

MedWaves⁴⁷

THE MEDITERRANEAN ACTION PLAN MAGAZINE

INVASIVE ALIEN SPECIES

TOURISM AND CONSERVATION: THE CASE OF ZAKYNTHOS

MONITORING POLLUTION

SATELLITES FOR COASTAL PLANNING | THE CAMP NEW GENERATION | CLEANER PRODUCTION AND THE SMES

BUREAU SETS UP MAP PRIORITIES

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> A TURNING POINT IN THE TRANSITION TOWARDS SUSTAINABLE DEVELOPMENT



2002 has been the year for Sustainable Development, the year in which several key building blocks have been established, paving the way towards Sustainable Development.

At the global level:

- > The preparatory process and holding of the World Summit on Sustainable Development have brought together, in an integrated way, the economic, social and environmental pillars of Sustainable Development, as well as the good governance factor.
- > A greater awareness of all partners and major groups has been achieved, notably by the Civil Society and the business sector.
- > Partnership, (corporate) accountability, transparency, common but differentiated responsibility, and public participation are now widely accepted as basic principles.
- > With the notable exception of the United States of America, most countries have ratified the Kyoto Protocol, and the Global Environment Facility (GEF) has been replenished.

At the Mediterranean regional level:

- > The preparatory process for the Mediterranean Strategy for Sustainable Development has been launched, as well as the appraisal of prospects for improving the efficiency of the Mediterranean Commission on Sustainable Development (MCSD) as a "decision making tool" towards regional Sustainable Development.
- > A new Protocol concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea has been signed and the process of

ratification / acceptance of the amendments to the MAP legal instruments is in progress.

- > A reporting system is being tested by seven volunteer countries and a monitoring system for the enforcement of the MAP legal instruments is being considered.
- > The sustainable management of coastal regions is heading for an adequate regional legal instrument, while practical cases through the Coastal Areas Management Programme continue to assist countries for a more efficient management of their resources.
- > The preparation of a Mediterranean Environment and Development outlook is well advanced while a major regional project on protected areas is being implemented; awareness and assistance on cleaner production techniques, widely promoted, and the use of remote sensing tools, extended.
- > Implementation of the GEF / SAP project has gone through an intensive momentum, with a series of activities being implemented in various countries.
- > The Euro-Mediterranean Partnership confirmed the need for Sustainable Development as an action framework; recognised the importance of cooperating with the MAP, and decided to provide support to the MCSD and the Mediterranean Strategy for Sustainable Development.

There are of course shortcomings, constraints and gaps in the course towards Sustainable Development, but we prefer to end the year with a positive and encouraging note, aware as we are that huge challenges are still ahead.

ARAB HOBALLAH
DEPUTY CO-ORDINATOR
MEDITERRANEAN ACTION PLAN



> THE BUREAU SETS UP THE MAP PRIORITIES

In their meeting in Monaco on 17–18 October under the presidency of Minister Bernard Fautrier, senior officials from Algeria, Bosnia and Herzegovina, Greece, Monaco, Slovenia, and Syria (members of the Bureau of the Contracting Parties to the Barcelona Convention) adopted, among others, the following decisions:

Status of ratifications: To remind the MAP Focal Points that once the ratification process (of the amended Barcelona Convention and its Protocols) has been completed in their respective country, they are requested to immediately inform the Depositary State. Regarding the SPA and Biodiversity Protocol, the Bureau also recalled that its ratification concerns both the Protocol and its annexes, which constitute one single document.

Reporting System: The Bureau stressed the importance of the trial exercise carried out by several countries on a voluntary basis enabling a Reporting System to be set up at MAP, in view of the enforcement of the new and amended MAP legal instruments in the near future. It should be rational and consistent with the other regional or international environmental conventions.

Liability and compensation: The Secretariat will convene a restricted group of experts who, after detailed analysis, will report at the next Bureau meeting on the advisability and feasibility of setting up a Mediterranean legal mechanism on the subject.

Monitoring system for the enforcement of MAP legal instruments: The Secretariat will submit, at the next meeting, a proposal on the composition and working method of the proposed technical committee whose task will be to deal with the difficulties related to the implementation of MAP legal instruments. This should be done on a non-jurisdictional basis. It will be for the next Contracting Parties meeting to make a final decision.

Evaluation of MAP: The Secretariat will set up as soon as possible a Think Tank to prepare a global assessment of MAP as requested by the Contracting Parties at their Monaco meeting. The group will consist of the President of the Bureau (Monaco) and representatives from: a Mediterranean country member of the EU (Greece); a Southern or Eastern Mediterranean country (Syria); a Mediterranean country included in the next enlargement of the EU (Slovenia); and two experts to be appointed by the Secretariat.

The group may consult IGOs and NGOs, and will gear its evaluation: towards a prospective approach; towards an adjustment of MAP and in particular of the MCSD to the post Johannesburg situation by including in its considerations the

task force deliberations on the future of the MCSD; towards an increasing presence of MAP in the European context (Euromed Partnership; EU legislation, etc.), and towards a more sustained involvement of MAP in technical assistance activities extended to countries.

A first progress report will be submitted to the Bureau at its next meeting, to be subsequently transmitted to the Contracting Parties meeting.

Second Euromed Conference on the Environment: The Bureau welcomed the content of the Athens Ministerial Declaration (July 2002), which indicates a real will to greater cooperation between the Euromed Partnership and the MAP, and recognised inter alia the role of the latter and of MCSD in the formulation of the Mediterranean strategy.

The Secretariat will establish the necessary contacts with the EC so that the will expressed in the Declaration be translated into concrete actions

List of MAP partners: The Bureau examined and approved the new list of MAP partners, drawn up according to the common and additional criteria. Consequently, it equally approved the withdrawal from the list of 15 organisations that did not meet these criteria.

SAP activities: The Bureau decided to urge countries to start, in cooperation with the Secretariat, the process of preparing their 2003 national baseline budget of pollutants' releases that is the basis for the gradual achievement of the pollution reductions foreseen by the SAP.

Coastal Area Management Programme: The Bureau was in favour of continuing the CAMPs which, for the beneficiary countries, represent a unique opportunity to take direct and practical advantage of the expertise of all the MAP components. However, it insisted on the shortcomings found in the follow-up of programmes.

