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STRATEGIC ACTION PROGRAMME

SECOND REPORT ON THE

POLLUTION HOT SPOTS IN THE MEDITERRANEAN

Part I

COUNTRY RESULTS

In cooperation with

WHO

UNEP
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Foreword

The MED POL Programme for the Assessment and Control of Marine Pollution in the Mediterranean is, among other, responsible to follow up the implementation of the provisions of the Protocol related to the control of pollution from land-based activities (LBS Protocol). In 1996 a Strategic Action Programme (SAP) to Address Pollution from Land-based Activities was formulated and one year after was adopted by the Contracting Parties in the framework of the implementation of the LBS Protocol. One of the most important activities of the SAP was the identification of priority pollution hot spots and sensitive areas, which would provide a general assessment of the state of pollution of the Mediterranean. As a result, a report was prepared including a list of pollution hot spots and sensitive areas of national priority, which were compiled according to the country reports prepared by national or international consultants with the assistance and input of the MED POL National Coordinators.

Following the meeting of the Contracting Parties held in Monaco from 14-17 November 2001 and the related recommendations, the need was felt to update the pollution hot spots in the Mediterranean taking also into consideration the financial aspect of the measures required to abate pollution. As in the past, the above task was entrusted to WHO/EURO, within the framework of the MED POL Phase III Programme. For this purpose the Contracting Parties to the Barcelona Convention were asked to revise the already existing lists as they were included in the MAP Technical Reports Series issue no. 124 and to make possible changes related to new data and information, based on surveys or new measurements and analyses carried out in the meantime.

In the new national lists that appear in the present document following the revision of hot spots in 2002, changes were made on the pollution hot spots in relation to the following: (a) the reduction of pollution loads; (b) the elimination of pollution sources, (c) the measures taken for progressive or immediate decrease of loads polluting the sea; (d) the existence of another pollution hot spots with greater impact to human health and the environment than the listed ones; and (e) the inappropriate inclusion in the list.

New hot spots are also indicated and supported (not always) by relevant data on pollution load, collection, treatment and disposal of municipal and industrial wastewater.

The present document includes an analysis of country results of the revised pollution hot spots in 2002 and a comparative analysis between the pollution hot spots indicated in the 1997 survey and those updated in 2002, using the data and information that were provided and adopted by the MED POL National Coordinators.

A. SUMMARY AND ANALYSIS OF COUNTRY RESULTS

A1. General Comments

During the initial identification of Hot Spots in 1997, the countries that fulfilled the specific requirement for determining the areas with increased pollution pressure to the Mediterranean Sea were Albania, Algeria, Bosnia-Herzegovina, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya Arab Jamahiruya, Malta, Monaco, Morocco, Slovenia, Spain, Syria, Tunisia and Turkey. All the above mentioned countries, through the respective country reports, provided the updated list of the Hot Spots in the Mediterranean Region for the year 2002, with the exception of France that did not answer to the requested invitation and thus is not considered further in the analysis. With respect to the information provided by the Principality of Monaco, the way of discharge of both municipal and industrial wastewater is not specified, an issue that could have been clarified.

- A general observation regarding the procedure for identification of Hot Spots is that in some cases the definition of a Hot Spot is not clearly and uniformly understood. According to the guidance document the nature of hot spots should be related to a) coastal cities and urban coastal agglomerations with considerable population and b) main industrial facilities discharging directly to the Mediterranean Sea. In all cases a Hot Spot is the coastal area that is subjected to significant pressures due to intense human activities. Some countries report as a hot spot the city or the industrial facility itself rather than the recipient of their pollution. This means that the coastal area corresponding to the city Is the actual pollution hot spot.

In order to demonstrate this issue the example of the country report from Syria may be used, where the areas identified as hot spots are subjected to municipal and/or industrial pollution from coastal activities and pollution from inland activities that are transported to the sea through a river. This is graphically presented in Figure 1, where combined municipal and industrial effluents from the areas of Azhari, Zanoubi, Itihad and Shaab directly affect the coastal area of Lattakia, which at the same time accepts the pollution from inland activities, indirectly through the Al-Kabir Al-Shamali river. Following the same rationale Greece has identified as hot spots coastal waters that receive effluents from land based activities.

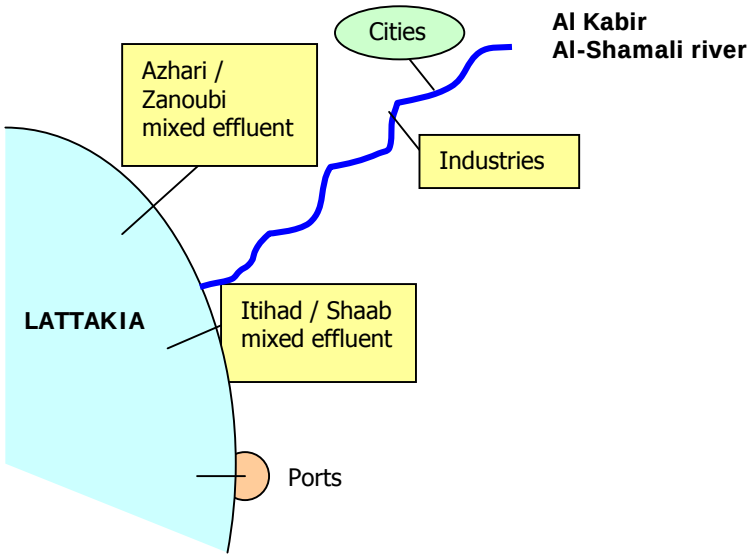


Figure 1: Hot Spot under different pressures

However, this approach was not followed by most countries, which identified as hot spots the sources of pollution (i.e. a city or an industrial installation), rather than the actual recipient of pollution (i.e. coastal waters). Spain is one of these cases and identified five wider areas consisting of large cities with increased industrial activity (Barcelona, Tarragona, Valencia, Cartagena and Algeciras) as hot spots without reference to the receiving water body. This was also the case for Turkey in which case, although in the previous report the identification was correctly based on the effect of urban and industrial activities in five bays, in the recent report of 2002 the hot spots identified reflected cities and industries (e.g. the coastal waters of Icel accepts wastewater from Mersin (mixed), Erdemli (mixed), Silifke (municipal) and Tarsus (municipal) and four hot spots were identified). Therefore, in all similar cases the pollution hot spot area is the coastal area corresponding to the city.

- Several important limitations and constraints were highlighted by most countries, such as:

  - Lack of information on both conventional and non-conventional pollution substances (e.g. hydrocarbons, metals etc) and their quality assurance;
  - Unavailability of monitoring data on coastal areas, i.e. receiving waters;
  - Reduced access to information on industries and industrial wastewaters;
  - Lack of skilled personnel, qualified to operate wastewater installations
  - Lack of funds for monitoring and investments for infrastructure works.

Due to the above limitations and discrepancies, an accurate and detailed evaluation of the provided information is a difficult task; thus evaluation and conclusions presented in the report are subjected to the inherent uncertainties due to the limited and in some cases of questionable validity provided information.

A2. Analysis of results

For each country the priority HS are presented in Annex I, with the exception of France, which as previously mentioned did not send an updated list and Monaco, where no pollution hot spots exist. Furthermore, the results of the country analysis are summarised in the tables of Annex II. More specifically, the following information is given:

- Table II-1: List of the updated priority HS for each country (total of 120) in descending order according to their category A, B, C, D, or E.
- Table II-2: Information on annual loads of conventional pollutants (BOD, COD, Total-N, Total-P and TSS) for each HS.
- Table II-3: Information on toxic, persistent and liable to bio-accumulate substances (TPBs and metals Hg, Cd, Pb, Cr, Cu, Zn, Ni, POPs and others mainly hydrocarbons) for each HS.

- The **updated list** of the priority hot spots in the Mediterranean consists of 120 areas that have been identified as such, due to the impact of human activities on a series of parameters related to public health, drinking water quality, recreational activities and other beneficial uses, aquatic life and the economy and welfare of each area and their habitants. All HS have been grouped in five categories, according to the magnitude of impacts and pressures. It should be noted that the five categories A, B, C, D, and E cover a range from extreme (category A) to insignificant effect (category E). A general overview of this classification is presented in Table 1.

Table 1

Classification of Hot Spots (2002)

Category	Number of Hot Spots	% of total
A	0	0 %
B	25	20.8 %
C	50	41.7 %
D	36	30.0 %
E	9	7.5 %
Total	120	100.0 %

Table 1 shows that no area is extremely affected by human activities, although two hot spots (Mersin and Erdemli in Turkey) were marginally classified in category B (rather than A). According to the information provided by the countries 37.5% of the hot spots (categories D and E) are not subjected to significant pressures, approximately 20.8% are under significant pressure, whereas most of the hot spots (51 HS or 41.7%) are moderately affected by human activities.

- With respect to **source of pollution** the majority of the identified hot spots (55%) accept mixed wastewater (industrial and municipal). Municipal wastewater is the source in 26.7% of the cases and in the remaining 18.3% the pollution originates exclusively from industrial discharges (Table 2).

Table 2

Source of pollution of Hot Spots 2002

	Source of pollution		
	Municipal	**Industrial**	**Mixed**
No of Hot Spots	32	22	66
% total	26.7 %	18.3 %	55.0 %

- The **information** provided in the 2002 Country Reports regarding the pollution loads that are discharged in the Mediterranean, is not complete. Loads concerning conventional pollutants, such as BOD, COD, TN, TP and TSS, are given for about two thirds of the identified HS (77-90 out of the total 120). Limited information related to 5-26 HS is provided for other pollutants such as heavy metals, oil and phenols. Thus the following remarks are based on the provided data and may only be used as indicative of the actual loads. A tabulated presentation of the data obtained is shown in Table 3.

Table 3

General figures for collected data for 2002

Pollution Parameter	No of HS reported (out of a total of 120)	Respective total annual load (t/yr)
BOD	82	431,689
COD	77	861,118
TN	90	294,648
TP	85	64,441
TSS	77	714,531
Metals	12-26	2-175 (depending on the element)
Oil	18	3,985
Phenols	5	0.22

It should be mentioned that five countries (Bosnia-Herzegovina, Egypt, Italy, Spain, Tunisia) did not provide any information on pollution loads and as a result this affects the analysis of the following sections.

- The total **annual BOD load** reported (corresponding to 82 HS) sums 431,689 t.

From the reported data the source of pollution that has a major contribution to the BOD load (about 74%) is related to combined sewage (municipal and industrial), whereas second in order source of pollution (corresponding to 25% of the total BOD load) is related to cities located in coastal areas. It should be noted that only 1% of the total BOD load originates exclusively from industrial effluents (Table 4).

Table 4

Hot Spots related to source of pollution and annual BOD load

Source of pollution	Municipal	Industrial	Mixed	Total
No of Hot Spots	28	10	44	82
% of HS	34.2%	12.2%	53.6%	100%
BOD load (t/yr)	110,143	4,507	317,039	431,689
% of BOD load	25,5%	1,0%	73,5%	100%

The same remark as the previously mentioned for BOD also applies for COD since 73% of total COD load results from the disposal of combined sewage (municipal and industrial), followed by 26% of total COD load from urban wastewater and only 1% is originating exclusively from the industrial sector (Table 5).

