



# **United Nations Environment Programme**

**EP**

UNEP(DEC)/MED WG.190/Inf.6

ENGLISH



## **MEDITERRANEAN ACTION PLAN**

Meeting of MAP National Focal Points

Athens, 11-14 September 2001

### **LITTER MANAGEMENT IN COASTAL ZONES OF THE MEDITERRANEAN BASIN**

### **ANALYSIS OF THE QUESTIONNAIRE AND PROPOSALS FOR GUIDELINES**



**United Nations  
Environment  
Programme**

**EP**



UNEP(DEC)/MED WG.183/Inf.4  
7 May 2001

ENGLISH  
Original: FRENCH

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Meeting of the MED POL National Coordinators

Venice, Italy, 28 - 31 May 2001

**LITTER MANAGEMENT IN COASTAL ZONES OF  
THE MEDITERRANEAN BASIN**

**ANALYSIS OF THE QUESTIONNAIRE AND PROPOSALS FOR GUIDELINES**

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## SUMMARY

An analysis of the current situation of marine litter management in Mediterranean countries and the mechanisms which regulate and organize this activity leads to a certain number of conclusions, especially with regard to the general approaches, problems and common trends, and allows the institutional and operational mechanisms that govern the management and monitoring of marine and coastal areas in these countries to be identified.

The interest attached to protecting coastal zones (beaches, ports, etc.) in the context of an environmental protection programme has been highlighted. The majority of countries integrate coastal litter management in their national policies. Four countries have opted for more specific management of marine litter, with special litter management policies, paying particular attention to beaches and ports but slightly less to coastal zones.

In order to ensure rational litter management, the prerogatives and competence of the various actors must be defined so that responsibilities are allotted and shared in a consistent and unequivocal manner. The first finding is that, in an overall litter management system, the environmental authorities and local communities are the actors most involved in litter management. The role of municipalities is easy to understand because they are often responsible for litter collection, either directly or indirectly through private firms. The three actors responsible for litter management are ultimately the Ministry of the Environment, municipal authorities and port authorities. Other institutions may have parallel activities, often in association with the other three, for instance, the Ministry of the Interior, regional authorities or the Ministry of Transport.

Analysis of the indicators identified eight that should be recommended to Mediterranean countries. These are the indicators most commonly used for litter management in the countries consulted and are economic, institutional/legal, and technical indicators.

Regarding the origin of litter, direct disposal by households constitutes the main source, followed by the impact of tourism facilities and run-off from waste dumps, thus showing that marine litter mainly comes from coastal areas, even though disposal of litter from mobile or fixed marine installations is still common.

The development of guidelines for waste management calls for a full understanding of the lacunae and the common problems and a better objective approach to the achievements and the efforts made to manage the marine and coastal environment. This type of analysis is necessary in order to identify all the opportunities immediately available for integrated and optimum management of the marine and coastal environment, particularly as regards investment in the logistics for managing such litter. On this basis, a number of recommendations and guidelines are proposed concerning the technical and logistic organization of litter management, the legal and institutional organization, an approach to public participation and, lastly, proposals for economic and financial mechanisms.

Such mechanisms must be applicable to the region as a whole, although certain needs, opportunities and demands can be specified. In order to provide the best and most comprehensive response to needs, the mechanisms must be designed and implemented in such a way as to provide a simultaneous response at the national and regional levels, providing the necessary flexibility to respond to national characteristics but within a regional context.

For this purpose, it is highly recommended that efforts be made to achieve operational efficiency through the optimum distribution of activities among the public and private sectors and other actors in civil society, each in its own particular branch. The involvement of the

private sector in operational and competitive activities will provide technical know-how and efficiency and such decentralization of authority and responsibilities towards the lowest level capable of assuming them is desirable.

Proper management of marine and coastal litter must of course be based on ongoing and strict controls, which should be preventive or curative depending on the situation. The controls can only be operational and effective if they are within the framework of clear and consistent regulations and an economic and financial strategy based on two principles: "the polluter pays principle" and "the production/recovery principle".

A financing system that reflects costs should be introduced and it should be proportional to the volume of waste. An economic instrument in the form of a tax would complement local taxes. This would encourage reduction at source and would convey a clearer message to generators of litter, as well as fostering changes in behaviour with a view to better waste management. A contribution by the State could be envisaged in order to promote and regularize the activity. This is justified by the need to preserve national interests in the light of the externalities in this sector and the frequent lack of any short-term related profitability. It would help to ensure that the national community as a whole did not have to bear the direct and indirect costs incurred by inadequacies in waste management.

**Lastly, a system for following up and collecting information is recommended. The waste sector in general and the marine litter sector in particular lack quantitative data, particularly on waste streams. Such a monitoring system should be designed and adapted to needs and trends, as well as to resources. It could be implemented in a modular and gradual fashion.**

## **INTRODUCTION**

### **1. PURPOSE**

Following the consultation seminar held in Athens in December 1999 for the purpose of discussing guidelines for the marine litter management programme to be adopted by Mediterranean countries, a questionnaire was prepared and sent to Mediterranean countries in order to identify divergences and problems. This report examines and analyses the information contained in the replies to the questionnaire and formulates guidelines for the management of marine litter to assist local authorities in improving their marine litter management system.

The objective is to give the competent authorities, planners and managers of natural resources in the various countries the opportunity of placing their national and regional development strategies in a context that will, as far as possible, safeguard the Mediterranean environment on an ongoing basis. It is also intended to provide a common reference framework to underline the complex interaction between development and environmental issues in each country and among countries in the region, highlighting areas where needs or opportunities exist.

Following upon the results of Phases I and II of MED POL and the recommendations in Agenda MED 21, MED POL Phase III (1996-2005) was adopted and launched in 1996 and it has evolved in the direction of pollution control and training for its application. This objective is in line with the future trends in Blue Plan. Information is made available to the competent authorities and planners in various Mediterranean countries so as to enable them to draw up their own plans and ensure sustained optimum socio-economic development without environmental deterioration. Another objective is to help governments of coastal States in the Mediterranean region to enhance their understanding of the common problems facing them both in the Mediterranean Sea and in the coastal zones.

### **2. GENERAL APPROACH OF THE STUDY**

This report is divided into two parts. The first part analyses the information in the replies to the questionnaire, providing a statistical analysis, a number of conclusions that were drawn, particularly regarding the general approaches, problems and common trends. The institutional and operational mechanisms which govern management and follow-up in marine and coastal areas in the Mediterranean countries have been highlighted.

The second part of the report deals with the development of guidelines for litter management. These cover the technical and logistic organization of litter management, legal and institutional organization, an approach to public participation, with proposals on the recommended economic and financial means and mechanisms.

## **PART 1 – EXAMINATION AND ANALYSIS OF REPLIES TO THE QUESTIONNAIRE**

### **1. INTRODUCTION**

Safeguarding the land and marine coastal fringe is an extremely difficult task in the long term because of growing human pressures and the vulnerability of the natural environment. The coastal fringe undoubtedly constitutes one of the most precious assets of all Mediterranean countries without exception and its conservation thus calls for ongoing and unwavering determination on the part of governments and public authorities based on active and sustainable support for the populations concerned.

Each Mediterranean country has of course reached a certain level in the organization and management of its environment, especially the marine and coastal environment. Mediterranean countries have to varying degrees examined this question from the point of view of their strategy or have set objectives. The essential objective of this analysis will be, on the one hand, to pinpoint common problems and inadequacies and, on the other, to define the assets and parameters that will permit the optimum use of litter management systems both from the institutional and organizational standpoints and the operational and technical perspectives.

A preliminary analysis of replies to the questionnaire showed the interest attached to the protection of coastal zones (beaches, ports, etc.) in the context of environmental protection programmes. This question will of course be dealt with in more detail later.

The quality of the replies to the questionnaire was generally satisfactory despite some omissions or vague answers. The headings in the questionnaire covered the majority of issues relating to management of the marine environment and more particularly litter and waste management.

The following countries replied to the questionnaire: Albania, Algeria, Bosnia and Herzegovina, Croatia, Cyprus, Egypt, Greece, Israel, Lebanon, Libya, Malta, Monaco, Slovenia, Spain, Tunisia and Turkey. No replies were received from France, Italy, Morocco or Syria.

### **2. POLICIES FOLLOWED IN THIS AREA**

The national development strategies and policies implemented by all Mediterranean countries without exception have an over-riding influence on the state of environmental protection in the region. The protection of the Mediterranean Sea itself, its coastline and coastal areas, cannot be achieved through action directed solely at the sea or the coastal regions. It depends to a large extent on the development, environmental and land-use policies implemented by Mediterranean countries at the national level as a whole. It also depends on the economic and trade interaction among the Mediterranean countries and with the rest of the world in the sectors of agriculture, industry, energy, tourism and transport.

