum – Severe 0 1 2 3	3	60
Frequency/Duration	Occasion/Short – Continuous 0 1 2 3	1	10
Weight average score for Economic impacts		**2.5**	
Criteria for Health impacts	**Raw score**	**Score**	**Weight %**
Number of people affected	Very small – Very large 0 1 2 3	2	40
Degree of severity	Minimum – Severe 0 1 2 3	2	60
Frequency/Duration	Occasion/Short – Continuous 0 1 2 3	1	10
Weight average score for Health impacts		**1.9**	
Criteria for Other social and community impacts	**Raw score**	**Score**	**Weight %**
Number and/or size of community affected	Very small – Very large 0 1 2 3	2	60
Degree of severity	Minimum – Severe 0 1 2 3	2	20
Frequency/Duration	Occasion/Short – Continuous 0 1 2 3	2	20
Weight average score for Other social and community impacts		**2.0**	

II: Pollution

Environmental issues	Score	Weight	Environmental concern	Weight averaged score
4. Microbiological	2	35	Pollution	1.9
5. Eutrophication	1	5		
6. Chemical	2	30		
7. Suspended solids	2	10		
8. Solid wastes	2	5		
9. Thermal	1	3		
10. Radionuclides	1	2		
11. Spills	2	10		

Criteria for Economics impacts	Raw score	Score	Weight %
Size of economic or public sectors affected	Very small – Very large 0 1 2 3	2	30
Degree of impact (cost, output changes etc.)	Minimum – Severe 0 1 2 3	2	60
Frequency/Duration	Occasion/Short – Continuous 0 1 2 3	2	10
Weight average score for Economic impacts		**2.0**	
Criteria for Health impacts	**Raw score**	**Score**	**Weight %**
Number of people affected	Very small – Very large 0 1 2 3	2	40
Degree of severity	Minimum – Severe 0 1 2 3	2	50
Frequency/Duration	Occasion/Short – Continuous 0 1 2 3	1	10
Weight average score for Health impacts		**1.9**	
Criteria for Other social and community impacts	**Raw score**	**Score**	**Weight %**
Number and/or size of community affected	Very small – Very large 0 1 2 3	2	50
Degree of severity	Minimum – Severe 0 1 2 3	2	30
Frequency/Duration	Occasion/Short – Continuous 0 1 2 3	2	20
Weight average score for Other social and community impacts		**2.0**	

III: Habitat and community modification

Environmental issues	Score	Weight	Environmental concern	Weight averaged score
12. Loss of ecosystems	2	55	Habitat and community modification	2.0
13. Modification of ecosystems or ecotones, including community structure and/or species composition	2	45		

Criteria for Economics impacts	Raw score	Score	Weight %
Size of economic or public sectors affected	Very small – Very large 0 1 2 3	1	20
Degree of impact (cost, output changes etc.)	Minimum – Severe 0 1 2 3	1	20
Frequency/Duration	Occasion/Short – Continuous 0 1 2 3	2	60
Weight average score for Economic impacts		**1.6**	
Criteria for Health impacts	**Raw score**	**Score**	**Weight %**
Number of people affected	Very small – Very large 0 1 2 3	0	-
Degree of severity	Minimum – Severe 0 1 2 3	0	-
Frequency/Duration	Occasion/Short – Continuous 0 1 2 3	0	-
Weight average score for Health impacts		**0**	
Criteria for Other social and community impacts	**Raw score**	**Score**	**Weight %**
Number and/or size of community affected	Very small – Very large 0 1 2 3	2	50
Degree of severity	Minimum – Severe 0 1 2 3	2	30
Frequency/Duration	Occasion/Short – Continuous 0 1 2 3	2	20
Weight average score for Other social and community impacts		**2.0**	

IV: Unsustainable exploitation of fish and other living resources

Environmental issues	Score	Weight %	Environmental concern	Weight averaged score
14. Overexploitation	3	60	Unsustainable exploitation of fish	2.1
15. Excessive by-catch and discards	0	5		
16. Destructive fishing practices	1	20		
17. Decreased viability of stock through pollution and disease	0	5		
18. Impact on biological and genetic diversity	1	10		

Criteria for Economics impacts	Raw score	Score	Weight %
Size of economic or public sectors affected	Very small – Very large 0 1 2 3	3	25
Degree of impact (cost, output changes etc.)	Minimum – Severe 0 1 2 3	3	50
Frequency/Duration	Occasion/Short – Continuous 0 1 2 3	2	25
Weight average score for Economic impacts		**2.8**	
Criteria for Health impacts	**Raw score**	**Score**	**Weight %**
Number of people affected	Very small – Very large 0 1 2 3	0	-
Degree of severity	Minimum – Severe 0 1 2 3	0	-
Frequency/Duration	Occasion/Short – Continuous 0 1 2 3	0	-
Weight average score for Health impacts		**0**	
Criteria for Other social and community impacts	**Raw score**	**Score**	**Weight %**
Number and/or size of community affected	Very small – Very large 0 1 2 3	2	50
Degree of severity	Minimum – Severe 0 1 2 3	2	30
Frequency/Duration	Occasion/Short – Continuous 0 1 2 3	2	20
Weight average score for Other social and community impacts		**2.0**	

V: Global change

Environmental issues	Score	Weight	Environmental concern	Weight averaged score
19. Changes in the hydrological cycle	2	60	Global change	1.6
20. Sea level change	1	15		
21. Increased UV-B radiation as a result of ozone depletion	1	20		
22. Changes in ocean CO_2 source/sink function	0	5		

Criteria for Economics impacts	Raw score	Score	Weight %
Size of economic or public sectors affected	Very small – Very large 0 1 2 3	2	30
Degree of impact (cost, output changes etc.)	Minimum – Severe 0 1 2 3	2	50
Frequency/Duration	Occasion/Short – Continuous 0 1 2 3	2	20
Weight average score for Economic impacts		**2.0**	
Criteria for Health impacts	**Raw score**	**Score**	**Weight %**
Number of people affected	Very small – Very large 0 1 2 3	2	40
Degree of severity	Minimum – Severe 0 1 2 3	2	40
Frequency/Duration	Occasion/Short – Continuous 0 1 2 3	1	20
Weight average score for Health impacts		**1.8**	
Criteria for Other social and community impacts	**Raw score**	**Score**	**Weight %**
Number and/or size of community affected	Very small – Very large 0 1 2 3	3	40
Degree of severity	Minimum – Severe 0 1 2 3	2	40
Frequency/Duration	Occasion/Short – Continuous 0 1 2 3	2	20
Weight average score for Other social and community impacts		**2.4**	

Comparative environmental and socio-economic impacts of each GIWA concern

Concern	Types of impacts								Overall score	Rank
	Environmental score		Economic score		Human health score		Social and community score			
	Present (a)	Future (b)	Present (a)	Future (b)	Present (a)	Future (b)	Present (a)	Future (b)		
Freshwater shortage	1.9	2.1	2.5	2.7	1.9	2.1	2.0	2.2	**2.2**	**1**
Pollution	1.9	2.2	2.0	2.3	1.9	2.0	2.0	2.1	**2.1**	**2**
Habitat and community modification	2.0	2.2	1.6	1.6	0	0	2.0	2.1	**1.4**	**5**
Unsustainable exploitation of fish and other living resources	2.1	2.2	2.8	2.8	0	0	2.0	2.8	**1.8**	**4**
Global change	1.6	1.8	2.0	2.2	2.0	1.8	2.4	2.6	**2.1**	**3**

Annex III
List of conventions and specific laws that affect water use in the region

1. Plan of Action for the Protection of the Marine Environment and Coastal Areas of the South Pacific (1981)

This Plan, as adopted, has the same characteristics as other Regional Seas programmes promoted by UNEP. The main objective of this regional cooperation mechanism is to protect the marine environment and coastal areas to safeguard the heath and well-being of current and future generations.