Table 5

Hot Spots related to source of pollution and annual COD load

Source of pollution	Municipal	Industrial	Mixed	Total
No of Hot Spots	27	7	43	77
% of HS	35.1%	9.1%	55.8%	100%
COD load (t/yr)	224,511	7,315	629,292	861,118
% of COD load	26,1%	0,9%	73,0%	100%

- With respect to **nutrients** discharged into the Mediterranean and considering the available information the total reported load is 294,648 (90 HS) and 64,441 (85 HS).

- The information reported by the different countries with respect to the discharge of metals or other substances (phenols, oil) was limited since the relevant information was provided by a low number of hot spots (to the order of 15-25 hot spots).

- Table 6 shows the cities situated along the Mediterranean coast and their respective population, as reported by the countries. Nine cities, including two of the greater cities of the area Barcelona (Spain) and Athens (Inner Saronicos gulf - Greece), host 55% of the reported population. However, for some of the large coastal cities (Alexandria or Barcelona) there is absence of relevant data with respect to the municipal load.

- Regarding the required investment for the rehabilitation of the identified hot spots, all countries with the exception of Spain provided relevant information. The total estimated cost, mainly related to the construction of municipal and/or industrial wastewater treatment plants, amounts to about 3.2 billion US dollars (corresponding to 104 HS).

Table 6

Coastal cities in the Mediterranean and respective population

Population	No of cities reported	Total population	% Total
>1,000,000	9	19,649,526	55.3%
500,000-999,999	10	7,160,497	20.1%
250,000-499,999	13	4,098,279	11.5%
<250,000	45	4,644,089	13.1%
Total	*77*	*35,552,391*	*100.0%*

Figure 2 presents the distribution of this cost between the countries. About 23% of the total investment cost is reported by Italy, while for most of the countries the respective percentage is less than 6.5%.

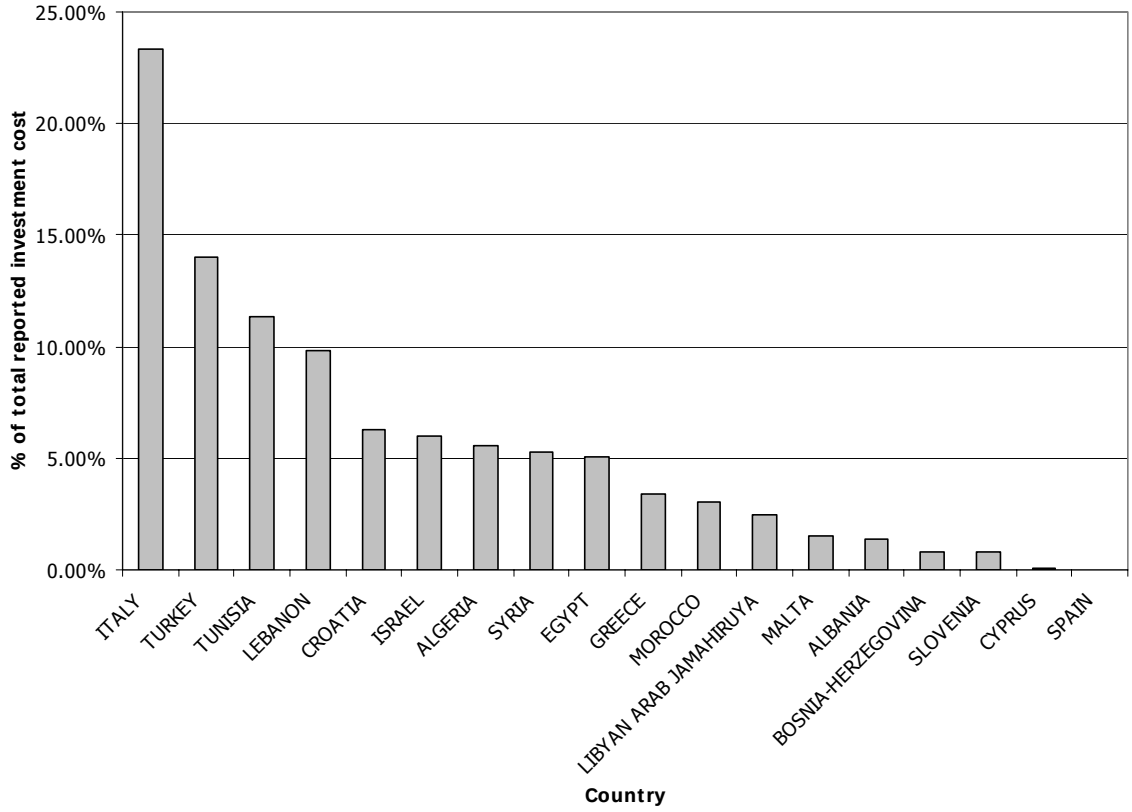
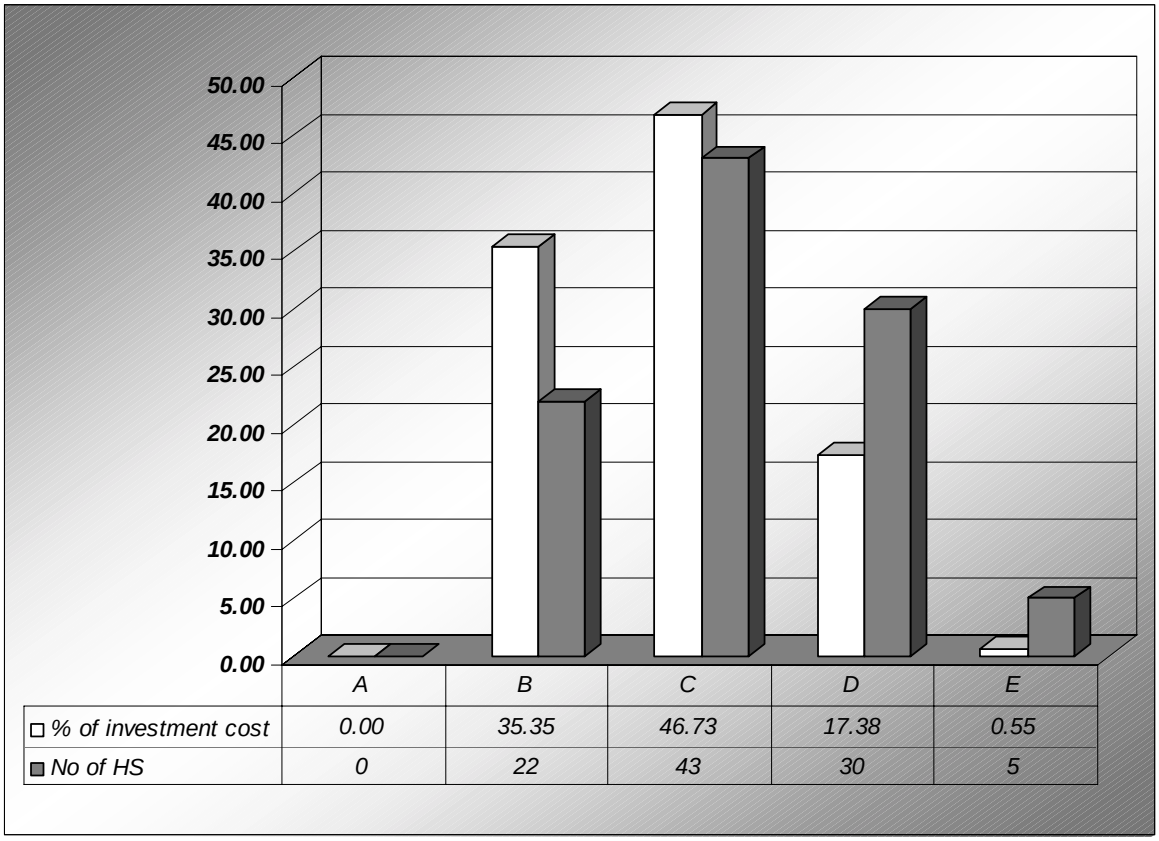


Figure 2: Investment cost for rehabilitation of identified hot spots

The average cost per HS amounts to 32.0 million US dollars, therefore the projected cost for 120 HS reaches 3.84 billion US dollars.



	A	B	C	D	E
% of investment cost	0.00	35.35	46.73	17.38	0.55
No of HS	0	22	43	30	5

Figure 3: Investment cost per category and number of hot spots

From Figure 3 it can be deduced that the average investment needed per HS varies considerably with the classification of the HS. For hot spots in category E the average per HS cost is as low as 3.5 million US dollars and increases to 18.5, 34.8 and 51.4 million US dollars per HS for categories D, C and B respectively. About 82% of the total investment is required for categories B and C, which represent about 65% of the hot spots.

ANNEX I

PRIORITY POLLUTION HOT SPOTS (SITUATION YEAR 2002)

Pollution Hot Spots in ALBANIA

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
Durres	Domestic	6	4,5	2,1	4	1,6	1,4	C	WWTP	20 millions
Durres	Industrial	6	5,4	3,5	4,8	1,6	1,4	B	Area rehabilitation	12 millions
Vlora	Industrial	6	5,4	3,5	4,8	1,6	1,4	B	Area rehabilitation	12 millions

Pollution Hot Spots in ALGERIA

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
Oran	Urban and industrial	5	1	4	6	5	5	B	WWTP : Rehabilitation Expansion PTIW : Implementation	90 millions of dollars ND
Rouiba - Réghaia	Urban and industrial	5	2	5	5	4	5	B	PTIW : Implementation	?
Ghazaouet	Urban and industrial	5	1	6	5	4	5	B	WWTP : Implementation PTIW : Implementation	19 millions of dollars ND
Alger	Urban and industrial	5	1	4	6	4	5	B	WWTP : Rehabilitation PTIW : Implementation	30.000 dollars ND
Mostaganem	Urban and industrial	4	1	6	4	4	5	C	WWTP : Implementation PTIW : Implementation	50 millions of dollars ND
Béjaia	Urban and industrial	5	1	5	5	4	4	C	WWTP : Implementation Expansion PTIW : Implementation	700.000 dollars ND
Annaba	Urban and industrial	5	1	4	5	4	4	C	WWTP : Rehabilitation Expansion PTIW : Implementation	408.000 dollars ND
Skikda	Urban and industrial	5	1	5	4	3	4	C	WWTP : Implementation PTIW : Implementation	20 millions of dollars ND

WWTP : Urban wastewater treatment plant / PTIW : Pretreatment of industrial effluents / ND : Not determined (requires a specific study for each industry)

Pollution Hot Spots in BOSNIA AND HERZEGOVINA

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
Regional System for Municipality of Neum	Domestic	3	1	3	5	4	2	D	Construction of regional sewerage system + Building of WWTP	25.1 million

