"FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS"

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FAO TECHNICAL CONFERENCE ON MARINE POLLUTION AND ITS EFFECTS ON LIVING RESOURCES AND FISHING

Rome, Italy
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CONCLUSIONS AND RECOMMENDATIONS AS APPROVED

1 GENERAL

1.1 General recommendation

THE CONFERENCE expressed its serious concern at the increasing pollution of the marine environment and its harmful, and at times lethal, effects on living marine resources, and was of the opinion that more expert knowledge should be gained in order to understand, as a basis for action, the immediate and long-term consequences of pollution which threatens the marine environment; believed that the increases in uncontrolled industrialization and in other waste-producing activities constitute, in the absence of new and increased remedial measures and preventative action, the major threat to the success of any measures for alleviating marine pollution, and that this threat is aggravated by the increasing world population; recognized marine pollution to be a part of the overall problem of the pollution of the human environment and, therefore, recommended urgent action to prevent and combat pollution on international, regional, national and individual levels in order to minimize effects on the marine environment, its living resources and fishing.

1.2 Pollution control at source and re-cycling

The Conference, noting that, in addition to the inputs from marine outfalls and dumping, marine waters are polluted from the atmosphere and the land, via landrunoff and river discharges, recognized the urgent need for a coordinated approach to marine pollution control, and firmly recorded their view that the only satisfactory base for control is at the source, i.e. where the potential pollutant is first released, whether it be into the air, land or sea. In most instances this means applying restraint, by local action under national jurisdiction, so as to restrict releases to levels and to methods accepted as potentially harmless. In some instances, and indeed also for economic reasons, the possibility of waste-recycling techniques should be explored. The Conference recommended that research on techniques of treatment, recovery and recycling of wastes in industry should be encouraged as widely as possible.

1.3 Dumping

One particular instance of pollution concerned deliberate off-shore dumping in the high seas. This received special attention, as presenting problems not only in the general context of pollution, but also as presenting physical problems and even danger for fishermen, and indeed potential international problems in so far as such dumping is done extra-territorially. The Conference strongly recommended that deliberate dumping of toxic and solid wastes on recognized and potential fishing grounds and other shallow water areas be prohibited. It was also recognized that, even in respect of carefully controlled dumping in deep waters, much further information is still required on important aspects such as rates of degradation of the materials, and especially rates of transport and diffusion of toxic substances in such circumstances, both physically in the aquatic medium and biologically through the food-web. The use of dumping in deep trenches where in-folding may occur should be further investigated. The Conference recommended that FAO, in collaboration with IOC, be asked to encourage and speed up research in both fields as a matter of urgency.

1.4 Mercury pollution

The Conference was aware of the accumulation of mercury by aquatic organisms and of the tragic consequences of mercury pollution to human health, particularly as exemplified by the so-called "Minimata disease" in Japan. Moreover, because of the hazards of mercury poisoning and the banning of contaminated fish, the fishing industry in many parts of the world has suffered severe economic losses. The Conference was informed that technology is now available virtually to eliminate mercury losses from industries where this metal is used. Therefore, the Conference recommended that action be taken by governments to ensure advanced techniques be adopted for mercury recovery in all factories producing mercurial products or using mercury or its compounds as catalysts, cathodes or for other purposes in production. It further recommended that seed-dressings, alimicides and other mercurial compounds be replaced at the earliest possible time by other non-mercurial substitutes.

1.5 Oil pollution

The Conference recognized that there will be a continuous increase in the amount of petroleum and its products transported over and under the sea by ships and pipelines, and exploited from the sea bed, and recognized that in spite of measures taken by IMCO and industry concerned, it would be very difficult to eliminate all accidental or deliberate releases into the sea from these sources, and that releases from land-based installations and through the atmosphere are also taking place in substantial amounts; noted with concern the damage already done to water fowl and to some aquatic organisms; the potential hazards of the accumulation of dangerous chlorinated hydrocarbons, such as DDT and polychlorinated biphenyls, as well as other aromatic hydrocarbons in oil films and the possible toxicity to aquatic life and possibly to man; and potential damage by oil to sensitive ecosystems, such as those of coral reefs and of arctic waters and, therefore recommended an immediate increase in research at national or international laboratories, to examine more closely the scientific problems associated with oil pollution effects on the marine environment and its living organisms, so that action can be taken to avoid dangers that could arise, and furthermore, that FAO together with IOC, in consultation with their advisory bodies, including GESAMP, coordinate such research and, in cooperation with appropriate agencies, foster necessary action.

