EUTROSYM'76

20.–25. IX. 1976 Karl-Marx-Stadt
German Democratic Republic

Proceedings

of the International Symposium
on EUTROPHICATION and REHABILITATION
of SURFACE WATERS

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E U T R O S Y M '76

International Symposium on Eutrophication and Rehabilitation of Surface Waters

September 20 - 25, 1976
Karl-Marx-Stadt
German Democratic Republic

organized by

United Nations Environment Programme (UNEP)

Institute of Water Management of the Ministry of Environmental Protection and Water Management of the German Democratic Republic

Vol. I, part 2

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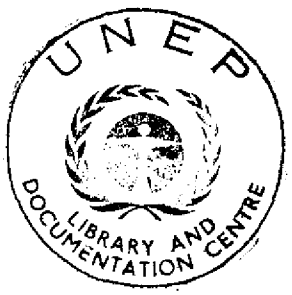

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UNEP

Original: English

Recommendations for the Protection of Surface Waters from Eutrophication

as adopted by the

International Symposium on Eutrophication and Rehabilitation of Surface Waters - EUTROSYM '76 -

commonly organized by the

United Nations Environment Programme and the Institute of Water Management of the Ministry for Environment Protection and Water Management of the German Democratic Republic.

Karl-Marx-Stadt,
September 20-25, 1976

I. Introduction

1) Eutrophication is analogous to the natural ageing in the broadest sense of the word the increased supply of plant nutrients to waters due to human activities in catchment areas which results in an increased production of algae and higher aquatic plants.

Eutrophication caused by human activities has risen to one of the most important problems in water quality deterioration in the world.

2) The causes lie in the progressive intensification of agricultural and industrial production and the increasing amounts of domestic sewage which stress the water bodies.

3) The consequences are:

a) Eutrophication impairs or prevents the rational use of water resources;

b) The utilization of eutrophic waters for potable and industrial water as well as for recreational purposes (bathing) involves ever greater expenditure;

c) Fishing, which is of major importance for human nutrition, is impeded or made impossible;

d) The spreading of disease vectors is encouraged;

e) Waterways become impassable and irrigation and drainage ditches cease to fulfill their functions;

f) Excessive growth of aquatic plants contributes towards the rapid silting and alluviation of water bodies.

4) Consequently there is an urgent need to increase and generalize knowledge of the mechanisms and multifarious relationships existing between the causes and consequences of eutrophication, to derive from this knowledge foundations for taking decisions on practical measures against eutrophication and to make the public acquainted with the problems involve.

5) Taking this into account, EUTROSYM '76 Symposium was held in Karl-Marx-Stadt, GDR from 20-25 September, 1976, within

the framework of the United Nations Environmental Programme (UNEP). Participants from 34 countries and representatives of United Nations bodies discussed the following complexes:

Complex A: Economic and social aspects of eutrophication;

Complex B: Mechanisms of eutrophication in inland waters, estuaries, coastal waters and enclosed seas; trends and lags of eutrophication and oligotrophication and the simulation thereof;

Complex C: Measures against the mass growth of aquatic weeds and phytoplankton;

Complex D: Use of eutrophic waters and technologies for their rehabilitation;

Complex E: Education and training.

6) As a result of the Symposium it is noted:

a) In many countries and international organizations, great efforts are being undertaken against the consequences of eutrophication. Numerous results of research and development are available which requires systematic application. Further research is necessary.

b) Education and training as well as public relations activities on the problem of eutrophication are already receiving due attention in various countries.

c) In countries with continued industrialization and intensification of production there is already a great number of possibilities for the systematic elimination of the consequences of eutrophication as well as for the introduction of long-term prophylactic measures against eutrophication.

d) In some countries environmental control for eutrophication problems is being carried out in a manner consistent with the economic and technological conditions. In other cases, this is not the fact and increased efforts are required.

e) According to the current level of knowledge, definite

preventive and rehabilitative measures against eutrophication can be proposed, including publicity work, education and training for specialists as well as research.

f) In this manner UNEP at the same time makes a contribution in preparation of the United Nations Water Conference in accordance with Resolution 3513 (XXX) of 15 December, 1975, ECOSOC Resolution 1983 (LX) of 23 April, 1976, and Resolution 55 (IV) of the 14th UNEP Executive Board Session of 13 April, 1976.

II. Recommendations of the Symposium

A. Proposals on Measures Against the Eutrophication of Waters and for the Opening Up of the Use Possibilities of Already Eutrophic Waters

1) Creating the legislative basis (laws, standards, guidelines) for reducing the trophic level and preventing eutrophication of waters not yet eutrophicated by

a) the control of water use
b) the reduction of nutrient import
c) the marking of water protection zones and conservation areas
d) optimum use for fisheries.

