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THE "RED TIDES" IN THE MEDITERRANEAN

Held in the framework of the MED POL Programme, the Bologna (2-6 March 1987) and Athens (4-6 April 1989) meetings have shed new light on eutrophication and its manifestations in the Mediterranean.

On 9 May 1988, an aquaculturist of the Gullmar Fjord, 100 kilometers North of Göteborg in Sweden, discovers that the trout in his hatcheries are suffering from a form of anoxia which leads to a massive death of the fish a few days later. Within a week the phenomenon spreads to the North and affects the Norwegian coast. It is not a new phenomenon in the North Sea or in the Baltic. But this time it spreads over much larger areas. Scientists quickly diagnose the problem: a rather unknown algal organism, *chrysochromulina polylepis* multiplies so fast that the infected waters may contain up to twenty million organisms per litre. The evolution of the phenomenon can be followed by remote sensing. The mass media bring the phenomenon to everybody's attention, the "killer algae" make headlines. However, for scientists, this is but a manifestation of a phenomenon called "eutrophication", a word made up of "eu" meaning "well" and "trophe" meaning "nourishment". Eutrophication then is the phenomenon whereby there is an excessive input of nutrients in the water, as a result of discharges due to human activities which gives rise to phytoplancton development and leads to anoxia (or lack of oxygen) to the detriment of other marine species and ecosystem balance. The scientific explanation of the phenomenon remains a matter of controversy as concerns many of its aspects. Many physical, chemical and biological factors are at play and influence one another, and the theories proposed to explain the sequence of events differ considerably from one author to the next. On the other hand, the "visible" effects of eutrophication cannot be disputed. Even if certain marine regions like the Baltic Sea are more frequently affected, the Mediterranean coasts are not spared altogether. For about 10 years now, researchers from the Coastal States have been studying the areas most affected. Eutrophication is one of the objectives of the Monitoring and Research Programme MED

POL II (1981-1990). Activity "H" consists in carrying out "research on eutrophication and concomitant plancton blooms and the need to evaluate the possibility to lessen the impact and damage caused by the repeated blooms". It is within the framework of this MED POL activity that the UNESCO / FAO / UNEP Scientific Workshop "Eutrophication in the Mediterranean Sea: receiving capacity and monitoring of long term effects" was organized. Another meeting was recently convened at Athens between the fourth and the sixth of April 1989. The knowledge acquired to date allows us to form a general picture of eutrophication for the whole Mediterranean Basin.

From the lakes to the seas, a developing phenomenon

About 20 years ago, specialists considered eutrophication a problem of fresh water lakes (or a limnological problem) which appeared first as a slow ageing of the waters and then, eventually, as excessive fertilization caused by anthropogenic activities, through the accumulation in high temperatures of rotting organic matter in the stagnant waters which led to anoxia in the deep water layers due to algal proliferation. Soon assessment and control methods were developed for this process. For any given lake it is possible today to establish and implement a corrective programme depending on the level of eutrophication which is assessed on the basis of concentrations, inputs and the time that nutrients remain in the lake. For the sea, the phenomenon was diagnosed a lot later, and at first scientists considered excess inputs of nutrients as a positive phenomenon which would lead to an increase in the productivity of living resources.

Is eutrophication a form of pollution?

The eutrophication problem is firstly a theoretical problem. It is in effect difficult to determine at which qualitative and quantitative level of nutrients the waters can be classified as eutrophic. In addition, eutrophication is in the beginning a natural phenomenon which occurs under normal conditions under the effect of various factors, such as upwelling or inputs from non-polluted water courses. Anthropogenic or cultural eutrophication refers to the same process but is a consequence of pollution by sewage or industrial effluents, of chemical fertilizers which enter the marine environment with the run-off and of a polluted atmosphere. The only difference between those two types of eutrophication is chronological: natural eutrophication is a slow process which allows the ecosystems to adjust to the new trophic conditions, whereas one of the characteristics of man-made eutrophication is the occurrence in the marine environment of sudden changes (within a period of 10 years or less); this brings about an ecosystem imbalance which is not compensated, an altered environment and possible damage to the living resources.

Thus, the concept even of eutrophication lends itself to various interpretations: and it reflects also the different definitions given for pollution. According to the GESAMP definition, accepted by the Mediterranean Action Plan, it is "the introduction by man, directly or indirectly of substances or energy into the marine environments (including estuaries) resulting in such deleterious effects as cause harm to living resources, hazards to human health, hindrance to marine activities including fishing, impairment of quality for use of seawater and reduction of amenities". From this broad definition, it appears that eutrophication is not a form of pollution but a consequence of man-made pollution. Such pollution is the discharge of any substance which promotes plancton blooms and it therefore requires taking measures for the evaluation, prevention and combating of this type of pollution.

"Red tides in the Mediterranean"

The concept of eutrophication was introduced in 1917 in limnology, but the "red tides" which are its visible manifestation have been known since antiquity (see Box); they have a seasonal character, are localized and generally brief occurrences lasting several hours or days or rarely even a few weeks. Already in the 19th century, scientists mentioned occasional red tides in their writings. Red tides became more systematic after World War II with progressing industrialization, especially in the Baltic Sea. However, in the Mediterranean, it is the Adriatic that first attracted attention. Since 1975, eutrophication has become regular in the coastal waters of Emilia-Romagna. There is generally a Diatom proliferation (Diatoms being brown unicellular algae) at the end of winter in the coastal and offshore waters which lasts till summer. The proliferations of Dinoflagellates (another type of unicellular algae) peak between August and October and occur mostly in the coastal waters. A number of signs have been identified according to which the nutrients carried down by the Po River cause a generalized enrichment of coastal waters and a rapid increase of Diatoms and Dinoflagellates. The first impressive phenomenon occurred on 7 Sep. 1975 when thousands of tons of dead benthic fish and mollusks were collected in the coastal area near Ravenna after a very impressive algae proliferation. The phenomenon has been repeated several times since and causes problems for fishing and tourism (40 million tourist days for the 100 kilometre Adriatic coast between the 15th of June and the 15th of September). Naturally, the presence of summer tourists aggravates the problem because of the increase of urban wastes discharged into the sea. As is often the case in ecology, the impact of the demographic boom and the impact of the industrial boom are cumulative. At the same time it was observed that plancton blooms frequently occurred after heavy rains which increase fresh water inputs and near the Po River mouth; the Po as the largest river in Italy carries into the marine environment increased loads of phosphates and nitrates which are the nutrients most favourable to algal development.