The general legal framework of the Plan of Action of the South East Pacific is the Convention for the Protection of the Marine Environment and Coastal Areas of the South East Pacific, also known as the "Lima Convention" of 1981, which binds the High Contracting Parties to make an effort, whether individually or through bilateral or multilateral cooperation, to adopt the appropriate measures to prevent, reduce and control the pollution of the marine environment and coastal areas in the South East Pacific and secure and adequate management of the natural resources.

The Plan of Action for the South East Pacific has the following components:

- Environmental assessment: This is the main component, which provides the scientific basis to implement the other components, and comprises an assessment of the pollution caused by oil spills; determination of the degree of pollution caused by industrial, mining and agricultural wastes and their effect; pollution caused by domestic wastes, radioactive pollution, pollution of the marine environment through the atmosphere, among others.
- Environmental management: Formulation and application of programmes to prevent, monitoring, reduce and eliminate pollution.
- Legal component: Development of regional instruments, which will be describes below, constitute a major achievement of the Plan of Action.
- Institutional and financial mechanisms: According to this component, the General Authority of the Plan of Action remains with the regular meeting of Government representatives (Intergovernmental Meetings). They are mandated to assess the implementation progress of the Plan of Action and approve the projects and activities.

2. Convention for the Protection of the Marine Environment and the Coastal Zone of the South East Pacific (1981)

The Plenipotentiaries of Colombia, Chile, Ecuador, Panama and Peru signed the Convention for the Protection of the Marine Environment and Coastal Areas in the South East Pacific in Lima, Peru on November 12, 1981. The respective signatory Governments handed the ratification documents. The High Contracting Parties to this Convention manifested, in the recitals and preamble thereof, the need to protect and preserve the marine environment and coastal areas of the South East Pacific from all types of pollution and pollution sources; and emphasize the economic, social and cultural significance of the South East Pacific as a means of interlinking the countries within the region.

3. Agreement for the Regional Cooperation Against the Pollution of the South East Pacific by Hydrocarbons and other Harmful Substances in Cases of Emergency (1981)

This Agreement complements or is related to the previous Convention and specifically refers to the pollution caused by hydrocarbon and other harmful substances and to the need for regional cooperation in cases of emergency. This Agreement was signed on November 12, 1981 by the five member countries, which lodged their relevant ratification instruments with the General Secretariat of the CPPS.

4. Complementary Protocol to the Agreement for the Regional Cooperation Against the Pollution of the South East Pacific by Hydrocarbons and other Harmful Substances (1983)

The complementary Protocol of the Agreement on Regional Cooperation in Combating Pollution of the South East Pacific by Hydrocarbons and other Harmful Substances was signed on July 22, 1983. This regional document elaborates on the regional principles on regional cooperation against pollution caused by hydrocarbons and harmful substances in cases of emergency contained in the aforementioned Agreement of 1981.

5. Protocol for the Protection of the South East Pacific Against the Pollution from Land-based Sources (1983)

This Protocol provides for the general obligations, practices and procedures; cooperation and consultation guidelines and procedures between the Parties; surveillance programmes, exchange of information, scientific and technical cooperation; and penalty measures, among others.

6. Protocol for the Conservation and Management of Marine and Coastal protected Areas of the South East Pacific (1989).

The Governments acknowledge, through this Convention, the need to adopt appropriate measures to protect and preserve ecosystems that

are fragile, vulnerable or which have a unique natural value, as well as the fauna and flora on the verge of depletion or extinction. It also establishes a principle of common interest to pursue the management of coastal areas attaching a rational value to the equilibrium that should exist between conservation and development.

This Convention also contains regulations regarding protected areas, common criteria to establish such areas, for regulation activities through and integrated environmental management mechanism within the guidelines contained in Article 5, buffer areas, measures to prevent, reduce and control pollution in protected areas, environmental impact assessment, establishing an integrated analysis procedure, scientific and technical cooperation; promotion of community involvement and environmental education, among others.

7. Protocol for the Protection of the South East Pacific Against Radioactive Pollution

This Protocol was signed in Paipa, Colombia, on September 21, 1989 and entered into force in 1994 after submission of the ratification instruments. It provides for regulations, principles, criteria and general obligations prohibiting the dumping of radioactive waste and other radioactive substances into the sea and/or seabed included within the scope of application of the Convention; i.e., the maritime area of the South East Pacific under the sovereignty and jurisdiction of Governments up to 200 nautical miles. This Protocol is also applicable to the Continental Shelf when extended by the High Contracting Parties beyond their 200 nautical mile zones.

8. Protocol on the Program for the Regional Study of the "El Niño" Phenomenon in the South East Pacific (ERFEN)

The States Members of the Permanent Commission for the South Pacific –CPPS signed this protocol on 6th November 1992 in Callao, Peru. The aim of ERFEN is forecast the ocean-atmospheric changes with enough anticipation to allow the issue of policies and emergency measures facing the yield variations in productive activities such as fishing, agriculture, industry and hydro-biological resource management, among others.

9. Project: Integrated Management of the Large Marine Ecosystem of the Humboldt Current (GEF/ONUDI-IMARPE/PERU-IFOP/CHILE)

The large marine ecosystem of the Humboldt Current is one of the most productive systems of the world. It depends of upwelling that provides a continuous supply of nutrients to surface waters where large populations of planktonic organisms grow. These populations are the basis of an ecosystem that influences the whole marine life along thousand kilometres of the west South American coasts. The project has to address four main problems:

- The unsustainable exploitation of the fishing resources.
- The insufficient knowledge of the variability of the system.
- Threats to the ecosystem biodiversity and relevant to the fishing production.
- Features related to the coastal habitat.

The project was designed to contribute with solutions for the above identified transboundary issues and pretend to increase the national capabilities including an integrated ecosystem approach.

10. Framework Agreement for the Conservation of Living Resources on the High Seas of the South East Pacific (Galápagos Agreement) (2000)

The countries of the South East Pacific belonging to the Permanent Commission for the South Pacific (Chile, Colombia, Ecuador and Peru) signed this agreement in 2000. The main objective of this Agreement is to define the legal framework for the conservation and management of living marine resources in the high seas zones of the South East Pacific, with special reference to straddling and highly migratory fish populations. The Agreement is applicable to the high seas beyond the external limits of the EEZ of the countries to the 120°W meridian between 5°N and 60°S.

11. Declaration of Ministers of Foreign Affairs on occasion of the 50th anniversary of the "Santiago Declaration" and the establishment of the Permanent Commission for the South Pacific CPPS (Santiago, Chile, 14 August, 2002 Santiago Declaration 2002)

The Ministry of Foreign Affairs of the Republic of Peru and Chile, the Vice-minister of Foreign Affairs of Ecuador, and the Vice-minister of Foreign Affairs for Multilateral Issues of Colombia convened at Santiago, Chile, within the framework of the celebration of the fiftieth anniversary of the "Santiago Declaration" of 1952, concerning the maritime zone and the establishment of the CPPS, deliver the following Declaration:

1. Express their satisfaction and pride upon celebrating the fiftieth anniversary of the Santiago Declaration which stipulated the principle of the two hundred nautical miles, practiced worldwide by states, as an essential part of the law of the sea.
2. Render tribute to the developers of the principles contained in the "Santiago Declaration" of 1952, who first declared the existence of a two hundred-mile jurisdictional maritime zone, on the basis of economic and conservation grounds, and who were tasked with defending the recognition of such zone in various international forums until set forth in the new law of the sea.