So as to correct this situation, it suggested that, in future, the new CAMP agreements include a clause on the follow-up and relevant funding. The Secretariat will draft a document of a political nature on the general vision of the CAMP to be submitted at the next Contracting Parties meeting.

The Bureau has given its approval in principle for the starting of a feasibility study on a CAMP proposed by Spain for the Mar Menor (Murcia region) to be approved by the Contracting Parties meeting. Such a CAMP should not entail a financial burden for the MAP and the allocation of human resources, which would not be compatible with the other CAMPs.

The next Bureau meeting will take place in Sarajevo, between mid April and mid May 2003.

> TOURISM AND CONSERVATION: THE CASE OF ZAKYNTHOS



Tourism and conservation of Nature can be compatible and even complementary activities provided that a good planning for sustainable development is adopted. In some cases this planning is particularly difficult and, thus, special measures and precautions are to be taken. This is the case for the few places where marine turtles are still nesting in the Mediterranean. The coincidence of the places (sand beaches) and the season (summer) creates serious difficulties in preserving the availability of these areas for turtle nesting.

The case of Zakynthos Island (Greece) is a good example of this situation and the result of the current activities undertaken by the authorities will be a clear reference for future sustainable tourism alternatives in the region.

The Bay of Laganas on Zakynthos is one of the most important nesting areas for loggerhead turtle (*Caretta caretta*) in the Mediterranean. The six nesting beaches in the Bay (Marathonissi, East Laganas, Kalamaki, Sekania, Daphni and Gerakas) host an average of 1,300 nests per season. This average represents the highest known in the whole Mediterranean region

Taking this into account, several NGOs, scientific bodies and other institutions have asked the Greek authorities, since the beginning of the eighties, to adopt protection measures in order to avoid the degradation of the nesting sites by human activities.

As a consequence, in 1984 the Greek Government and the local authorities approved several legal and administrative measures aiming at safeguarding the most important nesting areas and its surroundings.

The measures foreseen in the adopted legislation (regulation of access to the beaches, prohibition of vehicles, banning of night flights at Laganas airport, maritime traffic regulation in the Bay, public awareness campaigns, control of activities by wardens,...) could have been very positive, especially because the most dangerous pressure –the one generated by tourism– was still very small in that period: around 20,000 tourists in 1984.



Unfortunately, the insufficient enforcement of the adopted measures made possible an increasing degradation of the area by illegal activities (such as beach facilities in crucial nesting areas; buildings; vehicles and horses on the nesting beaches; degradation of sand dunes; violation of maritime traffic rules,...), as well as the pressure by some landowners and some economic interests for continuing their activities.

In view of this situation, several international organizations have taken action to encourage the Greek Government to take the necessary effective measures to protect the area. The Bern Convention adopted a strong Declaration related to the situation in Zakynthos.

In the framework of the Mediterranean Action Plan (MAP) an Action Plan for the Conservation of Mediterranean Sea Turtles was adopted in 1989 and amended in 1999. The amended version

stressed that Greece should “finalize the process of setting up the Zakynthos National Marine Park and its managing body, and further conservation and management of the site”.

Finally, the National Marine Park of Zakynthos was declared on 22 December 1999.

The declaration of the National Marine Park of Zakynthos has proved to be a positive step and has facilitated some improvements in the implementa-

>> TOURISM AND CONSERVATION: THE CASE OF ZAKYNTHOS

tion of the protection measures for the area. The establishment of a Management Agency to run the Park is as well a positive step.

In spite of this advance and as underlined by a recent judgement of the European Court of Justice, the results of the activities carried out since the

declaration of the Park are still far from the approved objectives.

At present the following are the most relevant problems to be solved:

- > to prevent visitors, beach facilities, boats, cars and motorbikes from exceeding the legal limitations or using prohibited areas;

- > to drastically implement measures to avoid and correct the illegal activities in the area of Daphni (illegal beach facilities, buildings, taverns and canteens);
- > to prevent the violation of the measures established to regulate maritime traffic in the protected areas;

> THE VIEW OF THE ZAKYNTHOS PARK COORDINATOR

Zakynthos island, Greece, hosts, at the southern part (Laganas Bay), one of the most important nesting rookeries in the Mediterranean for the loggerhead sea turtles *Caretta caretta*; a habitat essential for protection. The efforts to protect the nesting beaches started in 1984. Unfortunately, until 2000 the enforcement of the protection measures was very poor.

The establishment of the National Marine Park of Zakynthos (NMPZ) and the Board of the Management Agency, in 2000, is definitely a major breakthrough for sea turtle conservation in Greece and the Mediterranean.

In the last two years since the Management Agency of the NMPZ has been operating, several positive steps have been taken.

As Mr. Jean-Francois Verstryngne (Deputy Director General, European Commission / DG Environment) said, during his visit to Zakynthos in September 2002, "we are, in conclusion, in a situation that has clearly improved and we are very satisfied about this, if we are to compare the situation today with the situation 2 to 3 years ago. But there is still some distance to go to get the satisfactory solution for the first Marine Park, Natura 2000 Park, in Greece and we hope that we can resolve all the issues we have mentioned."

In these two years the Management Agency of the NMPZ has successfully implemented the following activities:

- > guarding programme of the nesting beaches;
- > public awareness programme for the visitors;
- > delineation of the NMPZ land area (sign posting);
- > delineation of the NMPZ maritime area;
- > building control within the Park area;
- > environmental education programme;
- > monitoring of sea turtle nesting activity and on site nests protection;
- > co-operation with local authorities in order to protect the nesting beaches;



A. DENEROPOULOS

- > co-operation with environmental organisations;
- > co-operation with tourist companies to promote the protection of the environment;
- > international co-operation (collaboration with the Pan-European Ecological Network and Europark federation; co-operation with other national marine parks).

Of course there are still actions that have to be undertaken, in order to solve the conservation problems within Laganas Bay. Such are:

- > the implementation of the compensation measures;
- > the better enforcement of the protection measures, especially on Daphni beach;
- > the better control of the number of the beach furniture on the nesting beaches;
- > the better regulation of the navigation within the maritime area;
- > completion of a land register (cadastre).

