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PANEL OF **E**XPERTS ON **E**NVIRONMENTAL **M**ANAGEMENT FOR VECTOR CONTROL **(PEEM)**

Report of the Fourth Meeting
Geneva, 1-5 October 1984

PART I: GENERAL PROGRAMME AND POLICY

PART II: TECHNICAL DISCUSSION -- Institutional arrangements to ensure the incorporation of health and environmental safeguards in water resources development projects

PEEM Secretariat
World Health Organization
Geneva, 1984

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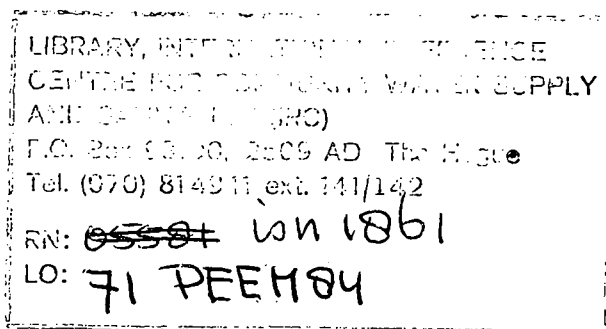
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JOINT WHO/FAO/UNEP PANEL OF EXPERTS
ON ENVIRONMENTAL MANAGEMENT FOR VECTOR CONTROL

REPORT OF THE FOURTH MEETING

Geneva, 1-5 October 1984



PEEM Secretariat
World Health Organization
Geneva 1984

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JOINT WHO/FAO/UNEP PANEL OF EXPERTS
ON ENVIRONMENTAL MANAGEMENT FOR VECTOR CONTROL

Fourth Meeting, Geneva, 1-5 October 1984

Members*

Dr Mahmoud Abu-Zeid

Chairman, Water Research Centre, Ministry of Irrigation, Cairo, Egypt

Professor A. N. Alekseev

Head, Department of Medical Entomology and Chief, Division of Toxicology and Biological Control, Martsinovskiy Institute of Medical Parasitology and Tropical Medicine, Moscow, USSR

Dr Ralph H. Brooks

Assistant Director, Division of Air and Water Resources, Tennessee Valley Authority, Knoxville, Tennessee, USA

Dr M. Falkenmark

Executive Secretary, Committee for Hydrology, Swedish Natural Science Research Council, International Hydrological Programme, Stockholm, Sweden

Dr Chamlong Harinasuta

Coordinator, SEAMEO TROPED Project, TROPED Central Office, Bangkok, Thailand

Professor A. M. A. Imevbore

President, Nigerian Committee on Large Dams, Director, Institute of Ecology, University of Ife, Ile-Ife, Nigeria

Dr R. J. H. Kruisinga

Member of the Senate and Chairman of the Senate Committee on Agriculture, Fisheries and Nature Preservation, The Netherlands

Professor V. Ramalingaswami

Director-General, Indian Council of Medical Research, New Delhi, India

Dr M. Sasa

President, Toyama Medical and Pharmaceutical University, Toyama City, Japan

* Unable to attend:

Dr Teklemariam Ayele, Director, Institute of Pathobiology, University of Addis Ababa, Addis Ababa, Ethiopia

Dr A. M. Fakhro, Minister of Higher Education and Science, Ministry of Higher Education and Science, Manama, Bahrain

Dr M. M. Law, Assistant Deputy Minister, Health and Welfare Canada, Health Services and Promotion Branch, Ottawa, Canada

Professor W. A. Schmid, Institute for Land Improvement and Water Management, Federal Institute of Technology, Zurich, Switzerland

Mr C. L. Tech

Assistant Administrator for Project Development and Implementation, National Irrigation Administration, Quezon City, Philippines

Dr Rodrigo Zeledón

Chief, Department of Medical Ecology, National University, Heredia, and President, Council of Science and Technology of Costa Rica (CONICIT), Zapote, Costa Rica

Representatives of other organizations

Institute for Land Improvement and Water Management, Federal Institute of Technology, Zurich, Switzerland

Mr C. Bernasconi

International Development Research Centre, Ottawa, Canada

Mr A. Redekopp

Dr P. M. Wijeyaratne

International Institute for Land Reclamation and Improvement, Wageningen, The Netherlands

Mr W. T. Lincklaen Arriëns

Dr J. M. V. Oomen

Japanese Association for Tropical Medicine, Tokyo, Japan

Dr T. Ohse

United States International Development Cooperation Agency, Washington, D.C., USA

Dr V. Barbiero

Secretariat

Mr M. A. Acheson

Regional Cooperation Officer, Division of Environmental Health, World Health Organization, Geneva, Switzerland

Mr R. Bahar (Acting Secretary)

Scientist, Equipment, Planning and Operations, Division of Vector Biology and Control, World Health Organization, Geneva, Switzerland

Dr R. Bos

Associate Scientist, Equipment, Planning and Operations, Division of Vector Biology and Control, World Health Organization, Geneva, Switzerland

Mr J. Fauchon (Temporary Adviser)

Former Director, Natural Resources and Ecosystems Division, then Director, Environment Management Division, United Nations Environment Programme, Ornex, Ferney-Voltaire, France

Dr T. Fujikura

Veterinary Public Health, Division of Communicable Diseases, World Health Organization, Geneva, Switzerland

- Mr L. Godamunne (Temporary Adviser)
Secretary General, Mahaweli Authority of Sri Lanka, Colombo, Sri Lanka
- Dr N. G. Gratz
Director, Division of Vector Biology and Control, World Health Organization,
Geneva, Switzerland
- Dr A. Kucherenko
Scientific Affairs Officer, International Register of Potentially Toxic
Chemicals, United Nations Environment Programme, Geneva, Switzerland
- Dr R. LeBerre
Scientist/Entomologist, Ecology and Control of Vectors, Division of Vector
Biology and Control, World Health Organization, Geneva, Switzerland
- Mr T. H. Mather
Senior Officer, Water Resources, Development and Management Services, Food
and Agriculture Organization of the United Nations, Rome, Italy
- Dr F. McCullough
Medical Zoologist, Ecology and Control of Vectors, Division of Vector
Biology and Control, World Health Organization, Geneva, Switzerland
- Dr K. E. Mott
Chief, Schistosomiasis and other Snail-borne Trematode Infections, Parasitic
Diseases Programme, World Health Organization, Geneva, Switzerland
- Dr D. Muir
Epidemiological Methodology and Evaluation, Malaria Action Programme, World
Health Organization, Geneva, Switzerland
- Dr C. P. Pant
Chief, Ecology and Control of Vectors, Division of Vector Biology and
Control, World Health Organization, Geneva, Switzerland
- Dr G. Quélenec
(Acting Chief), Pesticide Development and Safe Use, Division of Vector
Biology and Control, World Health Organization, Geneva, Switzerland
- Dr P. Rosenfield
Special Programme for Research and Training in Tropical Diseases, World
Health Organization, Geneva, Switzerland
- Dr A. Smith
Scientist/Entomologist, Ecology and Control of Vectors, Division of Vector
Biology and Control, World Health Organization, Geneva, Switzerland
- Mr Ismet Tan (Temporary Adviser)
Head of Irrigation Drainage Division, General Directorate of TOPRAKSU
(Public Works), Ankara, Turkey
- Mr J. de Wolf (Temporary Adviser)
Project Coordinator, Health and Irrigation Project, International Institute
for Land Reclamation and Improvement, Wageningen, The Netherlands

JOINT WHO/FAO/UNEP PANEL OF EXPERTS
ON ENVIRONMENTAL MANAGEMENT FOR VECTOR CONTROL

Report of the Fourth Meeting

The fourth meeting of the WHO/FAO/UNEP Panel of Experts on Environmental Management for Vector Control was held in Geneva from 1 to 5 October 1984 with Dr R. H. Brooks in the chair.

The outgoing Chairman, Dr R. J. H. Kruisinga, welcomed the participants and requested Dr S. K. Litvinov, Assistant Director-General, to open the meeting on behalf of the Director-General of WHO.

In his opening address, Dr Litvinov recalled that the world was presently faced with a need for a rapid expansion of water resources development projects to meet the growing demands for food, fibre and energy, which had added a new dimension to the problem of vector-borne disease transmission. Chapter II of the Constitution of the World Health Organization prescribes the promotion of the improvement of nutrition, housing, sanitation, recreation, economic or working conditions and other aspects of environmental hygiene, in cooperation with other specialized agencies. This principle is also underlined by the adoption of World Health Assembly Resolution 35.17.

Although it was gratifying that so many of the activities, recommended by the Panel, were now under implementation, it was timely to consider further diversification of the Panel's work. Dr Litvinov mentioned as examples the rapid and uncontrolled growth of urban areas, with their specific vector-borne disease implications, and the need for improvement of housing for control of Chagas' disease as examples. It was obvious that it would be imperative to seek further support over and above the present level of contributions provided by the participating agencies. In this connection, the Panel members could be very instrumental, and its success would, for the most part, depend on their perseverance.

On behalf of the Director-General of FAO, Mr T. H. Mather, Chief, Water Resources, Development and Management Services, reported on the interest in PEEM reports and documents shown by colleagues and agencies engaged in agricultural and rural development. He listed some of the FAO publications which were aimed at promoting the objectives of PEEM, and gave examples of the transition to direct involvement in field activities which is now beginning. At the same time, it had to be recognized that such activities could only represent a minimal impact on the vast problem of vector control and that there was a need to mobilize many institutions and individuals throughout the world to achieve any measurable effect. This must continue to be a major PEEM objective through Panel members, collaborating centres and the participating organizations.

Dr A. Kucherenko, Scientific Affairs Officer, International Register of Potentially Toxic Chemicals, United Nations Environment Programme, Geneva, addressed the meeting on behalf of the Executive Director of UNEP. He stated that UNEP was eagerly looking ahead to the further implementation of activities which could stimulate the incorporation of health and environmental safeguards in both existing and new projects. He referred specifically to the introduction of a schistosomiasis control project in the UNEP 1984/1985 activities. In this framework, UNEP proposed to establish a network of collaborating institutions involved in research and also to introduce selected environmental management elements into the integrated vector control approach.

The opening ceremony was concluded by the election of officers, and by the adoption by the Panel of the provisional agenda and the proposed programme of work for this meeting. The Panel approved the addition of working paper EPO/PE/WP/84.6 under agenda item 9.

INTRODUCTION

In the three years of the Panel's existence, this year has seen the largest number of Panel recommended activities under implementation. The Panel's approved programme of work for the year 1983/1984 has been satisfactorily carried out, and its recommendations were followed to the extent feasible. The progress review by the Panel at its fourth meeting showed that the groundwork had now been properly laid down, and it could be expected that an accelerated implementation of more field-oriented activities would take place.

The Panel's review of the preliminary results of the activities which had been implemented was followed by a discussion on the self-evaluation exercise carried out this year. A new Steering Committee was elected and it presented a report to the Panel.

The proposed programme of work for 1984-1985 was approved and project proposals were scrutinized for their technical value and relevance to the Panel's objectives. A decision was made with respect to the arrangements for the next annual meeting.

The Technical Discussion sessions of the fourth meeting were dedicated to the subject "Institutional arrangements to ensure the incorporation of health and environmental safeguards in water resources development projects". The Panel felt that the information given in the working papers prepared for this Technical Discussion was of great value; this information should, therefore, be made available, on request, to interested readers. Condensed versions of the working papers, and excerpts of the Panel's discussion, are presented in Part II of this Report.