1.6 Pollution by chlorinated hydrocarbons

The Conference was informed about the increasing volume of persistent chlorinated hydrocarbons, such as DDT and polychlorinated biphenyls, entering the marine environment and its living organisms through water discharges, land runoff and the atmosphere. Their accumulation by organisms and their direct toxic effects, leading to loss of reproductive ability in fish and birds at the top of the food chain, and to mortality of certain aquatic organisms were noted with serious concern. The economic losses to fisheries, because of banning of fish contaminated by these substances, is an economic burden to fishermen and society. The

Conference recommended, therefore, that FAO, with assistance from its advisory bodies, request member nations to increase research on ecologically less harmful substitutes for the control of pests, and that better control of losses into the environment of polychlorinated biphenyls, and also of other potentially hazardous chemicals be immediately instituted.

1.7 Education

The Conference recommend the importance of educating the public on the aspects of pollution in relation to conservation and management of the marine environment and the living resources and urged FAO, in association with other appropriate bodies, to use their influence to encourage governments to stimulate increase of public awareness of conservation and environmental management through appropriate coverage of such matters in their educational curricula, keeping in mind the special needs of developing countries.

1.8 Pollution and ecosystems

Recognizing the urgent need for improved understanding of the marine ecosystems if the potential effects of pollutants are to be properly assessed, the Conference recommended that FAO, in cooperation with appropriate international organizations, encourage research in this field, by biologists, physicists, mathematicians and others in collaboration, with the object of establishing realistic models of natural conditions and especially those conditions for which predictions of the fate of pollutants and their effects on members of the food-web will be required.

1.9 Monitoring pollution and its effects

In considering a global system for marine pollution monitoring the first objective must be to provide data and information on the state and trends of pollution of the world oceans, with a view to facilitating management measures and their enforcement. The Conference noted and agreed with the suggestions made by the Seminar on Methods of Detection, Measurement and Monitoring of Pollution in the Marine Environment (Rome, 4-10 December 1969), and recommended that, as a first step, existing national monitoring programmes, particularly in areas with a risk of heavy pollution should be encouraged to cooperate in pilot regional monitoring exercises, such as are being organized under ICES at present for the North and Baltic Seas. Such regional projects will provide valuable experience both in necessary techniques and in management of monitoring; they will at the same time facilitate contacts between the relevant laboratories regarding the essential basic research, the substances to be monitored, the sampling procedures and the analyses of pollutants.

As all nations should, in the long run, participate in monitoring of marine pollution, the Conference recommended that FAO, together with IOC, and their relevant advisory bodies should use all possible means to promote the development, and adoption of intercalibration, and suitable methods for monitoring, and should further assist in establishing national marine pollution programmes in developing countries, especially in training scientists and technicians, in expanding existing specialized laboratories or, when necessary, setting up of new laboratories performing international functions, and in intercalibrating and/or standardizing sampling and analytical equipment.

In order to facilitate the establishment of a marine pollution monitoring programme on a world-wide basis, the Conference further strongly recommended that a preliminary exploratory survey for evaluation of the state of pollution of the world ocean should be made by international cooperation at the earliest possible date, in order to establish the levels of various substances (natural and artificially introduced) in the water column, together with their accumulation in the plankton, the benthos, the fish and the sediments. Special attention would need to be paid to the coastal zone. Substances that should be surveyed include especially metals (mercury, lead, cadmium, copper and zinc), petroleum-derived halogenated hydrocarbons, including polychlorinated biphenyls, and some other aromatic hydrocarbons. The survey designed by the Study Group on Critical Environmental Problems (SCEP) may serve as an example for the planning of such a survey, but it would need to be extended and repeated as facilities and information develop.

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In recommending this preliminary assessment, to be followed by further surveys of the state and health of the ocean, the Conference recognized that the initiating and developing of a global system for marine pollution monitoring must take place through close coordination and collaboration among the international agencies responsible for monitoring of the marine, terrestrial and atmospheric components of the earth's environment. Only through such close cooperation can all the information essential for man's further evolution on the planet earth - in equilibrium with the remainder of the ecosystem - be provided.