The Management Agency of the NMPZ has given priority to these issues and has already started the procedure to resolve them.

In order to protect and conserve an area like the National Marine Park of Zakynthos, there is a lot of work to be done, requiring the co-operation of all parties involved in this issue (Ministry of Environment, local authorities, locals, conservationists, tourist companies, stakeholders, visitors etc).

This is the task that the Management Agency of the NMPZ has to carry out in order to bring together all the different opinions and also to find the proper solutions for

the problems that occur, in order to protect the essential habitat of Laganas Bay.

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- > to establish compensation measures to legal landowners damaged by the protection of the zone;
- > to provide effective support to the management body by national and local authorities;
- > to develop educational campaigns and alternative plans for local po-

pulation to facilitate a more active support to the Marine Park of Zakynthos.

This expected progress requests additional resources to be provided to the National Marine Park of Zakynthos as well as co-operation from all concerned actors at the local level.

The Mediterranean Action Plan is fully confident that the efforts undertaken by the Greek Authorities and, in particular, by the National Marine Park of Zakynthos, will lead to the proper solution to all the issues raised, in the interest of the Mediterranean marine biodiversity.

> THE VIEW OF NGOs

The establishment of the National Marine Park of Zakynthos in Laganas Bay (1999) was the result of persistent pressure exerted by several NGOs on the local authorities, the Greek government, the Council of Europe (Bern Convention), and the European Commission. These NGOs include ARCHELON, the Sea Turtle Protection Society of Greece, that has been conducting loggerhead sea turtle monitoring and public awareness work on the island since 1983, and MEDASSET —the Mediterranean Association to Save the Sea Turtles— which has spearheaded national and international lobbying since 1984, urging the EC to take Greece to the European Court of Justice on the grounds of infringement of EU Habitats Directive (92/43/EEC). In turn, WWF Greece purchased land behind the beach with the highest loggerhead nesting density in the Mediterranean, thanks to support from the European Commission and others. An important contribution was also made by the Zakynthian Ecological Movement to influence the local authorities and society.

The Management Agency of the National Park was formed in July, 2000, with ARCHELON and WWF Greece representing the NGOs on the 10-member Board. This body is the first of its kind in Greece, and inherited several problems arising from unplanned tourist development, illegal activities, lack of law enforcement, and insufficient support from



H. DA CRUZ

local authorities. All these problems represent serious threats to the nesting efforts made by sea turtles every summer in the Bay, and the Agency has made attempts to control them through specific management techniques

Two years later, the Management Agency is moving in the right direction by establishing itself at a local level. It has also become a beneficiary of an EC co-funded programme, and in order to reach its objectives, has signed an agreement with ARCHELON involving monitoring nesting activity, raising public awareness, and investigating specific compensation measures for affected landowners. Both WWF Greece and MEDASSET have signed an agreement of co-operation with the Agency.

There is still a long way to go before the Management Agency reaches the desired level of protection and management. The upcoming drafting of a Management Plan will contribute towards delineating its long-term strategy for the area. Indeed, if progress is to be made, it will be achieved through strengthening the Agency to build a local consensus and develop partnerships. History is in the making on the verdant island of Zakynthos: let it become an example for other protected areas soon to be established in Greece.

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> THE STORY OF THE INVASIVE ALIEN SPECIES

According to the Convention on Biological Diversity, *“invasive alien species are species introduced deliberately or unintentionally outside their natural habitats where they have the ability to establish themselves, invade, out-compete natives and take over the new environments. They are widespread in the world and are found in all categories of living organisms and all types of ecosystems. The threat to biodiversity due to invasive alien species is considered second only to that of habitat loss.”* The Mediterranean is affected.



At risk: Mediterranean habitats such as Posidonia meadows

Biological invasions operate now on a global scale and are expected to undergo rapid increase in this century due to interactions with other global changes such as increasing globalisation of markets, high rises in global trade, travel, tourism, and exchange of goods.

Invasive alien species can have significant irreversible environmental impact at the genetic, species and ecosystem levels. They can also have socio-economic impacts. Their management costs include not only costs of prevention, control and mitigation, but also indirect costs due to impacts on ecological services. Environmental and socio-economic impacts of harmful invasive alien species are already being felt.

In the last couple of decades increasing attention has been given to alien species and to biological invasions in marine ecosystems. Of course not all alien species are invasive. Alien species often disturb ecological equilibria; invasive species can revolutionise them—and have economic repercussions—on recreation, tourism and fisheries. Experience has shown that eradication of

alien species in the marine environment is not a realistic option, at least in the foreseeable future.

National and supranational organisations are active in promoting measures to control the introduction of alien species and to eradicate invasive species. The issue concerns of course not only marine but also terrestrial and freshwater environments.

Everyone is worried: CBD, IMO, GEF, MAP

The Convention on Biological Diversity (CBD) highlighted the problem by including it as one of the five main issues of concern for marine and coastal biodiversity. The Bern and the Barcelona Conventions are showing concern and so is the International Maritime Organisation (IMO), the Global Environment Facility (GEF) and others and their activities reflect this.

Within the Mediterranean Action Plan (MAP), the Regional Activity Centre for Specially Protected Areas (SPA/RAC) is now active towards drafting an Action Plan concerning species introductions and invasive species in the Mediterranean.



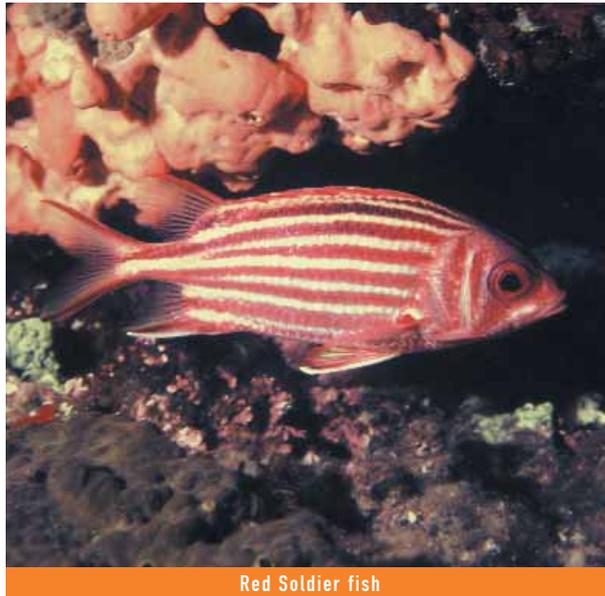
The Mediterranean is a semi-isolated ecosystem with high endemism that is susceptible to invasions from other seas and oceans. It was formed about 5.3 million years ago when movements in the Earth's crust opened up the Gibraltar straits, enough for the Atlantic waters to fill the enormous salt depression that was the more or less dry Mediterranean basin. This water brought with it living organisms that were the precursors of today's Mediterranean biodiversity.