PART I: GENERAL PROGRAMME AND POLICY

1. Review of progress in 1983-1984¹

1.1 Third meeting of the Panel

The WHO/FAO/UNEP Panel of Experts on Environmental Management for Vector Control held its third annual meeting in Rome from 12 to 16 September 1983, with nine members, representatives from three other organizations, eleven Secretariat members, and three temporary advisers present. This meeting resulted in the approval of the proposed programme of work, and several decisions on policy matters were made. Based on the achievements reached so far, and on the statements made by a number of members that a tangible impact of the Panel's activities was being felt in their countries, it was decided to continue along the same lines, maintaining a proper balance between administrative, promotional and technical functions. It was also decided to have an in-depth review of the Panel's achievements in 1986, which would serve as a basis for a decision by the three participating organizations on the way in which the Panel would continue to operate.

1.2 Publication and distribution of the report of the third annual meeting

The report of the third meeting was distributed in 3000 copies through the existing channels of the three participating organizations. It thus reached regional and field offices, UNDP Resident Representatives, and the relevant ministries and other governmental bodies at the country level. As in the past, ICID, ICOLD and FIDIC assisted in the distribution of the report by forwarding it to their national committees and members, which was greatly appreciated. It was generally felt that the report had been favourably received, but there was no significant increase in reactions received in comparison with last year.

¹ Document EPO/PE/84.4, PEEM Secretariat, WHO, Geneva, July 1984.

1.3 Implementation of the Panel's programme of work

1.3.1 Organization of the 1984 Panel meeting

The organization of this meeting was successfully carried out.

1.3.2 Secretariat meetings

Two meetings of Secretariat members from the three participating organizations were held: one in Rome immediately after the third Panel meeting and one in Geneva in May 1984. In addition, an informal consultation of Secretariat members from WHO and FAO was held in Geneva in February 1984. All these meetings proved to be most useful.

1.3.3 Establishment of an international information system

(a) National Water Resources Development Coordinating Boards

Secretariat observations on the present status of institutional arrangements for incorporation of environmental and health safeguards in water resources development projects in Kenya and Ethiopia, together with recommendations for their improvement, are presented in Part II of this report. Such short feasibility studies will continue to be carried out whenever possible. The Panel repeated that, in spite of great differences from one country to another, in the effectiveness of IDWSSD National Action Committees (NACs), priority should be given to investigating ways in which these NACs could be instrumental in the coordination of matters related to the health impact of water resources development projects at country level.

(b) Collaborating Centres (CCs)

Two additional institutions, namely the International Institute for Land Reclamation and Improvement (ILRI) in the Netherlands, and the International Rice Research Institute (IRRI) in the Philippines are being designated as PEEM Collaborating Centres. The representative of ILRI explained the present state of collaboration. In Sri Lanka, an ILRI team will study technical aspects of irrigation relevant to disease vector propagation in order to complement the WHO supported project being carried out under the coordination of SACEP, to which this report refers below. Furthermore, lectures on the vector-borne disease aspects of water management have been introduced into the International Course on Land Drainage as organized annually by ILRI.

The designation of IRRI was justified by the fact that the Panel from the very beginning had recognized the link which exists between methods of irrigated rice cultivation and vector propagation. IRRI had already had an important input in the preparation of the FAO publication "Environmental Management for Vector Control in Rice Fields", which was launched on the recommendation of the Panel.

During the year under review, the existing CCs were requested by the Secretary to suggest study or research items for the furtherance of the Panel's objectives; a response was received from the Tennessee Valley Authority (TVA), which was followed up appropriately by the Secretariat.

(c) International Reference Centre for Environmental Management (IRCEM)

At its second meeting in 1982, the Panel agreed that the establishment of the IRCEM would be pursued at a slower pace.

This year, the Panel provided new suggestions in the form of a follow-up guided by the Steering Committee. The Panel requested the Secretariat to explore the possibilities of establishing the IRCEM in the World Resources Institute, or in Water and Sanitation for Health (WASH, a USAID affiliated

organization) both located in Washington. If this did not prove feasible, it was recommended by the Panel that the various tasks of the IRCEM be defined and spread over more than one institution.

1.3.4 Preparation of a short list of useful references relating to environmental management for vector control

The Ross Institute of Tropical Hygiene, a PEEM Collaborating Centre, has been entrusted with the preparation of this short list of references, under contract with WHO. The project has been delayed, but the Secretariat was very recently assured that the document would be ready before the end of 1984.

1.3.5 Preparation of guidelines

Two sets of guidelines are now under preparation. The Liverpool School of Tropical Medicine is responsible for formulating the guideline for forecasting vector-borne disease implications in water resources development. For this guideline, which is a follow-up activity of the Panel's Technical Discussion at its third meeting, the Secretariat prepared an outline and a proposed matrix format, which were circulated to members and others for review. The comments received have been transmitted to Liverpool and an adequate timetable has been prepared which ensures that the final draft will be ready by the end of 1984.

Two other guidelines were proposed by the Panel during its third meeting, namely: "the incorporation by funding and executing agencies of health considerations into their terms of reference for project planning and monitoring", and "the implementation of World Health Assembly Resolution WHA 35.17". However, after a careful study of their intended purposes, the Secretariat reached the conclusion that these two guidelines could be combined into one.

A team from ILRI has been entrusted with the preparation of this guideline, for the incorporation of health safeguards in water resources development projects: it will provide the necessary technical and administrative guidance for the implementation of WHA Resolution 35.17. The ILRI team charged with this project attended the meeting and submitted an annotated outline to the Secretariat. They have organized a consultative group consisting of representatives from universities in the Netherlands and consulting engineers. This group will define the essential components of the guidelines. The final draft will be completed by the end of 1984.

1.3.6 Technical publications

The publication programme 1983/1984, as shown on page 21 of document VBC/83.4¹, proved to be over-optimistic. The Secretariat member from FAO presented the Panel with the advance copies of the publication "Environmental Management for Vector Control in Rice Fields" which has just been printed. It was published as Document No. 41 in FAO's Irrigation and Drainage Series. Two conclusions can be drawn from the preparation of the paper: first, that there are still many gaps in our knowledge of this topic; and second, the information available on environmental management experiences in the context of rice cultivation is very difficult to retrieve.

In this connection it was considered useful to investigate whether priorities identified by the Panel would slot in with the long term research programme at IRRI; in that case, some of the studies suggested on pages 95/96 of this publication could be carried out as a collaborative activity between PEEM and IRRI.

¹ PEEM. Report of the Third Meeting, Rome, 12-16 September 1983.

1.3.7 The Panel's Newsletter

The English version of the Newsletter is now being published by the World Water magazine, Liverpool, UK; the Panel expressed its satisfaction with the changes in presentation and layout. During the year under review, four issues were published; issue No. 10 was published during the Panel meeting. The publication of the French version has been smooth; it is prepared under contract by the International Training Centre for Water Resources Management (CEFIGRE), Sophia Antipolis, France. The contract with World Water covers publication of the Newsletter up to No. 13, and that with CEFIGRE up to No. 9.

The Panel requested that the Secretariat investigate how distribution of the Newsletter can be further improved.

In order to further increase the visibility of the Panel, it was considered recommendable to explore the possibilities of publishing Spanish and Russian versions of the Newsletter. For the Spanish edition the Secretariat and the Costa Rican Panel member would approach the Pan American Health Organization (PAHO) in Washington, while, for the Russian edition, the Panel member from the USSR would explore possibilities for translation and would prepare a mailing list. In the same spirit, the Costa Rican Panel member offered to provide a list of addresses of the National Councils for Science and Technology of all Latin American countries, to be added to the distribution list of PEEM documents.

1.3.8 Strengthening of the Secretariat

The addition to the Secretariat of the Associate Expert, provided to WHO by the Government of the Netherlands, has greatly facilitated the initiation of field studies and the follow-up of their implementation.

The Panel expressed its appreciation for the support given by the Government of the Netherlands and hoped it would be continued in the future. At the same time, it urged those members whose countries have an Associate Expert Programme to explore further possibilities for strengthening the Secretariat in this manner. The expansion of field activities would also be facilitated if Panel members would follow the same objectives of strengthening manpower through action by their governments, whenever possible.

1.4 Implementation of other Panel approved activities

The study on health problems of water resources development, included in the Panel's programme of work for 1982-1983, was divided into two components:

(a) A study on the global scale of the problem

This study is being carried out by the Liverpool School of Tropical Medicine; a draft paper was received from the principal authors in June 1984. This is presently being circulated in WHO, FAO and UNEP for review.

(b) Studies on vector-borne disease implications of small-scale water resources development projects in Nigeria and Sri Lanka

Both study projects have as their objective to investigate the nature and magnitude of the vector-borne disease implications resulting from small-scale water resources development. Each project envisages the preparation of a reasonably precise inventory of small-scale irrigation schemes; a comparative field study in which vector-borne disease situations in ecologically similar areas with and without irrigation are compared; and a final analysis with practical recommendations for corrective environmental management measures. In this connection, the Secretariat was requested by the Panel to refer to FAO

the preparation of a clarifying paper on the definition of "small-scale" in the context of water resources development, for presentation to the Panel at the next meeting.

The Panel member from Nigeria, who is the principal investigator for this project in his country, presented a progress report to the Panel.

A first draft of the inventory has been received from Sri Lanka; the Secretariat informed the Panel that unfavourable weather conditions and a delay in delivery of essential equipment had caused a set-back in the original project schedule. In Sri Lanka, the project team consists of professionals from the Anti-Malaria Campaign, the Anti-Filariasis Campaign and the Medical Research Institute under the coordination of the South Asia Co-operative Environment Programme (SACEP), the Director of which is a Panel member. As was mentioned before, ILRI contributes to this project by carrying out field water management and related agricultural studies.

It is expected that reports on the outcome of these studies will be presented at the next Panel meeting in 1985.

1.5 Implementation of the Panel's recommended projects

1.5.1 Projects already initiated

- Project (a): "Strengthening of engineering and agricultural educational institutions in environmental management for disease/vector control". The College of Engineering, Anna University, Madras, India, has agreed to incorporate lectures on health implications of water resources development, and on environmental management for vector control, in the relevant regular engineering courses offered by the College. The experiment will cover one academic year, and a report will be prepared on this experiment for distribution by PEEM.

- Project (e): "Preparation of training aids". This project is near completion and a final draft of the brochure which will accompany the set of slides and overhead transparencies will be available before the end of this year. This set will be made available through the PEEM Secretariat and through the Unit of Ecology and Control of Vectors (ECV) of WHO, the Chief of this unit provided the participants with handouts on the training aids on vector control already available, and a list of places where M.Sc. courses in medical entomology are being organized.

Project (f): "Organization of pilot operations in disease control programmes for incorporating simple environmental management measures". A project proposal for such pilot operations was formulated by the Nepal Malaria Eradication Organization with assistance from the Secretariat, which is actively seeking funding for it. A short explanation of the background and objectives of this proposed project was made available by the Secretariat.

- Project (g): "Preparation of guidelines for carrying out health/environmental impact studies". The preparation of these guidelines, which focus on a practical approach for carrying out environmental impact assessments for water resources development projects in the developing countries, was entrusted to the Asian Institute of Technology, Bangkok, Thailand. A final draft of this document was received in June 1984, and is, at present, being circulated for review to selected Panel members, WHO, FAO, UNEP and others.