3. Renew the effectiveness and projection of the principles and purposes contained in the above mentioned declaration, as well as the international instruments approved for their future development.
4. Firmly support the successful task of the Permanent Commission for the South Pacific, which has coordinated the maritime policies of Chile, Colombia, Ecuador and Peru, and whose presence in important international forums has produced a significant impact upon the evolution of the law of the sea, widely contributing to the establishment of a global oceanic policy.
5. Within this context, the states reaffirm their authority in the 200 mile jurisdictional zone, the exercise of their sovereign rights therein, and their right to issue those measures required for the exploration, exploitation, conservation and administration of the resources existing therein, in accordance to globally accepted instruments and practices, with special reference to the United Nations Convention on the Law of the Sea. Likewise, the states reiterate their sovereign rights over their ports and their corresponding preferential rights, where appropriate, in the high seas.
6. Decide that the presence of the CPPS must extend its influence in the Pacific Ocean, given the organization's capacity as regional maritime agreement and strategic, political and operational strategy in the South East Pacific.
7. Congratulate one another for the recent inauguration of the permanent seat of the CPPS in the city of Guayaquil, Ecuador, as well as for the completion of the organization's re-structuring and modernization process.
8. Reiterate the convenience of continuing joint actions in competent international forums, with the aim of strengthening and consolidating the organization's principles and objectives, established as a regional maritime system.
9. Highlight that the fifty years during which the coastal states of the South East Pacific have administered the two hundred-mile maritime zone, have allowed this area to become one of the less contaminated areas of the world, where marine resources are exploited in a sustainable manner.
10. Celebrate the subscription, in August, 2000, of the "Framework Agreement for the Conservation of Living Marine Resources in the High Seas of the South East Pacific" or "Galapagos Agreement", which, once standing, shall be open to the accession of third states having an established interest in the area of application of the agreement.
11. Express that such agreement is a principle part of the regional maritime system of the South East Pacific, directed toward the establishment of a harmonic regime of conservation and protection of living marine resources, in the benefit of their coastal populations.
12. Agree that the organisation must mainly focus its activities toward the regional political coordination of ocean related subject matters, the implementation and development of the "Galapagos Agreement", scientific research related to oceanic-atmospheric alterations, especially the "El Niño" phenomenon; arrangement and conservation actions, the regional protection of the marine environment, overall management of coastal-marine zones, as well as cooperating and promoting the efficiency of artisanal and industrial fishing operations.
13. Express their concern over the increase of illicit activities in the South East Pacific and decide to instruct their minstries of foreign affairs and the general secretariat, to promote increased regional coordination and cooperation, at every level, with the support of the pertinent international organizations, in order to eradicate such operations.
14. Agree to promote and further the development of the regional fisheries industry under sustainable criteria, transfer of technology, the promotion of investments and the conduction of negotiation rounds.
15. Declare their firm disagreement with the application of unilateral and unjustified restrictions affecting trade of fisheries products and toward granting of subsidies which encourage non-sustainable fishing operations. in order to face such challenges, the states instruct their ministries of foreign affairs, with the support of the general secretary, to strengthen the negotiation capacities and ensure the design of a regional strategy.
16. Reiterate their full political support toward the Action Plan of the South East Pacific and their commitment to strengthen this regional cooperation mechanism in its institutional, legal and financial aspects, in order to ensure the effective compliance of the plan's objectives.
17. Express that the successful cooperation maintained during these fifty years, has allowed for a close relationship and understanding between the states parties, which commits them to keep working jointly on the basis of the common destiny of their nations, the protection of their resources, and maritime development.

The Ministry of Foreign Affairs of the Republic of Peru, the Vice-minister of Foreign Affairs of Ecuador, and the Vice-minister of Foreign Affairs for Multilateral Issues of Colombia, express their gratitude toward the people and the Government of Chile, for their warm hospitality and friendship, which renew the fraternal relationship and cooperation links of the member states of the CPPS.

Annex IV
Data on pollution

Table 1 Total and faecal coliforms in water, Ecuador 1987-2002.

Site	Year	Total coliforms (NMP/100 ml)		Faecal coliforms (NMP/100 ml)		Source
		Min	Max	Min	Max	
Gulf of Guayaquil	1987	17	1 100	580	10 000	CPPS 2000a
	1989	4	2 400	300	5 000	CPPS 2000a
	1994	8	1 600	320	9 060	CPPS 2000a
	1994-1996	ND	ND	ND	1 000 000	Pin et al. 1998
Estero Salado	1986	43	2 000 billion	4	1 100 billion	CPPS 2000a
	1988	90 000	93 billion	ND	ND	CPPS 2000a
	1988	447	123 million	430	16 million	CPPS 2000a
	1988	5	21 billion	4	1.1 billion	CPPS 2000a
	1989	ND	ND	350	6 400	CPPS 2000a
	1989	ND	ND	78	147 000	CPPS 2000a
	1990	ND	ND	93	160 000	CPPS 2000a
	1994	ND	ND	1 020	35 000	CPPS 2000a
	1996	11	220	11	75	Valencia et al. 2000
	1998	2	240	2	2	Valencia et al. 2000
	2001	<70	240	ND	ND	INOCAR 2001a
Guayas River	1988	20	1 800	2 300	4 300	CPPS 2000a
	1988	93	1 025	550	5 600	CPPS 2000a
	1989	ND	ND	9 000	90 000	CPPS 2000a
	1990	ND	ND	530	13 600	CPPS 2000a
	1991	30	1 790	100	9 300	CPPS 2000a
	1996	240	93 000	ND	ND	Valencia et al. 2000
	1997	2 400	1 1 00	ND	ND	Valencia et al. 2000
	2000	4 600	11 000	2 400	11 000	INOCAR 2000
Guayas-Daule	1984	88	11 000	900	46 000	CPPS 2000a
	1985	1 500	24 000	3 900	24 000	CPPS 2000a
	1986	900	46 000	ND	ND	CPPS 2000a
Babahoyo-Guayas	1984	2 300	11 000	400	110 000	CPPS 2000a
	1986	2 300	11 000	400	124 000	CPPS 2000a
Manta	1985	4	2 400	90	2 400	CPPS 2000a
Santa Elena	1985	43	2 400	43	2 300	CPPS 2000a
Puerto Bolívar	1985	23	93	9	43	CPPS 2000a
	2002	ND	ND	ND	200	INOCAR 2002b
Daule River	1986	ND	8 757	ND	4 193	CPPS 2000a
	1986	ND	62 536	ND	25 946	CPPS 2000a
	1986	ND	7 242	ND	3 68	CPPS 2000a
San Lorenzo	2001	ND	<70	ND	ND	INOCAR 2001b
Atacames	2002	8 400	8 900	5 100	5 600	INOCAR 2002a
Santa Cruz Island (Galapagos Islands)	1999	ND	240	ND	15	Morán & Valencia 2000
San Cristobal Island (Galapagos Islands)	1999	ND	16	ND	8.8	Morán & Valencia 2000
Santa María, Isabela, Darwin Islands (Galapagos Islands)	1999	ND	5	ND	2	Morán & Valencia 2000

Note:: ND = No Data

Table 2 Total and faecal coliforms in water, Peru 1987-2002.