The analysis below identifies some of the gaps in national policies.

The question of litter is sometimes not included in national environmental policies at all and may come under other sectoral policies.

Figure 1 shows the comparative trend in policies implemented in this area, which are closely linked to the objectives and priorities fixed by the countries in question.

In reply to the question of whether litter management was included in the national environmental policy, it was found that for all the countries consulted beaches and ports, and to a slightly lesser extent, coastal zones, received the most attention in their strategies and policies.

The proximity of the land and the control of litter exercised from the land, together with concerns regarding visual pollution, mean that this waste receives the greatest attention as it is harmful for beaches, ports and coastal zones.

Litter management in relation to merchant ships, pleasure craft and marinas is not neglected. The necessary facilities and units are often placed under the responsibility of port authorities and managers of marinas.

The management of marine litter, particularly that on the seabed, is virtually ignored by the majority of the countries consulted and only four of them include it in their policies. In Monaco, this issue is dealt with at the sectoral rather than the specific level.

The majority of countries include the management of coastal litter in their national policies. Figure 2 shows that 80 per cent of the countries consulted include this issue in their national policies. In addition, Cyprus, Greece, Slovenia and Tunisia have opted for more specific management of marine litter and have a special policy for its management.

Only five countries, representing 40 per cent, have adopted a special strategy for litter otherwise it is included in the overall environmental policy framework or is dealt with at the sectoral level.

It should be noted that the issue is covered in all the countries. Even if it is not part of the general policy, it is dealt with more specifically or is included in sectoral environmental protection policies.

Intervention is all the more effective if the issue forms part of the national policy, underpinned by specific management.

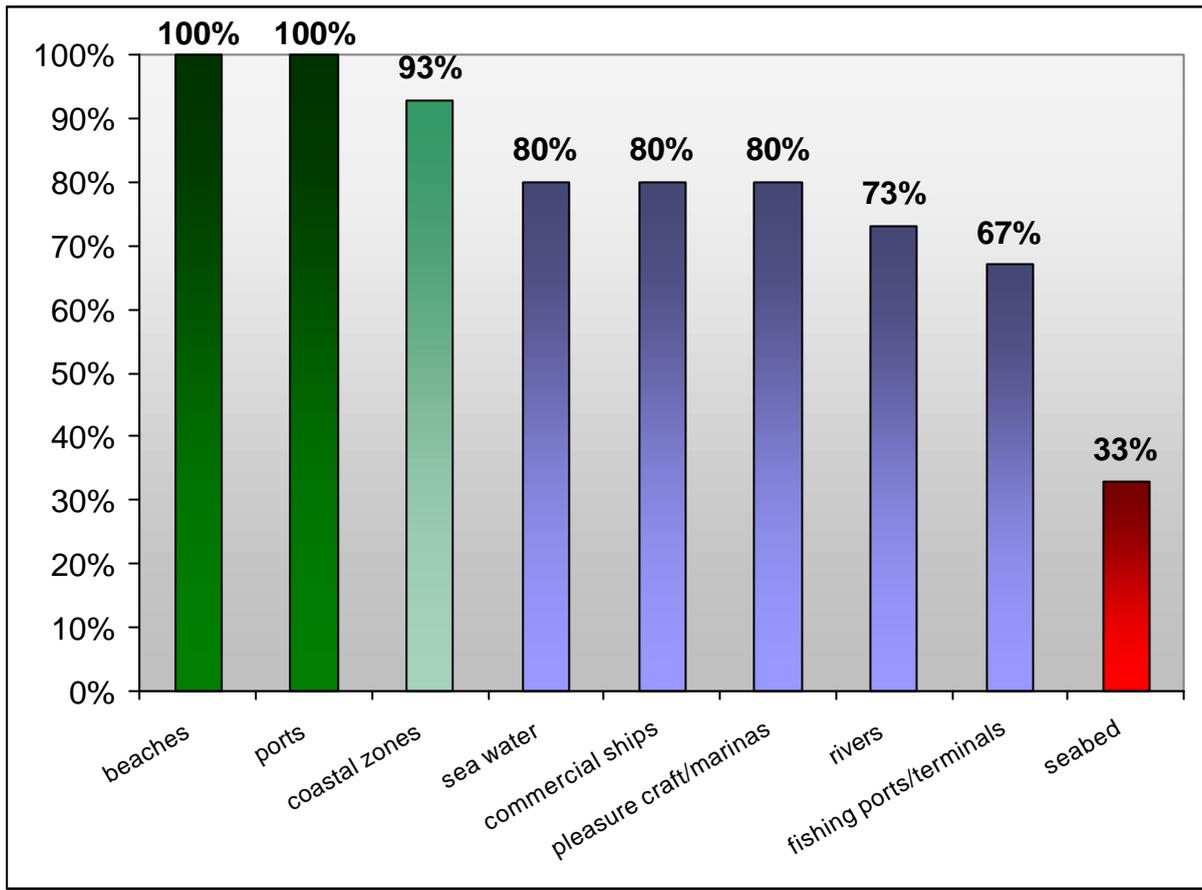


Figure1: Litter management policy adopted

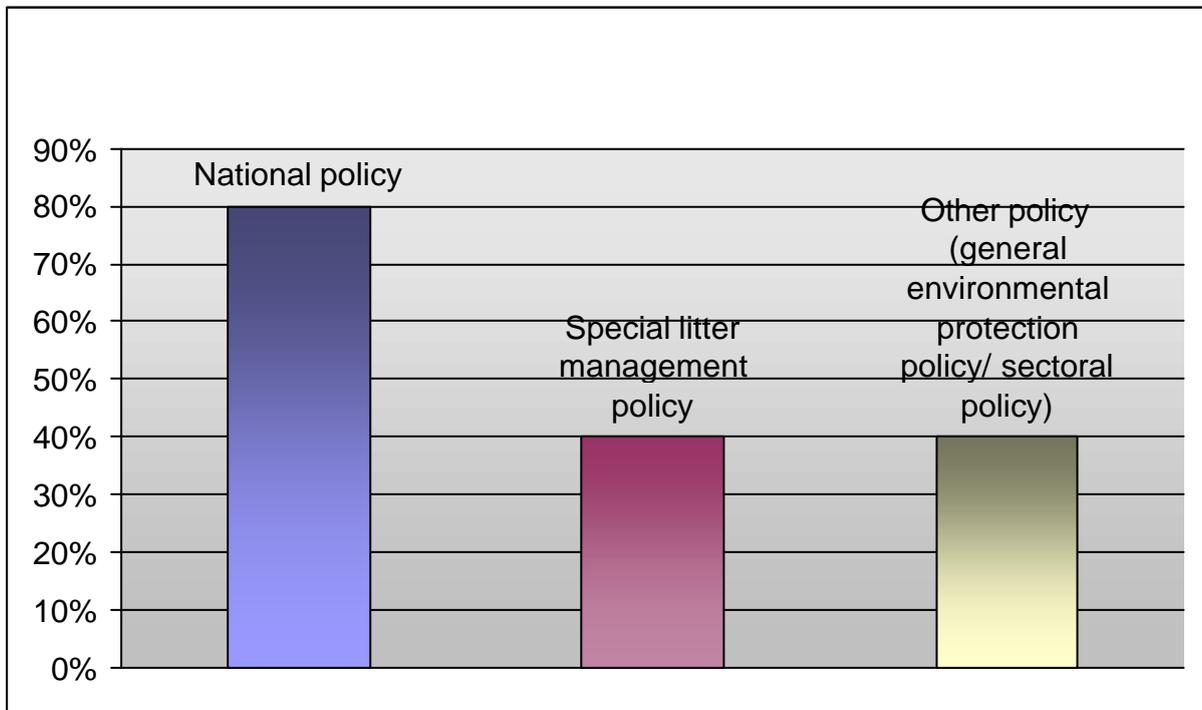


Figure 2: Coastal waste management policies

### 3. LITTER MANAGEMENT STRATEGY

In order to ensure rational waste management, the prerogatives and responsibilities of the various actors have to be defined clearly, with consistent and unequivocal organization and sharing of competence.

This analysis will of course describe the current situation of institutional mechanisms dealing with litter management in the countries concerned, but it will also provide a clearer vision of the actors that could potentially be involved in the litter management policy.

Figure 3 shows the various actors in litter management, not only at the national level but also in relation to coastal zones and ships. It reveals that, in an overall litter management system, the Ministry of the Environment (or the regional environment authority) and municipalities are the actors most involved in litter management.

For the majority of countries, the Ministry of the Environment is primarily responsible for litter management at the national level. Thirteen countries, representing 80 per cent, entrust the Ministry of the Environment with this task. Action by the Ministry is combined with effective participation by the local authorities.

The involvement of municipalities is justified because they are often responsible for litter collection, either directly or indirectly through private firms.