2) Further development of international cooperation especially in the fields of science and technology as well as working out projects for the rehabilitation of surface waters

3) Incorporation of eutrophication monitoring in national water control

4) Selecting the most favourable of preventive measures to limit nutrient import into waters, considering the following aspects:

a) sewage removal from the catchment area
b) nutrient elimination by chemical precipitation,

denitrification or biological incorporation as a measure against the eutrophication of waters

c) nutrient elimination in preimpoundment basins of drinking water reservoirs is of particular importance

d) nutrient elimination by agricultural application of properly treated sewage

e) agricultural and forestry management in catchment areas, aimed at maximum utilization of nutrients and their minimal run-off

f) special protection of waters affected by thermal effluents

5) Application of appropriate measures for the rehabilitation in eutrophic waters depending on local conditions including:

a) desludging

b) drainage of nutrient-rich hypolimnic water

c) artificial aeration

d) controlling aquatic plants by environmentally safe measures

e) nutrient precipitation in waters and covering sediments

f) modifying the flow-through processes to improve the nutrient balance

g) other measures like manipulation of fish stocks, removal of algae etc.

6) Development of high capacity technologies for the production of drinking water from eutrophic waters while maintaining the required standards of hygiene

7) Optimisation of the effort required for the sanitation of catchment areas serving the production of drinking water and for drinking water preparation techniques, taking regional peculiarities into consideration

8) Further development of technologies for extracting bioproducts from eutrophic waters, for example by:

a) controlled utilization of aquatic organisms for human and animal consumption, particularly by fishery management;

b) Utilization of aquatic plants from eutrophic waters as manure and for industrial and other economic purposes.

B. Proposals for research, education and training and public relations activities in the field of eutrophication

9) Promotion of research and development tasks on the problem of eutrophication.

10) The intensified consideration of the problems involved in eutrophication at all stages of education and training. These problems should be dealt with

a) in the framework of education at general educational schools as one aspect of environmental protection during biology lessons and in extra-curricular work groups organized by youth clubs

b) in the framework of vocational training of skilled workers for employment at water works, in water quality laboratories, in sewage works, in the inspectorates of the hygiene and water authorities and in fisheries

c) in subjects taught at universities which touch directly or indirectly upon the eutrophication problem, such as agriculture and forestry, building, landscaping, economics, jurisprudence, chemistry, chemical engineering and medicine

d) with a greater number of hours within the framework of special lectures, seminars and exercises in training disciplines for the protection of waters, e.g. for university and college graduate engineers in the fields of water supply, sewage treatment and water management, health engineers, hydrologists, hydrochemists, hydrobiologists and agrochemists

e) within the framework of the specialized training of hydrobiologists, hydrochemists and certified engineers in water-related problems as well as in the form of final papers prepared by university students in the field of remedial and preventive measures against eutrophication

11) Inclusion of eutrophication problems into specific further training programmes. These measures include:

11.1) the organization of special seminars for the African, Asian and Latin American regions concentrating on

a) the prevention and control of undesired plant growth in waters and on paddy fields (in connection with epidemiological and parasitologic problems of the use of potable and bathing water)

b) methods for the determination of bioproduction and the nutrient balance of waters, training programme for the registration of eutrophication processes within the "Global Environmental Monitoring System" (GEMS)

11.2) the organization of special seminars for the European region concentrating on

a) the protection of waters from eutrophication

b) problems relating to the rehabilitation of eutrophic aquatic ecosystems

11.3) the organization of courses aiming at the qualification of the technical personnel of water works using surface water and encountering water treatment problems due to eutrophication as well as of the personnel of sewage-treatment plants for instruction in nutrient elimination techniques

11.4) organization of local scientific symposia and congresses for further qualification (with international participation) to ensure that knowledge gained in the field of eutrophication can be quickly applied in practice and to further the improvement of techniques for the rehabilitation of waters

11.5) use of the further training of teachers as part of the regular extensions of the syllabus in the field of environmental protection

11.6) involvement of university teachers in research pro-

jects in the field of environmental protection to promote the unity of research, teaching and practice

12) Planning and implementation of short-term events for further training and of exchanges of experience by scientific societies and non-governmental organizations, in particular, by engineers' associations, on specific problems of rehabilitation techniques

13) Education of people appropriately behaviour in the field of waters and water use, inducement of planning bodies and superior economic bodies as well as the broad masses of the population to cooperate in preventive and restoring measures.

14) Generalisation of laws governing eutrophication mechanisms revealed by research taking into account regional peculiarities and application of the results in practice

15) Dissemination of the knowledge on eutrophication problems to the public by public relations work in order to enhance the understanding of the economic and ecological relations involved. This public relations work should be purposively directed to those causing eutrophication and those affected by it as well as to these responsible for management. For this purpose, scientific publications and mass means of communication, including newspapers, periodicals, exhibitions and placards, films radio and TV should be used.