Where alien species come to the Mediterranean from

Alien species reach the Mediterranean through various pathways. Ballast water brought *Mnemiopsis*, an American comb jelly, into the Black Sea in the early 1980s. There it proliferated and spread to the East Mediterranean. It feeds on plankton and impacts fish populations feeding on plankton.

In 1999 *Beroe ovata*, another comb jelly, apparently also invaded the Black Sea, feeding on *Mnemiopsis* and controlling its proliferation. The American blue crab, *Callinectes sapidus*, was also introduced in the Eastern Mediterranean in ballast water. Other species have come in as fouling organisms on ships.

Many species have come into this sea by way of mariculture introductions, mainly of oysters, such as the Pacific oyster, *Crassostrea gigas*. Mariculture activities have resulted in many unintentional introductions of alien species, such as the macroalga *Sargassum muticum*, in the North Mediterranean.



Red Soldier fish

A. DEMETROPOULOS

The unintentional introduction in the late 1980s, through the aquarium of the Oceanographic Museum of Monaco, and the spread of the tropical, highly invasive alga, *Caulerpa taxifolia*, is of course well known, as are the unsuccessful efforts to control it.

It has since been spreading fast and can now be found as far as Majorca, Tunisia and the Adriatic. Its first direct impact is on other algae and on sea grasses which it smothers and displaces.



Siganid

A. DEMETROPOULOS

Probably, however, the largest avenue for alien species into the Mediterranean is the Suez Canal. The Canal was opened in 1869. For the first time the Mediterranean's pure Atlantic-origin fauna faced competition from Indopacific species.

Several hundred species have since then entered and established themselves in the Eastern Mediterranean, in what is now known as the Lessepsian immigration. Five to ten new immigrant species are recorded every year.

These Indopacific species now form over 12% of the marine fauna of the East Mediterranean and 5% of the entire Mediterranean marine fauna. (Fredj et al., 1990; Bellan-Santini, 1992; Fredj et al., 1992).

Red Soldiers and Siganids, caught in the nets

Many species, such as the Red Soldier fish and two Siganids are now common in fish-catches in the Levantine basin and *Upeneus moluccensis*, a goatfish, has been replacing the more valuable local Red Mullet.

Many species of benthic organisms have also colonised the Levantine Basin and are slowly spreading west.

Halophila stipulacea, a mud dwelling seagrass, has colonised vast areas of the seabed and has reached the Aegean. The spread of Indopacific species in the Levantine basin seems to follow an anticlockwise pattern, no doubt following the prevailing coastal currents.



>> THE STORY OF THE INVASIVE ALIEN SPECIES

The explosive blooms of the jellyfish *Rhopilema nomadica*, on the Levant coast are also well known and have caused a multitude of problems to fisheries, clogging nets, to recreation and tourism (stinging bathers) and occasionally to water intakes of power stations.

The Caulerpas, fifty years after

Another Caulerpa, *Caulerpa racemosa*, is now posing problems, this time in the East Mediterranean.

It entered the Mediterranean about 50 years ago, but did not spread until about 1990 when it covered very large areas of seabed around Cyprus and elsewhere. It forms mats a few centimetres thick especially on soft substrates, competing very successfully with species such as *Caulerpa prolifera* and *Cymodocea nodosa*.

It threatens not only the native marine flora but also the marine fauna. Its impact on *Cymodocea nodosa* for example can have effects on the Green turtle, which feeds practically exclusively on this sea grass, at least up to its sub-adult stage.

Caulerpa racemosa fortunately, for the time being at least, seems to have “lost vigour” and is apparently proliferating more slowly now.

At about the same time, i.e., in 1989–1990 and periodically since then, an Indopacific *Cladophora* species (*Cladophora* is a notoriously difficult group from a taxonomic point of view), aided by favourable weather conditions and probably nutrient increases, has caused serious problems and some controversy in Cyprus, with its proliferation impacting both *Cystoseira* habitats and tourist beaches. It is an epiphytic filamentous alga.



Caulerpa racemosa

More measures to be taken...

The behaviour of alien species in the Mediterranean is unpredictable and can have revolutionary ecological –and economic– impacts; eradication after the event is obviously not an option.

These points, inevitably, emphasise the need for effective measures to prevent the introduction of species into this sea –in ballast water, through mariculture or through other possible pathways.

Some steps are already being taken in these directions –more are needed.

There is also the obvious need for some serious thinking on setting up and funding suitable barriers, such as salinity barriers, in the Suez Canal, to stop or at least minimise the inflow of alien species into the Mediterranean.

If no effective measures are taken to stop new introductions further instability of the Mediterranean ecosystem will be inevitable.

ANDREAS DEMETROPOULOS
MARINE BIOLOGIST



Cladophora on a beach

> A COMMON PLATFORM FOR POLLUTION REDUCTION



Five sub-regional meetings set the basis for harmonized and co-operative activities for Mediterranean countries to further work for the reduction of land-based pollution.

Damascus, Split, Monaco, Rabat, and Ankara were the scenes where experts from 20 Mediterranean countries took new steps towards the establishment of a common background for the preparation of the National Diagnostic Analysis (NDA), the identification of the amount of every targeted pollutant being released from the coastal areas (Baseline Budget of Releases, BB), and the consequent elaboration of National Action Plans (NAPs), all of them aiming at reducing pollution from land based sources in the region.