Pollution Hot Spots in CROATIA

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
Kaštela Bay	- Domestic - Industrial	5	1	5	5	3	6	B	WWTP + sewerage system	See Split
Zadar	- Domestic - Industrial	5	1	4	4	3	5	C	WWTP + sewerage system	35 million
Split	- Domestic - Industrial	5	1	4	3	3	6	C	WWTP + sewerage system	66 million
Rijeka and Kvarner	- Domestic - Industrial	5	1	4	4	2	6	C	WWTP extension	25 million
Oil refinery Rijeka (Mlaka + Urinj)	- Industrial	2	1	6	4	4	6	C	Underground sanitation	8 million
Šibenik	- Domestic - Industrial	5	1	3	4	3	5	C	WWTP + sewerage system extension	30 million
Pula	- Domestic - Industrial	4	1	3	4	3	5	C	WWTP + sewerage system extension	30 million
Dubrovnik	- Domestic	3	1	2	4	1	5	D	DWWTP and sewer extension	6 million
Neretva river (Ploče + Metković)	- Domestic - Industrial	3	1	2	3	2	3	D	Management plan and study of pollution sources	700.000
Ston (Neum)	- Domestic - Industrial	3	1	2	3	2	3	D	Study of pollution sources in the Bay	
Zadar (Soya + Cannery)	- Industrial	2	1	2	3	2	3	D	IWWTP and WWTP reconstruction	2 million

WWTP – Waste Water Treatment Plant
DWWTP – Domestic Waste Water Treatment Plant
IWWTP – Industrial Waste Water Treatment Plant
VTS – HAC – Vessel Traffic Service – Harbour Approach Control

Pollution Hot Spots in CYRPUS

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
ETKO	Winery and Distillery	1	1	2	2	2	3	E	WWT	400000
SODAP	do.	2	1	4	3	3	3	D	WWT	720000
LOEL	do.	1	1	2	2	2	3	E	WWT	300000
KEO	do.	2	1	4	3	3	3	D	WWT	745000
KEO B	Brewery	2	1	4	3	3	3	D	WWT	560000
Dhekelia Desalination Plant	Brine	1	1	3	2	1	1	E	Better disposal of brine	

Pollution Hot Spots in EGYPT

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
El'Mex Bay	Domestic, Industrial	2	1	3	2	2	4	D	WWTP Construction	101.2+
Alexandria	Domestic	2	1	2	2	1	2	E	WWTP Construction	
Abu Qir Bay	Industrial	2	1	3	2	2	4	D	WWTP Construction	61.6 million+
Lake Manzala	Domestic, Industrial	2	1	2	2	2	5	D	WWTP Construction	
Port Said	Domestic	1	1	2	1	1	1	E	WWTP Rehabilitation	

Pollution Hot Spots in GREECE

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
Thermaikos gulf	Municipal, industrial	3	1	2	3	2	4	D	Sewage network of Touristic areas / Industrial feasibility studies	6 million / *
Inner Saronic gulf	Municipal, industrial	6	1	2	3	4	4	C	Secondary treatment	140 million
Patraikos gulf	Municipal, industrial	3	1	2	3	2	4	D	Industrial feasibility studies	*
Pagasitikos gulf	Municipal, industrial	3	1	2	3	2	4	D	Expansion of plant and monitoring of industrial influent / Industrial feasibility studies	10,15 million / *
Gulf of Heraklio	Municipal, industrial	3	1	2	3	2	4	D	Industrial feasibility studies	*
Elefsis bay	Municipal, industrial	3	1	3	4	4	6	C	Construction of treatment plant / Industrial feasibility studies	90 million / *
North-Western Saronic gulf	Municipal, industrial	3	1	2	2	1	4	D	Industrial feasibility studies	*
Nea Karvali bay	Industrial	3	1	2	2	1	4	D	Industrial feasibility studies	*

* A total cost of 2 million USD is estimated for the feasibility studies that are needed.

Pollution Hot Spots in ISRAEL

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
Naaman	River	1	5	3	5	2	3	C	Outfall + treatment upgrade	3 million
Kishon	River	3	1	3	5	4	6	C	Outfall + tertiary treatment	20 million
EIL	Industry	3	1	2	4	1	4	D	Outfall + treatment upgrade	2 million
Ashdod	Industry	2	1	3	2	2	5	D	Biological treatment	20 million
Ako	Municipal	2	1	3	2	1	1	E	Outfall + Secondary treatment	5.5 million
Naharia	Municipal	2	1	3	3	2	1	E	Secondary treatment	4.5 million
Shafdan	Municipal sludge	3	1	4	2	2	5	D	Land-based treatment and discharge	120 million

Pollution Hot Spots in ITALY

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
Genova	Port/mixed	3	1	6	3	5	4	C	VTS-HAC/deloca-lization/WWTP/ monitoring	d = 10 million i = 80 million
La Spezia	Port/mixed	3	1	6	3	4	3	C	VTS-HAC/deloca-lization/WWTP/ energy power stn.	65 million
Livorno	Port, Industry	3	1	6	2	3	4	C	VTS-HAC/deloca-lization/WWTP/ monitoring	n.a.
Rosignano Solvay	Cl-NaOH, ethelene	4	1	6	3	3	2	C	BAT Chlorine/remedial on landfill	40 million
Golfo di Napoli	Port, refinery, domestic	3	1	4	4	3	5	C	VTS-HAC/WWTP	60 million
Milazzo	Port, refinery, domestic	3	1	6	3	3	4	C	VTS-HAC/deloca-lization/WWTP	45 million
Gela	Port, refinery, domestic	4	1	6	4	3	2	C	VTS-HAC/deloca-lization/WWTP	35 million
Augusta-Melilli	Port, refinery, domestic	5	1	6	3	3	2	C	VTS-HAC/deloca-lization/BAT chlo-rine/WWTP	70 million
Taranto	Port, refinery, domestic	5	1	6	2	3	2	C	VTS-HAC/WWTP	n.a.
Brindisi	Port, refinery, domestic	5	1	6	2	4	2	C	VTS-HAC/deloca-lization/WWTP inol/BAT chlorine	40 million
Bari-Berletta	Domestic	6	3	3	2	2	2	C	WWTP	100 million
Manfredonia	Port, industry, domestic	4	1	5	2	2	2	D	VTS-HAC/WWTP	25 million

Ancona-Falc.	Port, refinery	3	1	4	4	2	2	D	Monitoring	60 million
Ravenna	Port, refinery	3	1	6	2	4	4	C	Monitoring/deloca-lization	n.a.
Porto Marghera (VE)	Port, industry, domestic	6	1	6	4	5	5	B	VTS-HAC/monitor-ing/BAT CVM/BAT chlorine	120 million

Pollution Hot Spots in LEBANON

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
Greater Beirut area	Municipal, industrial, agricultural HS	6	1	3	5	4	4	C	-WWTP-Construction: Primary & secondary (CDR) -On site industrial pre-treatmnet units -Intgrated Pest management Program, current Project within MoE, Awereness and demonstration pilot project	-Construction Dora plant: 47 million -Upgrading to sec. Treatment: 93 million -Estimate fiture investment: average of 60.000US$ by unit -Phase 1: 328.000US$ -Phase 2: 4421.000 US$
Saida – Gazieh	Municipal, industrial, agricultural HS	4	1	4	5	4	4	C	WWTP- construction: primary & secondary	Construction: 32 million Upgrading to sec. Treatment: 12 million
Tripoli	Municipal, agricultural HS	5	2	3	4	4	2	C	WWTP –construction: primary & secondary	Construction: 106 million Upgrading to sec.Treat.: 20,5 million
Batroun –Selaata	Municipal, industrial, agricultural	4	1	4	3	3	2	D	WWTP: construction: Feasibility & secondary	Feasibility stufy: 0,5 - Sec. Treatment: 5,4

Pollution Hot Spots in LIBYA

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
Abo-Kammash	Chemical	2	4	2	2	1	3	D	WWTP Maintenance	0.8 Million
Zawia City	Municipal Industrial	2	4	3	3	2	4	D	WWTP + Sewerage System / WWTP Maintenance	8.0 Million 1.2 Million
Janzour City	Municipal Industrial	4	4	3	3	3	5	C	WWTP + Sewerage System / WWTP Maintenance	24 Million 1.2 Million
Tripoli City	Municipal	5	4	4	4	2	6	B	WWTP + Sewerage System	25 Million
Misratah City	Municipal Industrial	2	4	2	3	2	3	D	WWTP + Sewerage System / WWTP Maintenance	3 Million 1.2 Million
Ras-Lanouf	Petroleum Fertilizer	2	4	2	3	2	4	D	WWTP Maintenance	2.5 Million
Benghazi	Municipal	5	4	2	3	2	4	C	WWTP + Sewerage System	6 Million
Tobruk	Municipal	2	4	2	2	1	3	D	WWTP + Sewerage System	5 Million

Remarks:
1: Low reliability of data
2: Lack of skilled manpower
3: Operation and Maintenance problems

Pollution Hot Spots in MALTA

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
WIED GHAMMIEQ	Mixed	6	1	6	4	4	6	B	WWTP (EXT) WWTP (NEW)	4 million 32 million
CUMNIJA	Mixed	6	1	4	3	3	5	C	WWTP	8 million
RAS IL-HOBZ	Mixed	5	1	5	3	3	5	C	WWTP	4 million

Pollution Hot Spots in MOROCCO

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
*Tangier (MORI°	Domestic & industrial	3	1	2	2	3	6	D	1- Rehabilitation of the sewage system ; 2- Construction of a DWTP; 3- Merging of all existing outlet pipes into one underwater outlet; 4- Introduction of PTIW systems.	(1+2+3)- 30 million (4)- Capacity building using techno-financial upgrade and environmental conformity mechanisms for polluting industries along the lines of FODEP/GTZ . (Cost estimate required)

Tetouan (MOR II)	Domestic & industrial	4	3	4	3	3	6	C	1- DWTP + rehabilitation of the existing sewage system; 2- Introduction of PTIW systems.	(1+2)- 48 million (2)- Capacity building using techno-financial upgrade and environmental conformity mechanisms for polluting industries along the lines of FODEP/GTZ. (Cost estimate required)
Al Hoceima (MOR III)	Domestic & industrial	2	1	2	2	1	3	E	- Rehabilitation of the sewage network	- 7 million
Nador (MOR IV)	Domestic & Industrial	3	2	3	4	3	2	D	1- Construction of a DWTP (Nador-Zeghenghene); 2- Introduction of PTIW systems.	(1)- 12 million (2)- Capacity building using techno-financial upgrade and environmental conformity mechanisms for polluting industries along the lines of FODEP/GTZ. (Cost estimate required)

DWTP : Domestic wastewater treatment plant
PTIW : Pretreatment of industrial wastewater
1 U.S. dollar = 10 DH (dirhams)

Pollution Hot Spots in SLOVENIA

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
Rižana river	Domestic, Industrial	3	1	3	5	4	5	C	WWTP extension + sewage system reconstruction	11.000.000,00
Izola	Domestic, Industrial	3	1	3	5	4	4	C	WWTP construction + sewage system reconstruction	8.000.000,00.
Piran	Domestic	3	1	3	4	3	1	D	WWTP extension + sewage system reconstruction	6.000.000,00
Badaševica	Domestic, Industrial	3	1	3	4	4	3	D	See river Rižana and WWTP Koper	See river Rižana and WWTP Koper
Dragonja	Domestic, Agricultural	2	1	2	2	2	2	E		

Pollution Hot Spots in SPAIN

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
BARCELONA	Municipal, industrial	3	1	6	4	4	3	C		
TARRAGONA	Industrial	3	1	4	4	4	3	C		
VALENCIA	Municipal, industrial	2	1	4	4	4	3	D		
CARTAGENA	Industrial	3	1	3	3	3	3	D		
ALGECIRAS	Industrial	3	1	3	4	3	3	D		