*The unicellular alga **Dinophysis** which was discussed at length at the Athens meeting on eutrophication (April 1989). The **Dinophysis** blooms appeared in 1983 in the Atlantic and reached the Mediterranean (Gulf of Lion) in 1985. We see clearly a trend for a west to east movement; there is high toxicity affecting mussel cultures with resulting digestive problems if contaminated mussels are consumed by man.*

(Photograph IFREMER, Nantes, France)

In the Western Mediterranean, it is the Gulf of Lion on the Mediterranean Coast of France which has been studied most thoroughly. Here the same correlation between enrichment of the waters and algal blooms has been established. Here, the river in question is the Rhone where it has been determined that the content in nitrates and phosphates is 8-10 times and 3-10 times respectively higher that in the deep waters of the Mediterranean. These nutrient salts give rise to considerable eutrophication in part of the waters of the Gulf of Lion which along with the desalination (through the discharge of fresh water) brings about the development of a planctonic system which is not structured, not diversified and immature.

In the Eastern Mediterranean, phytoplancton blooms are rare because of the small inputs of nutrients (in this case the marine environment is called "oligotrophic"). Eutrophication phenomena only occur when a very localized enrichment of the waters takes place because of sewage outfalls. In Greece for example, the Saronikos Gulf receives sewage from the urban areas of Athens and Piraeus where more than a third of the Greek population lives. Studies covering the whole Gulf, parts of which are enclosed like Eleusis Bay and favour the eutrophication process, have shown a direct correlation between nitrogen concentrations and Dinoflagellate occurrences. It has also been established that the appearance of "red tides" tended to coincide with the mass mortality of fish.

"And all the waters that were in the river were turned to blood. And the fish that was in the river died. And the river stank. And the Egyptians could not drink the water of the river".

(Exodus, 7, 20-22 passim)

As is clearly seen from these two verses from the Bible, the Egyptians knew in antiquity the occurrence of toxic red tides. Cook and Vancouver, during their expedition to the NW coast of the Pacific, were the first to note the presence of such substances toxic for man; in their description of the voyage they deplored the fact that some of their men fell ill and died after eating poisoned mussels.

However it was Darwin in 1832 who, during his voyage on the "Beagle", first observed the occurrence of algal blooms which sound like blooms of toxic dinoflagellates. And it wasn't until the end of the 19th century that the origin of these "red tides" was truly attributed to an explosive multiplication of certain marine micro-organisms.

(Taken from M. and J. Aubert: paper presented to the Bologna Workshop on Eutrophication, March 1987).

Eutrophication effects: from the colour of the sea to collective intoxication

In addition to the harmful consequences for the many different marine habitats, there are in the Mediterranean many other effects which have a negative impact on the beneficial uses of the environment. There is a reduction of the recreational, aesthetic and tourist value of coastal waters due to changes in their transparency and colour, loss of fishing income due to mass mortality of demersal fish, the reduced or collapsed recruitment of estuarine and lagoon fish, hindrance of aquaculture and/or impairment of the quality of seafood. We should also note the pathological manifestations in the coastal communities which consume shellfish contaminated by the "red tides" or suffering from collective intoxication by the aerosols originating in the polluted waters. Certain planctonic organisms involved in blooms release specific toxins which have been studied and identified. In certain cases affected populations suffer for a period of several days from asthma-like respiratory problems, fever, arthralgias and skin rashes.

Combating eutrophication

Since it has become apparent that in certain coastal Mediterranean areas the inputs of eutrophying substances (especially phosphates and nitrates) exceed the receiving capacity of the marine environment, combating eutrophication would be integrated within the more general framework of combating pollution from land-based sources with measures such as treatment of urban sewage and industrial effluents, outfalls that allow diffusion of wastewater far from the coast and at sufficient depths, control of the chemical fertilizer loads carried by the run-off etc. This combating strategy should be supported and completed - as the Bologna and Athens meetings recommended - by a research component which

would gradually clarify the various aspects of the eutrophication process; the main axes would be the following:

- Studies on the factors controlling eutrophication processes;
- Studies on the structure and function of eutrophic ecosystems and the relevant hydrodynamics;
- Classification of the stages and degrees of eutrophication;
- Finally, investigation of the recovery procedure in ecosystems that have been modified due to anoxia and mortalities induced by competitive blooms of certain species of unicellular algae.