1.5.2 Projects under implementation by other institutions

- Project (b): "Seminar on prevention and control of health and environmental problems in water resources development projects". Several short courses have been, or are being, organized this year by institutions in different geographical regions, on their own initiative and without financial support from PEEM. A list of these courses was presented to the Panel. Special mention should be made of the initiative by the Japanese Association for Tropical Medicine, which organized a symposium for engineers on environmental management for vector control in water resources development projects in Tokyo and Toyama in July 1984. The Director of the Division of Vector Biology and Control of WHO, who participated in this symposium together with some Panel members, gave a short account on it. It should be noted that this symposium took place as a result of the Japanese member's promotional activities. The Panel was informed that there is now a notable change in policy at the Japanese International Cooperation Agency, which is showing an increasing interest in the field of health related to water resources development.

1.5.3 Projects for which implementation is being planned

- Project (d): "Training courses on prevention and control of health and environmental problems in water resources development projects in arid and semi-arid zones".

Discussions have been going on with the WHO Regional Office for the Western Pacific (WPRO) on the possibility of organizing a training course some time in 1985, probably in Malaysia, for a multidisciplinary audience, covering the subjects in project (d).

The possibility of organizing a regional training course in Kenya is under review by the Secretariat.

The Costa Rican Panel member offered to explore the possibilities for organizing a regional training course of this kind in his country, for participants from Mexico, Central America and the Caribbean.

The Panel considered the developments to be very encouraging. It decided to delete Project (k): "Training course in vector ecology and control in development", since it was felt this title indicated a scope which was at present considered to be too wide in relation to the Panel's objectives.

1.5.4 Projects for which implementation possibilities are to be sought

- Project (c): "Seminar on prevention and control of health and environmental problems in water resources development projects" (to be held in a developing country, with field observations).
- Project (h): "An assessment of the effectiveness and the long-term economy of canal lining for vector control".
- Project (i): "Field tests of equipment for environmental management related to vector control".
- Project (j): "Studies on the socio-economic impact of environmental management measures".

With respect to project (c) the Panel members from Egypt and Nigeria both offered to explore the possibility of organizing training seminars in their respective countries which in principle would have a regional character.

The Panel member from Egypt indicated that the Water Research Centre of the Egyptian Ministry of Irrigation would be interested in implementing Project (h), in collaboration with other national agencies. He would coordinate appropriate arrangements in this respect with the PEEM Secretariat.

1.6 Implementation of the Panel's Recommendations

1.6.1 Additional Panel members

In an effort to comply with a recommendation by the Panel to accelerate the broadening of the Panel's composition, five new members have been designated. As a result, the Panel now has members with expertise in anthropology/sociology, ecology and public health research administration, in addition to the many disciplines already represented. Geographically, the representation in the Panel has been expanded to include Australia, Costa Rica, India, Indonesia and Switzerland. A list of members is given in Annex I.

1.6.2 New participating organizations

In line with the recommendation to make a continuous effort to prevail upon major financing institutions to become participating organizations, the Secretariat contacted the Asian Development Bank (ADB). Although the latter appreciates the importance of the Panel's objectives, it declared that it was not presently in a position to accept an invitation to become a participating organization. A similar reply was received from the World Bank by last year's Panel Chairman, who had taken an initiative to contact an official of that institution.

1.6.3 In-depth review of the Panel's performance in 1986

The Panel agreed to the Secretariat's proposal to prepare a draft report for approval by the members during its 1985 meeting. In accordance with this decision, the discussion of this draft report, in which the in-depth review will be presented, has been included as a separate item in the proposed agenda for the next meeting. This report will be finalized after approval by the Panel as a separate document for submission to the executive heads of the participating organizations.

1.6.4 Participating organizations' support for the Panel

The Panel found it gratifying to learn that support for the organization of PEEM meetings has been upgraded from priority II to priority I in the UNEP budget proposal 1986-1987 for the System-Wide Medium-Term Environment Programme. The UNEP Secretariat member stated that, in this way, his organization intended to underline once more the importance it attaches to the Panel and its activities.

1.7 Financial report

The accounts for the contributions from the three participating organizations in 1982 and 1983 towards the costs of the second and third annual meetings were closed at the end of the WHO budget cycle for that biennium (i.e. 31 December 1983). While UNEP, at its request, was charged one third of the cost of the second meeting and a total of \$17,500 for the third meeting as per its instructions, there was a balance of \$7,100 from FAO's contribution. Authorization was subsequently received from FAO for this amount to be used for other Panel recommended activities.

The two contributions of UNEP for the costs of reporting and the PEEM Newsletter, each amounting to \$11,000, were almost totally expended on the contracts for issuing the Newsletter on behalf of the Panel.

The UNEP contribution of \$12,000 to support the Panel recommended Project (g), "Preparation of guidelines for carrying out health/environmental impact studies", was entirely spent on the two contracts with the Liverpool School of Tropical Medicine and the Asian Institute of Technology for the preparation of the guidelines.

The allocation of \$50,000 approved by the Director-General of WHO, from his Development Programme for 1982/1983, was used to cover the costs of publishing the PEEM Newsletter during the first year, consultancy services, research activities, promotion of collaboration, supporting services and administrative expenditures.

The Director of the Division of Vector Biology and Control (VBC), WHO, approved, in 1983, a total of \$58,000 to support Panel recommended activities and projects. This amount was used to sponsor Project (a), "Strengthening of engineering and agricultural educational institutions in environmental management for disease/vector control"; Project (e) "Preparation of training aids"; and the two field research projects in Nigeria and Sri Lanka.

For the implementation of new activities, the Director-General of WHO approved another allocation, this time amounting to \$58,000, from his Development Programme for 1984/1985, to support pilot projects for incorporation of simple environmental management methods into national malaria control programmes (Panel recommended project (f)) and preparation of guidelines for incorporating health safeguards in water resources development projects (items (e) (i) and (e) (ii) of Panel's programme of work for 1983/1984).

The Director VBC, WHO, has again approved an amount of \$5,000 from his divisional budget for 1984 to continue support for the field study in Sri Lanka. He has also agreed to absorb, insofar as possible, the cost of administrative support necessary to maintain the routine activities of the office of the PEEM Secretary.

The Netherlands Government has agreed to increase the 1984 travel budget for the Associate Expert provided to WHO by \$4,100. This is a "cash" input from a source other than the participating organizations. Hence it is of particular significance and deserves special mention.

1.8 Concluding remarks

In its concluding discussions concerning the annual report for 1983-1984, the Panel expressed its satisfaction that an apparent transition was taking place from promotional activities, which aim at increasing the level of awareness in various target groups, to a stage of active implementation of field projects. Several members stated that they would like to see this transition accelerated. However, it was understood that, in order to achieve this, the Secretariat would need to be further strengthened. The promotion of intersectoral collaboration between responsible ministries at the national level, and the United Nations specialized agencies at the international level, was considered a key element, which required further promotion.

The Panel also would like to see an increase in active involvement of the regional offices of the participating organizations. The role of Resident Representatives, Country Representatives and Programme Coordinators needs to be scrutinized to find ways in which they can more actively promote field projects.

2. Steering Committee

2.1 Election of a new Steering Committee

During the second annual PEEM meeting in Nairobi in 1982 the Panel decided to form a Steering Committee, for which it prepared and approved

provisional terms of reference. Five Panel members were elected to serve on this Committee; they had now completed their period of tenure, which was laid down in the provisional terms of reference as two years.

The Panel therefore selected the following members for the new Steering Committee:

- as Chairman: Dr R. J. H. Kruisinga
- as members: Dr R. H. Brooks (ex-officio)
Dr C. Harinasuta
Prof. V. Ramalingaswami
Dr R. Zeledón.

The terms of reference for the Steering Committee, drafted by the Secretariat in their final form, were discussed by the Panel. The Steering Committee was originally formed in order to concentrate the fund-raising efforts of Panel members in a single authorized body. The Panel agreed that the terms of reference of this Committee should be expanded to include also policy-making functions. In general, a more active approach by the Committee was considered highly desirable, but, at the same time, it was recognized that this would only be feasible if the Committee could meet twice a year: once at the time of the Panel meeting, and once some time in the middle of the Panel's budget year. The proposed terms of reference were therefore approved on the condition that function 1.3 would be deleted from them if no financial support was found for the organization of this extra meeting of the Steering Committee. The approved terms of reference will be found in Annex II.

2.2 Report of the Steering Committee

After the newly elected Steering Committee members had met, its Chairman presented a report to the Panel, which focused on the following points:

- (a) The desirability of two types of approach to obtain more support from donor agencies and countries, namely:
 - (1) preparation of a position paper focusing on the link between water resources development, environment and health on a global scale;
 - (2) preparation of a priority list of project proposals for circulation to donor agencies and countries.
- (b) The endorsement and strong support by the Committee for the suggestion to approach the World Resources Institute and WASH as possible candidates for the IRCM.
- (c) The need for preparation by the Secretariat of a core paper presenting the Panel's objectives, activities and achievements to World Health Organization Headquarters and Regional Office Advisory Committees for Medical Research.
- (d) The need for improvement of the information dissemination, including translation of the Newsletter into Spanish and Russian.
- (e) The need to improve the communication among Steering Committee members in order to achieve a more active approach as envisaged by the Panel in the approved terms of reference. It was recognized that this communication would be significantly improved by increasing the frequency of Steering Committee meetings from once to twice a year.

The Secretariat was requested to explore the possibility of raising the annual contribution by each participating organization from \$17,500 to \$20,000 to make this possible.

In addition, the Chairman of the Steering Committee presented copies of two papers to the Panel members for their information, entitled "Economic aspects of environmental accounting" and "Results of an economic scenario giving top-priority to saving the environment and energy instead of encouraging production growth", prepared by the Netherlands Bureau of Statistics.

3. Assessment of the Panel's impact and members' experience

3.1 Introduction

During the third annual meeting of the Panel in September 1983, it was decided to include a review of the Panel's impact and a discussion on Panel members' experience as a separate point on the agenda of the fourth annual PEEM meeting.

The Secretariat complied with this decision by designing a questionnaire which would permit adequate collection and subsequent analysis of data on the Panel's impact; this was forwarded to all Panel members and to the six WHO Regional Offices.

The questionnaire aimed primarily at assessing the members' individual perception of the Panel's impact and level of success in achieving its main objective, the promotion of environmental management for vector control. Furthermore, it aimed at assessing the scope and depth of the impact, at national level as well as on the bilateral and multilateral assistance agencies. The Panel members' opinion was requested with respect to the quality of the present structural and functional characteristics of the Panel. Finally, the quality of information dissemination and the level of feedback from the target readership was questioned. The outcome of this self-evaluation exercise is presented in Annex III.

3.2 Conclusions

Of the thirty-one members to whom a questionnaire was sent, fourteen replied. This low return rate makes it rather difficult to draw valid conclusions from this self-evaluation exercise, since less than half of the available information was obtained, and the overall picture, therefore, is far from complete. In this case, it is more appropriate to try to extract from the results of this exercise the improvements which can be applied to achieve a greater impact. From the return rate itself can be concluded that more work needs to be done to stimulate Panel members to participate actively in and to contribute to the Panel.