Six key goals were targeted by these meetings, which were organised by MED POL in the framework of the Strategic Action Programme (SAP) with the assistance of the Global Environment Facility (GEF) Mediterranean Project:

- > to create a hub of regional experts to promote the SAP and exchange related information;
- > to enhance horizontal co-operation and transfer of knowledge between the countries;
- > to review the overall strategy for the preparation of NAP, NDA and Baseline Budget;
- > to review the national strategy for the implementation of NAP, NDA and Baseline Budget;
- > to identify gaps, barriers and difficulties that would alter the implementation process at national levels;
- > to identify appropriate means to overcome such gaps, barriers and difficulties;

The sub-regional meetings took place in Damascus (with the participation of Syria, Libya, Egypt, Lebanon); Split (Croatia, Albania, Bosnia-Herzegovina, Slovenia); Monaco (Monaco, France, Italy, Spain, Greece); Rabat (Morocco, Tunisia, Algeria), and Ankara (Turkey, Israel, Malta, Cyprus).

Considered as a key activity towards effective actions for reducing land-based pollution, the National Diagnostic Analysis are aimed at identifying and assessing:

- i. the nature and severity of problems caused by the land based activities on the national coastal line and the coastal area;
- ii. the extent of physical alterations and destruction of habitats along the coast;
- iii. the sources of degradation of habitats and the marine environment
- iv. coastal and marine areas which are endangered by land based activities and proposing a preliminary ranking of environmental priority issues, taking into account, for each administrative region of the country, the relative importance of each environmental issue on food safety, public health, coastal and marine resources, and the health of the ecosystem and socio-economic benefits related to the following contaminants: Sewage; Urban Solid Wastes; Persistent Organic Pollutants (12 Priority POPs and others); Heavy metals and Organometallic compounds; Organohalogen

compounds (Halogenated Aliphatic Hydrocarbons, Halogenated Aromatic Hydrocarbons, Chlorinated Phenolic Compounds, Organohalogenated Pesticides); Radioactive Substances; Nutrients and Suspended Solids; Hazardous Wastes (obsolete chemicals, lubricating oil, batteries).

All countries are expected to provide information on the actual quantities of pollutants released into the Mediterranean sea. These quantities are named Baseline Budget of Releases, taking 2003 as the base year for each SAP targeted pollutant.

Due to the fact that the Mediterranean is characterised by great heterogeneity, in sectors, size of enterprise and applied technology, the existing information should be complemented as to calculate the BB and additional calculations are to be made, when no data is available. Calculation can be based on Emission Factors according to the "Guidelines for the calculation of Baseline Budget of Releases".

A specific software and database have also been developed by MED POL in co-operation with the secretariat of RAMOGE (co-operation agreement signed by Italy, Monaco and France to protect neighbouring coasts) to facilitate the calculation of the BB. The software and database were presented at the sub-regional meetings and participants were trained on their use.

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> WANT TO REDUCE MARINE POLLUTION? MONITOR IT!

Between the end of the sixties and the beginning of the seventies, marine pollution became visible along the Mediterranean coasts and not only in the eyes of specialists. Oil, litter, unsafe beaches, etc. were common in many tourist areas, bringing along epidemics and other diseases contracted from swimming and seafood consumption. Once the effects were evident, the problem was to identify the causes, i.e. to quantify and qualify marine pollution and possibly intervene with adequate measures.

It was therefore in those years that the MED POL Programme for the Assessment and Control of Marine Pollution in the Mediterranean was conceived within the Mediterranean Action Plan (MAP) in order to assist the countries of the region in tackling marine pollution.

One of the first activities organised was monitoring, i.e. a series of regular measurements of the concentration of marine pollutants in water, biota and sediments. Soon, the MED POL Programme set up a network of national institutes working with common objectives and methods and assisted by a large capacity building programme covering provision of instruments and chemicals, as well as training and data quality assurance.

The monitoring programme has since then widely developed. The initial objective (to simply measure the pollution) gradually became an instrument for the countries to proceed to appropriate coastal management, i.e. to control the quality of bathing water and beaches, to verify if the existing emission limits were respected (and if the Protocols were applied), and also to survey the existing trends in pollution.

The adoption of the Strategic Action Programme (SAP) brought a new prospect to the monitoring activities, which became the main assessment tool on the basis of which the countries will eventually take remedial measures and make interventions.

Thus, the entry of the SAP into an operational phase now gives the monitoring activities an even more important role. In fact, a national environmental monitoring network is a fundamental need while formulating and revising the national action plans and

when specific investments are planned, for example, for the hot spots.

Monitoring can provide a clear image of the magnitude of the problem and of its effects and can therefore give precise indications of what remedial action should be taken and where.

As a result, the related activities and actors of the SAP should be up to date with the outputs of monitoring activities, in order to be able to inform the decision makers on the real state of the environment. This is extremely important on the long-term for obtaining the expected results from any planned action requiring comprehensive efforts from many sectors.

Today, the general objectives of the monitoring activities implemented as part of MED POL Phase III are:

- > to present periodical assessments of the state of the environment in hot spots and coastal areas (needed to provide information for decision makers on the basic environmental status of the areas which are under anthropogenic pressures);
- > to determine temporal trends of some selected contaminants in order to assess the effectiveness of actions and policy measures, and
- > to enhance the control of pollution by means of applying national / international regulatory limits.

As for the trend-monitoring component, this aims at detecting site-specific temporal trends of selected contaminants at hot spots and coastal / reference areas. Trend monitoring of loads aims to provide estimates of inputs of some major groups of pollutants, hazardous substances and nutrients (all listed in the Land Based Sources Protocol) to the coastal marine environment via point



(rivers, municipal and industrial effluents) and non-point (atmospheric) land-based sources.

Biological effects monitoring (monitoring with biomarkers) has been included in the monitoring programmes as a pilot activity to test the methodology to be used as an early-warning tool to detect any destructive effects of pollutants to the organisms at the initial stage of exposure.

A new component regarding the monitoring of the eutrophication (algal noxious blooms) in the Mediterranean is being included in the MED POL monitoring programme. The monitoring sites of interest will be those where eutrophication phenomena are common and, in addition, potential-risk areas under the direct impact of anthropogenic nutrient and organic material inputs.

Compliance monitoring, referring to health-related conditions in bathing

and shellfish / aquaculture waters, effluents and hot spots, supports the pollution control component. In order to fully achieve the objectives of this component, countries are encouraged to prepare compliance reports by comparing the results of the monitoring with the existing limit values of their national and / or the international and regional legislations.