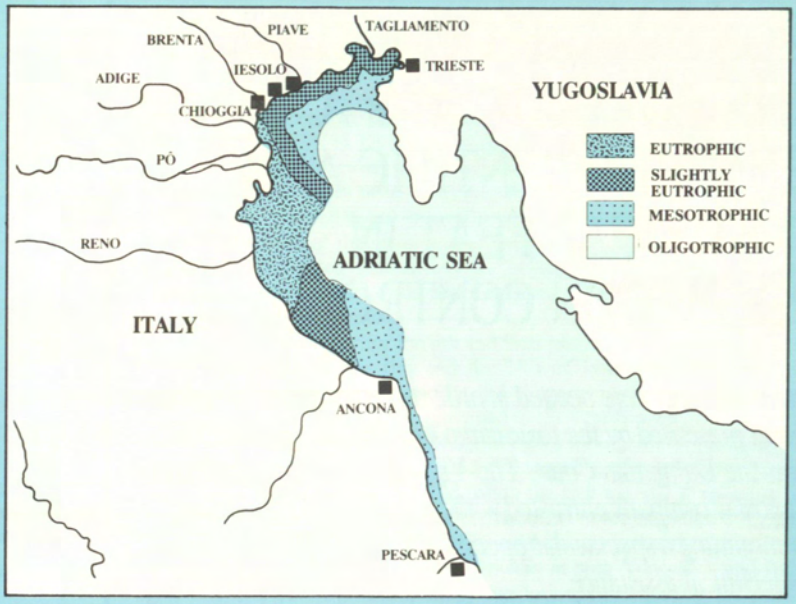
It is obvious that research and a better understanding of the eutrophication process will have an impact on prevention and regulatory measures which are necessary in order to limit as much as possible the negative effects of red tides. This aspect of pollution control is one of the newest research fields and thus one of the most exciting. For instance, according to one of the scientists who participated in the Bologna meeting, certain algal blooms may be stimulated by organic compounds of bacterial origin (vitamin B_{12}, phytohormones) and impeded by bioinhibitors: if the latter are identified they can be synthesized, produced by industry and used in shellfish-growing areas to stem the negative impact of eutrophication.

EXTRACTS FROM THE RECOMMENDATIONS OF THE ATHENS MEETING, 4-6 April 1989

- In any event, all discharges, direct or indirect through water courses should be prohibited in enclosed or semi-enclosed areas of a limited surface, where the self-cleaning capacity is saturated.

Furthermore, in areas where episodes of eutrophication and plankton blooms are regular events it was suggested to reduce local input of nutrients by at least 50 percent.

- Taking into consideration that certain, factors are recognized as possibly facilitating the development of phytoplanctonic disturbances, the Meeting recommended, wherever possible, the promotion of all measures which would prevent or correct density stratification of the environment and which would lessen the confinement of the waters.
- The cooperation among projects studying eutrophication and plankton blooms should be enhanced by exchange of information and regular meetings of experts especially in concomitance with exceptional phenomena in order to identify possible causes and environmental conditions.
- Considering that the problem of eutrophication and plankton blooms is already a serious and complex problem in the Mediterranean and that it is expected to worsen in the next years, the meeting recommended the establishment of a working group of specifically competent ecologists and occanographers from the Mediterranean region.



Schematic representation of trophic conditions in the coastal area of NW Adriatic. It can be seen that the region richest in nutrients corresponds with the Delta of the Po and the rivermouths of the Adige (the longest river in Italy after the Po), the Brenta and the Reno. The Po carries the greatest nutrient loads; it has a length of 652 km and drains an area of over 70,000 km². The delta starts 100 km upstream from the coast and after the river has already received the waters of several tributaries from the Alps and the Ligurian and Tuscan Apennines. The Po plain is where half the Italian cities with a population of over 100,000 are built. Under particular local conditions and in the vicinity of the coast, the eutrophic conditions give rise to plancton blooms. In addition, the low salinity of the polluted waters from the Po and other rivers brings about seawater stratification with the high nutrient contents in the surface layers. The seasonal development of various algal species, mainly diatoms and dinoflagellates is now a phenomenon repeated every year for short periods of time but affecting the enjoyment and aesthetic value of several tourist resorts along the coast. The large-scale effort to clean-up the Po which is continuing should in the near future reduce the loads of nutrients due mainly to urban sewage and industrial effluents dumped into the river. In the summer, the network of outfalls of the various bathing resorts adds to the loads; thus waste treatment plants will gradually have to be built. Similar problems are starting to appear on the opposite (Yugoslav) coast of the Adriatic. In May, on the 23rd and 24th a meeting on the state of health of the Adriatic will be held at Urbino, Italy, within the framework of a bilateral agreement concluded between the two countries. However "red tides" are not limited to that particular area of the Mediterranean. The phenomenon also occurs in certain sites of the Spanish coast, in the Gulf of Lion in France (near the Rhone delta, a river which also drains a heavy load of nutrient salts) and near the outfalls of the large urban centres of the Eastern Mediterranean (Athens-Piraeus in Greece, Istanbul in Turkey). Thus, combating pollution at a regional scale to reduce inputs from land-based sources will also lead to an improvement of trophic conditions and a containment of plancton blooms.

(Figure adapted from Marchetti et al., 1985 taken from MAP Technical Reports Series, No. 21 "Eutrophication in the Mediterranean Sea: receiving capacity and monitoring of long-term effects". This volume contains the Proceedings and Papers presented at the Bologna Meeting of 1987).

* ***Eutrophic*** conditions: waters very rich in nutrients; ***Mesotrophic*** conditions: waters moderately rich in nutrients; ***Oligotrophic*** conditions: waters poor in nutrients.

"THE BRIGITTA MONTANARI" OPERATION IN THE ADRIATIC SEA: A HUMAN, SCIENTIFIC AND TECHNICAL FEAT IN POLLUTION CONTROL

Almost 4 years were needed in order to remove the ecological threat presented by the toxic cargo of a ship that ran aground near the Dalmatian Coast. The Yugoslav authorities and the Yugoslav company entrusted with the task met a big challenge by mounting a spectacular operation to which UNEP offered its technical assistance.

To the long list of devastating "black tides", the beginning of 1989 added two new marine accidents, the loss of a lindane container in the Channel and massive dumping of hydrocarbons on the Arctic coast of Alaska - a region with a critical importance for the world ecosystem. However, there are also - if one may use the term - "happy accidents", where through rational and efficacious management the possible catastrophic impact on the relevant regions is avoided on time. In this connection, the story of the "Brigitta Montanari" refloating operation in the Adriatic Sea is a good example, both in terms of the result through the technical solution adopted and the careful planning that went into it. It was in the field of control of marine pollution a lesson which will be precious for the future.