Even though other Ministries are involved in litter management in Albania, Greece, Lebanon and Slovenia (the Ministry of the Interior or the Ministry of Rural and Municipal Affairs), their involvement is combined with the over-riding responsibility of the Ministry of the Environment and the local authorities.

The involvement of private entities is the exception and only three countries have utilized private firms at the national level. These are Monaco, Slovenia and Tunisia.

Action by the private sector is of course supervised by other public institutions (local authorities and the Ministry of the Environment).

This very limited participation by the private sector is covered in the second section because private sector involvement is highly recommended and advisable in support of the efforts of local authorities and waste management authorities.

The association between local authorities and regional environmental authorities is noted in connection with coastal management in coastal zones.

Participation by the region or local authorities in coastal zones is limited and is often combined with the involvement of the local community.

Coastguards do not have any role to play in coastal zones and their involvement is very limited even as regards ships.

Litter management for ships is usually the responsibility of port authorities, the main interface between ships and end management of waste on land. The Ministry of Transport also has responsibilities at this level, but always in cooperation with the port authorities and as the competent supervisory authority.

The three entities responsible for litter management are the Ministry of the Environment, municipalities and port authorities. In parallel, and often in collaboration with

the latter, other institutions may be involved, for example, the Ministry of the Interior, regional authorities or the Ministry of Transport.

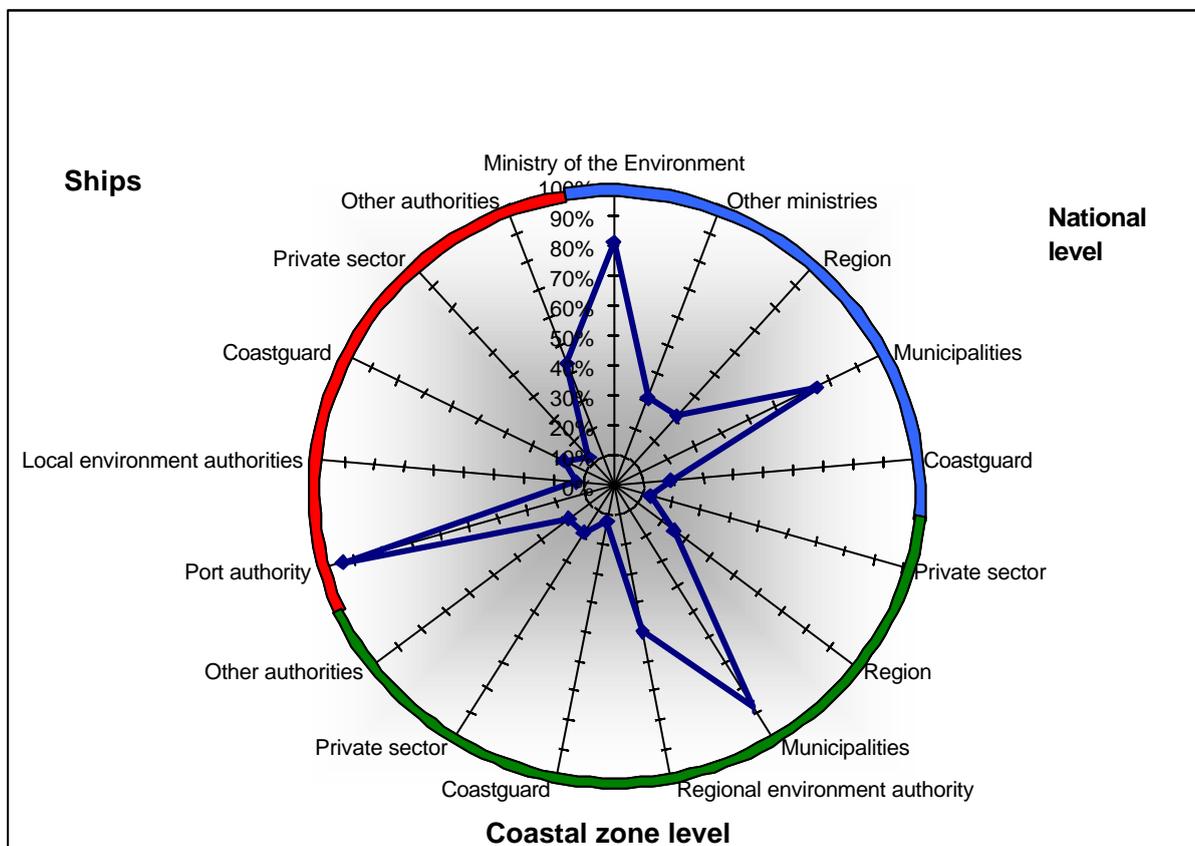


Figure 3: Participation in the management of marine and coastal litter

The essential role of environmental authorities in litter management in coastal zones is of course the control and enforcement of litter management plans and they fulfil this role in all the countries that replied to the questionnaire (figure 4).

Secondly, there is the legal and legislative role and in 70 per cent of the countries the environmental authorities fulfil this role, which is essential for organized and sustainable litter management.

Litter management is essentially the role of municipalities and the Ministry of the Environment. These two bodies share the operational and follow-up role and the way these tasks are allotted depends on the competence given to the two bodies and their involvement in the system as a whole.

The Ministry of the Environment's operational role is not so important and this can essentially be explained by the fact that municipalities have been given this task and have primary responsibility for waste management.

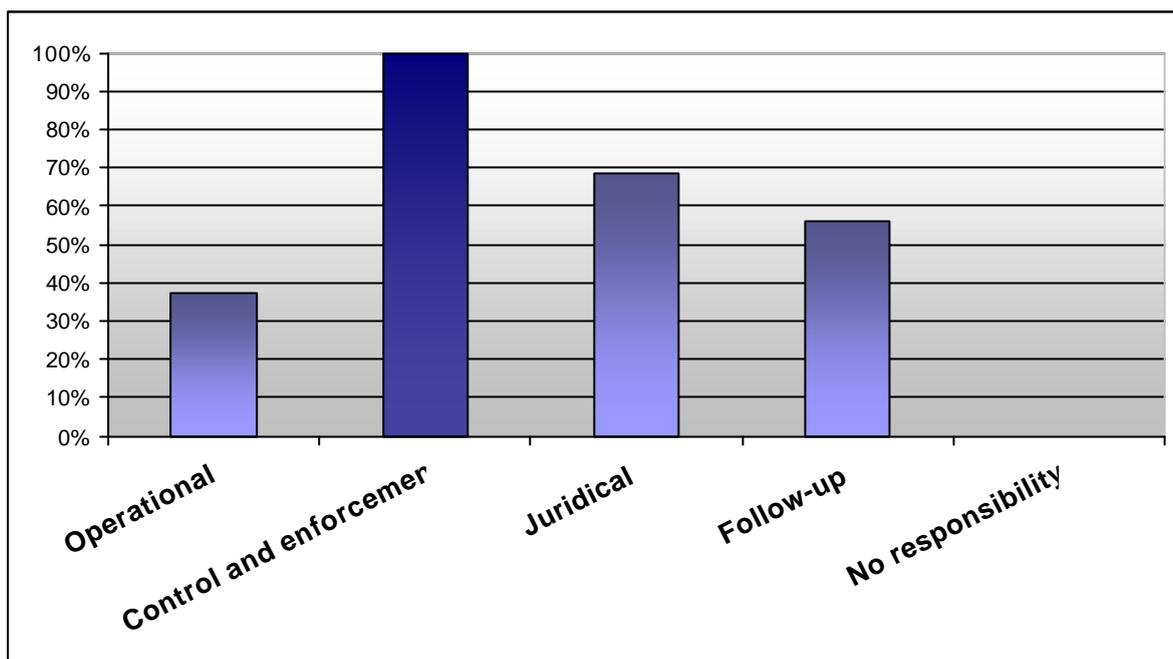


Figure 4: Responsibilities of the Ministry of the Environment for litter management in coastal zones

#### 4. FOLLOW-UP AND CONTROL INDICATORS

Indicators are management tools that help those in charge to determine trends in the areas concerned and to propose remedial measures.

Indicators must meet a number of criteria and they must be:

- a. relevant in relation to the stated sustainable development objectives;
- b. understandable, clear, simple and unequivocal;
- c. feasible within the limits (logistical and technical) of the national statistical system. The basic data should be available or be made available at low cost;
- d. as far as possible, limited in number and representative of international consensus.

A clear and flexible mechanism should be adopted for collecting information and monitoring the indicators because the information required often has to be obtained from several different bodies and authorities.

Environmental authorities could easily be responsible for this task, particularly through environmental observatories, which represent the best way of utilizing these indicators and providing tools in support of decision-making.

The indicators set out below are those most commonly used for litter management in the countries that responded. They are economic, institutional/legal and technical indicators.