Most members indicated that they noted an increased awareness of the need to pay more attention to the vector-borne disease aspects of water resources development projects and the importance of intersectoral collaboration in this connection. It is, however, clear that this has not resulted in any concrete steps being taken to establish adequate institutional arrangements. The Panel should therefore find ways to promote these arrangements, and especially their intersectoral component, now that a sufficient level of awareness has apparently been achieved. A group which has not been reached by the Panel's promotional activities in quite a few countries seems to be that of the planners and decision-makers. The Panel will have to give considerable thought to how to reach this group.

Another very important conclusion which can be drawn is that the Panel's promotional activities have not been sufficiently community-oriented. In view of the fact that community participation is instrumental in the development process as a whole, and considering that environmental management by its very

nature is a means of vector control which lends itself very well to application by the community, the Panel should devise mechanisms to reach this target group.

It is important to point out at this point that the Panel members' experience in the promotion of environmental management for vector control has been encouraging and satisfactory. In the three and a half years of its existence a notable increase in awareness of the need to solve potential and existing vector-borne disease problems by means of environmental management has occurred, which is very rewarding. The Panel's next task will be to transform this awareness into concrete applications, a goal which can only be achieved by a continued promotional effort by the Panel as a whole, and by individual Panel members, to ensure financial support for such undertakings from bilateral and multilateral assistance agencies.

3.3 The Panel's observations

In the discussion following the presentation of the results of this exercise, several members took the opportunity to give additional information on the Panel's impact and on their individual experience in this connection.

The Panel was informed that in Sweden the impact of PEEM's promotional activities had resulted in an increased awareness about health hazards of water resources development projects in the tropics. Consequently, the Swedish International Development Agency (SIDA) is now considering whether to include the application of appropriate preventive measures in its strategy for supporting water resources development projects. Reference was made to two seminars organized in Sweden: the UN interregional seminar on Rural Water Supply and Health (Stockholm, 1980) and the interdisciplinary seminar "Water for All", organized at the University of Linköping (1984). The latter seminar focused on three important aspects: (1) the need for coordination with other groups or agencies working at the village level; (2) the critical importance of local participation; (3) the importance of education and the potential role of women as teachers for other women. With respect to the last-mentioned, it was suggested that in any community-oriented activity initiated by the Panel, consideration should be given to the role women can play. The proceedings of both seminars were transmitted to the Secretariat.

The Panel was also informed about the developments which had taken place recently in Nigeria with respect to PEEM; these indicate increased awareness of the impact of environmental changes on vector-borne disease transmission. A coordinating committee for water resources, operating on a ministerial level, was established to coordinate activities of three national sub-committees on: (a) Water Supply and Sanitation; (b) Irrigation and Drainage; and (c) Large Dams. These sub-committees are respectively affiliated to the international arrangements and bodies for the International Drinking Water Supply and Sanitation Decade (IDWSSD), the International Commission for Irrigation and Drainage (ICID) and the International Commission on Large Dams (ICOLD). The sub-committee on Irrigation and Drainage has officially taken responsibility for the promotion of PEEM's objectives in Nigeria. Copies of correspondence relevant to this matter were presented to the Panel. This guarantees a meaningful support for PEEM at the decision-making level in Nigeria. It is precisely at this level that it is widely believed that a negative vector-borne disease impact of water resources development is unavoidable in the long run. Managers and planners have to be convinced of the effectiveness of preventive measures.

The lack of sufficient and adequate intersectorial collaboration, which should be stimulated on a national level among ministries and on an international level between UN agencies, was still a matter of concern to the Panel. Ways and means should be devised to improve intersectorial collaboration in compliance with the Panel's objectives. Some Panel members spoke of their experience with the World Bank, which requires a health

component to be included in the water resources development projects it sponsors. In this connection, the Secretariat informed the Panel of the continuing contacts with Mr José Olivares of the World Bank, who is carrying out case studies for a UNDP funded project in the field of investment priorities in irrigation. This project takes health into account as a major component within the overall framework of its studies and analyses.

A letter from the World Bank was recently received by the Chairman of the Steering Committee, reiterating that the Bank cannot join the Panel as a participating agency, but that its officials are ready to provide the Panel with all relevant documentation. The Panel felt strongly that other donor agencies should also be approached in order to collect information to facilitate an assessment of their present policies and views on the incorporation of health safeguards in water resources development projects.

With respect to Egypt, the Panel was informed that the increased awareness among engineers had led to a need to develop more training activities in this particular field; the suggestion that Egypt could host one or two of these courses was welcomed by the Panel, to which the Secretariat added that courses organized in Egypt should be given in Arabic to better serve the region. The lack of impact at community level was considered another important issue for concern; it was recommended that the subject of "Community participation in environmental management for vector control" be selected as a topic for extensive discussions at a future meeting. It was stated that the apparent failure of PEEM to reach the community mirrored the experience of International Drinking Water Supply and Sanitation Decade in many countries, and that mechanisms must therefore be designed to reach the community with useful information and with simple and effective tools.

Finally, the Secretariat made reference to the International Conference on "Water Management and Food Production" to be organized by the Texas A & M University, USA, in May 1985. FAO has been asked to participate: if this is approved, it will prepare a paper to reflect PEEM's objectives and activities. The conference is being organized to further cooperation between universities in the USA, bilateral and multilateral assistance agencies and developing countries.

4. Programme of Work for the Panel, 1984-1985

The Panel reviewed the draft programme of work submitted by the Secretariat for the period October 1984 to October 1985 and approved it, after the addition of some amendments.

(a) Organization of the next Panel meeting in 1985

The fifth annual PEEM meeting will be held from 7 to 11 October 1985 in Bangkok, Thailand. As usual, twelve Panel members will be invited to attend the meeting.

The Panel requested that the Secretariat explore the possibility for the participating organizations to raise their annual contribution each by \$2,500, in order that an extra mid-term Steering Committee meeting could be organized. Should this increase become effective, then the title of this topic should read: "Organization of the next Panel meeting and of a mid-term Steering Committee meeting in 1985", and the budget indicated hereafter will be adjusted accordingly.

Estimated budget: US\$ 52,500

(b) Secretariat meetings

Two meetings of Secretariat members from the three participating organizations are scheduled for the coming year: one immediately after the

present meeting of the Panel, and the other in May/June 1985. As in previous years, all expenses for these meetings will be covered by the participating organizations.

(c) Establishment of an international information system for environmental management

(i) National water resources development coordination boards

The feasibility of including environmental management for vector control in the functions of existing national action committees for the IDWSSD, already under study by the Panel, will continue to be explored. As before, PEEM members are asked to try to conduct these studies through their institutions, with the Panel covering additional costs entailed.

Estimated budget: US\$ 6,000

(ii) Collaborating centres (CC)

Two additional institutions - the International Institute for Land Reclamation and Improvement (ILRI), in the Netherlands, and the International Rice Research Institute, in the Philippines - are in the process of being designated as PEEM CCs. The CCs will serve as focal points for advice, studies or research items, thus forming a network with wide geographical coverage and diverse scientific and technical capabilities. The CC will undertake studies on a contractual basis on behalf of PEEM, for the furtherance of its objectives.

Estimated budget: US\$ 8,000

(iii) International Reference Centre for Environmental Management (IRCEM)

Until an IRCEM can be designated, the PEEM Secretariat will continue to try to meet requests for information and advice from its own resources and from those of its participating organizations. Any additional costs for this service will be met through a PEEM contribution.

Estimated budget: US\$ 5,000

(d) Technical publications

The following publications will become available during the period October 1984 to October 1985. The first three items are carried over from 1983/1984, and details will be found in document VBC/83.4, subsections 1.3.4 and 1.4.1.

- (i) The global scale of health problems of water resources development.
- (ii) Health problems in small scale water resources development projects.
- (iii) Incorporation of health aspects in the courses relating to water resources development offered by universities to engineering students.
- (iv) Guidelines for forecasting vector-borne disease implications resulting from the development of water resources projects (Liverpool School of Tropical Medicine).
- (v) Guidelines for environmental impact studies (Asian Institute for Technology).

- (vi) Guidelines for the incorporation of health and environmental safeguards in water resources development projects, and terms of reference for project development organizations (ILRI).

In addition to costs already provided for in the preparation of these documents, some PEEM budgetary provision may be needed for associated costs.

Estimated budget: US\$ 3,000

(e) The Panel's Newsletter

It was decided that this activity should be continued in the same manner as in the previous year, apart from the change of publisher for the English version. The Panel requested the Secretariat to seek additional funds, amounting to US\$ 7,500, to make the publication of the Spanish and Russian versions of the Newsletter possible. If obtained, the budget indicated hereafter will be adjusted accordingly.

Estimated budget:

English version	US\$ 6,000
French version	US\$ 5,000
	<u>US\$ 11,000</u>

These amounts include the costs of editing, publishing and distribution.

(f) Strengthening of the Secretariat

It was agreed that a provision similar to that of the previous year, as detailed below, would be made for 1984/1985.

Estimated budget:

- Contractual technical, administrative and clerical services	US \$ 10,000
- Duty travel, Secretary	US \$ 10,000
- Miscellaneous and contingencies	US \$ 5,000
	<u>US \$ 25,000</u>

The Panel noted that country visits by the members of the Secretariat are very instrumental in accelerating the transition towards more field activities and asked the participating agencies to give priority support to such visits.

BUDGET SUMMARY

<u>Item</u>	<u>As approved</u>	<u>If amended</u>
	<u>US\$</u>	<u>US\$</u>
(a) Organization of the next Panel meeting	52,500	(60,000)
(b) Secretariat meeting	-	
(c) Establishment of an international information system	19,000	
(d) Technical publications	3,000	
(e) Newsletter	11,000	(18,500)
(f) Strengthening of Secretariat	<u>25,000</u>	
Total (Annual contributions)	US\$ 110,500	(125,500)

5. Project Proposals for 1984/1985

The Secretariat submitted four project proposals which had been received from WHO and UNEP for consideration by the Panel.

5.1 Effect of azolla cultivation on the mosquito fauna in ricefields

Azolla is an aquatic fern which, in symbiotic association with the blue-green alga Anabaena Azollae, has the property of fixing atmospheric nitrogen. Because of this property it has been promoted for cultivation in lowland irrigated ricefields as a cheap and environmentally safe substitute for artificial fertilizers.

No information exists concerning the possible effect which the ecological changes caused by the introduction of azolla may have on the mosquito fauna in ricefields, which in China include such important vector species as Anopheles aconitus, A. sinensis and Culex tritaeniorhynchus. The fact that the symbionts grow as a layer on the water surface would suggest an effect on the quality and quantity of potential breeding places. The Panel agreed to include this proposal in the list of projects to be carried out, with the incorporation of a suggestion by two Panel members to also include a study on the toxic effects of different species of the genus Anabaena.

5.2 Preparation of training course curricula/syllabi on the health and environmental impacts of water resources development

In order to facilitate the introduction of education on health and environmental aspects of water resources development on a larger scale, training programmes need to be developed (a) for implementation in university courses, at the undergraduate level, on civil engineering and agricultural sciences and (b) for institutions offering special education for environmental managers. The Panel endorsed the proposed approach to resolve the present lack of public sector cadres, particularly in developing countries, and to promote the introduction of environmental management measures for disease vector control at the planning stage of development projects.