An ecological time-bomb at a depth of 80 m

On 16 Nov. 1984, the Italian tanker "Brigitta Montanari", 70 m in length, ran aground off the Dalmatian Coast a few nautical miles from the port of Sibenik. It carried a load of 1300 tons of VCM (vinyl chloride monomer) a chemical used in the production of plastics. It is obvious what threat this load presented for the environment. VCM has low acute toxicity for the short-term, but its long-term effects are very serious, mainly carcinogenic. Furthermore, it is a very unstable product, in gaseous or liquid form, and if it comes into contact with the air it forms explosive mixtures. Thus the idea that the wreck can be left as is, is immediately abandoned. However the two factors mentioned above - low immediate risk, "ecological time-bomb" - give the Croatian authorities enough time to study carefully the state of the wreck, the condition of the local ecosystem, to gather information on the nature of the toxic substance involved and its behaviour, then in the light of this assessment to adopt the optimal solution. However, as time goes by, the problem will prove very complex and become even more intractable through unforeseen circumstances. No less than three and a half years will be needed in order to complete the operation successfully.

A wreck difficult to handle

The whole operation is entrusted by the Croatian authorities to the BRODOSPAS Company, headquartered at Split, which has a large experience in this area. The initial idea is to refloat the ship along with its cargo. The first attempt to control the wreck takes place in September 1985. A tragedy occurs. Two divers die because of equipment failure. This accident has nothing to do with the cargo, but it leads to long delays to allow the teams of divers to train for work in deep waters and develop adequate equipment. Indeed, the wreck is at a depth of 80 m, which implies very difficult work in often unfavourable climatic conditions as well as bell dives. During this preparation period, the BRODOSPAS experts examine all possible solutions and plan the operation. However, in August 1987 the presence of VCM is detected in the water and the air around the wreck. This is a sign that there is a leakage, even if minimal in the beginning, which raises questions as to the fragility of the wreck. The idea to refloat the ship is abandoned for the moment, especially since the latter is lying on its side and since the refloating operations might produce a massive outflow of the cargo with consequences for the divers which would be hard to predict. To identify the area of the leakage the divers go down repeatedly (for a total of 20 hours). After a careful examination of the ship's structure, it appears that VCM has filled the area between the tanks and the shell plating. We are talking about hundreds of tons of the chemical. The threat of direct contamination becomes clear, action must be taken as soon as possible. The pocket of "free" VCM is conveyed up to the surface of the sea through a system of pipes and burned under control or (a small part) dispersed in the air.

Fig. 1 Lifting of the "Brigitta Montanari" from 80m to 55m by means of
on 8 Ma

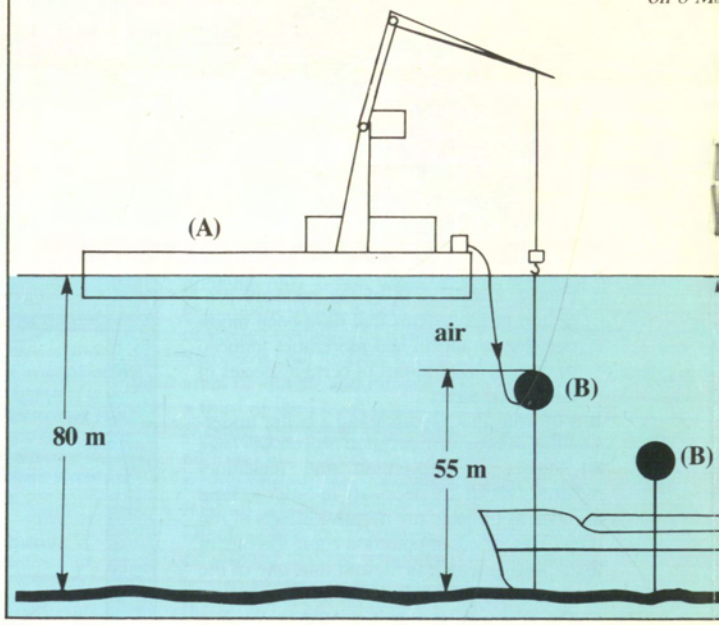
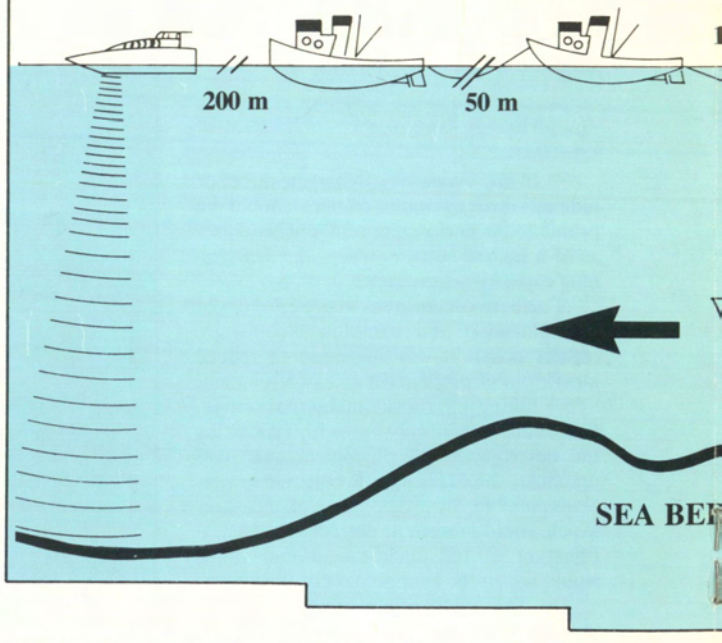
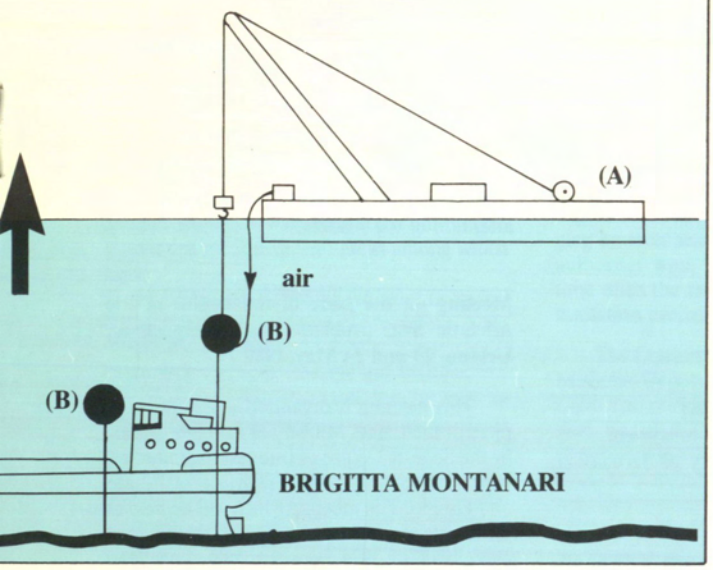