Pollution Hot Spots in SYRIA

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
Banias	Municipal and industrial	5	4	5	3	2	6	B	- DWWTP (construction) - Refinery WWTP (rehabilitation) - Adoption of clean technology - Improving monitoring system - Industrial feasibility study - Rehabilitation of oil terminal	36 million
Lattakia	Municipal and industrial	5	4	3	5	3	4	B	- DWWTP (construction) - IWWTP (planned & construction) - Improving industrial inspection and monitoring systems -Industrial feasibility study - Capacity building	73 million

Tartous	Municipal and industrial	3	5	3	5	3	3	C	- DWWTP (construction) - IWWTP (planned & construction) - Cement factory rehabilitation - Port and oil terminal rehabilitation -Industrial feasibility study	40 million
Jableh	Municipal and industrial	2	3	3	2	2	2	D	- DWWTP (construction) - Improving monitoring system	20 million

Pollution Hot Spots in TUNISIA

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
Gabès	Domestic Industrial Fertilisers/ Phosphates	6	2	6	5	4	5	B	-Extension : network+ STEP -Tertiary treatment - Dumping of phosphor-gypsum	35 120
Sfax South	Domestic Industrial (fertilisers/ Phosphates	6	1	5	4	4	5	B	Extension and rehabilitation : STEP network -Tertiary treatment Depollution /development of the industrial zone/ pre-treatment	40 50 (unstudied estimate)
Tunis South Lake	Domestic Industrial (Oil,Textiles)	5	1	6	5	4	5	B	Extension and rehabilitation of sanitation networks Rehabilitation of industrial and port areas / pre- treatment	20 20

Lake Bizerte	Domestic Industrial (metal-working, Oil, Cement)	6	2	6	4	4	5	B	Extension of sanitation and tertiary treatment networks Depollution / development of the industrial zones/ pre-treatment	40 40 (unstudied estimate)

Pollution Hot Spots in TURKEY

Name	Type	Public Health	Drinking Water Quality	Aquatic Life	Recreation	Other beneficial us	Welfare and economy	Category	Nature of investment	Preliminary estimated financial requirement (in US$)
		(1)	(0.9)	(0.7)	(0.8)	(0.8)	(0.7)			
Mersin	Mixed	6	3	6	6	4	5	B	SW (including medical wastes) +WWTP	Feasibilities have been completed for both SW and WWTP, SW 40 million+ WWTP 50 million
Erdemli (coastal area strip which includes 12 municipalities and Erdemli)	Mixed	6	3	6	6	4	5	B	SW+WWTP	SW 10 million+ WWTP 122 million. Feasibility studies have been completed for both solid waste and Waste water
Silifke	Domestic	3	4	4	3	3	4	C	SW+WWTP	SW 2 million: WWTP is under construction
Tarsus	Domestic	5	4	5	3	4	5	B	SW	SW 14 million
Antalya	Domestic	5	5	6	4	3	6	B	SW +WWTP	* Submitted to World Bank for financing
Alanya	Domestic	3	1	3	6	5	3	C	SW	SW 12 million
Side	Domestic	3	1	3	6	4	2	C	SW+WWTP	SW 1.8 million+ network is completed, WWTP is near completion.
Manavgat	Domestic	3	1	3	6	5	3	C	SW	SW 3.6 million
Adana	Mixed	5	4	4	5	4	5	B	SW (including medical waste)	Feasibility is completed SW 48 million
Ceyhan	Domestic	3	4	3	2	4	5	C	SW+WWTP	SW 6 million : WWTP 25 million
Antakya	Domestic	5	4	5	4	3	4	B	SW	SW 8.5 million
Iskenderun	Domestic	5	2	5	5	3	4	C	SW	SW 9.2 million

Dortyol	Domestic	5	4	5	4	3	4	B	SW+WWTP	SW 9.2 million : WWTP 13 million
Kirikhan	Domestic	5	4	5	4	3	4	B	SW+WWTP	SW 5.4 million : WWTP 25 million
Bodrum	Domestic	3	2	3	6	5	3	C	SW	SW 1.9 million
Marmaris	Domestic	3	2	3	6	5	3	C	SW (landfill side is completed) +WWTP	Network is completed. Finance has been obtained from WB
Datca	Domestic	2	2	3	6	5	2	C	SW+WWTP	SW 0.5 million : WWTP 13 million is under construction
Foca	Domestic	3	2	3	6	5	3	C	WWTP	WWTP 18.8 million. Feasibility is completed
Cesme-Alacatı	Domestic	5	4	5	4	3	4	B	SW+WWTP	SW 5 million, WWTP 8 million

* No estimation was provided
* SW : Solid Wastes

ANNEX II

SUMMARY TABLES
(SITUATION YEAR 2002)

Table II (1):
List of hot spots in descending order by country

Table II (2):
Population and main pollution loads (BOD, COD, TN, TP, TSS) for each hot spot by country

Table II (3):
TPB discharges (Hg, Cd, Pb, Cr, Cu, Zn, Ni, others) for each hot spot by country

Table II (1): List of hot spots in descending order by country

Country	Hot Spot	Type	Category	Preliminary estimated financial requirement (in US$)
ALBANIA	Durres	Industrial	B	12,000,000
ALBANIA	Vlora	Industrial	B	12,000,000
ALBANIA	Durres	Municipal	C	20,000,000
ALGERIA	Oran	Mixed	B	90,000,000
ALGERIA	Rouiba - Réghaia	Mixed	B	n.a.
ALGERIA	Ghazaouet	Mixed	B	19,000,000
ALGERIA	Alger	Mixed	B	30,000
ALGERIA	Mostaganem	Mixed	C	50,000,000
ALGERIA	Béjaia	Mixed	C	700,000
ALGERIA	Annaba	Mixed	C	408,000
ALGERIA	Skikda	Mixed	C	20,000,000
BOSNIA-HERZEGOVINA	Regional System for Municipality of Neum	Municipal	D	25,100,000
CROATIA	Kaštela Bay	Mixed	B	Split
CROATIA	Zadar	Mixed	C	35,000,000
CROATIA	Split	Mixed	C	66,000,000
CROATIA	Rijeka and Kvarner	Mixed	C	25,000,000
CROATIA	Oil refinery Rijeka (Mlaka + Urinj)	Industrial	C	8,000,000
CROATIA	Šibenik	Mixed	C	30,000,000
CROATIA	Pula	Mixed	C	30,000,000
CROATIA	Dubrovnik	Municipal	D	6,000,000
CROATIA	Neretva river (Ploče + Metković)	Mixed	D	700,000
CROATIA	Ston (Neum)	Mixed	D	n.a.
CROATIA	Zadar (Soya + Cannery)	Industrial	D	2,000,000
CYPRUS	SODAP	Industrial	D	720,000
CYPRUS	KEO	Industrial	D	745,000
CYPRUS	KEO B	Industrial	D	560,000
CYPRUS	ETKO	Industrial	E	400,000
CYPRUS	LOEL	Industrial	E	300,000
CYPRUS	Dhekelia Desalination Plant	Industrial	E	n.a.
EGYPT	El'Mex Bay	Mixed	D	101,200,000
EGYPT	Abu Qir Bay	Industrial	D	61,600,000
EGYPT	Lake Manzala	Mixed	D	n.a.
EGYPT	Alexandria	Domestic	E	n.a.
EGYPT	Port Said	Domestic	E	n.a.
GREECE	Inner Saronic gulf	Mixed	C	finacned
GREECE	Elefsis bay	Mixed	C	90,285,000
GREECE	Thermaikos gulf	Mixed	D	6,285,000
GREECE	Patraikos gulf	Mixed	D	285,000
GREECE	Pagasitikos gulf	Mixed	D	10,435,000
GREECE	Gulf of Heraklio	Mixed	D	285,000
GREECE	North-Western Saronic gulf	Mixed	D	285,000
GREECE	Nea Karvali bay	Industrial	D	285,000
ISRAEL	Naaman	Mixed	C	3,000,000
ISRAEL	Kishon	Mixed	C	20,000,000
ISRAEL	EIL	Industry	D	20,000,000
ISRAEL	Ashdod	Industry	D	20,000,000

Country	Hot Spot	Type	Category	Preliminary estimated financial requirement (in US$)
ISRAEL	Shafdan	Municipal	D	120,000,000
ISRAEL	Ako	Municipal	E	5,500,000
ISRAEL	Naharia	Municipal	E	4,500,000
ITALY	Porto Marghera (VE)	Mixed	B	120,000,000
ITALY	Genova	Mixed	C	90,000,000
ITALY	La Spezia	Mixed	C	65,000,000
ITALY	Livorno	Mixed	C	n.a.
ITALY	Rosignano Solvay	Industrial	C	40,000,000
ITALY	Golfo di Napoli	Mixed	C	60,000,000
ITALY	Milazzo	Mixed	C	45,000,000
ITALY	Gela	Mixed	C	35,000,000
ITALY	Augusta-Melilli	Mixed	C	70,000,000
ITALY	Taranto	Mixed	C	n.a.
ITALY	Brindisi	Mixed	C	40,000,000
ITALY	Bari-Berletta	Municipal	C	100,000,000
ITALY	Ravenna	Mixed	C	n.a.
ITALY	Manfredonia	Mixed	D	25,000,000
ITALY	Ancona-Falc.	Mixed	D	60,000,000
LEBANON	Greater Beirut area	Mixed	C	140,210,000
LEBANON	Saida – Gazieh	Mixed	C	44,000,000
LEBANON	Tripoli	Municipal, agricultural	C	126,500,000
LEBANON	Batroun –Selaata	Mixed	D	5,900,000
LIBYAN ARAB JAMAHIRUYA	Tripoli City	Municipal	B	25,000,000
LIBYAN ARAB JAMAHIRUYA	Janzour City	Mixed	C	25,200,000
LIBYAN ARAB JAMAHIRUYA	Benghazi	Municipal	C	6,000,000
LIBYAN ARAB JAMAHIRUYA	Abo-Kammash	Industrial	D	800,000
LIBYAN ARAB JAMAHIRUYA	Zawia City	Mixed	D	9,200,000
LIBYAN ARAB JAMAHIRUYA	Misratah City	Mixed	D	4,200,000
LIBYAN ARAB JAMAHIRUYA	Ras-Lanouf	Industrial	D	2,500,000
LIBYAN ARAB JAMAHIRUYA	Tobruk	Municipal	D	5,000,000
MALTA	WIED GHAMMIEQ	Mixed	B	36,000,000
MALTA	CUMNIJA	Mixed	C	8,000,000
MALTA	RAS IL-HOBZ	Mixed	C	4,000,000
MOROCCO	Tetouan (MOR II)	Mixed	C	48,000,000
MOROCCO	Tangier (MORI°	Mixed	D	30,000,000
MOROCCO	Nador (MOR IV)	Mixed	D	12,000,000
MOROCCO	Al Hoceima (MOR III)	Mixed	E	7,000,000
SLOVENIA	Rižana river	Mixed	C	11,000,000
SLOVENIA	Izola	Mixed	C	8,000,000
SLOVENIA	Piran	Municipal	D	6,000,000
SLOVENIA	Badaševica	Mixed	D	Rizana
SLOVENIA	Dragonja	Municipal, agricultural	E	n.a.
SPAIN	BARCELONA	Mixed	C	n.a.
SPAIN	TARRAGONA	Industrial	C	n.a.
SPAIN	VALENCIA	Mixed	D	n.a.
SPAIN	CARTAGENA	Industrial	D	n.a.
SPAIN	ALGECIRAS	Industrial	D	n.a.
SYRIA	Banias	Mixed	B	36,000,000