Site	Year	Total coliforms (NMP/100 ml)		Faecal coliforms (NMP/100 ml)		Source
		Min	Max	Min	Max	
Huarmey	2000	ND	ND	30	15 billion	Tam et al. 2000
Rimac- Callao	1989	460 000	46 billion	ND	ND	CPPS 2000a
	1995	ND	930 million	ND	ND	Sánchez et al. 1996
	2000	ND	ND	30	2 300	Guzman et al. 2000
Tumbes	2000	ND	ND	30	43	Castillo et al. 2000
Lima-Metropolitan	2001	ND	ND	30	93	Orozco 2002
Paita	2001	ND	ND	30	23	Sánchez et al. 2002
Supe Paramonga	2001	ND	ND	30	23	Orozco 2002
Huacho -Carquin	1995	430	93 000	<3	93 000	Sánchez et al. 1996
	2001	ND	ND	30	93 000 23 000	Orozco 2002
Callao	2001	ND	ND	30	230 000	Jacinto et al. 2001
Cañete	2001	ND	ND	30	430	Orozco 2002
Callao	2002	ND	ND	70 billion	2.3 million	Sánchez et al. 2002
Huarmey	2002	ND	ND	30	430	Cabello et al. 2002
Paita	1995	<3	43 000	ND	ND	Sánchez et al. 1996
	2002	ND	ND	90 billion	930	Jacinto et al. 2001
Ferrol-Chimbote	1989	23	16 000	12	16 000	CPPS 2000a
		ND	4.3 billion	ND	ND	CPPS 2000a
	2002	ND	ND	30	930 23 000	Sánchez et al. 2002
Cañete	2002	ND	ND	30	930	Sanchez et al. 2002
Bahía Ancón	1988	43	2 400	4	2 400	CPPS 2000a
	1989	17	1 100	9	1 000	CPPS 2000a
Pisco-Paracas	1988	23	2 400	4	2 400	CPPS 2000a
	1989	8	1 600	3	1 600	CPPS 2000a
	1995	ND	9 300	ND	9 300	Sánchez et al. 1996
	2002	ND	ND	30	90 billion	Jacinto et al. 2001
Ilo-Ite	2002	ND	ND	30	230	Jacinto et al. 2001
Agua Dulce	1987	43	110 000	11	4 600	CPPS 2000a
La Pampilla	1987	39	110 000	9	110 000	CPPS 2000a
La Chira	1987	640	46 000	460	16 000	CPPS 2000a
La Herradura	1987	9	46 000	9	9 000	CPPS 2000a
Marbella	1987	240	24 000	9	11 000	CPPS 2000[a]
Talara	1995	ND	ND	<3	9 300	Sánchez et al. 1996
Huacho-Carquin	2002	ND	ND	30	230 000	Orozco 2002
Supe-Paramonga	2002	ND	ND	30	2 300	Sánchez et al. 2002

Note:: ND = No Data

Table 3 Average values of total and faecal coliforms in coastal surface waters in Chile during 1994 (Zúñiga and Burgos, 1996).

Site	Total coliforms (NMP/100 ml)	Faecal coliforms (NMP/100 ml)
Arica	7.8	2
Iquique	7.8	2
Tocopilla	ND	ND
Antofagasta	2 400	1 600
Chanaral	ND	ND
Coquimbo	ND	ND
Quintero	23	2
Concon	13	4.5
Valparaiso	130	33
Playa Ancha	ND	ND
San Antonio	1 600	33
Talcahuano	3.6	3.6
San Vicente	1 100	210
Valdivia	210	130
Puerto Montt	2	2
Castro	240	130
Punta Arenas	1 600	540

Note: ND = No Data.

(Source: Zúñiga & Burgos 1996)

Table 5 Concentrations of POPs in sediment and water, Peru 1994-1996.

Site	Pesticide						
	Lindane	DDT	DDE	DDD	Aldrin	Arochlor 1254	Arochlor 1260
Fertiza (ng/g)	ND	0.230-2.66	1.65	1.02	ND	ND	ND
Chillón River (ng/g)	ND	ND	16.89	ND	ND	12.09	9.94
Pisco (ng/g)	ND	ND	0.426	ND	ND	ND	ND
Ite (ng/g)	9.23	ND	ND	0.21	3	7	2.14
Huacho (ng/g)	ND	4.45	ND	ND	ND	8	ND
Cañete River (water) (ng/g)	ND	2.8	ND	ND	ND	21.02	ND
Cañete River (sediments) (ng/g)	ND	2.8	ND	ND	ND	ND	ND

Note: ND = No Data.

(Source:CPPS 2000a, Cabello & Sánchez 2003)

Table 6 Concentrations of POPs, Chile.

Site	Pesticide					
	Lindane	DDT	pp' DDE	pp'DDD	Aldrin	Arochlor 54
VIII Region (water) (ppb)	0.001-0.015	ND	ND	ND	0-0.013	ND
VIII Region (sediments) (ppb)	0.02-1.364	0.02-0.68	ND	ND	0.015-0.374	ND
Concepción Bay (ppb)	ND	0.45-0.68	ND	ND	ND	ND
Concón/Acocagua River (pg/g)	500	400-9 800	100-5 700	2 500-6 100	ND	1 200-45 100

Note: ND = No Data.

(Source: CPPS 2000a, based on Chuecas et al.1989 and SERPLAC 1980)

Table 4 Concentrations of POPs in water and sediments, Ecuador.

Site	Pesticide																						
	BCH	Alfa BCH	Delta BCH	Lindane	Heptachlor	DDT	4,4'DDT	4,4' DDE	4,4'DDD	Chlordane	Aldrin	Dieldrin	Endin	Malathion	Parathion	Tilt	Calixin	Toxapheno	Endosulfan	Metoxichlore	Imazalil	Chloratonil	Methyl Paration
Guayas River (ppb) [a]	0.028	ND	ND	0.039	0.007	0.02	ND	ND	ND	0.05-2.72	0.056	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Guayas River (mg/l) [b]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10	23	ND	ND	ND	ND	ND	ND	ND	ND
Shrimp ponds (µg/kg) [c]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.018	0.018	ND	ND	ND	ND	ND	ND
Daule River (ug/l) [d]	ND	ND	ND	ND	ND	0.05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND
Estero Salado (µg/kg) [e]	ND	ND	0.58-0.41	0.2-1.98	ND	ND	ND	0.065	ND	ND	0.07-1.62	ND	ND	ND	ND	ND	ND	ND	0.32-0.36	ND	ND	ND	ND
Guayaquil City (µg/kg) [f]	ND	ND	ND	0.059-0.12	ND	ND	ND	0.13-0.15	ND	ND	0.24-0.38	ND	0.41	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Atacames (µg/kg) [g]	ND	ND	1.48-1.61	0.29	0.24	ND	0.03	0.22-0.48	5.86	ND	0.36-0.66	0.27-0.94	ND	ND	ND	ND	ND	ND	0.56-1.24	ND	ND	ND	ND
Santa Rosa (µg/kg) [h]	ND	0.57-2.1	ND	ND	ND	ND	ND	ND	ND	ND	0.17-0.44	0.23	0.7	ND	ND	ND	ND	ND	ND	0.91	0.31	2.1	1.63-4.32

Note: ND = No Data.

(Source: [a] PMRC 1993, [b] Ormaza 1994, [c] Intriago et al. 1994, [d] CPPS 2000a, [e] INOCAR 2001a, [f] INOCAR 2001b, [g] INOCAR 2002a; [h] INOCAR 2002b)

Table 7 Concentations of copper in water, Ecuador.