5.3 Introduction of environmental management in urban vector control programmes

The Panel approved the objective of this project proposal, which is to identify those environmental management and sanitation methods for vector

control which are relevant under urban conditions; its purpose is to demonstrate the effectiveness of such measures as part of an integrated urban vector control approach, and to study the cost/benefit of these measures as compared to conventional chemical control methods.

5.4 Studies on the effectiveness of environmental management measures under different ecological circumstances in rural areas

The Panel approved of the proposed pilot studies on the effectiveness of environmental management measures for vector control under rural conditions. These will indicate the cost/benefit ratio of environmental management as compared to chemical control. Recommendations will be made as to which environmental management measures are most suitable under which circumstances.

No funds are presently available to carry out any of the above activities; support for specific projects will be sought from the participating agencies, from individual donor countries or from international donor agencies.

6. Arrangements for the next meeting

At the third annual PEEM meeting in 1983, the Thai Panel member, on behalf of the Faculty of Tropical Medicine of Mahidol University, Bangkok, and of the SEAMEO TROPMED Project, invited the Panel to hold its fifth meeting in Bangkok.

The Panel reviewed the implications of holding its next meeting in Bangkok. It took account of the financial implications and concluded that the proposal was feasible in this respect. The possibility of organizing a Panel meeting in one of the members' countries rather than at the Headquarters of the participating organizations was in accordance with earlier recommendations made by the Panel. It was considered very important that the Panel members could make on-site visits to water resources development projects and observe the local problems in a real-life scenario. In this connection, it was agreed that in principle, the Panel would try to alternate between having its meeting in a Panel member's country and at one of the participating organizations' headquarters.

The Panel agreed that the fifth Panel meeting will be held from 7 to 11 October 1985 in Bangkok and that the number of Panel members invited would be 12. The provisional agenda as approved is shown in Annex IV.

The Panel expressed its gratitude to the Faculty of Tropical Medicine of Mahidol University and to the SEAMEO TROPMED Project for their kind invitation.

The Panel chose "The environmental impact of population resettlement and its effect on vector-borne diseases" as the subject for Technical Discussion.

It was understood that should the organization of the meeting in Bangkok become impossible because of unforeseen circumstances, the FAO is prepared to host the meeting at its headquarters in Rome.

7. Recommendations:

- (1) The Panel, basing itself on the outcome of this year's self-evaluation exercise, recommends that the Secretariat takes action on the following points:
 - investigation of the possibility of devising means to make the impact of the Panel's promotional activities better felt at community level;
 - broadening of the scope of promotional activities to reach government officials, planners and decision-makers;

- stimulating the active involvement of the agencies' regional offices in the identification, initiation and follow-up of field activities relevant to the Panel's objectives.
- (2) The Panel, observing the results of this year's self-evaluation exercise, and in particular the response rate of the questionnaire, and considering that the individual Panel members' input can be highly instrumental in achieving the Panel's objectives, recommends that all members make an effort to increase their level of active contribution to the promotion of the Panel's objectives, by any means or through any channel available to them, and to become more alert in identifying activities in their countries which are of interest to the Panel, and in communicating these to the Secretariat.
 - (3) The Panel, considering that the parameters studies on the pre-feasibility and feasibility assessments for water resources development projects are almost exclusively expressed in terms of cost-effectiveness and expected economic output, and observing that the lack of knowledge with respect to the cost-effectiveness of incorporating health and environmental safe-guards in water resources development projects limits their implementation, recommends that the participating agencies give priority to studies which aim at the collection of relevant available data or at eliciting new data on the long-term cost-effectiveness of environmental management measures to enable planners and decision-makers to take the economic impact of negative health hazards into account.
 - (4) The Panel, considering the magnitude of the vector-borne disease problems caused by the already existing irrigation and other water development activities, and being aware of the fact that water management can be significantly improved in many of these cases, recommends that the participating organizations actively seek support for any efforts and projects which aim at the improvement of the water management in existing irrigation schemes, with the objective of diminishing vector-borne disease transmission.
 - (5) The Panel, convinced of the imperative need to establish suitable institutional arrangements in order to ensure incorporation of health and environmental safeguards in water resources development projects, recommends that the participating organizations give a broad distribution to information on this subject, make the original working papers for the Technical Discussion on this subject available on request, and assist Governments in the assessment of the present status of institutional arrangements, the identification of new and improved organizational structures and the implementation of these in an adequate manner.

PART II: TECHNICAL DISCUSSION

Institutional arrangements to ensure the incorporation of health and environmental safeguards in water resources development projects

1. Introduction

In recent years, health hazards (especially those concerning vector-borne disease), resulting from environmental changes caused by water resources development, have been clearly recognized. As a result, the incorporation of preventive measures in project designs and operating schedules has been actively advocated. However, adequate attention, in many cases, has still not been given to such hazards, and their prevention, due, to a significant extent, to the lack of appropriate institutional arrangements.

The management responsibility for a water resources development project usually is assigned to a project authority, located in a governmental engineering department or ministry, where in-house expertise on health and environmental problems may not be readily available. In many instances, the organizational structure of the project authority, and of its mother department or ministry does not facilitate effective intersectoral collaboration. In addition, financial constraints may prevent the incorporation of health and environmental safeguards into any given project.

2. Elements of ideal institutional arrangements¹

Generally speaking, one can state that, even though several technical measures for the prevention of vector-borne diseases are known, their application with respect to planning, design and implementation of water resources development projects has not been implemented to a sufficient extent, due to shortcomings in planning the project organization and management.

A review of the health component in three major water resources development projects in Africa has provided an opportunity to list a number of more concrete reasons why, in these and probably in other projects, health management was less than satisfactory:

- (1) a time factor: adverse health effects reach their full impact after a prolonged period;
- (2) a discrepancy between national and local needs and benefits;
- (3) health is not given priority as a development goal;
- (4) no legislative base exists for the introduction and enforcement of health measures;
- (5) a lack of administrative cohesion between sectors and vertical administrative levels;
- (6) a lack of basic health information; and
- (7) a lack of community orientation with regard to health intervention.

In this chapter, arrangements which ensure incorporation of health and environmental safeguards are defined, and suggestions are made for ways to introduce these into water resources development projects, assuming one is dealing with "ideal" circumstances.

¹ Document EPO/PE/WP/84.1: Elements of ideal institutional arrangements conducive to the incorporation of health and environmental safeguards in water resources development projects, by W. T. Lincklaen Arriëns, J. M. V. Oomen and J. de Wolf, International Institute for Land Reclamation and Improvement, Netherlands.

2.1 What is meant by institutional arrangements?

Institutionalization is a complex concept. The term, "institutional", is meant to refer to:

"Known legal and administrative processes and structures through which decisions are made with respect to public policy. The processes and structures consist of laws and regulations that govern the distribution of benefits and costs, and set the basic rules for conflict resolution. They include also informal procedures by which conflicts are regularly resolved when laws are unclear or not consistent with the actual distribution of power in the policy network".¹

Organizational and managerial aspects are often identified as the principal bottlenecks in the functioning of institutions. Generally, potential problems resulting in organizational constraints concern: coordination, communication and commitment.

Institutional arrangements conducive to the incorporation of health and environmental safeguards in water resources development projects should therefore include not only the design of appropriate organizations, or of units within existing organizations, but also the improvement of work relationships between organizations (coordination, collaboration), the strengthening of the managerial capacity within organizations, the improvement of planning and management, and all activities aiming at intensifying commitment at various levels.

2.2 Water resources development projects

Both negative and positive influences on "Health and Environment" depend, to a large extent, on the type of water resources development project concerned and on the management structure of such projects. A short review of types of projects and of their organization/management structure may be useful.

2.2.1 Types of project

A common subdivision of types of water resources development projects is as follows: irrigation/drainage projects; rural water supply; hydro-electric schemes; flood control; miscellaneous. The majority of the economic water-related activities for many countries are concerned with irrigation/drainage projects; a further subdivision used is: large-scale formal schemes; small-scale formal schemes; small-scale informal schemes (village-type development); and private schemes based on pumping. For details the report of the third PEEM meeting should be consulted: Part II - Technical Discussion, chapter 2.1: types of project and their potential for socio-economic change (VBC/83.4, pages 27-29, WHO, Geneva, 1983).

2.2.2 Organization/management structures

There are two main types of organizational structures:

(1) the segregated approach: this implies the existence of dynamic social groups, which develop their own organizational structure according to needs;

¹Water Resource Research, Vol. 20, No. 3 March 1984, pp.323-334: Guidelines for improved institutional analyses in water resources planning, by Helen M. Ingram et al.

(2) the integrated approach: this implies centralized management, providing for the needs of the individuals. A complex organization is required to cover all eventualities. The ultimate goal is achieved through the interaction of several organizational units: each one aims at lower goals; all are connected through a clear line of command. These organizational structures are frequently referred to as "project authorities" or "project organizations", since they deal with most of the technical and socio-economic issues of an irrigation project in an integrated manner.

Integrated organizational structures may be very adequate for the solution of problems of coordination at the national level, but in order to be able to do so, they must be well-organized, equipped with competent technical staff and provided with sufficient financial means to be able to undertake their many responsibilities successfully. The first requirement is the existence of a central/national institution capable of procuring the technical and financial support necessary at the project level; the second requirement is a willingness on the part of the government to delegate a considerable amount of authority and autonomy to the individual project authorities. Otherwise, a permanent conflict will emerge between the project authority and the department of the national institutions dealing with credit, research, extension and health.

The main types of irrigation organizations are presented in Table 1. A short explanation is useful for some of them.

(a) The most complex of the integrated management organizations are the Irrigation Settlement Projects. It should be decided how to integrate or coordinate the wide variety of services needed, each of which may depend on a different ministry. The formation of a coordinating committee in charge of overseeing the responsibilities of the different institutions is, in theory, the easiest way. However, such an arrangement has seldom worked in developed countries and is much less likely to succeed in developing countries, where financial constraints and organizational problems are greater. Therefore, the solution of a single integrated organization providing most of the social and technical services, is normally preferred.

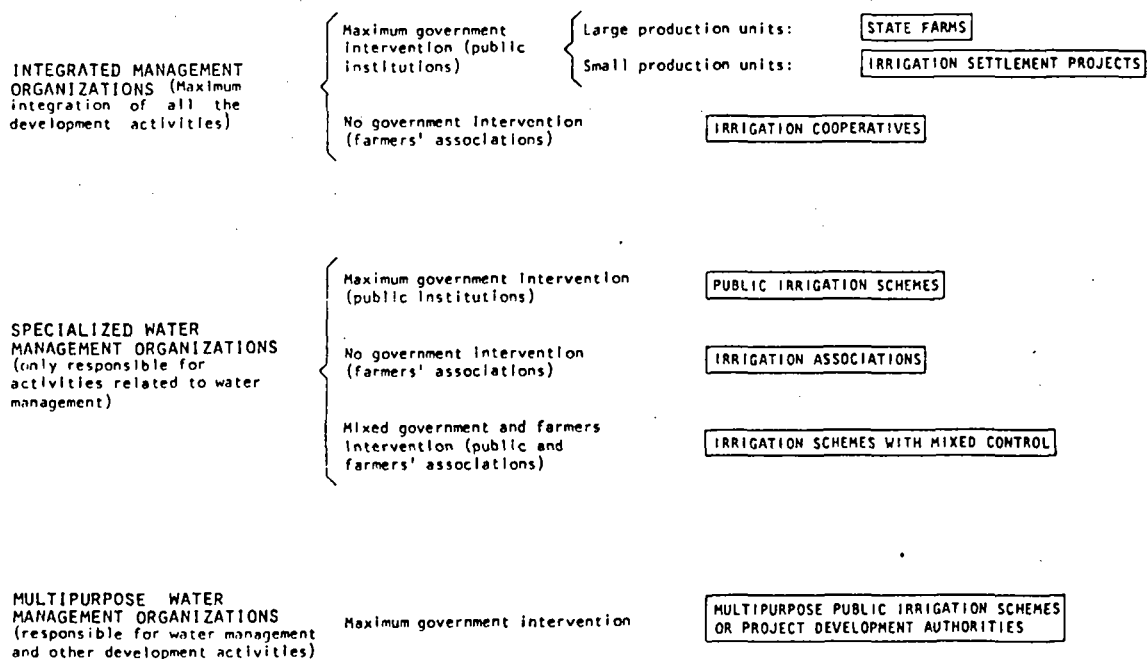


Table 1.
Main types of irrigation organizations
(as defined by FAO 1982)

(b) Specialized water management organizations.