Country	Hot Spot	Type	Category	Preliminary estimated financial requirement (in US$)
SYRIA	Lattakia	Mixed	B	73,000,000
SYRIA	Tartous	Mixed	C	40,000,000
SYRIA	Jableh	Mixed	D	20,000,000
TUNISIA	Gabès	Mixed	B	155,000,000
TUNISIA	Sfax South	Mixed	B	90,000,000
TUNISIA	Tunis South Lake	Mixed	B	40,000,000
TUNISIA	Lake Bizerte	Mixed	B	80,000,000
TURKEY	Mersin	Mixed	B	90,000,000
TURKEY	Erdemli	Mixed	B	132,000,000
TURKEY	Tarsus	Municipal	B	14,000,000
TURKEY	Antalya	Municipal	B	financed
TURKEY	Adana	Mixed	B	48,000,000
TURKEY	Antakya	Municipal	B	8,500,000
TURKEY	Dortyol	Municipal	B	21,200,000
TURKEY	Kirikhan	Municipal	B	30,400,000
TURKEY	Cesme-Alacatı	Municipal	B	13,000,000
TURKEY	Silifke	Municipal	C	2,000,000
TURKEY	Alanya	Municipal	C	12,000,000
TURKEY	Side	Municipal	C	1,800,000
TURKEY	Manavgat	Municipal	C	3,600,000
TURKEY	Ceyhan	Municipal	C	31,000,000
TURKEY	Iskenderun	Municipal	C	9,200,000
TURKEY	Bodrum	Municipal	C	1,900,000
TURKEY	Marmaris	Municipal	C	financed
TURKEY	Datca	Municipal	C	13,500,000
TURKEY	Foca	Municipal	C	18,800,000

Table II (2): Population and main pollution loads (BOD, COD, TN, TP, TSS) for each hot spot by country

Country	HS	Population	BOD t/year	COD t/year	TN t/year	TP t/year	TSS t/year
ALBANIA	Durres	100,000	2,864		477	96	4,300
	Durres	-					
	Vlora						
ALGERIA	Oran	1,281,378	28,062	46,770	7,015	2,806	42,213
	Ruiba-Reghaia						
	Ghazaouet	108,692	2,380	4,760	39	99	2,777
	Alger	2,460,069	53,875	89,792	13,468	5,387	80,812
	Mostaganem	629,445	13,784	22,974	3,446	1,378	20,752
	Bejaia	901,263	19,737	32,896	4,934	1,973	29,606
	Annaba	555,485	12,165	20,275	3,041	1,216	18,247
	Skikda	910,680	19,943	33,239	4,985	1,994	30,034
BOSNIA-HERZEGOVINA	Neum	12,900					
CROATIA	Kastela Bay	-	458	1,369	148	20	939
	Zadar	136,000	538	1,282	83	14	2,250
	Split	350,000	740	1,479	302	37	738
	Rijeka-Kvarner	206,000	2,743	3,770	313	78	1,704
	Oil refinery Rijeka						
	Sibenik	85,000	121	375	105	13	230
	Pula	85,000	555		130	16	
	Dubrovnik	71,000	169	461	98	21	427
	Neretva river	100,000	85	379	38	7	109
	Ston	-	207	457	53	8	137
	Zadar	-	11	37	1	0	7
CYPRUS	Etko	-	58	104	33	2	1
	Sodap	-	310	590	70	6	1
	Loel	-	14	30	20	2	1
	Keo	-	228	456	114	11	2
	Keo B	-	400	600	80	1	2
	Dhekelia desalination plant	-					
EGYPT	El Mex Bay						
	Alexandria						

Country	HS	Population	BOD t/year	COD t/year	TN t/year	TP t/year	TSS t/year
	Adu Qir Bay						
	Lake Manzala						
	Port Said						
GREECE	Thermaikos gulf	880,000	1,362	6,294	607	397	1,753
	Inner Saronic gulf	3,500,000	58,000	132,000	15,000	3,000	35,000
	Patraikos gulf	160,000	340	1,358	255	145	340
	Pagasitikos gulf	100,000	150	584	91	73	150
	Gulf of Heraklio	145,000	218	852	145	104	218
	Elefsis bay	50,000	2,448	4,648	389	92	2,760
	North-Western Saronic gulf		75		70		120
	Nea Karvali bay	-	93		1,110	93	650
ISRAEL	Naaman River	-	140	770	55	22	1,100
	Kishon River	-	305	1,017	819	99	1,533
	EIL	-	374			7	434
	Asdod	-	2,944	5,498	466	0	47
	Ako	55,000	1,262	3,046	125		1,137
	Naharia	50,000	2,358	4,500	201	37	2,248
	Shafdan	1,600,000	19,757	77,972	3,886	1,853	63,633
ITALY	Genova				4,664	625	
	La Spezia				1,120	347	
	Livorno				3,650	1,047	
	Rodignano Solvay						
	Napoli Gulf				10,046	727	
	Milazzo						
	Gela						
	Augusta-Melilli						
	Taranto				7,778	3,208	
	Brindisi				5,108	2,288	
	Bari-Berletta				7,616	2,328	
	Manfredonia						
	Ancona-Falc				2,858	1,375	
	Ravenna				6,064	3,347	
	Porto Marghera						
LEBANON	Greater Beirut area	1,300,000	10,183	50,122	7,955		

Country	HS	Population	BOD t/year	COD t/year	TN t/year	TP t/year	TSS t/year
	Saida-Gazieh	220,000	1,318	6,486	1,029		
	Tripoli	360,000	2,156	10,614	1,648		
	Bartoun-Selaara	60,000	359	1,769	280		
LIBYAN ARAB JAMAHIRUYA	Abo-Kammash	-					
	Zawia city	120,000	1,460	2,190	128	37	1,180
	Janzour city	120,000	3,920	4,380	256	74	2,372
	Tripoli city	1,500,000	16,060	24,090	1,606	321	14,053
	Misratah city	380,000	1,022	1,533	117	35	876
	Ras-Lanouf	-					
	Benghazi	750,000	5,267	8,432	644	193	4,818
	Tobruk	100,000	760	1,140	88	26	608
MALTA	Wied Ghammieq	270,085	10,250	16,029	135,412	12,447	124,538
	Cumnija	59,224	2,412	3,599	1,914	1,495	14,240
	Ras Il Hobz	25,957	1,273	3,318	1,777	2,233	28,165
MOROCCO	Tangier	526,215	4,010	10,289	600	105	2,226
	Tetouan	404,000	1,943	3,250	209	35	1,095
	Al Hoceima	122,000	273	370	76	12	50
	Nador	269,000	1,079	1,714	200	26	413
SLOVENIA	Rizana river (KOPER)	48,251	689	2,138	548	8	507
	Izola	14,590	641	1,976	88	16	641
	Piran	17,440	270	594	92	8	270
	Badasevica		329	5,563	445	6	688
	Dragonja		114	1,109	117	2	127
SPAIN	Barcelona	4,680,000					
	Tarragona	110,000					
	Valencia	2,143,000					
	Cartagena	168,000					
	Algeciras	85,000					
SYRIA	Banias	168,900					
	Lattakia	746,851	7,367	12,222	1,664	377	9,503
	Tartous	319,152	3,240	7,846	552	136	3,353
	Jableh	166,779	2,342	6,893	162	82	2,862
TUNISIA	Gabes	180,000					
	Sfax South	300,000					

Country	HS	Population	BOD t/year	COD t/year	TN t/year	TP t/year	TSS t/year
	Tunis South Lake	250,000					
	Lake Bizerte	300,000					
TURKEY	Mersin	653,662	14,315	23,858	3,579	1,432	21,473
	Erdemli	118,528	2,595	4,326	649	260	3,894
	Silifke	168,360	3,687	6,145	922	368	5,531
	Tarsus	306,433	6,701	11,184	1,678	671	10,066
	Antalya	606,896	13,291	22,151	3,323	1,329	19,937
	Antalya	235,884	5,165	8,609	1,291	517	7,749
	Side	87,067	1,906	3,177	477	191	2,860
	Manavgat	174,354	3,818	6,364	955	382	5,726
	Adana	1,185,079	25,952	43,254	6,488	2,595	38,929
	Ceyhan	157,050	3,439	5,732	860	344	5,151
	Antakya	313,371	6,862	11,438	1,716	686	10,294
	Iskenderun	276,238	6,049	10,082	1,512	605	9,074
	Dortyol	121,098	2,652	4,420	663	265	3,978
	Kirikhan	118,524	2,595	4,326	649	260	3,894
	Bodrum	75,994	1,664	2,773	416	166	2,496
	Marmaris	58,925	1,290	2,150	323	129	1,936
	Datca	11,802	258	430	65	26	388
	Foca	33,061	724	1,206	181	72	1,086
	Cesme-Alacati	32,709	716	1,193	179	72	1,074

Table II (3): TPB discharges (Hg, Cd, Pb, Cr, Cu, Zn, Ni, others) for each hot spot by country (t/year)

Country	HS	Zn	Cr	Ni	Cd	Cu	Pb	Hg	Oil	Phenols	Others
ALBANIA	Durres										
ALBANIA	Durres										
ALBANIA	Vlora										
ALGERIA	Oran										
ALGERIA	Ruiba-Reghaia										
ALGERIA	Ghazaouet										
ALGERIA	Alger										
ALGERIA	Mostaganem										
ALGERIA	Bejaia										
ALGERIA	Annaba										
ALGERIA	Skikda										
BOSNIA-HERZEGOVINA	Neum										
CROATIA	Kastela Bay	0.75	0.16		0.04		0.14				
CROATIA	Zadar	0.52	0.10				0.08	0.01			
CROATIA	Split	1.89	0.13		0.10		0.22				
CROATIA	Rijeka-Kvarner	0.14			0.11	0.18	0.11				
CROATIA	Oil refinery Rijeka								67.50		
CROATIA	Sibenik										
CROATIA	Pula										
CROATIA	Dubrovnik										
CROATIA	Neretva river										
CROATIA	Ston	0.43									
CROATIA	Zadar										
CYPRUS	Etko										
CYPRUS	Sodap										
CYPRUS	Loel										
CYPRUS	Keo										
CYPRUS	Keo B										
CYPRUS	Dhekelia desalination plant										