Capacity building programmes to support all the components of monitoring have been organised, including direct technical and financial assistance to the countries, quality assurance programmes and support for the scientific follow-up of emerging environmental issues.

The effective implementation of national monitoring programmes including these components started in 1999. At present, eight countries are implementing them jointly with MED

POL. The countries mainly make the selection of the monitoring areas. The spatial coverage of hot spots can be considered satisfactory. However, the selected monitoring areas in some of the programmes are still too few to permit the evaluation of the state of the environment and the assessment of the impacts of the land-based activities.

Currently, the common monitoring strategy of MED POL is basically followed in all the ongoing national programmes. However, there are cases in which some components are not fully covered. For example, the monitoring of loads from both point and non-point land-based sources is not widely performed, while the formulation and implementation of compliance monitoring activities are not carried out in all countries, basically due to complex institutional arrangements.

Some countries are still not participating in the MED POL monitoring programme in spite of the fact that they are known to have well-established national monitoring programmes whereas others still have no monitoring network.

The task ahead is to try to complete as much as possible the geographical coverage of the monitoring component in all Mediterranean countries and set up a solid platform of data and information on which the countries will base their efforts to reduce pollution.

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> SATELLITES SUPPORT COASTAL PLANNING

The pictures you see in this article are the result of merging a number of images taken by artificial satellites continuously orbiting the Earth. The technology enabling the acquisition of such pictures and information is called Remote Sensing. It is employed in the Mediterranean as a tool to support sustainable coastal planning and effective pollution control.

Remote Sensing satellites are part of a number of satellite constellations. There are around 15 different civilian satellite constellations orbiting the Earth, possessing different characteristics in terms of details that can be visualised and imaging frequency. Spatial features on the land as small as 50 cm can be detected; the imaging frequency can be as low as a few hours.

In these days, the need is arising to improve suitable integrated monitoring in line with Sustainable Development Policy –using also advanced techniques– in order to support sustainable coastal planning and efficient control of sea pollution.

With respect to the objectives of the Mediterranean Action Plan (MAP), coastal areas and relevant sea pollution, its control, understanding and the research of integrated remedies for it are important issues, which have concerned the Mediterranean Community for many years.

Satellite Remote Sensing can provide updated and frequent data, possessing an intrinsic spatial dimension, that are used –integrated with conventional data– within Geographic Information Systems and Decision Support Systems for spatial and integrated planning and assessment. Remote Sensing (RS) in particular can be used for: monitoring of specific parameters (e.g. water quality, oil slicks); mapping (base and land cover / use), and statistics (e.g. indicators).

In particular, the approach in the use of RS vs *in situ* data is based on the following:

- a) the strong points of RS, that are: the provision of a spatial (horizontal and vertical) dimension; synopticity, repetitivity, continuity and homogeneity in collecting data;
- b) RS is a strong environmental or cartographic data integration tool;
- c) observation capabilities from Space are improving thanks to new sensors and satellite missions: new generation of high revisit satellites; hyperspectral; Synthetic Aperture Radar; very high resolution (0.5–1m).

- In brief, the benefits of using RS are:
- > quick and updated overview or detailed mapping: RS data are available in short time;
 - > gaps in time series of *in situ* data: Satellites are always orbiting. RS time series are generally consistent;
 - > remote and difficult to access areas (e.g. wetlands);
 - > areas undergoing rapid changes;
 - > transnational standardisation often difficult with ground networks only: Satellite RS is intrinsically homogeneous;
 - > facilitate exchange of information among various actors (e.g. public administration, NGOs, private sector).





Due to the particular high relevance of water pollution –a fundamental factor also for the other monitoring issues mentioned above– more details are given on the use of remote sensing for that specific monitoring.

The potential for application of remote sensing for water characterisation is relevant to the surface (or near surface) values of the following parameters:

> water temperature (SST).

The surface temperature as measured by space sensors is representative of the water / atmosphere interface. Remotely sensed temperature may be more or less representative of the skin (most frequent case), or the bulk, or the air near the surface, depending on sea wind / roughness and on the spectral band used to perform the observation (infrared or microwave).

> water constituents (optically active constituents):

- >> algae chlorophyllous pigments, namely chlorophyll-a;
- >> coloured dissolved organic matter, known as yellow substance.

It characterises the terrestrial discharge as well as the organic decomposition level in surface waters;

- >> inorganic suspended sediments relevant to land and river discharge as well as re-suspension of sedimented material through hydrodynamic processes.

> optical properties. The water optical properties are fundamental parameters that define the physical characteristics of the water column, with regard to light, in particular:

- >> diffuse attenuation coefficient (K_d), as a measurement of the turbidity of the medium;
- >> volume reflectance;
- >> Secchi depth;
- >> water colour.



Other parameters relevant to water characteristics could be indirectly derived, namely:

- > photic depth which is derived from the diffuse attenuation coefficient K_d ;
- > net organic matter production (daily primary production rate) from measurements of chlorophyll-a;
- > detritus concentration (measurement of such parameters is the fruit of recent research development, it is expressed as a percentage of chlorophyll-a in surface waters).

As for the assessment of sea pollution, current sensors allow the detection of oil slick extent on the sea surface, through microwave sensors.

As a conclusion, in monitoring and protection of coastal areas it has been shown that Satellite Remote Sensing data, integrated with *in situ* data and models in Geographic Information systems, can be a very useful tool for obtaining updated, frequent, homogeneous and accurate monitoring and forecasting data and information. In the near future Satellite RS capabilities will increase thanks to the growing number of satellite constellations and improved performance.

Important actions to be carried out in order to improve the use of Remote Sensing are the setting up of pilot projects with the active participation of the users, the raising of awareness on technology among the users and the decision makers; the training of the experts; the increase in the capacity to handle

such data in a number of Mediterranean Countries.

The Regional Activity Centre for Environment Remote Sensing (ERS/RAC), based in Palermo (Italy), one of the six Regional Activity Centres within the MAP, contributes to the planning processes in the Mediterranean by using advanced techniques.

In particular, its aim is to cooperate with and assist MAP components and Mediterranean countries in improving the monitoring of environmental status and changes through the use of space and advanced technology.