With these important matters in mind, especially the need for a greater understanding of the scientific basis for rational management of living marine resources as a matter of urgency, the Conference recommended that FAO should strengthen its work and capability in the field of ecology in the closest collaboration with intergovernmental and non-governmental scientific organizations. Recognizing the need for the establishment of closer contacts between workers in the field of research and control of marine pollution, the Conference also recommended that FAO, in collaboration with other relevant international organizations, should continue and increase its activities in the exchange and retrieval of marine scientific information in general, but concerning pollution in particular, including registers and tabulations of marine pollutants and the compilation of lists of experts and institutions active in this field. The Conference recommended further the encouragement and support of arrangements for the production of manuals on monitoring and minimizing pollution. Such manuals should be issued in various languages for the use by marine scientists and engineers and in relevant training courses.

1.10 Assistance to developing countries

In general, the Conference recognized that marine pollution is of growing concern to public welfare and opinion, and to the fisheries industries, in developing as well as in developed countries. It recognized further that some tropical areas are widely occupied by ecosystems which are particularly susceptible to ecological stress, especially by pollution, and therefore drew aware of the urgent need for improved understanding, with resultant progress for monitoring and minimizing pollution in these areas, noting that it is an international duty to help developing countries to be equipped to deal with immediate problems in the field of marine pollution, and to protect their aquatic environment and the future of their fisheries, and to assist them to develop their economies and industries in a way and without damaging their natural resources and environment. The Conference therefore recommended that FAO should initiate negotiations with the United Nations Development Programme (UNDP) in order to ensure that financial support for the maximum international technical assistance be provided, in present and future projects in environmental research related to marine pollution and its effects on the living resources and fishing and its control. FAO should also encourage and mobilize the maximum assistance in this field from bi- and multi-lateral sources.

The Conference recommended further that FAO should promote and coordinate training courses necessary for the specialization in various fields of marine pollution in connection with the protection of the living resources of the sea, in all fields (research, planning, etc.) and that FAO should approach UNDP and countries in a position to facilitate and assist with the necessary training in these disciplines; FAO should also explore the possibility of establishing laboratories to serve different regions, and dealing with analysis of special types of pollutants, on-the-job training, and to provide advice under request to member countries on matters concerning management of the marine environment and protection of fisheries from pollution until the time these countries have their own personnel and facilities.

1.11 UN Conference on the Human Environment

Recognizing that the oceans covering two-thirds of this earth's surface, tend to be used as the universal sink, and that it may well be impossible to endorse any major disturbance to them, the Conference urged that FAO should bring all these recommendations immediately to the attention of the UN at its Conference on the Human Environment, to be held in

Stockholm in 1972, and to the other international agencies directly concerned, so as to ensure the maximum appreciation of the importance for man of maintaining the biosphere as a whole, and the oceans in particular, in a state in which man can thrive and evolve, in equilibrium with the physical environment and the other organisms on which he is dependent for so many of his economic needs and acceptable standards for human life.

2 Section I: MARINE POLLUTION IN THE WORLD TODAY

2.1 The Conference recognized the need for a coordinated approach to marine pollution control, taking into account the contributions from the atmosphere and river discharges in addition to those from marine outfalls and dumping.

2.2 The Conference stressed the need for further regional studies of pollution situations on patterns similar to those followed by ICES in the North Sea and Baltic, and the Group of Experts from GESAMP/ICNAF in the Mediterranean. It was recommended that, where there is no appropriate regional body, FAO should take the initiative and should arrange for expert guidance to be available. Where surveys have already been made, they should be updated from time to time.

2.3 The Conference recommended that, in enclosed and semi-enclosed seas (such as the Baltic, North Sea and Arctic Ocean); in sea areas spanning national boundaries; and where large river systems drain several countries discharge, pollution control should be organized on a regional cooperative basis, based on joint scientific evaluation. Subsequent monitoring on the effects of measures adopted to control pollution should also be arranged cooperatively employing standardized methods.

2.4 For the purposes of pollution control there may be advantages in differentiating between estuaries and coastal waters according to their principal uses, defining, for example, areas to be set aside mainly for fishery purposes (e.g. shellfish cultivation) or recreation (bathing and water sports) and others, where a lower standard of water quality may be accepted to accommodate industrial waste or sewage discharges after treatment. Such a classification system should be dynamic, however, moving towards an eventual elimination of pollution.

2.5 Where large areas are being considered in pollution surveys, it is useful to classify them into regions according to biophysical or ecological characteristics as was done in the survey of estuarine and coastal pollution in the U.S.A.