Country	HS	Zn	Cr	Ni	Cd	Cu	Pb	Hg	Oil	Phenols	Others
EGYPT	El Mex Bay										
EGYPT	Alexandria										
EGYPT	Adu Qir Bay										
EGYPT	Lake Manzala										
EGYPT	Port Said										
GREECE	Thermaikos gulf										
GREECE	Inner Saronic gulf	82.50	46.00	2.30		5.10	4.10				
GREECE	Patraikos gulf										
GREECE	Pagasitikos gulf	0.12	0.29	0.32		0.18	0.02				
GREECE	Gulf of Heraklio										
GREECE	Elefsis bay										
GREECE	North-Western Saronic gulf		0.50								
GREECE	Nea Karvali bay										
ISRAEL	Naaman River										
ISRAEL	Kishon River	3.20	0.66		0.13	0.98	0.51	0.01	45.40		
ISRAEL	EIL							0.01			
ISRAEL	Asdod								12.50	0.05	0.15 POPs
ISRAEL	Ako								27.70		
ISRAEL	Naharia										
ISRAEL	Shafdan	67.13	8.33	3.85	0.27	19.61	2.51	0.08			
ITALY	Genova										
ITALY	La Spezia										
ITALY	Livorno										
ITALY	Rodignano Solvay										
ITALY	Napoli Gulf										
ITALY	Milazzo										
ITALY	Gela										
ITALY	Augusta-Melilli										
ITALY	Taranto										
ITALY	Brindisi										
ITALY	Bari-Berletta										
ITALY	Manfredonia										

Country	HS	Zn	Cr	Ni	Cd	Cu	Pb	Hg	Oil	Phenols	Others
ITALY	Ancona-Falc										
ITALY	Ravenna										
ITALY	Porto Marghera										
LEBANON	Greater Beirut area										
LEBANON	Saida-Gazieh										
LEBANON	Tripoli										
LEBANON	Bartoun-Selaara										
LIBYAN ARAB JAMAHIRUYA	Abo-Kammash										
LIBYAN ARAB JAMAHIRUYA	Zawia city	0.37				0.01	0.21		365.00		0.004 organochl
LIBYAN ARAB JAMAHIRUYA	Janzour city	0.74				0.20	0.42		365.00		0.01 organochl
LIBYAN ARAB JAMAHIRUYA	Tripoli city	3.50				1.20	2.30		256.00		0.0136 organochl
LIBYAN ARAB JAMAHIRUYA	Misratah city	0.30				0.08	0.17		292.00		0.0136 organochl
LIBYAN ARAB JAMAHIRUYA	Ras-Lanouf										
LIBYAN ARAB JAMAHIRUYA	Benghazi	1.63				0.44	0.92		1,605.00		0.0079 organochl
LIBYAN ARAB JAMAHIRUYA	Tobruk	0.22				0.06	0.13		219.00		0.0063 organochl
MALTA	Wied Ghammieq										
MALTA	Cumnija										
MALTA	Ras Il Hobz										
MOROCCO	Tangier	1.80	0.72	0.27	0.49	0.44	0.06	0.02		0.09	
MOROCCO	Tetouan	3.00	0.16	0.66	0.96	0.42	0.04	0.01		0.08	
MOROCCO	Al Hoceima	0.21	0.01	0.05	0.01	0.00	0.00	0.00		0.00	
MOROCCO	Nador	0.10	0.02	0.22	0.01	0.06	0.08	0.00		0.00	
SLOVENIA	Rizana river (KOPER)	1.01	0.12	2.47		0.64	0.39	0.00	0.06		
SLOVENIA	Izola	0.95		0.02	0.05	0.37	0.06	0.00	0.02		
SLOVENIA	Piran	0.60		0.03	0.01	0.28	0.02	0.00	0.01		
SLOVENIA	Badasevica	0.72	0.06	0.04		0.16	0.07	0.00	0.04		
SLOVENIA	Dragonja		0.02	0.04		0.03	0.02	0.00	0.00		
SPAIN	Barcelona										
SPAIN	Tarragona										
SPAIN	Valencia										
SPAIN	Cartagena										
SPAIN	Algeciras										

Country	HS	Zn	Cr	Ni	Cd	Cu	Pb	Hg	Oil	Phenols	Others
SYRIA	Banias										
SYRIA	Lattakia	2.48	0.13		0.02	0.64	0.05	0.13	91.41		
SYRIA	Tartous	0.54	0.05		0.00	0.31	0.01	0.14	200.00		
SYRIA	Jableh	0.14	0.05		0.00	0.19	0.01	2.00	438.00		
TUNISIA	Gabes										
TUNISIA	Sfax South										
TUNISIA	Tunis South Lake										
TUNISIA	Lake Bizerte										
TURKEY	Mersin										
TURKEY	Erdemli										
TURKEY	Silifke										
TURKEY	Tarsus										
TURKEY	Antalya										
TURKEY	Antalya										
TURKEY	Side										
TURKEY	Manavgat										
TURKEY	Adana										
TURKEY	Ceyhan										
TURKEY	Antakya										
TURKEY	Iskenderun										
TURKEY	Dortyol										
TURKEY	Kirikhan										
TURKEY	Bodrum										
TURKEY	Marmaris										
TURKEY	Datca										
TURKEY	Foca										
TURKEY	Cesme-Alacati										

B. COMPARISON OF 1997 AND 2002 RESULTS

B1. Comparison of number of Hot Spots

In the report MAP124 of 1999 a total of 120 (122 if Haifa region is segregated) Hot Spots were identified. A number of Hot Spots (14) were de-listed in 2002, but 12 more were added, thus the total number in 2002 reaches 120 (Table 1). Therefore, both reports include 108 common Hot Spots.

Table 1

Hot Spots identified by each country

Country	2002	1997
ALBANIA	3	8
ALGERIA	8	8
BOSNIA-HERZEGOVINA	1	1
CROATIA	11	10
CYPRUS	6	9
EGYPT	5	5
GREECE	8	9
ISRAEL	7	5
ITALY	15	15
LEBANON	4	5
LIBYAN ARAB JAMAHIRUYA	8	5
MALTA	3	3
MOROCCO	4	3
SLOVENIA	5	4
SPAIN	5	5
SYRIA	4	4
TUNISIA	4	4
TURKEY	19	17
TOTAL	**120**	**120***

* This number increases to 122 if the coastal area of Haifa Bay (reported in 1997) is split in three separate areas (Naaman river, Kishon river and EIL industrial area) as reported in 2002.

Table 2 presents the 14 Hot Spots of the 1997 report (from 7 countries) eliminated in the 2002 report and Table 3 the 12 new Hot Spots (from 6 countries) added. According to the guidance document for the review of pollution Hot Spots in the Mediterranean, the exclusion of coastal areas from the initial list can be related to a) the reduction of pollution loads, b) the elimination of pollution sources, c) measures taken for progressive or immediate decrease of loads polluting sea, d) existence of another pollution Hot Spot with greater impact to human health and the environment than the listed ones and e) inappropriate inclusion in the initial list. For the new Hot Spots adequate information should be reported for both municipal and industrial sources of pollution, according to the provided questionnaire.

Table 2

Hot Spots removed from the 1997 list

Country	Hot Spot	Pollution category	Reasoning supporting elimination
ALBANIA	Vlora	Municipal	Construction of WWTP.
	Drini river	Mixed	These rivers are not Hot Spots but their impact to the Southern Adriatic should be evaluated.
	Mati river	Municipal	
	Semani river	Municipal	
	Shkumbini river	Municipal	
CROATIA	Cokery	Industrial	Closing of industries.
	Krka	Mixed	Practically Krka river serves as a recipient of municipal and industrial discharges from Sibenik.
CYPRUS	Limassol WWTP	Municipal	Wastewater reuse - The existing outfall is used only in emergency cases.
	Vassilikos cement factory	Dust	No liquid discharges from cement factory.
	Cyprus petroleum refinery	Industrial	No liquid discharges from refinery.
EGYPT	Damietta	Mixed	No justification.
GREECE	Larymna bay	Industrial	Reduced production.
LEBANON	Jounieh	Mixed	No justification.
SLOVENIA	Delamaris	Industrial	Incorporated to IZOLA coast.

Although the guidance document specifies the criteria according to which a coastal area may not be considered anymore as a Hot Spot (Table 2) the reasoning in some cases is unclear and/or ambiguous and thus the de-listing procedure appears to be somewhat arbitrary without sufficient justification. In any case, the main two reasons for exclusion that have been reported are related to decreased industrial activity and alternative disposal routes of the wastewater produced, i.e. wastewater reuse.

According to the classification of the eliminated Hot Spots, it should be noticed that 11 out of the 14 Hot Spots had been classified in categories near the borderline for selecting an area as a Hot Spot, i.e. categories D and E and only two Hot Spots belonged to categories C and B. As a result the de-listing of these areas does not signify a major improvement of the quality of coastal waters.

Regarding the added Hot Spots (Table 3), again in some cases the decision to include them is poorly supported, as crucial information, mainly regarding loads, is omitted in the country reports.

Table 3

Hot Spots added to the 2002 list

Country	Hot Spot	Pollution category	Reasoning supporting inclusion
CROATIA	Oil refinery Rijeka	Industrial	Large oil refinery with 6 million tons of oil derivatives. Although appropriate treatment is applied there are accidental spills.
	Ston	Mixed	Importance of Malostonski bay (recipient of wastewater).
	Zadar	Industrial	Limited wastewater treatment.
EGYPT	Port Said	Municipal	No information on loads and low scoring (E) may not justify the inclusion.
LIBYAN ARAB JAMAHIRUYA	Abu-Kammash	Industrial	Reference to increased industrial activity but limited information on loads.
	Misratah city	Mixed	
	Ras-Lanouf	Industrial	
MOROCCO	Al Hoceima	Mixed	From the reported loads no indication of significant load - Low scoring (E) may not justify the inclusion.
SLOVENIA	Badasevica river	Mixed	Significant organic and nutrient pollution.
	Dragonja river	Municipal, agricultural	Significant nutrient pollution.
TURKEY	Foca	Municipal	No information for loads.
	Cesme-Alacati	Municipal	

With reference to the 2002 classification of the added Hot Spots, it should be noticed that 9 out of the 12 Hot Spots are classified in categories near the borderline for selecting an area as a Hot Spot, i.e. categories D and E and three Hot Spots belong to categories C (2 Hot Spots, one form Turkey and one from Croatia) and B (1 Hot Spot from Turkey). Considering the lack of data with respect to pollution loads it is difficult to estimate the impact of the added areas to coastal waters.

B2. Comparative Classification of the Hot Spots

Table 5 presents the list of hot spots, noted with bold characters the new Hot Spots and noted with italics the Hot Spots that have been eliminated from the 1997 list. Furthermore, the classification (A, B, C, D, and E) for both periods is noted. The scoring of Hot Spots according to the weighted total impact in 1997 is presented in Table 4. Taking into account the recent approach (2002) it is apparent that the new categorisation of the Hot Spots (A, B, C, D, and E) can be also applied to the 1997 scoring.

Table 4

Hot Spot scoring 1997 and 2002

1997 scoring	2002 scoring	Category of pollution 2002
>25	29.4-24.5	A
25-20	24.5-19.6	B
20-15	19.6-14.7	C
15-10	14.7-9.8	D
<10	9.8-4.9	E

Following this categorisation for the 108 common Hot Spots of the 1997 and 2002 reports, Figure 2 presents the number of Hot Spots per category. From the 108 Hot Spots, 39 have changed category, with 26 Hot Spots (Haifa Bay divided in three areas) showing an improvement between the two periods, whereas 13 Hot Spots showing deterioration. An overall improvement is reflected by the elimination of Hot Spots in the A category and a general shift towards categories D and E. However, in most cases (28 out of 39) the differences are marginal and may be attributed to inconsistencies during evaluation and scoring rather than actual changes (improvements or deteriorations).