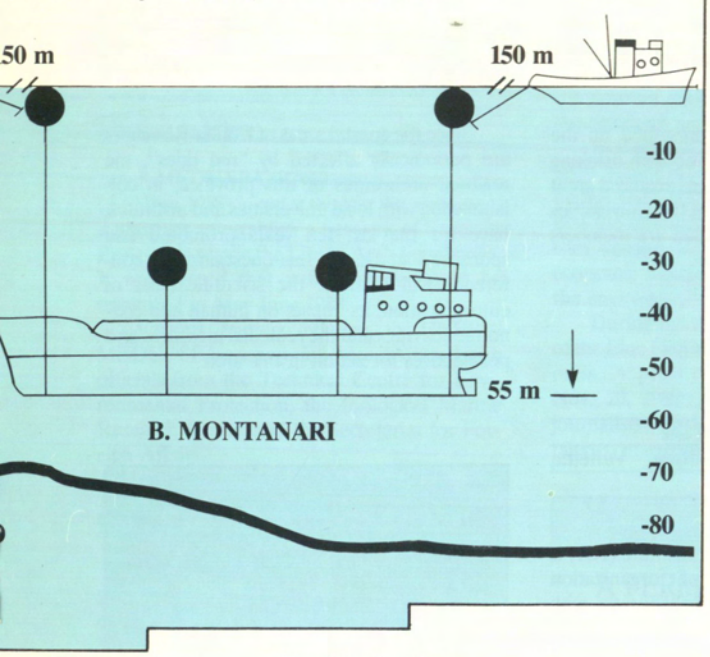
Fig. 2 The "Brigitta Montanari", having been lifted to a depth of 55m, is to
The buoyancy cylinders reduce the weight of the sh



floating cranes (A) and buoyancy cylinders (B). Operation carried out ay 1988.



owed underwater toward the island of Kaprije with its toxic load of VCM. hip (A). Second part of the operation of 8 May 1988.



A variety of options

These problems that cropped up made the BRODOSPAS experts carefully rethink the various options about what to do with the cargo. One could encase it into concrete, a low-cost and practical solution which however would mean passing the problem along to a future generation. One could think of the polymerization of the VCM contained in the tanks by introducing an initiator. This would give an inert product, but would the walls of the tanks be strong enough to contain the chemical reaction? What about the explosive cracking of the tanks? It would bring about the release of the toxic substance in the sea with however the concurrent formation of a cloud at the mercy of the winds. Too risky for public health. Finally it is decided to proceed with a "partial refloating" which would give maximum security while allowing the recovery of the remaining quantity of VCM. Two experts sent to the site by UNEP give their full support to this original solution.

A spectacular operation

The operation will be completed in 8 months divided into 4 phases. First, the ship is straightened onto the keel by means of two buoyancy cylinders. It is thus in the proper position for the actual lifting. Because of the onset of winter and bad weather, a new delay becomes necessary. Second phase, 8 May 1988. Thanks to a technique especially developed by BRODOSPAS, which involves two floating cranes and 4 buoyancy cylinders (to reduce the weight of shell plating), the "Brigitta Montanari" is lifted from 80 m to a depth of 55 m (Fig. 1). On the same day the third phase of the operation is carried out; it is the most spectacular: the wreck is pulled horizontally while remaining at the depth of 55 m, as if one pulled a submarine (Fig. 2). It is brought to a sheltered bay of the nearby island Kaprije, then lifted to a depth of 30 m. Because of the calm sea the wreck is now more accessible. Why wasn't the ship lifted immediately to the surface? Because a sufficient hydrostatic pressure had to be maintained in order to avoid any possible leakage during the operation.

Everything is now ready for the 4th and final phase of the operation which takes place between the 11th and the 14th of June 1988. The VCM is transferred to another Italian tanker, the "Cape Verde". In this way all 700 tons of the chemical which had remained in the 4 tanks could be recovered safely. The unfortunate odyssey of the "Brigitta Montanari" is finished, the ship can finally be completely floated and tugged to the scrapyard. At the time of the largest leakage of VCM (when the ship was still stranded at an 80 m depth), the concentration of the chemical never exceeded 5 mg per litre in a 300 m radius. One can therefore safely conclude that the toxic effects of the spill were negligible. The mass media in both Yugoslavia and Italy give extensive coverage to this happy conclusion; consequently, the populations concerned feel free from the environmental, financial (especially from tourism) and public health repercussions that might have had the prolonged presence of the wreck with its cargo. A new environmental success is accomplished, through often heroic efforts (divers going down 200 times in very hard conditions) and through the mobilization of 150 BRODOSPAS staff, the Yugoslav Navy, the INA oil company and the Zagreb Institute Rudjer Boskovic.

