Rijeka), chemical and petroleum refining industries competing for the almost exhausted sites at the littoral. At present the gross revenue of the tourist industry on both sides of the Adriatic amounts to some 8,000 million $. The threat to the tourist industry, and even more important, to the whole marine ecosystem are the plankton and algal blooms. The eutrophication of the marine ecosystem is becoming a steady event of the presence of excess nutrients and organic matter cycling. It also endangers the environmental quality of registered national parks, such as the Brioni Islands and the Kornati archipelago (UNEP, 1989). How to apply rational management strategies?

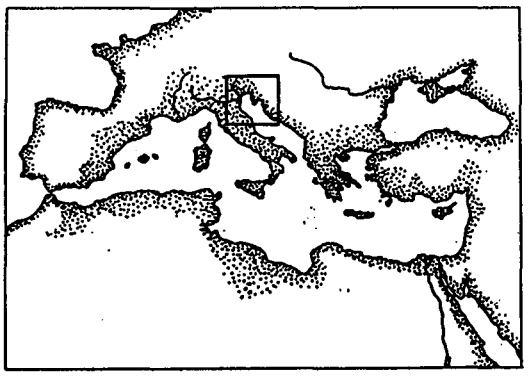

Fig.1. The map showing the position of the Adriatic sea in southern Europe.

The strategic concepts: general aspects

The Yugoslav environmental management system was up to now rather chaotic in nature, although there were attempts at amelioration (OECD, 1986). Yugoslavia has passed some 400 various environmental protection laws, ratified some 35 international conventions and protocols, most prominently the Barcelona Convention and its Protocols, the MARPOL Convention, and is a party to the London Dumping Convention. The Protocol on the Land Based Sources of Pollution to the Barcelona Convention (UNEP, 1982) contains, ever since its original adoption, the provision of the *receiving capacity* as a regulatory measure. However the enforcement of the provisions of this Protocol in the Yugoslav Adriatic region lagged much behind the legal provisions: the inspection system was either nonexistent or rather weak. Under Yugoslav law it is difficult to sue for damages to amenities, and besides the provisions still carry the requirement of bodily proof and monetary assessment.

The European continent in its diversity of nations and legal systems has experienced *three generations* of strategies of environmental management and protection.

The first generation of strategies is represented by the sum of various laws and regulations relying on restrictions, prohibitions, and penalties for violation of these. The *polluter-pays-principle* is the rationale which has been used to some success

in enforcing the strategy. The representative means of achieving these goals were the regulations of:

- the black and grey lists of substances;
- the uniform emission standards;
- the best technological means available (BTMA);
- the best practicable means available (BPMA).

The regulations based on the black and grey list of substances have been the favorite of the UNEP sponsored Regional Seas Conventions (UNEP, 1982a; UNEP, 1984; Kuwabara, 1984), of the Paris Convention (Anon.,1974) and other documents which have followed the same conceptual approaches. It maintains as feasible, that the substances listed in Annex I (the "black" list) should be prohibited from reaching the marine environment, those in Annex II (the "grey" list) should be subject to licenced and controlled releases. However, the well intended regulations are meaningless if one considers that urban sewage would usually contain unknown amounts of any or of all of these substances.

The *uniform emission standards* have most prominently been advanced in the European Community, and the regulation is based on the Council Directive 76/464 (EEC, 1976). This Directive and its regulations are based on the idea that the same industries should have equal obligations, and consequently enjoing equal economic conditions throughout the Commmunity. It largely neglects specific environmental sensitivity, particularly important for the semienclosed seas, and the need of industries and urban settlements to adjust to it. The equal economic opportunities, until possibly the great unification of Europe in 1992, have largely been a matter of taxes and salary scales rather than environmental protection measures.

The concept of *BTMA* and *BPMA* are certainly needed and a good regulatory mechanism, except they consider mostly what is available or practicable for the industry, and not primarily necessary for the preservation of the marine environment. One of the reasons for the early popularity of these regulations were their, apparently, straightforward enforceability. In all, the first generation strategies have been considered a major concession of the industries to the public purpose.