A specialized water management organization can be broadly defined as a social organization arranging the appropriate use of water for irrigation purposes for the farmers of a community.

The functions of specialized water management organizations are: operation of irrigation and drainage systems; maintenance of the systems; and the assessment and collection of water charges. They are assisted by certain general management services (finance, personnel, planning and monitoring). The degree of intervention by the government, and by the farmers, in carrying out these functions is the criterion used to distinguish the main types of specialized water management organizations, which are:

(i) Public Irrigation Schemes.

These institutions are usually closely connected to the organization involved in the construction stage of the irrigation project. Frequently, most of the executive and administrative personnel employed during the construction period continues to run the irrigation scheme after its completion. The risk involved in this organizational structure is that too little attention may be paid to agricultural problems.

The important features of this organization are:

- When farmers have little or no experience in irrigation, a public irrigation scheme is the only way of running an irrigation scheme during the initial stages. When the farmers have learned enough about the scheme, they can handle it themselves.
- To function properly, a public irrigation scheme needs strong institutional support at the national level. In other words, these organizations should be part of an autonomous or national institution dealing with the management of irrigation schemes.

For the purpose of providing additional services which do not fall under the direct responsibility of a public irrigation scheme, a "Supervisory Board" could be established on which representatives of the institutions responsible for providing the services are members, together with the farmers' representatives.

(ii) Multipurpose water management organizations.

A multipurpose water management organization is characterized by having responsibilities directly related to water management, and some others, which may include irrigation extension, research, water quality management, marketing, etc. These responsibilities are based on a careful examination of functions needed in the project that cannot be effectively provided by existing institutions. Therefore, multipurpose organizations basically take the form of a public irrigation scheme when the relevant new activities are added. Typical added functions are: irrigation assistance to farmers, applied irrigation research, irrigation improvement service, water quality management, etc. Insofar as it incorporates health-safeguards, the MPIS can be considered a useful form of organization.

(iii) Irrigation Associations.

The irrigation association has a number of excellent characteristics, such as: securing farmers' participation; good recovery of water fees; and good respect for rules and regulations. Under proper technical guidance, and with sufficient financial resources, it can be a dynamic, modern, organization capable of implementing the necessary safeguards.

To ensure coordination with agricultural services and to engage them actively in the affairs of the irrigation scheme, it is a good policy to include representatives of such institutions on the board of directors of the association, as special members. Alternatively, representatives of the

irrigation associations should be invited to the decision making meetings of the concerned institutions at a regional level or, where justified, at the national level. In any case it is important to assure the possibility of a dialogue between the institutions providing the services and the representatives of the farmers receiving them, thus creating the right conditions for the incorporation of health and environmental safeguards.

2.3 The scope of health planning in irrigated agriculture

The negative health consequences of water development projects in the tropics have been amply documented both in terms of physical disease and with respect to social and mental ill health. As a direct consequence, an increase in water-related vector-borne diseases (e.g. malaria, schistosomiasis, onchocerciasis, trypanosomiasis) has been noted. Less obvious has been the considerable misery caused by physical, social and psychological stress. From another perspective, few, if any, documents exist that demonstrate health improvement after implementation of a project.

A multidisciplinary approach for the control of vector-borne diseases in water development projects is now considered to be the most efficient, and the most feasible way of approaching this problem. This implies that health and environmental safeguards will be incorporated as part of the overall control effort. A positive attitude towards health improvement, however, requires a broader perspective.

Planning of irrigated agriculture offers, in most cases, an opportunity to modify socio-economic factors to make them conducive to enhancement of health, without necessarily increasing the project costs. Socio-economic factors which are of particular importance to health, are mainly concerned with the provision of "basic needs".

2.3.1 Primary health care and water resources development

The provision of health care for people in rural areas in the tropics poses serious problems. A health policy which stressed the importance of providing community health care, and/or basic health services, was advocated until the 1970's as a solution. It was felt, however, that neither of these possibilities had sufficient impact on the health situation in these countries.

In the 1970's, an alternative concept for health care was developed. Health care should include widespread coverage with preventive and promotional services by community health workers, as well as active involvement and participation of the community in managing their own health problems.

In 1978, UNICEF and WHO adopted the Primary Health Care (PHC) approach as their key policy to achieve the target of "Health for All by the year 2000".

PHC consists of the provision of eight elements: health education; adequate food and nutrition; safe water and sanitation; maternal and child health services, including family planning; immunization; control and prevention of endemic diseases; treatment of common diseases; and provision of adequate drugs.

If it is accepted that water resources development has an important impact on health, it could be concluded that implementing the PHC policy requires definite commitments by the Water Resources Development (WRD) sector. The commitments would concern four PHC elements:

- (1) Control and prevention of endemic diseases;
- (2) Supply of safe water and sanitation;
- (3) Adequate nutrition; and
- (4) Health education.

Elements (1) and (2) involve, amongst others, the inclusion of health and environmental safeguards in irrigated agriculture. The relevance of (3) and (4) in this context is closely related to the farmer. The fundamental accent of PHC is not so much on what is provided (in this case health and environmental safeguards), but how it is provided, namely in accordance with the twelve principles mentioned in the definition of PHC as criteria.

2.3.2 Health planning and health care planning

Customarily, health planning is a task which belongs to the health sector. In this traditional sense, health planning:

- refers mainly to the planning of health services, e.g., curative health services; maternal and child health services; communicable disease control and immunization, and occupational health services;
- is the responsibility of national and regional authorities under the Ministry of Health. The planners are primarily health professionals and, sometimes, social scientists;
- uses health needs and demands as the dependent variables, and service inputs in terms of personnel, facilities and materials as independent variables.

It would be more accurate to denote this type of health planning as health services or health care planning.

In the context of irrigated agriculture and other sectors of development, health planning has a different orientation:

- its concern is with the technical and social design options of development projects: e.g., the design of reservoirs and irrigation networks, distribution of water, agricultural practices, and siting of settlements;
- the actual designing and planning is carried out by ministries other than the Ministry of Health, and, moreover, is often delegated to engineering consultants. The planners and designers are primarily engineers and social scientists;
- more specific health problems (e.g., malaria, schistosomiasis, diarrhoeal disease) form the dependent variables, and design options, the independent variables.

Both types of health planning share the need for sound epidemiological information and understanding, but present action requires a different professional expertise and environment.

It would be desirable that the term "health planning" be reserved for the manipulation and modification of technical and social determinants of health. The four PHC elements mentioned under 2.3.1 lend themselves to this purpose.

2.4 Health and environmental safeguards

Health safeguards are understood to be precautionary measures, comprising stipulations to prevent vector-borne diseases. A subdivision could be:

- (i) Environmental modification (permanent measures);
- (ii) Environmental manipulation (recurrent measures);
- (iii) Man-water-vector contact reduction (fencing, zoning, foot bridges);

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- (iv) Chemical and biological control;
- (v) Immunization and chemotherapy;
- (vi) Health care services.

Environmental modification, together with "environmental manipulation", constitute "environmental management", in a strict sense. In recent years, it has been the subject of discussion at various international meetings. In the course of the latter, the term, "environmental management", and related terms, were defined more precisely.¹

Not considering "health care services", because of its specific character, safeguards (i) to (v) need to be incorporated in various degrees of intensity.

The degree of intensity depends largely on the environmental situation, the type of measure, as such, the type of water resources development project, and the type of management.

Generally, environmental modification implies high level technological interference and the need for high quality management and experienced farmers. On the one hand, such ideal circumstances could lead to sophisticated measures; on the other hand, one should bear in mind that more modest environmental modification measures may be required which are within the scope of the particular project or scheme. Environmental manipulation, represents a more simple way of intervening in the water management process, and is one that is more adapted to rural technology, skill and presence of cooperation (for example, canal maintenance).

According to recent policy, "integrated control" should be the national, or regional, goal for the control of vector-borne diseases, because it is assumed to be the most efficient use of available means. Integrated control includes the use of a combination of control methods directed at the parasite, the vectors or the hosts of the disease concerned. In practice, it is a concern of the community and the sectors of development involved and is influenced by the policies of national and international organizations. As indicated, "environmental management" is one of its components, and community participation and hygiene education can be regarded as important delivery mechanisms of integrated control.

Figure 1 illustrates the concept of integrated control.

2.5 Health planning in the water resources development sector: a systems approach

2.5.1 The water resources development (WRD) sector as a system

Health and environmental safeguards need to be incorporated in various development activities related to land and water use, such as irrigation, drainage, community water supply and sanitation, flood control, (re)settlement, hydropower, etc. In this chapter, all development activities and institutions in these fields are considered as an (imaginary) water resources development (WRD) sector. This sector consists of those parts of the agricultural and public works sector that relate to land and water resources development. Within the WRD sector, the irrigated agriculture complex of activities seems most directly related to the problems of health and environment. The issue of institutionalization of health and

¹ See also: Manual on Environmental Management for Mosquito Control (WHO Offset Publication No. 66, Geneva, 1982).

environmental safeguards in this WRD sector can be approached from two complementary angles: substantial ("what?") and procedural ("how?"). This chapter discusses the incorporation of health planning in the WRD sector as a whole, from a substantial point of view. Chapter 8 explains the incorporation of health and environmental safeguards in an irrigation project (a smaller entity of the WRD sector) in a more detailed, procedural way. The systems approach provides a practical and functional tool for planning, and facilitates the identification of relevant institutional elements. The components that constitute the WRD sector are visualized in Figure 2, together with their environment.

2.5.2 The sector's environment

Having defined the sector as a system, a definition of the environment of the system should follow. A functional classification of the environment is provided by a subdivision into the socio-cultural, economic, physical, and institutional environmental areas. This subdivision can be combined with the distinction of an influenced and an appreciated environment. The sector system may thus be visualized as two concentric circles rotating independently. Relationships between the various components, and between components and the environment, are numerous, while relationships can vary in time (dynamic system).

To describe an issue as related to some components is, of course, a simplification. Functionality requires that less important relationships be left out of consideration. Analysis should therefore concentrate on those relationships that cause major constraints when malfunctioning. They are the potential bottlenecks in sector performance. As the subject matter of this chapter concerns the incorporation of health and environmental safeguards in WRD sector activities, the linkages between the various sector components and the health sector (in this model, a part of the environment) have to be analysed and described.