Precious scientific lessons learned

The area where the ship ran aground was close not only to the Dalmatian Coast, which is a well-known touristic area, but to the Kornati National Park and Natural Reserve as well. In addition, there are a lot of little islands, part of the Dalmatian Archipelago. As soon as the accident became known, mechanisms were set up in order to monitor VCM rates including the installation of an ecological laboratory on the island of Kaprije. It should be pointed out that it was the first time that such a cargo had been dumped in coastal waters. VCM is the object of a very intensive maritime traffic which exceeds 20 million tons a year. The bibliography on the product is rather scant however. Thus, the accident involving the "Brigitta" (in addition to the technical feat of the refloating operation itself) made possible a better understanding of the fate and behaviour of VCM in the marine environment through periodic sampling, especially during leakage. A mathematical model was constructed in order to study dispersion and dissolution phenomena and carry out calibration with the real situation. The concentration fields obtained will form the basis for prevention measures and for the identification of the area which should be closed to maritime traffic and fishing if such accidents should occur in the future. On the whole the data collected to date confirmed the hypothesis that this chemical does not produce acute toxic effects. The study of sublethal effects is still on-going and one cannot at this point draw any conclusions.

We see therefore how, in addition to the development of refloating techniques, this accident has led to a more in-depth study of a contaminant which is not so well known from an environmental point of view. The monitoring will be useful for updating the regulatory or legislative recommendations concerning maritime transport of VCM, its storage and the emergency measures to be taken in critical situations. The Yugoslav authorities acted in full respect of their obligations under the London and Barcelona Conventions. During the eleventh Consultative Meeting of Contracting Parties to the London Convention on the prevention of marine pollution by dumping, the Yugoslav delegation made a detailed presentation of the "Brigitta Montanari" rescue operation and communicated the first scientific results mentioned above. They speak for themselves. The interest of the scientific community and the appreciation of ecologists were commensurate with the effort exerted.

As time goes by, an ever increasing number of seminars, conferences and meetings on environmental matters is being organized by governmental or non-governmental institutions in the Mediterranean countries. This is especially the case for 1989, as can be seen by the activities listed below. All these activities will promote environmental protection.

Libyan Arab Jamahariya:

International Seminar on combating pollution and the preservation of the health of the Mediterranean Sea, Ras-Lanuf, Gulf of Sirte, 5-8 June 1989

This seminar is a contribution of the Libyan authorities to the protection of the Mediterranean basin. It is sponsored by the People's Committee for Marine Health and jointly organized by the Marine Biology Research Centre and the Technical Centre for Environmental Protection. Among the topics to be discussed are the following:

- Physico-chemical characteristics of the Mediterranean Sea (current systems, water masses, spatial and temporal variations in temperature and salinity etc.);
- Living resources (fisheries, fish stocks, biological qualitative and quantitative studies, aquaculture, endangered species);
- Sources of pollution;
- Environmental legislation;
- Prospective studies of the Mediterranean Sea.

The official languages of the Seminar will be Arabic and English with simultaneous interpretation. Arrangements are being made to host the MED POL exhibit at Ras-Lanuf at that time.

Turkey:

Conference: The Mediterranean in the 90s. Antalya, 23-26 October, 1989.

The Environmental Problems Foundation of Turkey (EPFT), Ankara, is organizing this conference to which representatives of the Mediterranean countries and of governmental / non-governmental organizations of the region are being invited. The Conference will be a forum to discuss ideas and formulate plans for the future management of the Mediterranean basin. The plans could be implemented within the framework of a possible extension of the Mediterranean Action Plan. The conclusions of the conference could be submitted to the Secretariat as recommendations for the improvement of the Mediterranean Action Plan as well as for the promotion of its implementation and extension. Among the topics to be discussed, the pollution of the North Sea and its impact on the Sea of Marmara will be especially highlighted in order to gain a better understanding of the state of these two closed seas, "annexes" in a certain way of the Mediterranean, the latter through the Strait of the Dardanelles. MAP supports the conference and will be officially represented; in addition the EPFT will receive financial support from the Japan Shipbuilding Industry Foundation. This shows, for the first time, the interest of Japanese investors in the Mediterranean region and its problems.

Israel:

4th International Conference: Environmental quality and ecosystem stability, Hebrew University of Jerusalem, 4-8 June, 1989

This conference, organized under the auspices of the Israeli Society of Sciences relative to ecology and environmental quality, will cover, as is apparent from its title, a wide range of environmental topics such as:

- Eastern Mediterranean: characteristics and threats;
- Stress factors for ecosystem stability;
- Combating marine pollution, treatment and re-use of effluents;
- Algal ecology

Finally, papers will be presented on the treatment of surface waters to obtain drinking water, a field in which Israel has acquired great experience. Representatives of the Universities of Tel-Aviv, Haifa and Bar Ilan are members of the Organizing Committee.

Malta:

Regional Training course of the International Ocean Institute, Valletta, Malta, 2-8 December, 1989

The International Ocean Institute (IOI) is a non-governmental, non-profit organization based in Valletta, Malta. It collaborates with the Foundation for International Studies of the Government of Malta and with the University of Chicago (U.S.A.), Dalhousie University in Halifax (Canada) and the University of Hawaii.

It has organized a series of courses on problems of the Oceans for officials of the developing countries and will devote a training Programme on the Mediterranean and especially the implementation requirements of international regimes, in particular: the Convention on the Law of the Sea, the Barcelona Convention and MAP, the General Council of the Mediterranean. Part of the Programme will be devoted to a simulation exercise designed to assess problem management techniques and international cooperation.

Italy:

Since this issue of MEDWAVES is devoted to the problem of eutrophication, it must be pointed out that Italy, which is affected by this phenomenon on its Adriatic coast, has for a long time played an important role in this field. Two activities must be brought to the attention of the readers:

Meeting on the state of the health of the Adriatic Sea, problems and perspectives, Urbino, 23 and 24 May, 1989

This meeting is organized under the auspices of the Italian Ministry of Foreign Affairs, by the Sogesta Centre of International Studies, headquartered at Urbino, province of Pesaro and Urbino. The meeting which will be held at Urbino will fulfil a requirement of the bilateral agreement of 1974 between Yugoslavia and Italy to organize an international conference. It will discuss all the problems of the Adriatic Sea concerning eutrophication, phytoplancton, zooplancton and benthos.