The introduction of the *second generation* of strategies happened in the late 1960s and particularly the 1970s, in the wake of the 1969 National Environmental Protection Act (NEPA) of the United States (CEQ, 1978) and the Stockholm Conference on the Human Environment of 1972 (UNEP, 1982b). Economic stimula were gradually added to what was described above as the first generation strategies. Various techniques were used such as tax incentives, development credits and, in the particular case of Yugoslavia waiving of custom duties for imports of pollution abatement gear. These are the ways and means governments tried to overcome the serious difficulties of implementation of environmental quality objectives, a goal never reached by previous approaches.

The *second generation* strategies have still remained industry oriented, and have generally failed to document the suc-

cess of preventive measures in major problem areas. The probable risks of a certain activity, or of a whole concept of economic and industrial development has been intentionally neglected. The political and military confrontations in Europe and in the Mediterranean have dictated a different order of priorities. The protection of the environment was very much down on the list, even if commanding headlines on UNEP's Regional Seas activities.

The particular feature of the second generation of strategies is the introduction of the concept, and the legislation of the format and scope, of the Environmental Impact Assessment (EIA) procedure (CEQ, 1978; Heffernan and Corwin, 1975; Beanlands and Duinker, 1983). It has been strongly influenced worldwide by the US practice. In many countries and in many specific cases the EIA procedure has never exceeded, either by format, or by the regulatory level of what should be more appropriately called an ecological study, a *post facto* assessment of impacts on the natural environment (Croatia, 1984). Some inherent value of this level of environmental management must be, however conceeded, since the most obvious, local, necessary and minimal measures to mitigate the most adverse pollution effects have usually been achieved. The ideas of Jaro Mayda, that the EIA process is, or must be made a comprehensive instrument of social technology (Mayda, 1978; 1982; 1985; 1986a; 1986b) in environmentally sound economic development has only been reluctantly and cursorily accepted. It would require another significant step, what is considered as the *third generation* of strategies to provide a framework for successful implementation of these ideas, particularly for the development in regions like the Adriatic sea.

The *third generation* strategies have been devised and recommended for action in the 1980s and beyond. These are based on the concept of comprehensive environmental management, on *anticipatory measures* and on *allocation of resources*, including air, water, the oceans, and the soil. The ideas have been developed in many places, but most explicitly described in three documents.

The *first* of these is a report issued by the IIASA (Holling, 1978). The technical term used was *adaptive environmental management*, and it describes a radical departure from the deterministic concepts of the original ideas of environmental management.

The second document, and one in the realm of sciences applied to ocean management was the hotly contested GESAMP report *Environmental Capacity* (GESAMP, 1986). It revived the idea of a final capacity of the marine environment to accept and deal with contaminants. It has been known in the literature on human toxicology as *assimilative capacity* and introduced in the 1970 into ocean disposal considerations by Goldberg (Goldberg, 1979). It has also been termed *receiving capacity* and converted into regulatory immision criteria in air pollution management. It is a concept based on the approach which recognizes the necessity to dispose of waste in a way that would minimize the danger of deleterious consequences of marine pollution. The profound change

was brought about in the 1980s by the emergence of "environmentally friendly" technologies, and by a gradual phase-out of both products and technologies of production, if these were unable to cope with the requirements of environmental protection.

The third document developing the concept of comprehensive management (or "integrated planning" in countries which use medium term economic plans) was the Report on the *Best Practicable Environmental Option* (BPEO), of the Royal Commission on the Environment of the United Kingdom (Royal Commission, 1988). It has been significantly influenced by the management principle discussed since the early 1980s in the Federal Republic of Germany: *The Vorsorgeprinzip* i.e. the *anticipatory environmental protection principle* (Feldhaus, 1980; Wessel, 1987).

The Yugoslav National Strategy: aims and limitations

The bottom line of environmental concern is the overwhelming need to provide fast and effective solutions, but never compromising long term sustainability goals.

The large differences in economic development between Yugoslavia and Italy, the two riparian states of the northern Adriatic, advocated a flexible transitionary Strategy, largely defined as one standing between the *second* and *third* generation. If consistently applied throughout, would result in the required comprehensive framework of regulations, incentives, and penalties. In addition the Strategy is based on a firmly established hierarchy of responsibilities, with common interests predominating over individual or group interests. This principle is important to counteract pressures of a nonregulated market economy, from the various development or industry lobbies, but also from environmental groups advocating their own, narrowly defined marine environment protection goals.