There is wide diversity in the adoption of indicators in the countries concerned and some countries such as Albania, Croatia, Greece and Israel have not yet adopted any indicators.

In the economic sector, five indicators in particular were proposed :

- cost/tonne/inhabitant;
- total expenditure/year;
- % of budget;
- cost of fleet maintenance/year;
- collection and transport.

For municipal and port authorities, management of marine waste is often not a priority. Even where indicators are adopted, they are simply secondary indicators and not specific to the management of marine litter.

The responses show that the «collection and transport» indicator is the most widespread and the best utilized because it is the most quantifiable and easy to correlate to the effort made in collecting litter.

Seven countries were in favour of the «cost/tonne/inhabitant» indicator, which allows the cost of collection to be estimated. This information is particularly useful because henceforward rational litter management will mean paying greater attention to cost. The goal will be to reduce costs while at the same time supplying a better service.

The «total expenditure/year» indicator is also interesting. It has been adopted by five of the 11 countries that have indicators and it can show decision-makers clearly what efforts have been made in this respect.

The analysis shows that two indicators have been adopted and supported by several countries :

- collection and transport indicator; and
- cost/tonne/inhabitant indicator.

These are very representative indicators and show clearly the cost of managing litter.

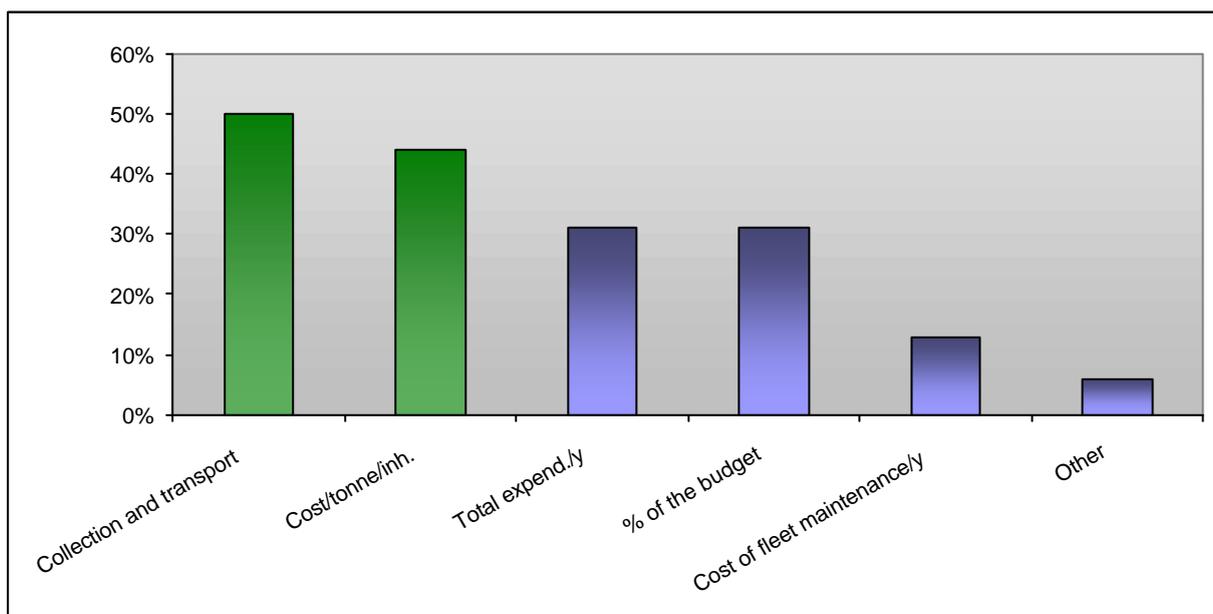


Figure 5: Economic indicators adopted by the countries concerned

Six institutional and legal indicators were proposed in the questionnaire :

- total number of personnel in charge;
- % of technical personnel;
- total number of regulations;
- number of new regulations issued each year;
- special regulations for beaches;
- special regulations for ships.

The analysis shows that, even though few countries have adopted institutional indicators, two have been adopted and are used : the first indicator is « total number of personnel in charge », which highlights the country's commitment to following up and enforcing the regulations.

The second indicator concerns special regulations for beaches. This is particularly important because it shows the country's commitment to protecting the coastline and beaches.

Six countries have not adopted any special institutional or legal indicators (Albania, Croatia, Egypt, Greece, Israel and Spain). This is a shortcoming (38 per cent of the countries concerned have adopted institutional and legal indicators in comparison with 50 per cent for economic and technical indicators). These countries could adopt both indicators in the first phase.

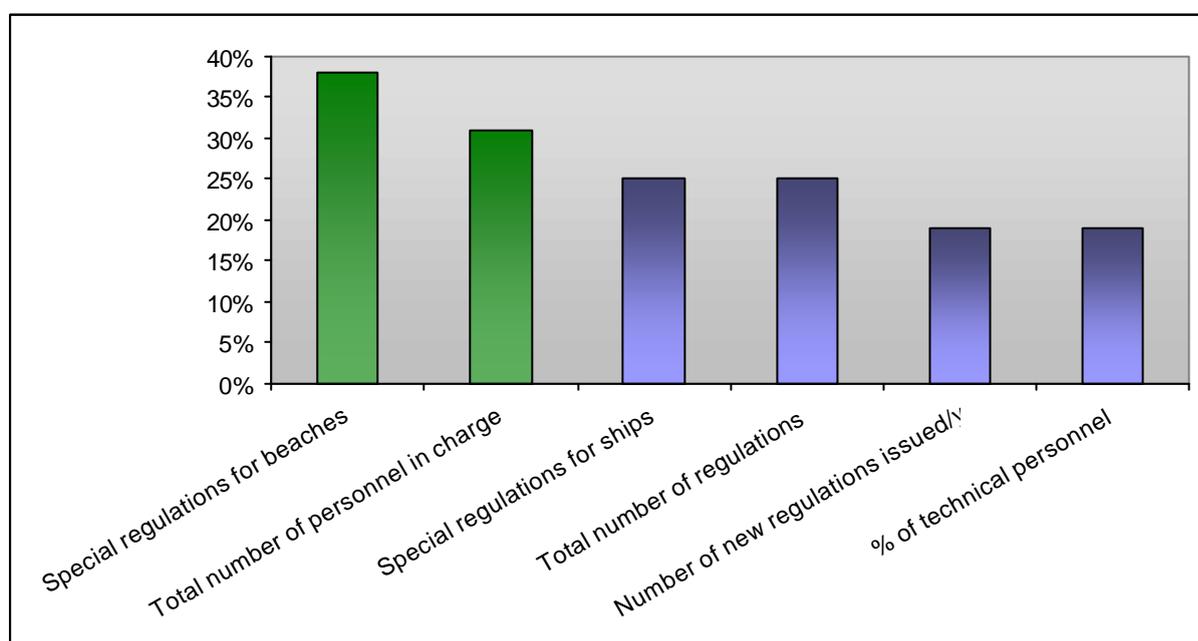


Figure 6: Institutional and legal indicators adopted by the countries concerned

Ten technical indicators were proposed in the questionnaire :

- quantity of waste generated per inhabitant/year;
- quantity of waste generated per hotel room/year;
- quantity of waste collected/day;
- quantity of waste transported/day
- presence of uncollected waste on beach;
- presence of floating waste;

- presence of waste on the seabed;
- existence of reception facilities in harbours;
- existence of municipal recycling programme;
- existence of recycling programme.

The analysis of replies to the questionnaire shows that the amount of waste collected each day is the indicator most commonly adopted (by 50 per cent of the countries). As already mentioned above, the municipalities which possess this information use it frequently and record it as part of their activities (either for their main activities or for selective activities in coastal areas), particularly as this information is extremely interesting and indicative.

The amount of waste per inhabitant is an indication that is easily available to municipal authorities and it is often used to estimate the cost of management. This indicator is used by a relative majority of the countries.

The indicator «existence of reception facilities in ports» is used to the extent that it is possible to collect this information because waste management in ports is an activity that is often the responsibility of port authorities and it reflects the waste management efforts made by them.