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> SLOVENIA AND CYPRUS: THE CAMP NEW GENERATION

The Mediterranean Action Plan launches the new generation of Coastal Area Management Programme (CAMP), with two projects in Cyprus and Slovenia.

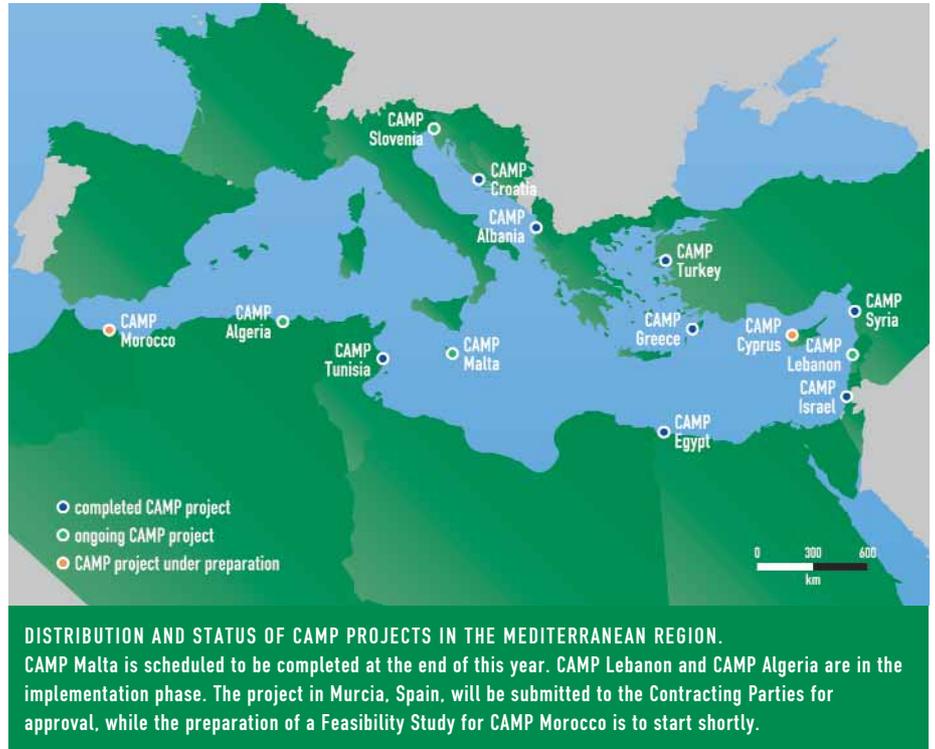
Cyprus and Slovenia are candidate countries for the membership of the European Union (EU), which they are expected to join in 2004. Therefore, the CAMP projects in these countries could have a number of common characteristics, particularly with regard to the compliance to some relevant EU directives, such as the EU Water Framework Directive, the Directive on Strategic Environmental Assessment (SEA) and Recommendations for ICZM.

But at the same time, these new projects will also be in line with the new MAP approach towards CAMP implementation, such as focusing on more strategic issues through the preparation of coastal strategies and visions, or extending the territorial scope of the project towards the entire Mediterranean watersheds of one country, or covering the whole coastal area in a country.

The proposed projects fully comply with the new MAP approach, and therefore present a new generation of CAMPs.

The projects also offer an opportunity for MAP Regional Activities Centres (RACs), especially for Priority Actions Programme (PAP/RAC), to improve their assistance to countries by concentrating resources on MAP priorities, as well as on countries' immediate objectives by complying to the EU regulations in those approaching membership.

In practice this would mean less individual activities within projects, but more concentrated and focused ones. Also, projects should be completed within a shorter timeframe, while



the financial contribution of these countries is expected to be higher than in former projects.

CAMP Cyprus

The major problems and issues affecting the coastal environment in Cyprus exhibit an overriding uniformity due to the small size of the island and the dominance of tourism development (in 1981 nearly 420,000 tourist arrivals, in 1995 more than two million).

The rapid pace of coastal development is the direct outcome of the proximity to the sea. However, the economic and demographic decline of the hinterland areas is indirectly affected by the pull of resources to the coastal areas that offer diverse economic opportunities.

Also, development pressures, implementation constraints and policy issues are common to all coastal areas and underlie the development / environment interactions and the multiple threats to the quality of the coast.

The pressures for the expansion of tourist zones, the loss of agricultural land, the transformation of village settlements into tourist centres, or the local reactions against various levels of coastal protection, are uniform and share a common relationship to the whole policy and institutional framework.

In 1974, 12% of coasts were urbanised, and in 2000, 19%. In the same period the amount of undeveloped coast was reduced from 83% to 40%.

Most importantly, the proposal of the Government of Cyprus for the



CAMP is based on the need to address existing gaps in the policy framework for coastal planning and management, and to explore and introduce tools of Integrated Coastal Area Management with a view to strengthening and harmonising the policy process.

Two main activities are proposed: Integrated Coastal Zone Management, and Tools for Integrated Coastal Zone Management.

CAMP Slovenia

The most pronounced environmental problems in the area are related to incomplete infrastructure of waste water drainage and treatment (in karst communities only 21% of users are connected to the wastewater collection and treatment system); solid waste management (in Ilirska Bistrica, for example, there are still 60 illegal dumps); management of protected areas at the local level; drinking water resources management; land-use planning and development control; marine transport and pollution of coastal waters, and lack of appropriate data bases and of information systems for effective coastal management.

The spatial development pattern of the area thus shows the following distinctive characteristics:

> littoralisation: depopulation and ageing of agricultural hinterland,

- change of traditional and characteristic landscape;
- > decline of traditional town centres;
- > new settlements, new activities in immediate neighbourhoods; urban sprawl in nearby hills around coastal towns and bigger centres, new tourist resorts on the coast;
- > denaturation of the coast: only 20% of the coast is still natural;
- > excessive growth of car traffic, heavy transport infrastructure; and
- > development of the Port of Koper.

The area of South Primorska region (3 coastal and 4 karst municipalities) and the municipality of Ilirska Bistrica are proposed as the CAMP area. The CAMP area corresponds to the Adriatic river basin of Slovenia, thus giving an ideal organisational framework also for the Integrated Coastal Area and River Basin Management (ICARM).