International Conference: Marine Coastal Eutrophication, Bologna, Italy, 21-24 March , 1990

Since the coastal areas of Emilia-Romagna are periodically affected by "red tides", the regional authorities of this province, in collaboration with local universities and institutes, have for the last ten years promoted and sponsored studies on this question. The conference will examine the scientific basis of eutrophication, its impact on human and economic activities and the remedial measures and perspectives for action in this area.

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If you would like to propose an article on a subject related to marine science, please address it to: Gérard Pierrat, Editor. MEDWAVES, Co-ordinating Unit of the Mediterranean Action Plan, 48 Vas. Konstantinou Ave., 116 35 Athens Greece. Tel. (00301) 7236.586, Telex 222 611 MEDU-GR.

MEETINGS HELD RECENTLY

FAO/UNEP/IAEA/WHO Review Meeting on the organophosphorus pilot survey, Barcelona, Spain, 24-26 January 1989

The meeting was organized to review the results of the pilot survey on organophosphorus compounds which was undertaken during 1988 in selected Mediterranean areas among which were:

a) the Ebro and Llobregat estuaries in Spain,
b) the river Po mouth and the Northern Adriatic coast of Italy,
c) the Nile Delta in Rosetta and Edffina.

Organophosphorus pesticides as well as non-pesticide organophosphorus compounds were detected in the Po and Ebro mouths. It was the first time that tris (2-chloroethyl) phosphate (TCEP) was unequivocally detected in Spanish rivers indicating its rise in the monitored area. Also tris-chloro-isopropylphosphate (TCPP) was detected for the first time in Italian surface water.

Organophosphorus pesticides were found in fish samples from the Ebro but not in mussels from Spain and Italy.

The Group recommended the continuation of the survey in other areas and for other organophosphorus compounds using very selective and sensitive analytical procedures.

Mission to Libya

A MEDU SPA/RAC mission visited Libya (4-10 Dec. 1988) in order to assist the competent authorities to establish a network of Specially Protected areas in the Libyan Arab Jamahariya. It was agreed that a field study would be organized in May-June 1989.

Various matters relating to UNEP / MEDU / SPA cooperation were discussed with officials from the Technical Centre for Environmental Protection, the Biological Marine Research Centre and the Secretariat for Foreign Affairs.

Carthage (Tunisia): The new list of 50 sites

In accordance with one of the objectives stipulated in the Genoa Declaration to the effect that during the Second decade of the Mediterranean Action Plan (1985-1995), at least 50 new marine/coastal sites or reserves of Mediterranean interest should be identified and protected, three meetings of experts from the Mediterranean Coastal States were convened during 1988 in Arles (France), Paphos (Cyprus) and Carthage (Tunisia) in order to promote the implementation of this goal.

During the last meeting, held at Carthage (Tunisia) in Sept. 1988, the group of experts agreed on a list of 55 sites proposed for protection. The new list will be submitted for examination and approval to the meeting of the Contracting Parties to the Barcelona Convention (Athens, 3-6 Oct. 1989).

Cairo (Egypt): the Aspen Institute Italia Conference on the Mediterranean

The 4th International Conference on the Mediterranean was organized by the Aspen Institute Italia and the Egyptian authorities in Cairo (21-23 Nov. 1988) on the theme "Mediterranean Crossroads at World Level: Managing environmental problems". The Egyptian authorites were hosting the conference at a time when the capital city is establishing a vast sanitation project.

The Conference was co-chaired by Mr. De Michelis, Deputy Prime Minister of Italy and Chairman of Aspen Institute Italia, and by Mr. Atef Ebeid, Minister of Cabinet Affairs and Administrative Development in charge of Environment of Egypt. The Conference was attended by sixty participants, including the Minister of Environment of Italy, the Ministry of Agriculture and Natural Resources of Cyprus, former Ministers of France (Messrs Jobert and Pisani), heads of industry, experts and journalists.

UNEP was represented by Mr. Aldo Manos, Coordinator of the Mediterranean Action Plan. At the end of the Conference, a press release was issued by Aspen. It stressed that the theme of Mediterranean environment protection was the unifying argument for a constructive dialogue between the North and the South of the Mediterranean.

In the spirit of the "Mediterranean Manifesto" which called for the creation of regional bodies, the Conference also expressed the wish that the governments of Mediterranean countries become aware of the need to promote economic development which would respect the environment.

During the Aspen Conference, the results of the Blue Plan were presented to the Egyptian press. A press conference was convened on Nov. 20, 1988; it was attended by over 20 journalists representing various Arab newspapers, magazines, radio and TV.

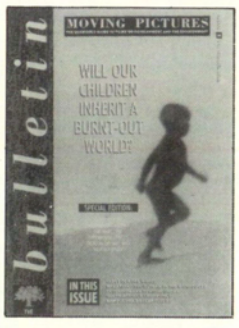
THE MAP CALENDAR OF MEETINGS

APRIL - JUNE

Second Inter-agency (IAEA/UNEP/WHO) Workshop on the Assessment and Management of Risk	17-21 April Athens Greece
Meeting of GESAMP (Joint Group of experts on scientific aspects of marine pollution)	8-12 May Athens Greece
Workshop on Combating Pollution of Mediterranean Sea by Harmful Substances	22-26 May Malta
Workshop on exchange of experience and methodology for environment/development prospective studies	22-26 May Sophia - Antipolis France
Workshop on Environmental Planning and Management of Mediterranean Tourism	30 May - 1 June Split Yugoslavia
Expert Meeting on Remote Sensing	7-9 June Montpellier France
World Bank Workshop on the Mediterranean	12-14 June Paris France
Expert Meeting on Marine Vegetation	12-19 June Marseille France
Consolidation Meeting on Code of Practice for Re-use of Municipal Waste Waters	15-16 June Split Yugoslavia
Joint Meeting of the Scientific and Technical Committee and the Socio-Economic Committe	26-30 June Athens Greece

BOOKS AND MAGAZINES

A PERMANENT LISTING OF MOVIES ON THE ENVIRONMENT



"Moving Pictures Bulletin" is a quarterly published in London in English which is soon going to have French and Spanish editions as well. The original character of its conception and implementation should be pointed out. Each issue reviews films (full-length or short) made for the cinema or TV devoted to development and environmental issues. Many of these films are never shown outside of the country where they are made. **The Moving Pictures Bulletin** reviews the new films and gives the main reference elements for each one of them (title, country, language, producer, director, executive producer, distributor, length etc.), as well as a 20-30 line summary of the subject treated in order to highlight the interest, style and main character of the films reviewed.