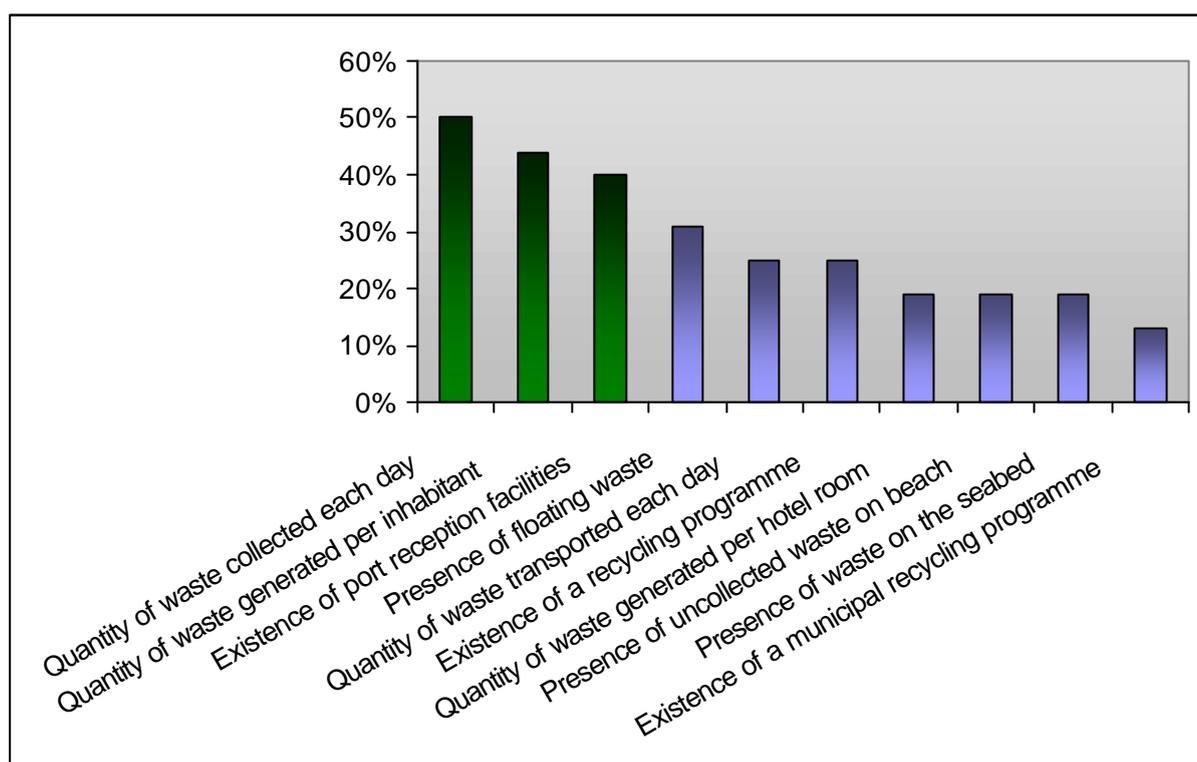


Figure 7: Technical indicators adopted by the countries concerned

A fourth indicator that is interesting and whose utilization gives a specific and very clear picture of the state of deterioration of the coastline and the effects of the presence of waste is the « presence of floating waste » indicator, which provides a direct estimate of the visual pollution caused by the presence of waste.

The analysis shows that a certain number of countries adopt indicators that are to a greater or lesser extent related to the management of marine waste; these are generally

indicators for which information is possessed and utilized by municipalities because they are the entities most concerned by waste collection.

The main goal is not to increase the number of indicators. What is more important is to ensure that the information needed for these indicators is collected and followed up on an ongoing basis.

Based on experience in these countries, eight indicators could be retained :

- cost/tonne/inhabitant;
- collection and transport;
- special regulations on beaches;
- total number of personnel in charge;
- quantity of waste collected each day;
- quantity of waste generated per inhabitant/year;
- existence of reception facilities in ports;
- presence of floating waste.

## 5. SOURCES OF WASTE IN COASTAL AREAS

Studies show that around 30 to 40 million tonnes of municipal solid waste of coastal origin are generated annually. The random siting of waste dumps encourages the transfer of solid wastes into the marine environment. In the Mediterranean, plastic alone accounts for 75 per cent of the waste on the sea surface and the seabed.

The sources of marine waste vary from one country to another and figure 9 below shows the sources and origin of waste.

The main source is direct disposal by households (figure 8), followed by the impact of tourist facilities and run-off from waste dumps (waste from land sources). This means that, in fact, the majority of marine waste comes from coastal areas.