L. MAHER

The Regional Development Agency (RDA) for South Primorska will probably act as the local management unit of the CAMP project. The organisational structure of the agency assures a broad partnership and involvement of all major stakeholders in the area. By appointing the RDA for the local management unit of the CAMP Slovenia project a very important goal – long-term sustainability of the project – could be achieved.

Coastal Area Management Programme (CAMP) was launched in the framework of MAP in 1989, as a continuation of the Country Pilot Projects (CPP) implemented by PAP between 1987 and 1989. The rationale was to harmonise involvement of all MAP components for a better use of the limited resources in accordance with long-term sustainable development principles in respective coastal areas.

Through the implementation of CAMP projects the principles of Integrated Coastal Area Management (ICAM) have been applied in practice. With the exchange of knowledge and experience, work with local and international experts, and integration of activities of all MAP components, the CAMP projects significantly assist the countries in dealing with priority coastal issues, being now a vehicle for sustainable development.

A short list of activities envisages the preparation of Regional Spatial Structure Plan, Tourism Development Strategy, workshop on recreational and nature protection zone, programme for the reduction of non-point pollution sources, establishment of the regional environmental information system, training course on ICAM tools and techniques, and an awareness raising campaign.

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for full details on the two projects:

www.pap-thecoastcentre.org/publications.html

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> CLEANER PRODUCTION AND THE SMEs

In the Mediterranean, the intense industrial activities, which represents 33 % of its economy, coming second only after tourism, generates a high level of pollution.

The challenge of safeguarding the environment while promoting development (a process in which the industry is called upon to play the main role) creates the necessity of setting up a new approach for the management process of all companies and industry in particular, in order to achieve a balance between economic development and conservation. This requires a change aiming at reducing and ultimately eliminating the negative impacts of industrial activity on the environment.

In order to achieve this objective, the issue should be addressed directly at its origin, i.e. to prevent and reduce pollution within the productive process itself. This is what is known as “cleaner production”.

This approach suggests the adoption of new methods that allow the preservation of resources and the substitution of raw materials that are considered harmful to the environment.

The process of cleaner production analyses the so-called cycle of production, proposing methods for its reformulation with the objective of reducing the environmental impact as much as possible throughout the whole cycle: from the extraction of the raw materials to the waste they generate.

The industrial sector has traditionally applied different solutions for reducing the environmental impacts of its activities. These however proved to be insufficient, not to talk about the additional investments they required.

Therefore, the Mediterranean industry must integrate environmental considerations in its productive process by means of alternatives that help minimise the impact of their activities.



While large industrial companies have the necessary resources to invest time and money into modernising their processes based on an economically feasible environmental approach, Small and Medium-sized Enterprises (SMEs), mainly in the industrial sector, face greater difficulties in having a share in new markets that demand environmental excellence as a sign of competitiveness.

The lack of financial and technical resources needed to invest in new management techniques and the often weak support provided by the central administration are the major obstacles for an environmentally sound process of modernisation.

In many cases, this process does not require great investments. A revision of the productive process allows

to identify opportunities for preventing and reducing pollution at the source in a short period of time.

In this task, the exchange of information and experience is fundamental so that small and medium-sized industries can identify those initiatives successfully carried out by other companies for the integration of environment in its own business management.

The Mediterranean Action Plan (MAP) assists countries in promoting a modern industry based on environmentally sustainable criteria, through a Regional Centre for Cleaner Production (CP/RAC) that works for the promotion of pollution prevention at the source.

The centre spreads options and techniques of prevention and cooperates with the countries through their Institutions in order to transmit to the industrial sector, a set of strategies of environmental and business management, either directly or through public or private intermediaries.

The dissemination of news on practical cases and studies on cleaner production and its implementation in industries are, along with capacity building, some of the tasks through which CP/RAC contributes to promoting this new parameter of modernisation in Mediterranean SMEs to help them conciliate environment with development.

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> A SELECTION OF PUBLICATIONS

for other publications, please check MAP's and RACs' websites

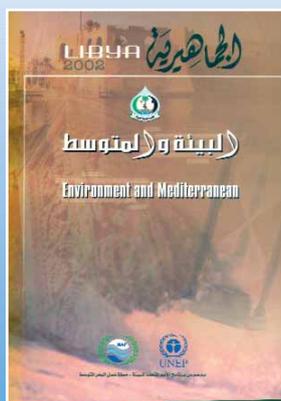


> NATIONAL MIRRORS: Environment and sustainable development in MAP countries

> Croatia



> Libya



> Morocco



> Turkey



Croatia, Libya, Morocco, and Turkey, have presented their latest state of the environment and sustainable development, in the form of national publications, following a MAP initiative. With these, the number of MAP countries that have up to now implemented the initiative, amount to twelve. Albania, Bosnia and Herzegovina, Egypt, Greece, Lebanon, Malta, Slovenia and Syria have already launched their respective publications (see MedWaves 45).

These national publications intend to act as a mirror, reflecting the rather complex however interesting mosaic of relations between environment and sustainable development

in each concerned country. They are addressed to all actors in all areas and at all levels, and also represent a further step towards the implementation of those activities geared at promoting wide public awareness at the national and local levels, this being as well among the major activities boosted by the Mediterranean Commission on Sustainable Development in the field of information and public awareness.

All national publications have been printed in the respective national language, in addition to English and, in some cases, also French.

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{ CALENDAR OF MAIN MEETINGS 2003 }



| | | |
|--------------------------------|--------------------|--------------------------------------------------------------------------------------------------------------|
| 12–14 February | Malta | 6th Meeting of REMPEC's Focal Points |
| 13–15 March tentative | Barcelona, Spain | MCSD Experts' Meeting on "Orientations" and Preparation for a Mediterranean Sustainable Development Strategy |
| 7–9 May tentative | Croatia | 8th Meeting of the MCSD |
| 27–30 May | Italy | Meeting of MED POL National Coordinators |
| End of May | Dubrovnik, Croatia | Meeting of Joint National Focal Points of BP/RAC, PAP/RAC, ERS/RAC |
| 15–18 September | Athens | Meeting of MAP National Focal Points |
| 27–30 November or 2–5 December | Catania, Italy | 13th Ordinary Meeting of the Contracting Parties to the Barcelona Convention |



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