Table 5

List of Hot Spots for 1997 and 2002

Country	Name	Nature of pollution	Category 2002	Category 1997
ALBANIA	Durres	Municipal	C	D
ALBANIA	Durres	Industrial	B	D
ALBANIA	Vlora	Industrial	B	E
ALBANIA	*Vlora*	*Municipal*	-	*D*
ALBANIA	*Drini river*	*Mixed*	-	*D*
ALBANIA	*Mati river*	*Municipal*	-	*D*
ALBANIA	*Semani river*	*Municipal*	-	*D*
ALBANIA	*Shkumbini river*	*Municipal*	-	*D*
ALGERIA	Oran	Mixed	B	B
ALGERIA	Ruiba-Reghaia	Mixed	B	B
ALGERIA	Ghazaouet	Mixed	B	B
ALGERIA	Alger	Mixed	B	B
ALGERIA	Mostaganem	Mixed	C	B
ALGERIA	Bejaia	Mixed	C	C
ALGERIA	Annaba	Mixed	C	C
ALGERIA	Skikda	Mixed	C	C
BOSNIA-HERZEGOVINA	Neum	Municipal	D	NA

Country	Name	Nature of pollution	Category 2002	Category 1997
CROATIA	Kastela Bay	Mixed	B	B, C
CROATIA	Zadar	Mixed	C	C
CROATIA	Split	Mixed	C	B
CROATIA	Rijeka-Kvarner	Mixed	C	C
CROATIA	**Oil refinery Rijeka**	**Industrial**	**C**	**-**
CROATIA	Sibenik	Mixed	C	C
CROATIA	Pula	Mixed	C	C
CROATIA	Dubrovnik	Municipal	D	D
CROATIA	Neretva river	Mixed	D	E
CROATIA	**Ston**	**Mixed**	**D**	**-**
CROATIA	**Zadar**	**Industrial**	**D**	**-**
CROATIA	*Cokery*	*Industrial*	-	*C*
CROATIA	*Krka*	*Mixed*	-	*D*
CYPRUS	Etko	Industrial	E	D
CYPRUS	Sodap	Industrial	D	D
CYPRUS	Loel	Industrial	E	D
CYPRUS	Keo	Industrial	D	D
CYPRUS	Keo B	Industrial	D	D
CYPRUS	Dhekelia desalination plant	Industrial	E	E
CYPRUS	*Limassol WWTP*	*Municipal*	-	*D*
CYPRUS	*Vassilikos cement factory*	*Dust*	-	*D*
CYPRUS	*Cyprus petroleum refinery*	*Industrial*	-	*E*
EGYPT	El Mex Bay	Mixed	D	C
EGYPT	Alexandria	Municipal	E	C
EGYPT	Adu Qir Bay	Industrial	D	A
EGYPT	Lake Manzala	Mixed	D	A
EGYPT	**Port Said**	**Municipal**	**E**	**-**
EGYPT	*Damietta*	*Mixed*	-	*C*
GREECE	Thermaikos gulf	Mixed	D	C
GREECE	Inner Saronic gulf	Mixed	C	C
GREECE	Patraikos gulf	Mixed	D	C
GREECE	Pagasitikos gulf	Mixed	D	D
GREECE	Gulf of Heraklio	Mixed	D	D
GREECE	Elefsis bay	Mixed	C	D
GREECE	North-Western Saronic gulf	Industrial	D	D
GREECE	Nea Karvali bay	Industrial	D	E
GREECE	*Larymna bay*	*Industrial*	-	*D*
ISRAEL	Naaman River	Municipal	C	Haifa bay A
ISRAEL	Kishon River	Municipal	C	

Country	Name	Nature of pollution	Category 2002	Category 1997
ISRAEL	EIL	Industrial	D	
ISRAEL	Asdod	Industrial	D	C
ISRAEL	Akko	Municipal	E	B
ISRAEL	Naharia	Municipal	E	B
ISRAEL	Shafdan	Municipal	D	Tel-Aviv region C
ITALY	Genova	Mixed	C	C
ITALY	La Spezia	Mixed	C	C
ITALY	Livorno	Industrial	C	C
ITALY	Rodignano Solvay	Industrial	C	C
ITALY	Napoli Gulf	Mixed	C	C
ITALY	Milazzo	Mixed	C	C
ITALY	Gela	Mixed	C	C
ITALY	Augusta-Melilli	Mixed	C	C
ITALY	Taranto	Mixed	C	C
ITALY	Brindisi	Mixed	C	C
ITALY	Bari-Bartetta	Municipal	C	C
ITALY	Manfredonia	Mixed	D	D
ITALY	Ancona-Falc	Mixed	D	D
ITALY	Ravenna	Mixed	C	C
ITALY	Porto Marghera	Mixed	B	B
LEBANON	Greater Beirut area	Mixed	C	B
LEBANON	Saida-Gazieh	Mixed	C	C
LEBANON	Tripoli	Mixed	C	C
LEBANON	Bartoun-Selaara	Mixed	D	C
LEBANON	*Jounieh*	*Mixed*	-	*B*
LIBYAN ARAB JAMAHIRUYA	**Abu-Kammash**	**Industrial**	**D**	**-**
LIBYAN ARAB JAMAHIRUYA	Zawia city	Mixed	D	D
LIBYAN ARAB JAMAHIRUYA	Janzour city	Mixed	C	C
LIBYAN ARAB JAMAHIRUYA	Tripoli city	Municipal	B	C
LIBYAN ARAB JAMAHIRUYA	**Misratah city**	**Mixed**	**D**	**-**
LIBYAN ARAB JAMAHIRUYA	**Ras-Lanouf**	**Industrial**	**D**	**-**
LIBYAN ARAB JAMAHIRUYA	Benghazi	Municipal	C	D
LIBYAN ARAB JAMAHIRUYA	Tobruk	Municipal	D	C

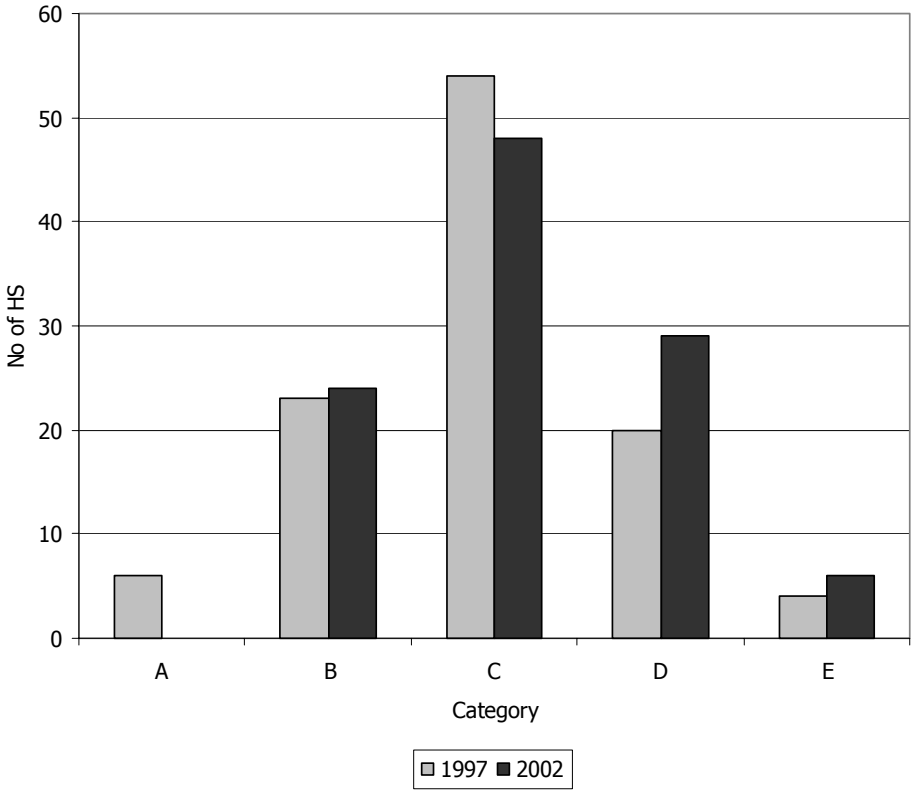
Country	Name	Nature of pollution	Category 2002	Category 1997
MALTA	Wied Ghammieq	Mixed	B	B
MALTA	Cumnija	Mixed	C	C
MALTA	Ras Il Hobz	Mixed	C	C
MOROCCO	Tangier	Mixed	D	B
MOROCCO	Tetouan	Mixed	C	C
MOROCCO	**Al Hoceima**	**Mixed**	**E**	**-**
MOROCCO	Nador	Mixed	D	C
SLOVENIA	Rizana river	Mixed	C	C
SLOVENIA	Izola	Mixed	C	C
SLOVENIA	Piran	Municipal	D	D
SLOVENIA	**Badasevica**	**Mixed**	**D**	**-**
SLOVENIA	**Dragonja**	**Municipal, agricultural**	**E**	**-**
SLOVENIA	*Delamaris*	*Industrial*	-	*D*
SPAIN	Barcelona	Mixed	C	C
SPAIN	Tarragona	Industrial	C	C
SPAIN	Valencia	Mixed	D	D
SPAIN	Cartagena	Industrial	D	D
SPAIN	Algeciras	Industrial	D	D
SYRIA	Banias	Mixed	B	B
SYRIA	Lattakia	Mixed	B	B
SYRIA	Tartous	Mixed	C	B
SYRIA	Jableh	Mixed	D	C
TUNISIA	Gabes	Mixed	B	B
TUNISIA	Sfax South	Mixed	B	C
TUNISIA	Tunis South Lake	Mixed	B	B
TUNISIA	Lake Bizerte	Mixed	B	C
TURKEY	Mersin	Mixed	B	A
TURKEY	Erdemli	Mixed	B	C
TURKEY	Silifke	Municipal	C	C
TURKEY	Tarsus	Municipal	B	B
TURKEY	Antalya	Municipal	B	B
TURKEY	Alanya	Municipal	C	C
TURKEY	Side	Municipal	C	C
TURKEY	Manavgat	Municipal	C	C
TURKEY	Adana	Mixed	B	B
TURKEY	Ceyhan	Municipal	C	C

Country	Name	Nature of pollution	Category 2002	Category 1997
TURKEY	Antakya	Municipal	B	B
TURKEY	Iskenderun	Municipal	C	B
TURKEY	Dortyol	Municipal	B	C
TURKEY	Kirikhan	Municipal	B	C
TURKEY	Bodrum	Municipal	C	C
TURKEY	Marmaris	Municipal	C	C
TURKEY	Datca	Municipal	C	C
TURKEY	**Foca**	**Municipal**	**C**	**-**
TURKEY	**Cesme-Alacati**	**Municipal**	**B**	**-**

For two Hot Spots in Albania the category changed from D and E to B, suggesting that the impact from the pollution sources has increased. In both cases the score in two criteria, drinking water quality and recreation, has increased from 1 (discharge with no effect-1997) to 6 (extreme effect-2002). However, these changes are not supported by respective information on pollution load discharges.