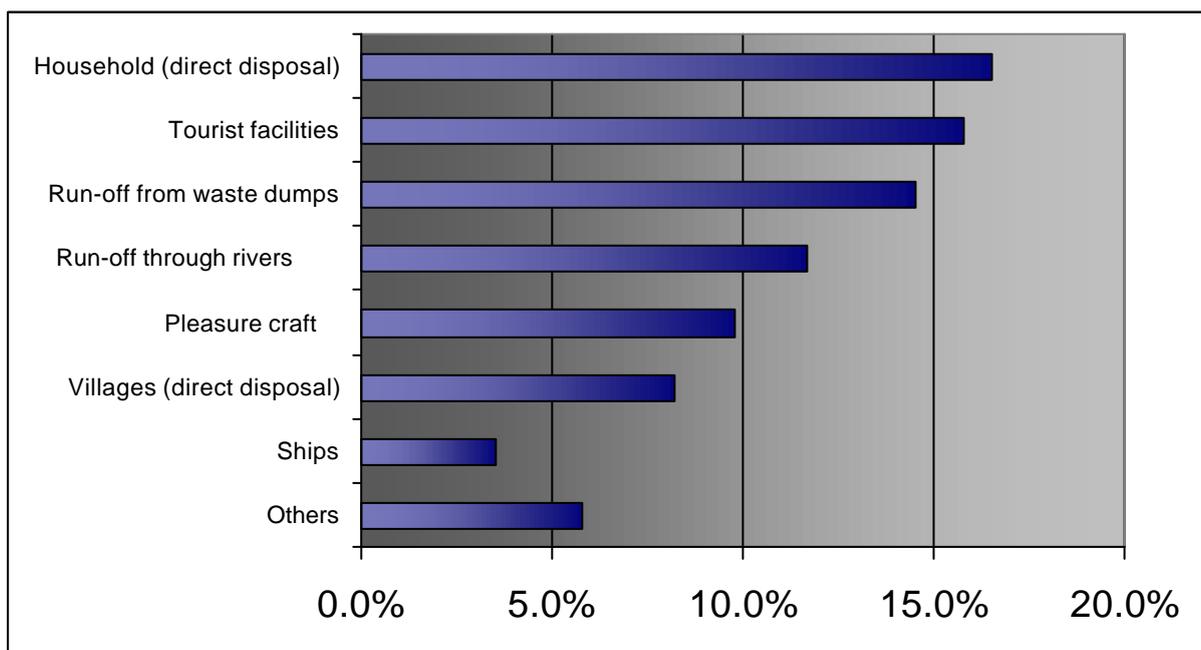


Figure 8: Sources of waste

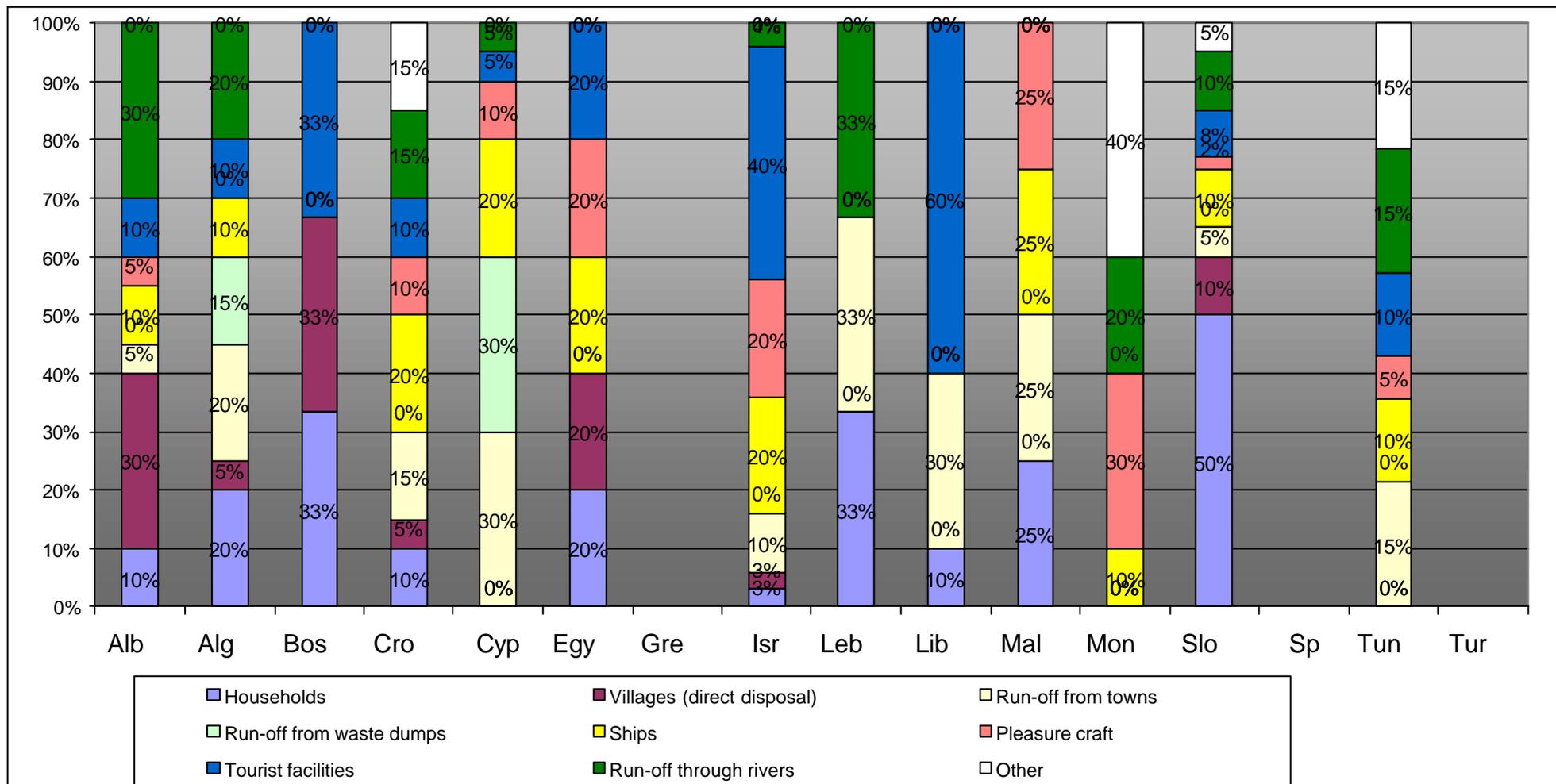


Figure 9: Sources of waste in each country

## 6. CLASSIFICATION OF COASTAL ZONES ACCORDING TO THE PRESENCE OF UNCOLLECTED WASTE

The area considered covers the whole of the Mediterranean coastal region and thus includes the coastal fringe itself. More specifically, it covers the land area of coastal communities (to a depth ranging from several hundred to a few thousand metres) and the coastal marine zone (whose limits are much less well-defined). It also includes the infra-coastal areas and lagoon areas.

The complexity of the environment makes the task difficult, as do the numerous pressures exerted by humans and their activity, interaction and reaction. This limited area of land and sea encompasses almost all environmental components and all human activities. It is interesting to note the major sources of pollution to which it is subject, including those of marine origin :

- bacterial pollution due essential to household wastewater discharged by coastal cities and containing suspended particles, mainly organic particles;
- pollution caused by discharge of solid urban waste and litter into the sea (especially plastic packaging), which can be exacerbated by currents and wind. Non-biodegradable plastic and tar balls build up on beaches and the whole of the Mediterranean coast;
- chemical pollution caused by industrial discharges, toxic products, detergents, hydrocarbons, oily wastes, etc.;
- secondary organic pollution caused by large discharges of organic matter (wastewater from cities, agricultural discharges, effluent from factories), which lead to important ecological changes;
- thermal pollution caused by the discharge of heated water from thermal power stations or large industrial complexes.

On the landward side, in addition to the urbanization and industrial sites and power stations referred to above, the following can also be mentioned :

- road and rail transport infrastructures sited close to the coast, which halt the natural processes by which the coastline is built up and evolves;
- restructuring of the coastline (marinas, fill-in, defensive structures, artificial beaches).

The following table recapitulates the coastal sites where uncollected waste has been noted, as mentioned in the replies to the questionnaire.

### Highly polluted sites

COUNTRY	BEACHES	SEAWATER	SEABED
ALGERIA	ALGIERS BAY ANNABA BAY	PORT OF ALGIERS PORT OF ORAN	PORT OF ALGIERS PORT OF ORAN PORT OF MOSTANGANEM PORT OF SIKKDA (NEW) PORT OF ANNABA
LEBANON	AAKAR TRIPOLI SAIDA OUJAILI KHADE NAKR BEIRUT ANTELIAR	AAKAR TRIPOLI SAIDA OUJAILI KHADE NAKR BEIRUT ANTELIAR	AAKAR TRIPOLI SAIDA OUJAILI KHADE NAKR BEIRUT ANTELIAR
ALBANIA	FIER LUSHNIE DURRES	SEMAN DELTA SHKVBINI ERZENI DELTA	

LIBYA	TAJURA GARABULLI ZANAUR TELIL SURMAN GELIANA SIDI KHALIFA	TRIPOLI HARBOUR BENHAZI MUSRATA KHOMS TOBRUK	
MALTA	FOMM RIM BAY		
EGYPT	EL GAMILLE ROMEL ISLAND EL ALANIEN NOBAR EL MEX WEST HARBOUR EAST HARBOUR EAST ABUKIR EL BURG LAST		

Polluted sites

Country	Beaches	Seawater	Seabed
ALGERIA	REHGAIA MOSTAGANEM ARZEW	PORT OF MOSTAGANEM PORT OF TEDNES PORT OF SKIKDA (OLD) PORT OF SKIKDA (NEW) PORT OF BÉJAIA PORT OF ANNABA	PORT OF SKIKDA (OLD) PORT OF MOSTAGANEM PORT OF JIJEL
LEBANON	JOUNIEH PORT OF BEIRUT CHEKKA DAOUR SAROFAND SOUR	JOUNIEH PORT OF BEIRUT CHEKKA DAOUR SAROFAND SOUR	JOUNIEH PORT OF BEIRUT CHEKKA DAOUR SAROFAND SOUR
ALBANIA	LEZHE SHKODER LAC SARANDE VLORE SHENGIM	DURRES HARBOUR SHENJIN HARBOUR BUNA DELTA SARANDA HARBOUR VLORA	
MALTA		HARBOUR AREA	SLIEMA AREA WIEDIZA ZURRIEA
EGYPT	SALLUM		
TURKEY	SAMANDAG CEVLIK THAT KULAK LAKE KARATAS TARSUS KASNH ADANALIOGLU YENITSKENT HUZURKENT BAHSIS MEZITLII DAVULTEPE		

## **PART 2 - PRINCIPAL ELEMENTS FOR THE MANAGEMENT OF MARINE AND COASTAL LITTER**

### **1. INTRODUCTION**

After identifying the common lacunae and problems and noting the achievements and efforts made in the area of marine and coastal environmental management, it is now necessary to identify all the opportunities that are immediately available for the integrated and optimum management of this environment, especially as regards investment in the logistics of managing such waste.

The sustainability of investment requires that particular attention be paid simultaneously to promoting public awareness, reinforcing institutions, to the legal and regulatory framework, the policies to be implemented, and the financial management systems, as well as capacity-building.

The following section proposes mechanisms that are applicable to the region as a whole, with specific components applicable to certain needs, opportunities and demands. In order to respond as effectively and comprehensively as possible to the needs, the design and implementation of such mechanisms must be decided in such a way that they provide a simultaneous response at the national and regional levels, allowing the necessary flexibility to respond to national specificities but in a regional context.

This approach reflects the special importance to be attached to the development of appropriate frameworks at the legal, institutional, financial and community levels and to capacity-building so as to ensure the sustainability of waste management mechanisms.

It will have to be bolstered by project initiatives that will encourage participation by the private sector, in accordance with each country's priorities.

### **2. TECHNICAL PROPOSALS**

The solid waste sector can be divided into two quite distinct categories:

- on the one hand, collection and transport to the transfer centre, the waste dump or the treatment facility;
- on the other, the treatment and elimination of waste in properly adapted facilities (incinerators, recycling facilities, public waste dumps, etc.).

Bearing in mind the numerous sources of waste and operators in maritime areas, as well as the wide geographical area to be covered, this analysis is essentially based on the questionnaire, whose purpose was to allow exhaustive information to be collected rapidly.

Waste management can be approached in two ways: on the one hand, the management of waste originating on land and, on the other, waste of marine origin (sea, ships, platforms, etc.).

As regards marine origin, the sources of waste at sea have to be identified and defined (ports, harbours, territorial waters) and then the type of management employed has to be specified, both as regards collection, transport and treatment or elimination.

Under the title of “ships and other artificial structures”, three categories of source can be identified:

- mobile structures;
- fixed structures;
- temporarily fixed structures;

A particular type of structure belongs to one of these three categories.

A ship is a floating building composed of three main compartments, namely:

- the engine compartment;
- the crew compartment (living quarters);
- the cargo compartment.

With the exception of passenger ships, where the cargo compartment is replaced by the passenger compartment, these compartments generate the same types of waste irrespective of the class of ship according to the following classification:

- cargo-related waste;
- waste related to maintenance of the ship: washing down the decks, painting (tins of paint, brushes, etc.);
- engine-related waste: changing the engine oil, cleaning and changing filters, leaks in tubes and pipes, maintenance of material and use of chemicals, cleaning of the engine room;
- domestic and similar waste;
- accidental waste: either from the cargo or due to exploitation (transfer from cargo holds, bilge water, etc.).