Site	Copper in water (µg/l)					Source
	1985	1986	1987	1988	1989	
Esmeraldas	1.1-20					Arcos 1985
	0.6-1.7					
		1. 6				Arcos 1986
		1.1-20.6				Samaniego 1986
		0.615				
		0.1-7.2				
			3.2-8.2			CPPS 2000a
Manta		0.2-1.2				Arcos 1986
					3.2-6.8	Choez 1989
B. Caráquez					2-4	Choez 1989
					2.4	CPPS 2000a
Monteverde					4.2-5.2	Choez 1989
La Libertad					4.7-7.2	Choez 1989
Santa Elena			0.03-20			Choez 1989
					3.9-7.7	CPPS 2000a
Salinas		0.3-0.9				Arcos 1986
					7.28	Choez 1989
					8.22	CPPS 2000a
Anconcito					3.3-4.2	Choez 1989
Ancón					5.8-6.8	Choez1989
Chanduy				4.7-7.3		Arcos 1986
Playas	0.1-0.4					Arcos 1985
					5.2-6.1	Choez 1989
Daule River	42.3-81.8					Solórzano 1985
	42-104					INP 1986
		37-126				
		53.3-104.7				Pérez 1986
					1.3-6.6	Pérez 1989
Babahoyo River	51.8-94.5					Solórzano 1985
		5-37				INP 1986
		53.33-104.7				Pérez 1986
				24-36.2		ESPOL 1987
					4-11.3	Pérez 1989
Guayas River	39.8-66.7					Solórzano 1985
		15-95				INP 1986
		4.8				Samaniego 1986
				4.4-7.3		Choez 1989
Estero Salado	0-135					Pérez 1986
		0-30				INP 1986
		0-199				Pérez 1986
			2			Samaniego 1986
					1.33-4	Pérez 1989
El Oro		3.32-18.8				Samaniego 1986
		3.9-7.7				ESPOL 1987
Puerto Bolívar		0.2-0.9				Arcos 1986
					6.9	Chóez 1989
Jambelí					3.7-7.7	Chóez 1989

Note: ND = No Data.

Table 8 Concentration of copper in biota, Ecuador.

Site	Biota	Copper (µg/g)
Santa Elena	Molluscs	4.75-31.25
Santa Elena	Fish	2.75-37.5
Puerto Bolívar	Fish	7.5-20.0
Puerto Bolívar	Fish	10.0-11.3

(Source: CPPS 2000a)

Table 9 Concentration of lead in biota, Ecuador.

Site	Biota	Lead (µg/g)
Santa Elena	Molluscs	0.0-62.5
Santa Elena	Fishes	0.25-27.5
Puerto Bolívar	Fishes	0.0-12.5

(Source: DIGMER 1988)

Table 9 Concentration of lead in water, Ecuador.

Site	Lead in water (µg/l)				Source
	1984-1987	1984	1994	1996	
Santa Elena	0.0001-0.0004	ND	ND	ND	Samaniego 1986, Arcos 1985
Daule River	ND	10	ND	ND	Solórzano 1985
Babahoyo River	ND	10-52.8	ND	ND	Solórzano 1985
Guayas River	ND	10-74	ND	ND	Solórzano 1985
Guayas River Basin	ND	ND	ND	5-15	CEDEGE 1996 in Intriago 1998
Gulf of Guayaquil	ND	10-74	0.29	ND	Pérez 1986, CAMM 1996, Intriago 1998

Note: ND = No Data.

Table 10 Concentration of copper in water, Peru.

Site	Copper in water (µg/l)				Source
	1984-1987	1985	1999	2000	
Callao	71-196	71-196	ND	ND	Guillén & Aquino 1978, López 1982, Ministerio de Salud de Peru 1986, Valcarcel et al. 1975, Guillén et al. 1986, Castañeda 1980
Chimbote	45-76	ND	ND	ND	Ministerio de Salud de Peru 1986, Valcarcel et al. 1975, Guillén et al. 1986, Castañeda 1980
Laguna Verde	62-98	ND	ND	ND	Valcarcel et al. 1975
Ite	107-857 65-220	ND	ND	ND	Ministerio de Salud 1986, Valcarcel et al. 1975, López 1982
Paracas	71-89	ND	ND	ND	Valcarcel et al. 1975, López 1982
Rimac River	9-50	75-650 100-370 38-100	62-1,820	13.9-1.056	Ministerio de Salud de Peru 1986, Guillén 1981, Castañeda 1980, CPPS 2000a

Note: ND = No Data.

Table 11 Concentration of copper in sediments, Ecuador.

Site	Copper in sediments (mg/kg)									Source
	1985	1986	1987	1988	1989	1994	1998-1999	2001	2002	
Esmeraldas	ND	ND	10-35	22.0-45.5 6.0-10.7 17.0-50.5	22.0-7	ND	ND	ND	ND	DIGMER 1988, Choez 1989
Manta	16.5-72.2	ND	ND	7.5-53.7	ND	ND	ND	ND	ND	DIGMER 1988
Guayas	ND	ND	ND		ND	40-113.0	ND	ND	ND	DIGMER 1988
La Libertad	ND	4.0-16.0	ND	9.5-15.5	ND	ND	ND	ND	ND	Choez 1989
Santa Elena	2.5-30	3.2-14.5	ND		ND	ND	ND	ND	ND	DIGMER 1988
Salinas	ND	ND	ND	9.0-10.0	ND	ND	ND	ND	ND	DIGMER 1988
Anconcito	ND	ND	ND	6.0-16.0	ND	ND	ND	ND	ND	Choez 1989
Chanduy	ND	ND	ND	7.2-10.5	ND	ND	ND	ND	ND	DIGMER 1988
Playas	ND	ND	6.0-19.2	5.5-14.0	ND	ND	ND	ND	ND	Choez 1989
Posorja	ND	ND	ND	8.7-31.5	ND	ND	ND	ND	ND	Choez 1989
Estero Salado	ND	ND	ND	ND	ND	ND	35-45.5	1-47.7	ND	Choez 1989, INOCAR 2001a
El Oro	ND	ND	ND	6.0-27.0	ND	ND	ND	ND	ND	Choez 1989
Puerto Bolívar	2.5-45.7	6.0-27.0	4.8-18	7.7-32.0 13.7-27.5	ND	ND	ND	ND	ND	DIGMER 1988, Choez 1989:
Jubones River	ND	ND	ND	ND	ND	ND	ND	ND	28.66	INOCAR 2002b
Santa Rosa Estuary	ND	ND	ND	ND	ND	ND	ND	ND	6.0-27.5	INOCAR 2002b

Note: ND = No Data.

Table 12 Concentations of cadmium in water and sediments, Ecuador.