2.5.3 Health planning in the sector components

It has already been indicated that health and environmental safeguards should form part of the "Integrated Control of Vector-borne Diseases" strategy. As the control methods are implemented primarily by agencies in the agriculture, public works and health sectors, intersectoral coordination or collaboration between these agencies is an essential requirement. In this section, some relationships between the WRD sector components and health planning will be outlined. This can be done by comparing the sector components with the environmental areas. The components which will be discussed are legislation, financing, manpower, community participation, and information.

(a) Legislation

In many countries, it is generally the policy that health matters are the sole concern of the Ministry of Health. Legislation provides a very powerful tool to overcome this situation. Legislation should not only concern the top administrative levels, but also should bestow the lower ones with authority to issue binding rules and regulations. It is important that legislation:

- (1) assigns authority and regulates intersectoral collaboration;
- (2) assigns responsibility for health planning as distinct from health care planning. In this respect, it is important that administrative responsibilities of different sectors use the same definitions of population covered;

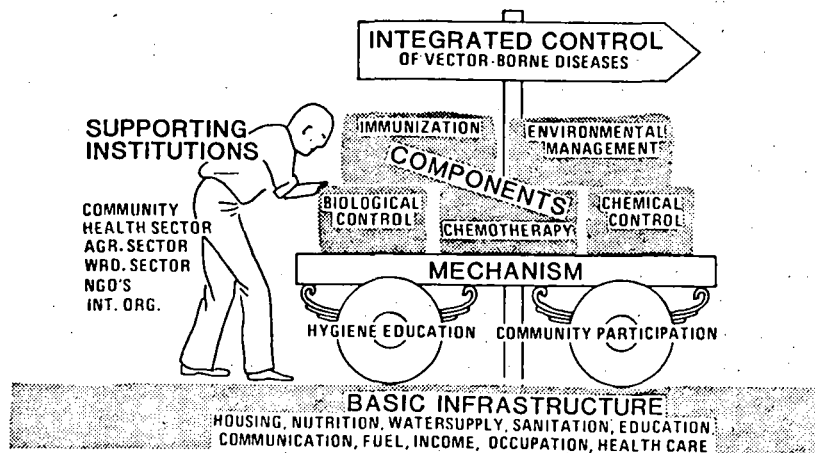


Figure 1. Integrated control of vector-borne diseases: its components, mechanisms, supporting institutions and infra-structure. (Lincklaen Arriëns)

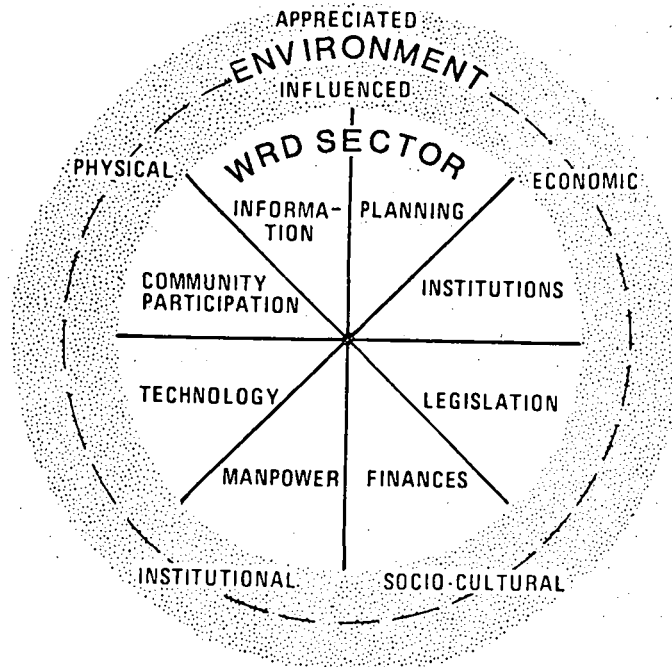


Figure 2. The water resources development sector and its environment (based on Lincklaen Arriëns and Hessing, 1982)

- (3) specifies standards and codes for engineering designs and operation schedules/procedures of water resources development projects;
- (4) specifies the information needs of environmental management and assigns the responsibility for collecting this information.

(b) Financing

The introduction of environmental management has its costs, which can be easily specified. Therefore, the agency which controls the project financing plays a vital part. The allocation of financing for projects is, apart from political considerations, mainly justified on economic criteria. Few economists will deny that good health has an economic value; the problem is the magnitude of that value in cost-benefit analysis. The economic impact of malaria or schistosomiasis on health improvement generally is variable and difficult to express in explicit economic terms. To quantify the effect of disease control measures is also difficult. However, the impact of water resources development on health and its economic significance has been extensively documented. This evidence should provide financing agencies with sufficient justification to handle economic criteria for health investments more liberally. As an alternative, it has been suggested that a fixed percentage of the total project expenditure be reserved for health-related studies and interventions.

(c) Manpower

Integration of environmental management in the planning and implementation of water resources development projects does not necessarily imply the engagement of extra manpower. The main need is for environmental management to become an integral part of professional training and attitude of staff in the WRD sector. This applies to managers, engineers, extension workers and farmers alike. As long as environmental management has not become a regular subject in the curricula of training courses, special arrangements for staff training need to be made. It appears important to emphasize that training of staff should involve more than imparting formal knowledge. The significance of the way irrigated agriculture is implemented and operated in enhancing health is not obvious, especially to intermediate and lower level staff. And, even when this is clear to them, they may not be rewarded for contributing to health enhancement. Therefore, staff training should especially aim at changing professional attitudes and motivation to include health-related matters.

(d) Community participation

The success of environmental management ultimately depends on the use or operation and maintenance of the system or facilities provided by the community. To achieve this, the community needs to be involved from the very beginning of the planning and decision making process. With respect to health matters, participation and education need to go hand in hand. Hygiene education, rather than health education, which is more directed towards imparting knowledge, is especially needed to facilitate behaviour change, leading to the acceptance of a new social code with respect to health and disease. To achieve this gradual process of behaviour change, hygiene education for environmental management has to be adapted to traditional concepts of health behaviour.

WRD sector field staff should carry out most of this education effort. The need for their appropriate training has already been stressed.

The health sector remains responsible for more biologically oriented health education, and it should be actively involved in providing

epidemiological feedback to the community. Providing regular feedback on the pattern and frequency of diseases is a powerful tool to increase awareness of the need for prevention.

(e) Information

Information is essential for rational planning. Accurate data on health is scarce, especially in rural areas of developing countries, and possibilities of acquiring it are limited by prevailing institutional and financial resource constraints.

Therefore, an improved information base is needed, but it has to be planned carefully, with a view to cost-effectiveness. Currently available computer technology enlarges possibilities for establishing effective health information systems at a reasonable cost, and should be used. Furthermore, data communication options enable the establishment of a national health information networks at different levels (e.g., national, by administrative unit, by project), provided that compatibility is ensured.

Information systems should include data on:

- (1) The disease problem (incidence, prevalence, impact, treatment).
- (2) Causal factors (parasite, vector, behaviour, environmental factors).
- (3) Interventions and cost-effectiveness.
- (4) Priority considerations and cost-benefit.
- (5) Resource allocation, operational plan and implementation.
- (6) Evaluation.

In the project context, information needs will change from "fact finding" to "monitoring", as the project develops. The size of a WRD project will determine whether the health information management is to be conducted by a project unit, or through liaison with the health sector. A second information need concerns the production of educational materials for WRD staff and for the community.

2.6 Environmental planning in the development planning process

2.6.1 Elements of and stages in environmental planning

Optimal water resources development planning means water resources development together with environmental development planning. "Environmental inventories" and "assessments of environmental consequences of development" are required. Development planning and environmental planning should go hand in hand.

Table 2 shows how the assessment and management of environmental consequences can be implemented in the various project stages. In addition to the need to assess the environment and environmental impact, the importance of agreement between all parties involved in an environmental action protocol is emphasized.

2.6.2 Project specific environmental profiles

Most development activities are interventions in dynamic equilibria in existing ecosystems. This is particularly clear when viewed in relation to the functions actually exercised by the ecosystem under consideration. Ecosystems have a production function, a carrier function, a regulation function, a purification function and an information function. The carrier

PROJECT STAGE	ENVIRONMENTAL PLANNING ELEMENT
IDENTIFICATION	Environmental Assessment (EA) <ul style="list-style-type: none"> - Environmental inventories and profiles : national/regional - Resource balance sheets - Preliminary judgements on land use planning <ul style="list-style-type: none"> • Environmental carrying capacity • Pattern of land utilization types • Zoning • Environmental strategies
DESIGN/FEASIBILITY	Environmental Impact Assessment (EIA) <ul style="list-style-type: none"> - Methodology <ul style="list-style-type: none"> • Adapted to resource management options • Related to the types of interventions • Realistic level of detail - Evaluation of alternative actions - Quantification and weighing Environmental Plan of action (EPA) <ul style="list-style-type: none"> - Per project alternative
SELECTION	Environmental Action Protocol (EAP) <ul style="list-style-type: none"> - Mutual agreement over environmental plan of action, including institutional arrangements, commitments, standards, etc.
IMPLEMENTATION	Implementation of EPA
OPERATION	Environmental Monitoring Information System (EMIS) <ul style="list-style-type: none"> - Data collection - Permanent system
EVALUATION	Environmental Impact Statement (EIS) <ul style="list-style-type: none"> - Conclusions from monitored data

Table 2. Elements of environmental planning coinciding with the various project stages (Adapted from van Ruy et al, 1980)

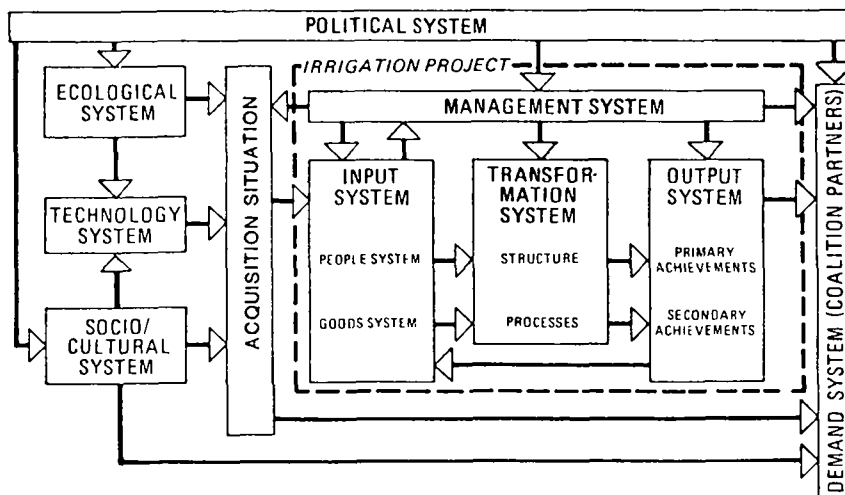


Figure 3. A systems view of an irrigation project and its environment (based on Walker, 1981)

function of a given water resource is of particular importance for the subject matter under consideration. Many development activities cannot be associated with one particular ecosystem. Resource-oriented development activities, such as those which address land and water in a particular region, commonly cut across a variety of ecosystems. Activities which focus on a social issue (e.g., health) require consideration of the inter-linkages between a variety of ecosystems.