2.6 The Conference recognized the serious lack of the ecological information needed to make assessments of pollution effects in tropical areas, e.g., in relation to such sensitive ecosystems as coral reefs, mangrove areas and coastal lagoons. There is also a serious lack of such information on the Arctic, therefore, it is recommended that additional research should be encouraged.

2.7 The Conference further stressed the need to consider standardization of the methods used in baseline ecological studies related to pollution control.

2.8 The Conference recommended that FAO should request appropriate agencies to continue to encourage research on the technology and on institutional constraints associated with the recycling of wastes.

2.9 In suitable regional areas consideration should be given to the desirability of assembling and distributing factual data on pollution in an appropriate form such as a Sampling Year Book to facilitate their analysis and evaluation.

2.10 The Conference recommended that FAO should assist in the urgent task of introducing environmental management into educational curricula so as to facilitate the implementation of marine pollution control.

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3 Section II: BEHAVIOUR AND FATE OF POLLUTANTS IN THE MARINE ENVIRONMENT

The Conference recommended that:

3.1 FAO be requested to seek the cooperation of other appropriate interested organizations in the setting up of a group of specialists in biological, physical, chemical and mathematical disciplines with a view to establishing mathematical models covering all aspects of the prediction of a pollutant's fate in the sea.

3.2 in view of the lack of knowledge of physical, chemical and biological processes in the deep water zones and the increasing interest in the use of these areas for waste disposal, FAO should be requested to encourage and bring to the attention of other organizations concerned, particularly IOC, the need for investigations into these matters by contracting member nations and interested scientific and technical organizations and laboratories.

3.3 as sedimentary processes are only partially understood at the present time, increased investigations into the role of these processes in the cycling or inactivation of pollutants should be encouraged.

3.4 in view of the need to survey various pollutants to establish objectively the levels of pollution, particularly in the seas of less developed areas of the world, FAO should investigate the possibility of setting up such studies. This should be arranged in collaboration with other organizations concerned, and with the participation of local laboratories and advisory bodies, in order to provide a useful basis and indicate areas which might later require monitoring.

4 Section III: EFFECTS OF POLLUTANTS ON THE BIOLOGY AND LIFE CYCLE OF MARINE ORGANISMS

The Conference recommended that:

4.1 an expert panel representative of regions and disciplines be established by FAO, in consultation with UNEP, to investigate the possibility of standardization of laboratory test methods, and to consider criteria for choice of test and indicator organisms.

4.2 FAO: include in its Species Synopsis Series on Aquatic Species and Stocks, relevant information on the effects of pollution on these organisms, and also that FAO expand this series to include information on species, representing different trophic levels, which are recognized to be particularly useful for the study of the effects of pollution, in the field as well as in the laboratory.

4.3 FAO consider establishing a register and bibliography, by species and pollutants, of data on biological effects of pollutants, giving special attention to the levels of concentration reached in species of special interest, and to sublethal effects and their minimum threshold values.

5 Section IV: ECOSYSTEM MODIFICATION AND EFFECTS OF MARINE OPERATIONS

The Conference recommended that a carefully composed working party of marine ecologists be established by FAO to collaborate with IOC to 1) review the present state of understanding of marine ecosystems with respect to pollution, and 2) prepare a system of priorities and detailed and costed working programmes for future study on the potential effects of pollution on the ecosystems.

6 Section V: TECHNICAL ASPECTS OF MINIMIZING POLLUTION AND CONTROLLING ITS EFFECTS

The Conference recommended that:

6.1 FAO, in association with appropriate international and national organizations, should encourage a quantitative world-wide inventory of the pertinent discharges of pollu-

tants from all land-based sources, with particular emphasis on river discharges and waste streams to the seas.

6.2 FAO and appropriate international and national agencies should be encouraged to identify the major pollutants of concern to the marine environment and the fishery, and document how the deleterious effects are related to the levels of pollutants.

6.3 FAO and appropriate international and national agencies should work diligently to ensure that all marine waste treatment and disposal systems are designed and operated with respect to particular problems of concern to the marine environment.

6.4 FAO and appropriate international and national agencies should work actively for the specifications and use of numerical and statistically-valid marine water quality parameters and should oppose the use of non-definitive and non-applicable statements about marine water quality or pollution.