Site	Cadmium in water (µg/l)					Cadmium in sediments (µg/l)		Source
	1984	1985	1986	1987	1989	1999	2001	
Esmeraldas	ND	ND	ND	ND	0.5-0.7	ND	ND	Chóez 1989
Manta	ND	ND	ND	ND	0.2-0.7	ND	ND	Chóez 1989
B. Caráquez	ND	ND	ND	ND	0.2	ND	ND	Chóez 1989
La Libertad	ND	ND	ND	ND	0.73-0.87	ND	ND	Chóez 1989
Salinas	ND	ND	ND	ND	0.2-3.59	ND	ND	Chóez 1989
Anconcito	ND	ND	ND	ND	0.85-1.21	ND	ND	Chóez 1989
Ancón	ND	ND	ND	ND	0.4	ND	ND	Chóez 1989
Posorja	ND	ND	ND	ND	0.73-0.85	ND	ND	Chóez 1989
Daule River	ND	14.48-<50	ND	ND	ND	ND	ND	Solórzano 1985
Babahoyo River	ND	7.47-<50	0.1-3.45	ND	ND	ND	ND	Solórzano 1985 CPPS 2000a
Guayas River	10.5-50	ND	ND	ND	ND	ND	ND	Solórzano 1985
Estero Salado	ND	ND	ND	ND	ND	0.97-1.94	0-3	INOCAR 2001a
Gulf of Guayaquil	ND	ND	7.5-10	ND	ND	ND	ND	INP 1986
El Oro	ND	ND	ND	0.73-3.45	ND	ND	ND	CPPS 2000a
Jubobes River	ND	ND	0.1	ND	ND	ND	ND	Chóez 1986
Jambelí	ND	ND	0-0.85	ND	ND	ND	ND	Chóez 1986

Note: ND = No Data.

Table 13 Concentration of lead in sediments, Ecuador.

Site	Lead in sediments (mg/kg)								Source
	1984	1986	1987	1988	1994	1998-1999	2001	2002	
Esmeraldas	ND	ND	12.5-42.5	3.7-10	ND	ND	ND	ND	DIGMER 1988, Choez 1989
Manabí	ND	ND	ND	5-15	ND	ND	ND	ND	Choez 1989
Manta	ND	ND	4.5-9	5-12	ND	ND	ND	ND	DIGMER 1988
Santa Elena	ND	ND	2.5-11	17.5-157.5	ND	ND	ND	ND	DIGMER 1988
La Libertad	ND	ND	ND	4.6-14.1	ND	ND	ND	ND	Choez 1989
Santa Rosa	ND	ND	ND	11.2	ND	ND	ND	ND	Choez 1989
Salinas	ND	ND	ND	10-16.2 14-51.2 13.7-17.5	ND	ND	ND	ND	Choez 1989, DIGMER 1994
Anconcito	6.8-13	ND	ND	5.7-8	ND	ND	ND	ND	Solórzano 1985, Choez 1989
Chanduy	ND	ND	ND	7.5-17.5	ND	ND	ND	ND	Choez 1989
Playas	ND	6.7-8	ND	ND	ND	ND	ND	ND	Choez 1989
Posorja	ND	ND	ND	15-16.2	ND	ND	ND	ND	Choez 1989
Guayas	ND	ND	ND	ND	125-218	ND	ND	ND	DIGMER 1994
Estero Salado	ND	ND	ND	ND	ND	3.2-9.76	0-34	ND	INOCAR 2001a
Puerto Bolívar	ND	ND	ND	4.8-21.2	ND	ND	ND	ND	DIGMER 1988;
Santa Rosa	ND	ND	ND	ND	ND	ND	ND	23.33	INOCAR 2002b
Jubones River	ND	ND	ND	ND	ND	ND	ND	21.34	INOCAR 2002b

Note: ND = No Data.

Table 14 Concentration of copper in sediments, Peru.

Site	Copper in sediments (mg/kg)							Source
	1984-1987	1985	1987	1989	1996	2000*	2002	
Chimbote	0.1-0.6	16.46-64.48	ND	ND	28.7-108	80-199	17.6-.23.4	Echegaray 1986, Jacinto et al. 1996, Guzmán 2003
Santa River	ND	ND	ND	ND	ND	ND	13.4-17.3	Sánchez et al. 2002
Paramonga	ND	ND	ND	ND	ND	164-267	ND	Instituto Cuanto 2001
Fortaleza River	ND	ND	ND	ND	ND	ND	69.7-74.7	Sánchez et al. 2002
Supe	ND	ND	ND	ND	ND	67-220	52.1-142.2	Instituto Cuanto 2001, Sánchez et al. 2002
Pativilca River	ND	ND	ND	ND	ND	ND	66.45	Sánchez et al. 2002
Rimac River	ND	109	ND	ND	ND	ND	ND	Echegaray 1986
Callao	ND	0-135.4	18-160	ND	ND	28-43.7	7.7-74.7	Echegaray 1986, Guzmán et al. 2000, Sánchez et al. 2002
Cañete	ND	ND	ND	ND	ND	ND	14.8-28.7	Sánchez et al. 2002
Cañete River	ND	ND	ND	ND	ND	ND	23.2-24.5	Sánchez et al. 2002
Pisco	ND	0-46.8	0.12-50	ND	50.5-91.7	ND	17.8-71.6	Echegaray 1986, Guzmán et al. 1997, Guzmán 2003
Paracas	ND	ND	ND	73.71	ND	ND	ND	Hinojosa & Ormeño 1989
Ite	ND	1 320	ND	65-220	31.2-826.3	ND	29.6-226.82	Echegaray 1986, Guzmán 2003
Tacna	ND	11.9-135.8	0.15-0.3	ND	ND	ND	ND	Echegaray 1986

*Note: ND = No Data. * Liofilised (freeze drying) sample*

Table 15 Concentration of copper in biota, Peru.

Site	Biota	Copper in biota (µg/g)									Source
		1972/1980	1981/1989	1986/1987	1989	1994	1995	1996	2001	2002	
Littoral	Molluscs	0.08-1.38	1.1-4.45	ND	ND	ND	ND	ND	ND	ND	Echegaray & Guerín 1989
	Fishes	0.03-0.43	ND	ND	ND	ND	ND	ND	ND	ND	
	Molluscs	ND	0.33-1.02	ND	ND	ND	ND	ND	ND	ND	
Chimbote	Molluscs	ND	ND	0.7-2.8	ND	0.48-18.5	0.38-1.21	0.42-22.5	ND	14.8-17.3	Echegaray et al. 1987, Jacinto et al. 1996, 1997, Guzmán et al. 1997, Guzmán 2003
	Crustaceans	ND	ND	ND	ND	8.1	ND	2.37-6.03	ND	12.9-14.2	
	Fishes	ND	ND	ND	ND	0.48-0.74	ND	ND	ND	1.21-3.73	
Huarmey	Molluscs	ND	ND	ND	ND	ND	ND	ND	2.9-27.9	ND	Jacinto et al. 2001
	Crustaceans	ND	ND	ND	ND	ND	ND	ND	19.54	ND	
	Fishes	ND	ND	ND	ND	ND	ND	ND	1.97	ND	
Callao	Molluscs	ND	ND	ND	ND	0.49-29.6	0,92-33.2	0.32-14.9	9.5-17.5	1.96-40.9	Guzmán 1996, Guzmán et al. 1997
	Crustaceans	ND	ND	ND	ND	8.16-10.8	4.23-21.7	7.4-15.7	ND	ND	
	Fishes	ND	ND	ND	ND	0.52-0.64	0.34-0.48	0.64	7.71	ND	
Cañete	Crustaceans	ND	ND	ND	ND	ND	ND	ND	0.2	12.4-43.7	Sánchez & Orozco 1997
	Molluscs	ND	ND	ND	ND	ND	ND	ND	1.27	ND	
	Fishes	ND	ND	ND	ND	ND	ND	ND	0.2	1.53-6.22	
Pisco	Molluscs	ND	ND	0.7-6.8	0.02-2.61	ND	1.42-1.97	9.38	ND	ND	Echegaray et al. 1987, Hinojosa & Hormeno 1989, Guzmán et al. 1997
	Crustaceans	ND	ND	ND	ND	ND	ND	4.08-7.58	ND	ND	
	Fishes	ND	ND	ND	ND	ND	0.44	ND	ND	ND	
Paracas	Molluscs	ND	ND	ND	0.11-0.28	ND	ND	ND	ND	ND	Hinojosa & Hormeno 1989
Ilo	Molluscs	ND	ND	ND	ND	ND	4.7-26.8	13.5-283	ND	ND	Jacinto & Carbrera 1998
	Crustaceans	ND	ND	ND	ND	ND	ND	16.4	ND	ND	
Ite	Molluscs	ND	ND	ND	ND	ND	ND	1.7-153.1	ND	ND	IMARPE database
	Crustaceans	ND	ND	ND	ND	ND	ND	13.5-21.1	ND	ND	

Note: ND = No Data.