The economic and financial group of regulations is suggesting the establishment of environmental protection funds initially on the state level, later on the federal. Strict limitations are being also suggested for the use of these funds. The collection of the money is through the application of a tax both for the use of natural resources and for polluting the environment.

Technical and technology tasks aim at both the producer and the user of potentially polluting products. One of the major specific tasks, characteristic need of the newly industrialized countries, is the request for observation of strict technological discipline. New, low polluting technologies are recommended, but the emphasis is on the change in products, and insistence on product performance standards, which should be re environmentally friendly rather than economically advantageous. The pollution abatment technologies (sewage treatment, exhaust control, unleaded fuels etc.) are in a high degree measures designed to align Yugoslav industry and transport to European Community standards. Transport and trade of dangerous substances would fall into this group of regulations.

Space (land use) planning and management regulations intro-

duce new concepts into physical and urban planning procedures, increasing the scope and using environmental considerations such as the carrying and assimilative capacities. This concept and its provisions are particularly neede to protect national parks, like the Kornati archipelago in the central Adriatic. In this group of measures the national and natural parks, sensitive and biological reproduction areas for animals and plants are dealt with. The Adriatic sea, the islands and its coastline, which belong to the fragile karst (limestone) geological region, have a central place in the new strategic development planning.

The information system is considered in the establishment, use, and application of data bases and numerical models for decision making. The emphasis of the regulations is on quality assurance and quality control of input data. Free access to all environmental data, irrespectively of their economic or political implications, is recommended.

Scientific research is considered an essence of environmental management. Following the terminology used, *science* includes both hard (natural) and soft sciences (social, humanities, law). Support is recommended to improve environmentally oriented research, monitoring, and the development of new managment techniques, specifically adapted for the sensitive environment of the Adriatic sea. **Training and education** is fostered to remove a weak point of the environmental managment structure: lack of professionally trained personnel. In education on all levels creation of the public awareness of environmental issues is the major aim.

Public information is given special consideration, in both the need for improvement in media coverage of environmental issues, as in the recommendation that professionals give more attention to the interpretation of environmental data for the general public. The **international** dimension of environmental protection and management is given strong support. The main recommendation is that Yugoslavia should join most of the international conventions and protocols on environmental protection, and implement, as soon as possible, the resulting obligations. The bilateral Yugoslav - Italian agreements on the protection of the Adriatic sea, regional agreements, as the Barcelona Convention, and the regional European agreements on the reduction of emissions, global agreements exemplified by the Convention on the Law of the Sea, the London Dumping Convention, and the Basel convention on the transport of hazardous waste are treated as separate but interconnected tasks in a comprehensive approach to marine environmental management.

Conclusions

It seems that the implementation of new ideas in marine environmental management applied to the semienclosed seas, the Adriatic in our case, will become possible as an effort in strategic planning of future development. It will be difficult, in the face of an emerging public awareness of environmental issues, to continue in the old pattern of development subject only to the needs of manufacturing industries. Yugoslavia is a

microcosm of Europe in which many problems have been aggravated by the common malaise, which many countries of the centrally planned economies experienced: *political interference* in areas, where market forces would certainly do better, as in the economic system and technological development; and *regulatory noninterference* in areas, where the intervention of the government as the guardian of common amenities, seems inevitable. The drafting of a long-term plan in Yugoslavia should therefore be considered as a test whether the conceptual framework of comprehensive environmental, economic, social, and technological development can be harmonized into a viable strategy for a semienclosed sea.

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REFERENCES

Anon.(1974): Conference on the Prevention of Marine Pollution from Land-Based Sources - *Convention for the Prevention of Marine Pollution from Land-Based Sources*, Document No.220, Paris.

Beanlands, G. E. and Duinker, P.N.(1983): *An Ecological Framework for Environmental Impact Assessment in Canada*, Institute for Resource and Environmental Studies, Dalhousie University, Halifax, N.S. Canada.

CEQ (1978): Council of Environmental Quality, Executive Office of the President: *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act*, Federal Register, Reprint 43 FR 55978-56007, Washington, D.C. 1978.