Two classes of ship can be distinguished according to the waste generated:

- cargo ships (cargo, roll-on roll-off (RoRo) ships and oil tankers);
- passenger ships.

The volume of waste produced by such ships and platforms can be considered according to the size of the ship and/or the number of passengers.

In general, the crew of cargo ships (cargo or RoRo ships, oil tankers, ore carriers, chemical carriers) has the same number of members so it can be considered that the amount of domestic and similar waste discharged is the same for all ships irrespective of their size. Engine waste is, however, closely related to the size of the vessel and the power of its engines. For passenger ships, the volume of domestic and similar waste is higher because of the number of people on board. The generation of waste is proportional to the number of passengers. On fishing vessels, the generation of waste depends on the number of passengers, and this is also the case for pleasure craft. Platforms have to be considered on a case-by-case basis.

The following is a qualitative recapitulative table of the sources of waste from passenger, RoRo and cargo ships, oil tankers, chemical carriers, tugs, fishing vessels and pleasure craft.

Type of discharge		Sources of discharge			
		Machinery	General services	Passenger areas	Cargo areas
Liquids	Oily waste	x	x		x
	Bilge water	x			x
	Hydrocarbons	x			
	Cargo				x
	Other*	x	x	x	
Solids	Domestic and similar		x	x	
	Packaging	x	x	x	
	Material waste	x	x		x
	Cargo				x

\* Chemicals and additives, treatment of boiler water, detergents, waste water.

As regards the management of waste from mobile and fixed platforms, solid waste from the machinery compartment is mainly the result of maintenance (dirty rags, worn-out mechanical parts, packaging).

Urban households, distribution and service activities and industrial enterprises generate solid waste. Its type and volume varies according to the size of the city, the zone and the period. It requires the establishment of collection and management services (destruction, recycling, reclamation and treatment). This activity is usually one of the tasks of local authorities and regional environmental authorities.

#### (a) Collection and transport

A close look at the first part of this report shows that in most countries waste management is the responsibility of municipalities and the Ministry responsible for the environment, and that the tasks and prerogatives, as well as the operational and follow-up activities, are shared.

As local authorities are usually primarily responsible for waste management, they must ensure the viability and sustainability of the collection system to be established. The system could quite easily be sub-contracted to private firms (even though at present their involvement is limited in the countries that responded). The participation of private firms is highly recommended and is advisable provided that the framework for such a partnership has a solid basis and that the objectives are professionalism and a sense of responsibility.

The principles are the following :

- the establishment of a framework favourable to global and integrated management of the solid waste sector;
- the quest for efficiency through the best possible distribution of activities among the public and private sectors and other actors in civil society, each within its sphere of competence; the involvement of the private sector in operational and competitive activities will provide technical know-how and efficiency;
- a clear definition of roles, eschewing any overlapping and incompatibility in the sharing of competence, separating control and operational activities;
- decentralization of authority and responsibility to the lowest level capable of assuming them.

Each party must be fully and unequivocally responsible for the waste it generates. It must select and establish a method for appropriate collection and transport, either under State control (collection using its own resources) or through specialized firms approved by the bodies concerned.

## **(b) Recycling**

The elements available for managing waste streams are, in order of priority :

- reduction at source;
- recycling and reclamation;
- sub-surface containment « dumping » and other methods of elimination (incineration and other treatment techniques).

It is mainly the level of resources available, the socio-economic and cultural context and the commitment of the various actors, as well as their endorsement of good management practices, which govern the balance among the different options and the observance of this order of priorities.

The benefits of recycling need no further emphasis :

- it permits a reduction in waste streams to be treated, thereby helping to lower the cost of treatment, it prevents overloading of waste dumps and extends their life cycle;
- it preserves natural raw material resources;
- it decreases the volume of imports; and
- it generates jobs.

Recycling, however, involves an often complex chain of interdependent activities and requires the mobilization of a large number of public and private actors.

The success of the activity depends on the efficacy of all the links in the chain. The reclamation chain, however, is only viable if it forms part of a viable economic circuit.

Recycling has two facets : an industrial facet and a waste management facet. A wholly industrial and commercial approach to recycling does not always guarantee the viability of this activity. Its feasibility is facilitated if the environmental benefits are taken into account.

The role of public authorities is to strive, in cooperation with professionals, to combine the two approaches; to establish the appropriate regulatory and institutional environment; and to define the economic instruments and adequate incentives for each channel.

Taking into account these facts and identifying the type of marine waste that can be recycled, it can be seen that, on the one hand, in view of the difficulty of mobilizing the potential and minimum stocks recyclers require and, on the other, the degree of contamination of this waste and its lack of homogeneity, this type of waste is of little interest to recyclers.

## **(c) Dumping**

Dumping usually concerns end waste (waste from waste) or waste that can no longer be reclaimed. This concerns countries that have already moved ahead and established installations for the appropriate reclamation and treatment of waste. Where necessary, sub-

soil containment in controlled dumps remains the solution for other countries. A waste dump must involve the region as a whole, without taking into account the administrative boundaries between places that are close to the dump.

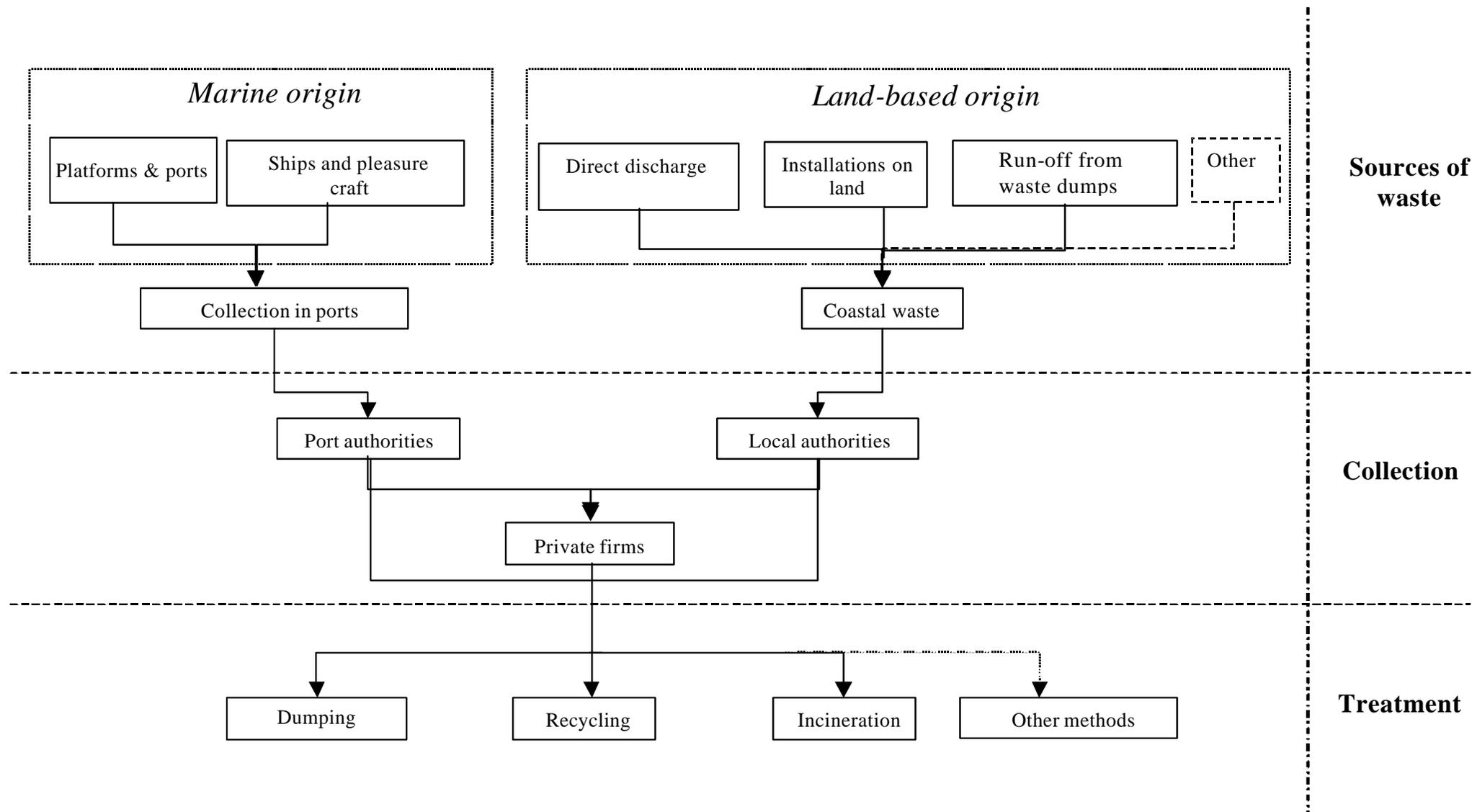


Figure 10 : Flow chart of marine and coastal waste management.