Table 16 Concentration of copper in water, Chile.

Site	Copper in water							Source
	1981 (ug/l)	1982 (ug/l)	1983 (ug/l)	1984-1987 (ug/l)	1987 (mg/l)	1989 (mg/l)	1994 (mg/l)	
R I Arica	ND	ND	ND	ND	ND	ND	3.05	Zúñiga & Burgos 1996
R I Iquique	ND	ND	ND	ND	ND	ND	8.17	Zúñiga & Burgos 1996
R II Tacopilla	ND	ND	ND	ND	ND	ND	66.99	Zúñiga & Burgos 1996
R II Antofagasta	ND	ND	ND	ND	ND	ND	11.39	Zúñiga & Burgos 1996
R III Charañal	ND	ND	ND	ND	ND	ND	21.89	Zúñiga & Burgos 1996
R IV Coquimbo	ND	ND	ND	ND	ND	ND	2.85	Zúñiga & Burgos 1996
R V Quintero	ND	ND	ND	ND	ND	ND	5.66	Zúñiga & Burgos 1996
R V Aconcagua River outlet	4.18	2.2	8.7	ND	ND	ND	ND	Pinochet et al. 1989
R V Valparaíso	ND	ND	0.05-2.4	0.6-2.4	7.99-19.56	4.29-19.5	ND	De Gregory et al. 1983, Universdad de Valparaiso 1987, Chiang 1989
R V Concon	ND	ND	ND	ND	3.43-20.58	3.43-26.8	5.22	Universdad de Valparaiso 1987, Chiang 1989, Zúñiga & Burgos 1996
R V San Antonio	ND	ND	ND	ND	ND	ND	ND	Zúñiga & Burgos 1996
R VIII Talcahuano	ND	ND	ND	ND	ND	ND	2.4	Zúñiga & Burgos 1996
R VIII Concepción	ND	ND	ND	0.6-0.7	ND	ND	ND	Universdad de Concepción 1980, 1985, 1986
San Vicente	ND	ND	ND	0.56-0.58	ND	ND	4.54	Zúñiga & Burgos 1996
Arauco Gulf	ND	ND	ND	0.56- 0.65	ND	ND	ND	Universdad de Concepción 1980
Valdivia	ND	ND	ND	ND	ND	ND	3.07	Zúñiga & Burgos 1996
R X Puerto Montt	ND	ND	ND	ND	ND	ND	5.35	Zúñiga & Burgos 1996
R X Castro	ND	ND	ND	ND	ND	ND	2.59	Zúñiga & Burgos 1996
R XII Punta Arenas	ND	ND	ND	ND	ND	ND	2.12 ?	Zúñiga & Burgos 1996
Playa Ancha	ND	ND	ND	ND	ND	ND	6.07	Universdad de Concepción 1980, Zúñiga & Burgos 1996
Renanca	ND	ND	ND	ND	ND	ND	10.97	Pinochet et al. 1989, Zúñiga & Burgos 1996

Note: ND = No Data.

Table 17 Concentration of copper in sediments, Chile.

Site	Copper in sediments					Source
	1977- 1979 (ppb)	1984-1986 (ug/g)	1986 (mg/kg)	1988 (mg/kg)	1994 (mg/kg)	
North Zone	ND	ND	ND	39.6-121.6*	ND	Zúñiga & Burgos 1996
R I Arica	ND	ND	ND	ND	130.1	Zúñiga & Burgos 1996
R I Iquique	ND	ND	12.3-26.4	ND	153.6	Bore 1987, Zúñiga & Burgos 1996
R II Antofagasta	ND	ND	ND	ND	5 789	Zúñiga & Burgos 1996
R III Charañal	16,628	ND	ND	ND	1 721	Zúñiga & Burgos 1996, Castilla & Nealer 1978, Castilla 1983
R IV Coquimbo	7-1,120a	ND	11.4-21.9	ND	4 518	Bore 1987, Chuecas et al. 1989, Zúñiga & Burgos 1996
R V Quintero	ND	ND	ND	ND	80.4	Zúñiga & Burgos 1996
R V Valparaíso	ND	ND	35.1-125.9	ND	ND	Universdad de Valparaíso 1987
R V Concon*	ND	ND	ND	ND	31.9	Zúñiga & Burgos 1996
R V San Antonio	ND	ND	ND	ND	216.5	Zúñiga & Burgos 1996
R VIII Talcahuano	ND	ND	ND	ND	60.3	Zúñiga & Burgos 1996
R VIII Concepción	ND	40.8-40.	ND	ND	ND	Universdad de Concepción 1980
San Vicente	ND	27.3-27.7	ND	ND	95.9	Universdad de Concepción 1980, Zúñiga & Burgos 1996
Arauco Gulf	ND	23.61	ND	ND	ND	Zúñiga & Burgos 1996
Valdivia	ND	ND	ND	ND	24.6	Zúñiga & Burgos 1996
R X Puerto Montt	ND	ND	ND	ND	24.6	Zúñiga & Burgos 1996
R X Castro	ND	ND	ND	ND	16.2	Zúñiga & Burgos 1996
R XII Punta Arenas	ND	ND	ND	ND	18.4	Zúñiga & Burgos 1996
Playa Ancha **	ND	ND	ND	ND	126.2	Zúñiga & Burgos 1996

*Note: * Concentration in ppb.*

Table 18 Concentration of copper in biota, Chile.