Croatia (1984): A particularly instructive case of this attitude is the author's own country and the State of Croatia: *Guidelines for the Production of Environmental Impact Studies* (in Croatian), Official Gezette of the SR of Croatia, No. 31 of August 7.

EEC(1976): European Economic Community, *Council Directive 76/464/EEC*, Off. J. Eur. Commun.: Legisl., 19 (L129) 23 -29.

Feldhaus, G.(1980): *Der Vorsorgegrundsatz des Bundes-Immissionsschutzgesetzes*, Deutsches Verwaltungsblatt, 133 -139. According to this reference the *Vorsorgeprinzip* was first explicitly mentioned and discussed in this paper and used later in the Royal Commission (U.K.)Report.

GESAMP(1986): IMO/FAO/ Unesco/ WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Pollution, *Environmental Capacity: An Approach to Marine Pollution Prevention*, Rep. Stud. GESAMP 30. 49pp.

Goldberg, E.D.(1979): *Assimilative Capacity of U.S. Coastal Waters for Pollutants*, Proceedings of a Workshop, Crystal Mountain, WA 1979, U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, Boulder, CO.

Heffernan, P.H. Corwin, R.(1975): *Environmental Impact Assessment*, Freeman, Cooper and Co., San Francisco, 1975.

Holling, C.S.(1978): *Adaptive Environmental Assessment and Mannagement*, Intl. Inst. for

Applied Systems Analysis / J. Wiley and Sons. Chichester.

Kuwabara, S.(1984): *The Legal Regime of the Protection of the Mediterranean against Pollution from Land-Based Sources*, Tycooly Intl. Publ. Ltd. and United Nations Environment Programme, Dublin.

Mayda, J.(1978): *Environmental Impact Assessment*, A Report to the Advisory Committee of Experts on the Legal Aspects of Pollution Resulting from Exploration and Exploitation of the Seabed in the Mediterranean, Intl. Juridical Organization, Rome.

Mayda, J.(1982): *Environmental Impact Assessment, Toward a General Adaptive Model*, 6th World Congress of the Intl. Water Resources Assoc., Buenos Aires (cited from the preprint).

Mayda,J.(1985): *External Development Aid: New Policy Considerations,* Contribution to the *Country Environmental Profile of Haiti*, Intl. Institute for Environment and Development, USAID, Washington, D.C.

Mayda, J. (1986a): *Discussion remarks, Symposium on The Environment and International Development: Policy Issues for 1986 and Beyond*, Washington, D.C. (cited from the preprint).

Mayda, J.(1986b): *Forest Management and the Environment: Worldwide Trends in Legislation and Institutional Arrangements*, Forest Ecology and Management Vol.15, Elsevier, Amsterdam.

OECD (1986): *Environmental Policies in Yugoslavia*, A review by the OECD and its Environment Committee undertaken in 1985 at the request of the Governement of Yugoslavia. Paris.

Royal Commission (1988): Royal Commission (U.K.) Reports on Environmental Pollution: *12th Report: Best Practicable Environmental Option*, Her Majesty's Stationery Office, London.

UNEP (1982a): *Convention for the Protection of the Mediterranean Sea against Pollution and its Related Protocols*, United Nations, New York 1982. The mentioned lists are Annexes I and II, respectively to the *Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources.*

UNEP (1982b): *Declaration of the United Nations Conference on the Human Environment, Stockholm, 16 June 1972,* UNEP, Nairobi.

UNEP (1984): *Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific and its Supplementary Agreements*, United Nations, New York.

UNEP (1989): *Directory of Marine and Coastal Protected Areas in the Mediterranean Region. Part I: Sites of Biological and Ecological Value*, UNEP, Mediterranean Action Plan, Regional Activity Centre for Specially Protected Areas, Tech. Rep. Ser. No.26, 166 - 171. Athens.

Wessel, D. (1987) Editor: *Umweltpolitik: Guidelines on Anticipatory Environmental Protection*, The Federal Minister for the Environment, Nature Conservation and Nuclear Safety, Federal Republik of Germany, Bonner Universitaets-Buchdruckerei, Bonn.