6.5 FAO should cooperate with appropriate agencies in working toward the eventual curtailing of the widespread practice of dumping wastes especially persistent toxic substances in the oceans. In the interim one step could be to encourage international studies of existing and selected dumping sites and make a scientific evaluation of both the short and long-term effects of such practices.

6.6 FAO and appropriate agencies should call attention to the increasing hazards associated with the entrance of persistent toxic substances into the sea. Because of the tendency of some materials such as chlorinated hydrocarbons (both aliphatic and aromatic) to accumulate in living organisms and the possible biological effects even at very low levels, special studies are needed to assess both the short and long-term effects.

6.7 FAO should cooperate with appropriate agencies in bringing about cessation of the practice of dumping toxic wastes, containers of waste, and/or obstacles in present and potential fishing grounds because of the hazard and the economic loss to fishing operations resulting from such actions.

6.8 increased attention and support be given to the assessment of the oil pollution problem including accurate evaluation of the major sources and their characteristics, short and long-term effects at various concentration levels, efficacy of various methods of minimizing the effects of oil spills on the biota, development of methods for routine measurement of oil concentrations and development of improved methods for the oil removal from the marine environment whatever its source.

6.9 FAO, along with appropriate agencies, should encourage and support the development of instrumentation for continuous monitoring of the pertinent physical, chemical and biological parameters of the ocean to ensure protection of the marine fishery. Continuing world-wide monitoring is needed and should be coordinated with other related monitoring, such as river and pollutant source monitoring. Particular attention needs to be given to the selection of biological parameters suitable for an adequate, statistically-valid description of the principal biota.

6.10 that because certain countries use sewage effluents for the production of fish, and because of the health implications involved, FAO and WHO, with the assistance of an interdisciplinary group of experts, should review the problems associated with this activity.

7 Section VI: EFFECTS OF POLLUTANTS ON QUALITY OF MARINE PRODUCTS AND EFFECTS ON FISHING

7.1 The Conference stressed that research is urgently required to evaluate the efficacy of the processes of making fish protein concentrate for removing pollutants.

7.2 It was recognized that work is required on the epidemiology of viral contamination and its relationship, where applicable, to bacterial indicators.

7.3 It was also recognized that investigations are required so that rapid tests may be established which accurately measure pollution with bacterial and viral pathogens.

7.4 The Conference recommended that studies be conducted to determine the role of pollutants in the biogenesis of marine biotoxins.

7.5 It was recommended that, as lethality is not a sufficient criterion for reflecting damage to aquatic resources, research should be encouraged to demonstrate (a) sublethal effects which jeopardize survival of populations and/or ecosystems; (b) synergistic effects; and (c) the relationships between levels of pollutants in organisms and toxicity to man.

7.6 The Conference agreed that much additional research is needed on marine pollution and its effects on living resources and fishing, utilizing a multidisciplinary approach with such disciplines as ecology, fishery biology, oceanography, chemistry, toxicology, and the health sciences.

8 Section VII: SCIENTIFIC BASIS FOR INTERNATIONAL LEGISLATIVE CONTROL OF MARINE POLLUTION, IN THE INTERESTS OF MARINE RESOURCES AND FISHERIES

The Conference recommended that:

8.1 studies should be undertaken to identify integrated ecological regions with the view to future promotion of regional marine pollution control agreements. At the same time it is recognized that the close interrelation between pollution of inland, coastal, and open ocean waters and of the atmosphere calls for one comprehensive system of control covering pollution in all its aspects, a system in which fishery interests should be adequately represented, and such a system should be sought for urgently.

8.2 further studies should be undertaken, with a view of classifying pollutants into categories according to their degree of toxicity and persistency.

8.3 a Working Group of lawyers, marine scientists and other concerned specialists should be set up to consider means for the regulation of the introduction into the marine environment of the most toxic and/or highly persistent pollutants. This consideration should include a system of registration to be set up on an urgent basis to cover the dumping of all persistent and highly toxic pollutants into the sea.

8.4 FAO, in cooperation with WHO and other appropriate international and national agencies, should intensify its promotion of scientific research to make available pesticides with a narrow spectrum and to develop biological techniques of pest control.

8.5 FAO, in collaboration with other appropriate international organizations, should establish a programme for the promotion of continuing consultation between lawyers, marine scientists and other specialists concerned with all aspects of marine pollution control in relation to living marine resources.

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