Site	Biota	Copper in biota				Source
		1984/1987 (µg/g)	1987 (mg/kg)	1987/1988 (mg/kg)	1994 (mg/kg)	
R I Arica	Molluscs	ND	ND	ND	0.3-0.1 ?	Zúñiga & Burgos 1996
R I Iquique	Molluscs	ND	1.09-7.94	0.08-7.23	1.3	Bore 1987, Chuecas et al. 1989, Zúñiga & Burgos 1996
R II Antofagasta	Molluscs	ND	ND	ND	ND	Zúñiga & Burgos 1996
R III Caldera	Molluscs	ND	7.92-22.5	0.08-8.45	ND	Bore 1987, Chuecas et al. 1989
R III Charañal	Fishes	ND	0.47-0.51	0.08-8.45	ND	Bore 1987
R IV Coquimbo	Molluscs	ND	1.01-2.15	ND	ND	Bore 1987, Chuecas et al. 1989
	Fishes	ND	0.33-3.85	ND	ND	
R V Quintero	Molluscs	ND	ND	ND	80.9	Bore 1987, Zúñiga & Burgos 1996
R V Valparaíso	Molluscs	0.9-5.97	ND	ND	51.4	Universdad de Valparaíso 1987, Zúñiga & Burgos 1996, Chuecas et al. 1989, Chiang & Nuñez 1983
	Fishes	0.50-0.80	0.75-14.36	ND	ND	
R V Concon	Molluscs	ND	ND	ND	88.4	Zúñiga & Burgos 1996
R V San Antonio	Molluscs	ND	ND	ND	30.2	Zúñiga & Burgos 1996
Central Zone	Molluscs	ND	ND	0.759	1416	Chuecas et al. 1989
	Fishes	ND	ND	0.30-1343	ND	
Central-South	Molluscs	ND	ND	4.36-14.36	ND	Chuecas et al. 1989
R VIII Talcahuano	Molluscs	ND	ND	ND	25.8	Chuecas et al. 1989
R VIII Concepción	Molluscs	0.081-15	ND	ND	ND	Universdad de Concepción 1980, 1987, 1988, Castilla 1983
San Vicente	Molluscs	0-6.1	ND	ND	28.8	Chuecas et al. 1989
Arauco Gulf	Molluscs	0-8.1	ND	ND	ND	Chuecas et al. 1989
Valdivia	Molluscs	ND	ND	ND	13.6	Chuecas et al. 1989
R X Puerto Montt	Molluscs	ND	ND	ND	14.3	Chuecas et al. 1989
R X Castro	Molluscs	ND	ND	ND	10.8	Chuecas et al. 1989
R XII Punta Arenas	Molluscs	ND	ND	ND	15.7	Chuecas et al. 1989
Magallanes	Molluscs	ND	ND	0.94-3.18	ND	Lecaros & Astorga 1989

Note: ND = No Data.

Table 19 Concentration of hydrocarbon in water, Ecuador

Site	Hydrocarbon in water (µg/l)										Source
	1985	1986	1987	1988	1989	1990	1994	1998-2001	2001	2002	
Esmeraldas	ND	ND	0.08-1.7	0.1-2.1	0.1-0.4	ND	ND	ND	ND	ND	INOCAR 1988 Valencia 1991
San Lorenzo	ND	ND	ND	ND	ND	ND	ND	ND	0.2-1.9	ND	INOCAR 2001b
Atacames	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7-2.5	INOCAR 2002a
Manta	ND	ND	0.9-2.8	1.3-2.3	0.2-0.5	ND	ND	ND	ND	ND	INOCAR 1988, Valencia 1991
Salinas	ND	0.6-1.4	0.06-1.06	0.08-0.31	0.1-0.3	ND	ND	ND	ND	ND	Valencia 1991
Guayaquil	0.09-5.15	ND	ND	0.24-1.1	0.06-1.12	0.03-1.08	ND	ND	5	ND	DIGMER 1987, CPPS 2000a, INOCAR 2001b
GuayasRiver	ND	ND	ND	ND	ND	ND	1.05-2.28	0.1-0.8	ND	ND	INOCAR 2001a, Valencia et al. 1996
Estero Salado	ND	ND	ND	ND	ND	ND	0.76-1.5	ND	ND	ND	Valencia 1991,
Puerto Bolívar	60	10-25	45-70	ND	0.1-0.3	ND	ND	ND	ND	ND	DIGMER 1987, Valencia 1991
Santa Rosa	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.15-0.35	INOCAR 2002b

Note: ND = No Data.

Table 20 Concentration of hydrocarbon in water, Peru.

Site	Hydrocarbon in water (µg/l)										Source
	1985	1986	1987	1988	1989	1995	1996	1999	2000	2001	2002	
Talara	ND	ND	0.2-9.83	1.42-26.5	ND	ND	0.13-19.63	ND	ND	ND	ND	Jacinto 1991, Jacinto & Cabello 1996
Ferrol of Chimbote	ND	ND	ND	ND	ND	ND	0.89-20.21	ND	0.88-1.8	ND	0.1-10.20	Jacinto & Cabello 1996, Cabello & Jacinto 2002
Paita	ND	ND	ND	ND	ND	ND	0.19-6.1	ND	<0.01-2.62	ND	0.1-1.63	Jacinto & Cabello 1996, Cabello & Jacinto 2002
Callao	0.2-5.77	0.2-1.71	0.06-8.54	ND	0-4.5	0.05-1.87	0.27-6.22	30.12-53.12	0.21-11.20	30.12-53.12	0.34-4.02	Jacinto 1991, Sánchez et al. 1996, Jacinto & Cabello 1996, Cabello & Jacinto 2002
La Pampilla	ND	ND	ND	ND	ND	0.62-1.46	ND	ND	ND	ND	ND	IMARPE 1996
Pisco Bay	ND	ND	ND	ND	ND	ND	0.1.-3.57	ND	ND	ND	0.33-19.6	Jacinto & Cabello 1996, Cabello & Jacinto 2002
Ilo-Ite	ND	ND	ND	1.58-5.7	ND	ND	ND	0.69-4	ND	ND	0.11-12.2	Jacinto & Cabello 1996, Cabello & Jacinto 2002

Note: ND = No Data.

Table 21 Concentration of hydrocarbon in sediments, Peru.

Site	Hydrcarbon in sediments (µg/l)								Source
	1987	1988	1992	1995	1996	1999	2000	2002	
Talara	2-4.2	6.3-25	ND	ND	0.13-19.63	ND	ND	ND	Jacinto 1991, Jacinto & Cabello 1996
Ferrol of Chimbote	ND	ND	ND	ND	0.89-20.21	ND	ND	0.1-10.2	Jacinto & Cabello 1996, Cabello & Jacinto 2002
Paita	ND	ND	ND	ND	0.19-6.1	ND	ND	0.1-1.63	Jacinto & Cabello 1996, Cabello & Jacinto 2002
Callao	6..9-16	2.9-10.5	1.1-8.8	2.2-2.3	0.33-33.38	30.12-53.12	0.21-11.2	0.34-4.02	Jacinto 1991, Jacinto & Cabello 1996, Cabello & Jacinto 2002
Pisco Bay	0.6-2.3	ND	ND	ND	ND	ND	ND	ND	Jacinto 1991
Ilo-Ite	ND	ND	ND	ND	ND	ND	ND	0.23-2.27	Cabello & Jacinto 2002

Note: ND = No Data.

Table 22 Concentration of hydrocarbon in water, Chile

Site	Hydrocarbon in water (µg/l)				Source
	1985	1986	1987	1988	
Quintero	ND	0.01-1.97	0.27-1.97	ND	Andrade & Alcázar 1989
Valparaíso	2-66	0.42-3.66	0.01-1.22	0.14-0.6	Alcázar et al. 1986, Dorion & Bonnet 1989
Concepción	ND	0.83-5	ND	44	Alcázar et al. 1986, Dorion & Bonnet 1989
Magallanes Strait	ND	ND	ND	2.08-8.92	Dorion & Bonnet 1989
Iquique/ Antofagasta	ND	ND	ND	2.5-5	Alcázar et al. 1989
Caldeera/ Coquimbo	ND	ND	ND	2.1-5	Alcázar et al. 1989

Note: ND = No Data.

Table 23 Concentrations of hydrocarbons in sediments, Chile.

Site	Hydrocarbon in sediments (µg/l)		Source
	1986	1988	
Valparaíso	ND	0.1-0.36	Alcázar et al. 1989
Concepción	2.52-5.06	ND	Alcázar et al. 1989
Magallanes Strait	ND	142-1860	Alcázar et al. 1989
Iquique/ Antofagasta	ND	0.77-7.95	Alcázar et al. 1989
Caldeera/ Coquimbo	ND	0.8-0.31	Alcázar et al. 1989

Note: ND = No Data.