#### **(d) Controls**

The control function in solid waste management has several facets which we would place in three categories:

- environmental controls;
- regulatory controls; and
- contractual controls.

Environmental control of projects and services supplied is generally conducted as part of prevention in the context of environmental impact assessments. At the implementation level, it must be followed by measures recommended in the impact assessments in order to ensure the elimination or effective diminution of the negative impacts. This competence is usually given to the Ministry responsible for the environment.

Regulatory control concerns compliance with the relevant regulations and the commission of various types of violation:

- immediate violation (for example, incineration in the open);
- violation in *flagrante delicto* such as the discharge of waste in natural areas;
- violation concerning the marine and transboundary movement of waste.

Proper management of marine and coastal waste must be based on ongoing and stringent controls. They must be preventive or curative according to the situation. They can only be operational and effective if there is a clear regulatory framework that provides for prosecution and strictly applied penalties where necessary.

The regulations should make it mandatory for producers and those in charge of eliminating waste to keep a follow-up register containing all necessary indications on the designation of the waste, transport operations and elimination. For transporters, consignment notes are required in order to follow the movement of the waste.

The following are the guidelines for controls:

- controls must be based on the existing institutional framework;
- controls must give the public entities jointly responsible for collection and treatment services a sense of responsibility;
- controls must be carried out in a spirit of cooperation and transparency between the party controlled and the control authorities;
- public and private operators should be subject to the same rules and standards and benefit from the same exceptions.

### **3. LEGAL AND INSTITUTIONAL RECOMMENDATIONS**

It must be borne in mind that regulatory and legal action alone is likely to be powerless to protect the coast in the long term and it must be accompanied by decisive action by economic mechanisms, especially by the real estate market. This means that agencies capable of defining the development objectives in given areas must be created as part of the regional and national development scenarios and they must be given the necessary resources for implementation.

The following are some of the actions that appear to be the most urgent or necessary:

- exchange of experience (and possibly projects) in order to take advantage of the special characteristics and complementarities of the various coastal regions;

- combined use of modern digital geographical information resources directed particularly at the treatment of environmental data;
- firm decisions in favour of flexibility for certain installations so that they can subsequently be adapted to changing situations and allow forward-looking management;
- identification of the parties on the coastal fringe most threatened by future development and the formulation of appropriate planning schemes for zones to be developed, designating at once the zones where there is total protection and zones with aquaculture potential;
- systematic consideration of the impact on the soil and on space through environmental impact assessments in coastal regions;
- as soon as possible, protection of a significant part of the land and marine coastal fringe in each country, through legislation, purchase, consultation with the population or private owners;
- when developing construction projects for the coastal fringe, identification of any adverse effects on the infra-coastal area and protection of larval or young forms of marine species by banning certain fishing methods in the zones identified;
- establishment of a better linkage or coordination between coastal development and development in the hinterland so as to relieve congestion along the coast.

At the legal level, it is recommended that regulations be adopted:

- to give a sense of responsibility to those in possession of waste (producers, transporters or those responsible for elimination);
- to classify waste by nature and origin;
- to require regular and specific follow-up of waste from production to elimination;
- to require regional waste plans;
- to impose severe penalties on offenders.

At the institutional level, it is recommended that financial and fiscal incentives affecting investment or exploitation be adopted to encourage privatization of collection, transport and treatment of waste.

#### **4. PUBLIC PARTICIPATION**

Public participation is vital for the best possible management of waste, particularly by encouraging the public to reduce waste at source. This preventive action is aimed at those holding waste and the managers of such waste, whether in mobile or fixed installations at sea (ships, platforms, etc) or on the coast (beaches, ports, bathing resorts, etc.). This is also a priority because if waste is not generated there is a saving in collection and elimination as the cheapest waste to eliminate is of course waste that has not been generated!

Communication and promoting awareness are essential for any solid waste management strategy irrespective of the waste's origin. Regulations and control of compliance, together with incentives, are necessary but do not suffice to achieve the goals set.

It is a very hard task to change the behaviour of the various generators of waste because it concerns daily life. It affects the population as a whole and economic actors. Furthermore, proper conduct is often neither natural nor spontaneous.

As far as solid waste is concerned, a communication and public awareness policy should be based on a number of elements, including the following:

- development of general public awareness campaigns (reforms, costs, etc.), around which specific thematic campaigns can be organized;
- use of channels and media adapted to the public targeted and to each level of society;
- proper long-term planning as a complement to the programmes and reforms;
- mobilization of all the actors in civil society, public authorities at the national and local levels, NGOs, educators, etc.;
- assessment of the impact and effectiveness of the campaigns carried out.

In addition, public participation is of the utmost importance in decision-making aimed at appropriate and sustainable waste management.

## **5. ECONOMIC AND FINANCIAL PROPOSALS**

Over the past few decades, socio-economic development has radically changed the Mediterranean coast. The Mediterranean coastline constitutes a narrow border between land and sea where new installations to be constructed converge and compete, whether industry (heavy and processing industries), energy (power stations), tourism, aquaculture, multimodal transport, technical centres, etc.

The coastal characteristics of the "sectors of activity" concern space because of their mandatory or chosen siting: fishing and aquaculture; desalination of seawater; processing of imported materials; cooling of thermal power stations; loading/unloading of petroleum products; tourism and pleasure craft; land/maritime transport interfaces; international transit, etc. Such a system of operation in coastal areas involves particularly complex interaction or retroaction because of the density of activities.

The economic and financial strategy in this sector is based on two principles:

- the polluter pays principle; and
- the production/recovery principle.

The ideal cost recovery system, which should be the aim whenever possible, must be fair, easy to administer and economically impartial and it should generate sufficient resources. Fairness means that people in the same situation should contribute to the same extent and that the population's ability to pay is taken into account. Easy to administer means that the problems of paying, collecting and auditing should be reduced to the minimum. Lastly, impartiality is guaranteed through non-interference in economic decisions unless such interference is necessary.

The advantages of proper management can be felt at the national, local and individual levels. This is why it would be natural to try to mobilize the resources needed among the various beneficiaries.

A financing system that reflects costs should be introduced and it should be proportional to the volume of waste. An economic instrument in the form of a tax would complement local taxes. This would encourage reduction at source and would send a clearer message to generators of waste, as well as fostering changes in behaviour with a view to better waste management.

An equilibrium in this sector may require a contribution by the State, which is justified by the need to preserve national interests in the light of the externalities in this sector. It would help to ensure that the national community as a whole did not have to bear the direct and indirect costs incurred by inadequacies in waste management.

Waste management is a local activity and it is not always easy to encourage its mechanization. On the other hand, the socio-economic consequences are not automatic. In order to make them a reality and as important as possible, the objectives of the sector should be:

- to pursue a policy of inciting the private sector to participate in environmental services;
- to encourage the creation of new jobs in the sector and make them more professional;
- to promote waste management professions and enhance the image of the profession and sector among young people;
- to encourage the creation of micro-enterprises;
- to plan and implement appropriate national training and capacity-building activities.

The mobilization of the resources required for the proper management of waste is a priority for the sector. To ensure its viability and its financial balance, it is recommended that:

- the waste management issue be included in the fiscal reform programme;
- the results of local reform should be monitored and its effectiveness enhanced;
- other cost recovery systems by sector should be explored and developed;
- any deficit should be made good by a State contribution.

## **6. THE NEED FOR AN INFORMATION SYSTEM ON MARINE AND COASTAL LITTER**

The waste sector in general and the marine litter sector in particular lack quantitative data, particularly on waste streams. Accurate and reliable information is essential in order:

- to identify the priorities for action and plan effectively;
- to enlighten decision-making;
- to inform and promote awareness among the generators of waste and to monitor the environmental impact in the sector.

There is a growing need for reliable and regular statistics on the sector, particularly on:

- per capita generation of waste;
- different categories of waste streams;
- composition of waste and trends;
- quantity of waste collected each day;
- presence of floating litter;
- quantification and specification at the regional and local levels and variations over time and according to the season;
- the percentage treated, recycled or dumped according to the type of waste;
- the cost of managing waste and the institutional framework.

Such a monitoring system should be designed and adapted to needs and trends, as well as to resources. It could be implemented in a modular and gradual fashion. For this purpose, it will be necessary:

- to assess needs and identify the relevant data to be collected;
- to define the best frequency for the collection and updating of data;
- to identify the actors involved in data collection;
- to define the methods and criteria for the dissemination of information;
- to estimate the cost of creating and operating such a system; and
- to identify sources of financing.

It is therefore recommended that the question of management of coastal and marine waste be included in the MED STAT programme under the solid waste management component.