In its 43rd Session

THE GENERAL ASSEMBLY OF THE UNITED NATIONS ADOPTS A RESOLUTION ON STRENGTHENING OF SECURITY AND COOPERATION IN THE MEDITERRANEAN REGION

Several other resolutions relate to the environment

Several resolutions passed by the General Assembly of the United Nations at its 43rd Session concern the Mediterranean Sea; one directly, the others indirectly since they regulate general environmental matters. The former, resolution 43/84 adopted on 7 Dec. 1988, calls for a **"strengthening of security and cooperation in the Mediterranean Region".** Concerned mostly with the problems raised by the persistent tensions in the region and the need to establish a lasting peace, the resolution in concrete terms:

- Urges all States to cooperate with the Mediterranean States in the further efforts required to reduce tension and promote peace, security and cooperation in the region in accordance with the purposes and principles of the Charter of the United Nations and with the provisions of the Declaration on Principles of International Law concerning Friendly Relations and Cooperation among States;
- Encourages once again efforts to intensify existing forms and to promote new forms of cooperation in various fields, particularly those aimed at reducing tension and strengthening confidence and security in the region;
- Reaffirms also the importance of intensifying and constantly promoting contacts in all fields where common interests exist in order to eliminate gradually, through cooperation, the causes preventing the faster social and economic development of the Mediterranean States, particularly the developing States of the region.
- Takes note, in this regard, of the idea of the establishment of a Mediterranean forum as a multidisciplinary framework for the promotion of cooperation in the region, which could bring together not only the representatives of governments but also of scientific, educational, cultural and other institutions, as well as prominent individuals specializing in Mediterranean studies.

However, among the resolutions that the General Assembly adopted during this session, there are others that are more directly linked with UNEP and MAP. Thus, with resolution 43/53 on **"Protection of global climate for present and future generations of mankind",** the General Assembly welcomes the convening in 1990 of the Second World Climate Conference; notes also in this connection the conclusions of the meeting held at Villach, Austria in 1985 (about which there was a lengthy article in the last issue of MEDWAVES) and urges all Governments, inter-governmental and non-governmental organizations to treat climate changes as a priority issue, to undertake and provide specific, cooperative action-oriented programmes and research so as to increase understanding on all sources and causes of climate change, including its regional aspects.
In its resolution 43/196, the General Assembly notes the fact that the largest part of the current emission of pollutants into the environment, including toxic and hazardous wastes, originates in developed countries and therefore recognizes that those countries have the main responsibility for combating such pollution. Finally - and here one sees an appeal to North-South cooperation, the need for which was made evident in the Blue Plan Report -, the General Assembly "reaffirms the need for developed countries to strengthen technical cooperation with developing countries to enable them to develop and strengthen their capacity for identifying, analyzing, monitoring, preventing and managing environmental problems in accordance with their national development plans, priorities and objectives".
On a more administrative level, it should be noted that on the occasion of the election of the members of the Governing Council of UNEP which took place on 24 October 1988, the following Mediterranean States were elected: France, Greece, Libya, Malta, Turkey and Yugoslavia.
The Coordinator of the Mediterranean Action Plan presented at the Meeting of the Bureau of the Contracting Parties to the Barcelona Convention (Athens, 14-15 March 1989) a report of activities and stressed the relevance of a number of resolutions adopted by the United Nations General Assembly for UNEP and MAP activities. The legal aspect was also highlighted: With resolution 43/18 of 1st Nov. 1988, the States recall the importance of the Convention for the Law of the Sea, further noting that the sea-bed and ocean floor and the subsoil thereof as well as the resources of the Area (i.e. beyond the limits of national jurisdiction) are the common heritage of mankind and that no State should undermine the Convention and related resolutions. Finally, the Assembly notes with satisfaction the progress made in the preparatory Commission for the International Sea-Bed Authority.

(continued from p.7)

BOOKS AND MAGAZINES

A second feature of the magazine with the title "Third Eye" reviews the videos of the third world. The central pages are devoted to a specialized topic (for example in the Sept. 1988 issue to ozone layer and the greenhouse effect). Finally there is a list of movie projects seeking coproduction funding.

This regular filmographic updating will be an extremely valuable tool for several potential groups of users: film and documentary makers who would like to know what is being done in other parts of the world, organizations in search of material for environment activities and festivals, specialists on Third World issues, television programming officials, journalists etc. The **Bulletin** is funded by the European Community, the Swiss Ministry of Foreign Affairs and is published by the **Television Trust for the Environment** (TVE) which is supported by UNEP. Very soon the **Bulletin** will publish a special issue on movies on the environment of the Mediterranean. We will then have the opportunity to talk about it again.

OCEANORAMA

Océanorama is a twice-yearly magazine published in Marseille, France by the Ricard Oceanographic Foundation, a non-profit association funded by a large industrial company in France to promote the study and protection of the marine environment; it also aims at informing the approximately 1,000 members of the Foundation in the various French-speaking countries. **Océanorama** excels in the quality of its presentation and illustrations. It targets wide audiences and deals with important environmental problems which it brings to the attention of the public, without however resorting to superficiality or an "alarmist" approach. One would wish that similar initiatives would be taken by other large firms in order to raise awareness on environmental problems. The Ricard Oceanographic Foundation also publishes studies on single issues, the most recent being "The sea urchin, unknown and unappreciated".