For nine cases the improvement was prominent with significant variations in the classification (e.g. A to C or A to D). The Haifa Bay (Israel) in the 1997 report was classified in category A, implying a great impact of the inland activities to the water quality of the receiving body. However, the re-evaluation of the area in 2002 was based on more accurate data, showing a load reduction of more than 50%, and the new classification is considered to be more accurate. In other cases significant improvements reported are not supported by relevant documentation. An example is the Adu Qir Bay (Egypt) where the class altered from A to D with the explanation that the 1997 data were inaccurate. The scoring between the two periods changes significantly since the impact of industrial activities was extreme (6 to all criteria except drinking water quality) in 1997 and reduced by 2 to 4 grades per criterion in the 2002 report, without justification. Furthermore, the estimated financial requirement remained the same (61.6 billion US dollars) for both periods. Another similar case is the area of Tangier (Morocco) where the change in classification from B to D is justified by a reported 50% reduction of the pollution load. However, it does not seem to be attributed to measures taken since the required investment is the same for the two reporting periods and thus the reasoning for the decreased load is unclear.

Figure 2: Comparison of 108 Hot Spots categories in 1997 and 2002



B3. Comparison of loads

With respect to the pollution load it should be noted that the data reported was limited for all Hot Spots, even for the conventional parameters (BOD, COD, TN, TP, TSS) and thus an accurate comparison with previous information is not feasible. The issue of data adequacy and validity is more prominent when trying to estimate the impact of different pollution Hot Spots to the Mediterranean as well as the improvement of the situation with respect to the Hot Spots that have been excluded. Table 6 shows the 14 de-listed areas and the subsequent expected reduction of the organic load as a result of the 1997 reported data.

Table 6

Hot Spots de-listed and respective load reduction

Country	Hot Spot	Pollution	Population	BOD (t/yr)	COD (t/yr)
ALBANIA	Vlora	Municipal	110,000	2,628	
CROATIA	Cokery	Industrial			
	Krka	Mixed			
CYPRUS	Limassol WWTP	Municipal	130,000	1,181	2,185
	Vassilikos cement factory	Dust			
	Cyprus petroleum refinery	Industrial			
EGYPT	Damietta	Mixed			

GREECE	Larymna bay	Industrial			7,516
LEBANON	Jounieh	Mixed	200,000	4,280	
SLOVENIA	Delamaris	Industrial	13,770	1,092	
		Load of 14 Hot Spots	453,770	9,181	9,701
		Total for 1997	40,194,946	804,248	1,729,852
		% reduction	1.13%	1.14%	0.56%

Blank cells mean that no information is available.

From the available data on loads and considering the classification of these areas it is apparent that no significant improvement in terms of load is evidenced. With respect to the added Hot Spots, the reported data on loads (also insufficient) will contribute by about 2,000 t/year and 9,000 t/year for BOD and COD respectively (Table 7).

Table 7

Hot Spots de-listed and respective load reduction

Country	Hot Spot	Pollution	Population	BOD (t/yr)	COD (t/yr)
CROATIA	Oil refinery Rijeka	Industrial			
	Ston	Mixed		207	457
	Zadar	Industrial		11	37
EGYPT	Port Said	Municipal			
LIBYAN ARAB JAMAHIRUYA	Abu-Kammash	Industrial			
	Misratah city	Mixed	380,000	1,022	1,533
	Ras-Lanouf	Industrial			
MOROCCO	Al Hoceima	Mixed	122,000	273	370
SLOVENIA	Badasevica	Mixed		329	5,563
	Dragonja	Municipal, agricultural		114	1,109
TURKEY	Foca	Municipal			
	Cesme-Alacati	Municipal			
		Load of 12 Hot Spots	502,000	1,956	9,069

Blank cells mean that no information is available.

Considering the lack of recent reported data for all Hot Spots, it is not possible to compare the two reporting periods since significant amounts of organic load were not reported for 2002. A typical example of this is the case El-Mex Bay (Egypt) with a contribution of 40% to the total BOD load in 1997 and no reference in 2002, with the sole explanation that the 1997 reported data were inaccurate.

An estimate on the total discharged load was based on the available reported information for 2002 and in order to fill the missing data, the previously reported figures were used. Following this rationale Table 8 shows that the total load discharged has increased in all substances to the order of 3-10%, whereas the total nitrogen discharged increased by 19.2%.

Table 8

Discharged pollution load to the Mediterranean

	Population	BOD t/year	COD t/year	TN t/year	TP t/year	TSS t/year
2002	40,515,009	829,383	1,928,369	309,521	80,491	1,286,029
1997	40,194,946	804,248	1,729,852	259,700	75,234	1,241,423
% increase	0.8%	3.1%	11.5%	19.2%	7.0%	3.6%

However it should be stressed again that this conclusion is based on the assumption that no load reduction has been effected wherever data for 2002 is missing, an assumption which has to be verified especially in cases where significant improvement in scoring has been reported (i.e. Alexandria, Adu-Qir Bay, Manzala), without supporting data related to loads.

B4. Comparison of economics

The estimated required investment costs reported for 100 Hot Spots in 2002 is to the order of 3.2 billion US$ as compared to 2.9 billion US$ for 81 Hot Spots in 1997 (Table 9). The investment mainly refers to the construction of urban or municipal wastewater treatment plants, sewerage networks, maintenance of existing installations, feasibility studies for industrial facilities or monitoring of the recipient.

Table 9

Reported investment needs estimated for the identified Hot Spots

	Estimation 1997	Estimation 2002
Investment needs reported	2.9 billion US$	3.2 billion US$
Number of Hot Spots	81	100

As already mentioned during the presentation of the 2002 report, on the basis of an average investment of 32.0 million US$ per Hot Spot, the projected total required investment for all 120 Hot Spots of the 2002 list is to the order of 3.84 billion US$. Using the same rationale for the 1997 list a total required investment of 4.3 billion US$ is estimated. The reduction by about 11% may reflect investments realised between 1997-2002, leading to the observed slight improvement already discussed. However, more documentation is needed in order to support the validity of this conclusion, given the uncertainties underlying the projection procedure for estimation of total costs and the inconsistencies of the reported cost data. To clarify the possible effect of the latter factor reference to Figure 3 can be made.

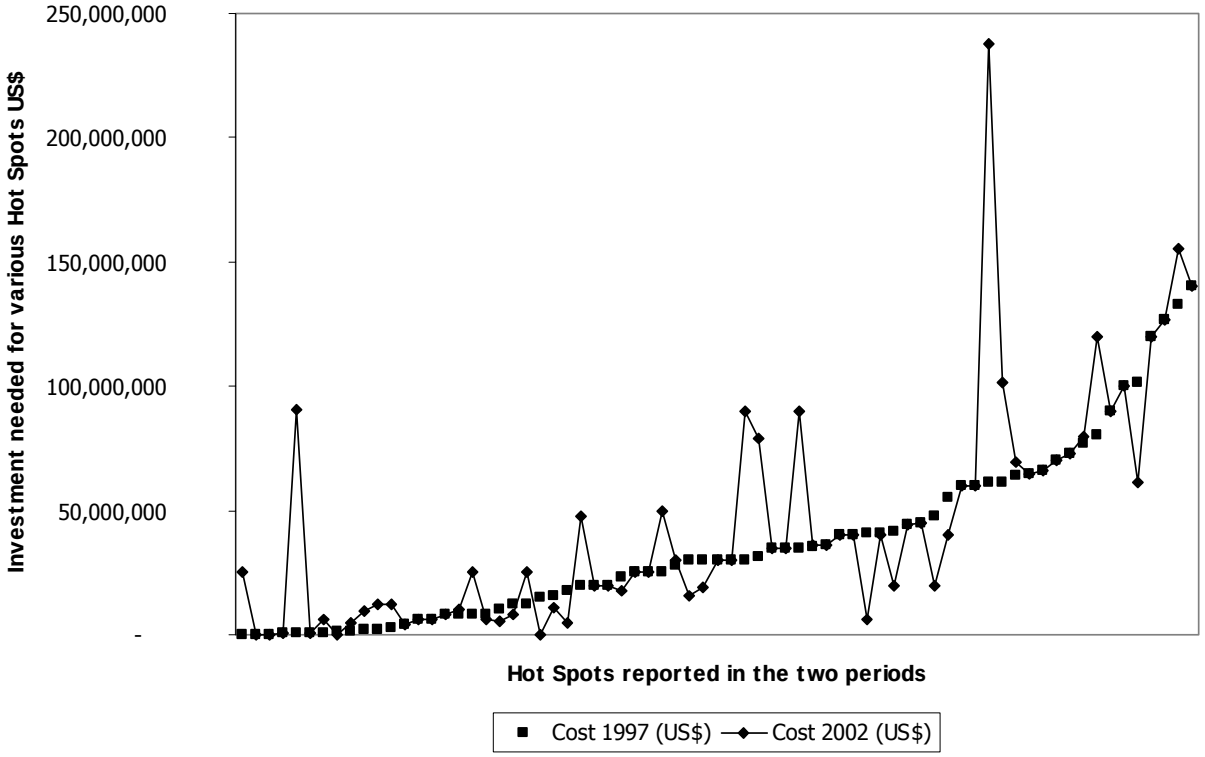


Figure 3: Comparison of investment needed for various Hot Spots reported in 1997 and 2002

The figure shows the investments needed for various Hot Spots as reported in 1997 and 2002. In some cases a reduced investment in 2002 is evident, possibly due to realised in the meantime investments, although no data to support this have been presented. On the other hand in some other cases the reported in 2002 costs are significantly higher when compared to the respective costs of 1997, again without any documentation. Thus, the possibility that the overall difference of 12% is the result of different logistics between the two periods (i.e. different cost estimates for the same situation) cannot be dismissed.

B5. Conclusions

The main conclusions of the comparative study may be summarised s follows:

- The two scoring systems (1997 and 2002) are in essence compatible, thus a comparison between the two periods is not hampered on this ground.

- The definition of a Hot Spot seems not to be uniformly understood by different countries and/or during subsequent reporting periods. Some countries follow an approach consistent with the guidance documents while other countries use the term Hot Spot to identify individual sources of pollution (domestic, industrial or mixed). It appears that the pollution hot spot area is the coastal area corresponding to the city.

- A comparison of the two reporting periods (1997 and 2002) reveals changes in about 50% of the Hot Spots (either in terms of elimination, addition, or category change). Most of the changes (about 70% of the cases) are marginal, without significant influence on the overall situation and may be attributed to the inherent subjectivity of the scoring procedure, rather than to changes in the actual situation. In the remaining 30% of the cases the changes are more pronounced and as an overall towards improvement of the situation. However, the inadequacy or even complete absence of supporting documentation (especially in terms of quantitative data related to loads) jeopardises the validity of the conclusion. Consequently, a more realistic conclusion would be that the situation between the two periods has remained unchanged.

- The economic data refer to about 70-80% of the Hot Spots; therefore a comparison of the required overall investments can only be based on projected costs. The estimation for 2002 is by 11% lower than the corresponding estimation for 1997. Although, it is possible that this reduction reflects investments realised (leading to a possible marginal improvement as discussed) it is equally possible that the difference is the result of different cost estimation procedures applied to some Hot Spots in the two reporting periods.