2.7 The incorporation of health and environmental safeguards in an irrigation project: elements for institutional analysis

2.7.1 General

An ideal irrigation project organization is one of the most important tools for incorporating "health and environmental safeguards". An environment-oriented model is presented, derived from modern organization research, in order to facilitate a systematic analysis of all components, sub-systems and systems which shape such an organization.

"Man" takes a central place in the organization of irrigation and the social character of such an organization is therefore evident. The output should reflect the prominence of the social component.

A systems view of an irrigation project (the model) is given in Figure 3. The system is determined by three variables: goals, instruments, and environment.

Each project has its own specific environment (see Figure 5). It cannot draw, without restrictions, on the environment with regard to "impacts"; neither can it, freely, charge the environment with respect to "outputs". This is indicated by "acquisition situation", and "demand system", respectively.

Coalition partners, external as well as internal, have a large influence on goal formulation.

2.7.2 Goals and evaluation

An irrigation organization is a socio-technical entity and has a multiple goal function. Various goals have to be achieved simultaneously for various interest groups (coalition partners), for example:

- (i) farmers: guarantee of subsistence, increase in income, equity in water distribution and an adequate supply of it, basic needs provision, elimination of vector-borne diseases;
- (ii) management: high-output level, autonomy, prestige, high water utilization efficiency, cost recovery;
- (iii) national government: maximizing food production, creation of employment.

The management has to apply a strategy in which the output system is in harmony with the demand system, and the input system, with the acquisition situation.

When evaluating the performance of an organization (to what extent does the organization comply with its goals?), certain evaluation criteria have to be applied at regular intervals. The IRR on capital (economics) and the efficiency in water use (technical) are well known. Social and other criteria should be applied, as well. Major indicators of project performance are: productivity, equity, environmental stability (including area of water-logging, area of salinity, alkalinity, water table levels, erosion

phenomena), costs, cost recovery, level of nutrition and effect of cropping pattern on farm families' diet, incidence of water-borne and water-related diseases, and effects on ecology.

2.7.3 Instruments

An organization needs "instruments", so that "goals" can be achieved. The "instruments" are related to the structure of the organization and there is interaction between "instruments" and the "action/behaviour" of the members of the organization.

Instruments of organization and management can be:

- (a) Horizontal autonomy (differentiation of tasks);
- (b) Integration of subsystems (coordination);
- (c) Vertical autonomy (delegation of competences);
- (d) Participation and leadership;
- (e) Education and training.

(a) Horizontal autonomy

The most important goal is to contribute to the demand system. The tasks of the organization are therefore arranged by subsystem on the basis of demand (expectations of the coalition partners). Functional (divisional) regional arrangements are acknowledged. An example of a divisional arrangement could be as follows: a management organization with divisions for administration, irrigation water operation, maintenance, PHC, crop production (cotton), etc.

(b) Coordination

There are two types of instruments to achieve coordination: people-oriented instruments and institutionalized instruments (people-independent). The first category comprises instructions (vertical communication) and formal and non-formal consultations (committees, conferences, meetings). In the second category, action programmes are important. In case a certain programme of action is regularly repeated (permanent realization), "standardization of tasks" should be envisaged. In particular, those management processes which have a strong tie to people such as recruitment, training/education, introduction of penalties, conflict resolution, can be considered in this context.

(c) Vertical autonomy

Every irrigation organization has a (vertical) arrangement of hierarchical levels. Higher levels must be able to delegate tasks to lower levels, with the latter taking on the responsibility for their execution. The delegation of competence should be clearly indicated and fixed for all levels. The organogram gives an insight into such delegation, from national - via regional - down to project level and even down to the structural units of the organization. Use is made of command (supervision) coordination and extension lines. Ideally, "the Health Department" and "vector-borne disease control" should always figure at some organizational level.

To indicate the complex relationships, an organogram is not enough. In addition job/task descriptions (functions, responsibilities) and a function diagram (matrix with the activities vertically listed and the units/divisions responsible for implementation horizontally listed) are needed.

(d) Participation and leadership

In an irrigation organization there are two sub-systems of a social character: the irrigation administration/water authority and the farmers. The success of the organization depends to a large extent on the way tasks are

delegated to the participants, and how they can take part in decision-making. The interrelationship between the two sub-systems via the "intermediary (agent, leader)" may be expressed in degrees of participation as indicated in Figure 4.

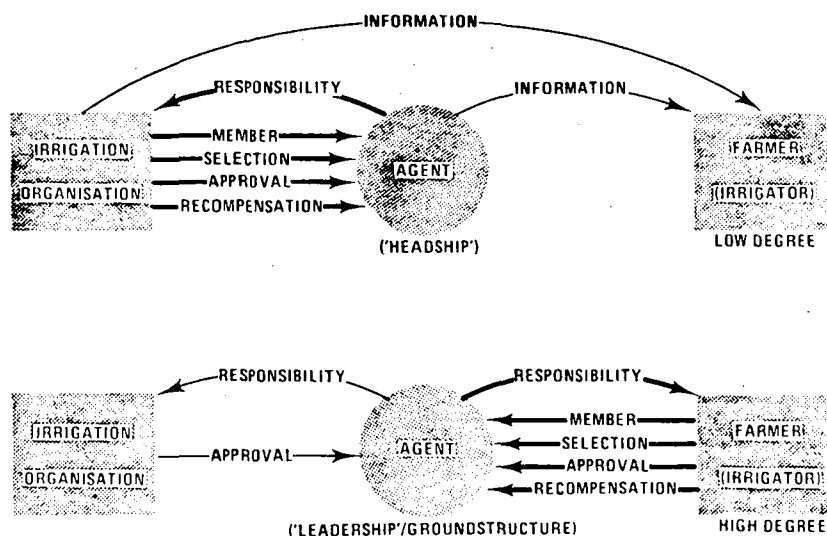


Figure 4. Degrees of farmer's participation in irrigation management (based on Walker, 1981)

In traditional irrigation organizations, leadership is available, and should be used to create viable, successful, and efficient irrigation organizations.

Characteristics of the role of traditional leaders are that they:

- (1) serve relatively small groups of water users, i.e., small areas of irrigated land surface;
- (2) are selected, in some manner, by the members of the local group which they serve;
- (3) are subject to review and replacement by the group which they serve;
- (4) receive compensation directly from the group members whom they serve.

Basic functions are: distribution of water; allocation of water; mobilization of labour for, and organization of, repair and maintenance of water works (canals and diversion devices); settlement of disputes; and enforcement of rules. These functions are of great value in order to achieve success in a vector-borne disease control programme.

(e) Education/training

The instrument variables relate to the "environment", in the sense that the type (need) of education and training depends on environmental sub-systems, such as socio-cultural background and level of technology. Two groups are to be trained: the management personnel and the farmers.

The training of farmers is difficult to organize, but the tendency to provide for an "accountable leadership" makes it necessary to organize workshops for representatives of irrigator groups. Training notes, dealing in a very practical and simple way with "vector-borne diseases", and made available on a world-wide scale, could be prepared.

2.7.4 The environment

From a large number of environmental components, 4 have been selected. These are: tradition and level of the farmers' knowledge; water and land use situation; technology; and health care.

(a) Tradition and level of the farmers' knowledge

To comply with its tasks, an organization needs people, and an important aspect is the problem-solving potential of the participants in the organization. This potential is characterized by knowledge (capacity) motivation (health) and by the socio-cultural context of the farmers (for example, inclination to form local users' groups). The recruitment of farmers (and also of the management staff and personnel) is related to the above.

(b) Water and land use situation

Of importance to agricultural production in the framework of an organization for irrigation are the issues of physical availability of water, availability of water in time, ownership and right of use.

The type of ownership and use of land can present complicated problems for the irrigation organization. Conflicts can be expected with respect to water distribution, water charges payment and maintenance, sometimes affecting the implementation of environmental management measures, resulting in a possible need for land consolidation.

(c) Technology

Mutual adaptation between the sort of "technology" and "type of organization" (what is offered should be used adequately) is indispensable. Technology consists of two topics: "irrigation infrastructure", and "crop husbandry", and for both, mechanization of activities plays a role. Mechanization (to a substantial degree) has advantages and disadvantages. If one attaches much merit to excellent farmer participation, emphasis should be placed on small-scale technology, with the additional advantage of possible use of local resources (for example, simple fractional pumps).

The choice of technology is related to the planning process. The incorporation of measures to ensure "safeguards" has to be envisaged at an early stage.

Steps to be planned for should include:

- Broad environmental analysis of the current situation and of proposed development strategies (Ch.7);
- Preparation of project environment impact assessment (Ch.7);
- Pilot area development, with particular attention to "environmental management measures", against the background of the proposed irrigated agriculture;
- Forecasting vector-borne diseases implications;
- Vector monitoring;
- Considerations about basic needs (drinking water, housing and sanitary provisions, primary health care);
- Expanding study teams with expertise on items such as: public health, entomology, sanitary engineering, settlement, environment.

With respect to planning, and with particular reference to design, an attempt to avoid institutional rigidity should be made. The project basis for the activities of both donor and implementing agencies leads to a perception of a project as a discrete entity to be planned for, designed and constructed in final form, and then turned over to an operating agency. Irrigation investments would be more successful if projects could evolve and change over a period of time, as the various participants learn and respond to the consequences of their activities.

(d) Health care

The provision of "general health care" and of "primary health care" has been mentioned above. The task of providing basic health services usually is the responsibility of the national or regional authorities of the Ministry of Health, and does not have a direct influence on the type of irrigation organization.

In those rural situations where the provision of health care is impeded, the WRD project organization may be charged with a large task, i.e., providing the majority of PHC-elements. Whatever the situation, in principle, a project organization should have to cope with the implementation of the four PHC-elements (control and prevention of endemic diseases; supply of safe water and sanitation; adequate nutrition; and health education).

In the course of time, and with successful development, the public health service, or other general services, may take back most of the PHC-tasks from the project organization, but "environmental management to prevent endemic diseases" should remain within the organization's competence.

2.8 Summary

A lack of adequate institutional arrangements forms a major impeding factor in the process of incorporation of health and environmental safeguards in water resources development projects. Both at the sector and at the project level, there is a need for intersectoral coordination and collaboration, as well as establishment and/or strengthening of an organizational structure and planning/managerial capacity. In particular, the timely incorporation of safeguards in projects through a comprehensive planning effort requires the existence of an institutional infrastructure.

Any institutional arrangements at project level should take proper account of the position of the farmer, who performs a pivotal role in achieving results. The farmer's position is, by no means, a static element in the process. His actions are influenced by changes in his own environment.

An ideal "institutional arrangement" should, therefore, in any case, be a flexible and dynamic one, and is situation dependent. In using any approach or model to identify and analyse (ideal) institutional arrangements, one should take this requirement into account.

The incorporation of health safeguards in water resources development projects, i.e., environmental management, chemical control, biological control, immunization, chemotherapy and health care (combined in a relevant integrated control package), should be achieved through a process of community participation and hygiene education. Furthermore, positive results from an integrated control effort can hardly be expected to materialize when a satisfactory basic needs infrastructure is not available.

The Water Resources Development (WRD) sector (agriculture and public works) should be responsible for four Primary Health Care (PHC) elements: control and prevention of (water related) endemic diseases (through environmental management), supply of safe water and sanitation, adequate nutrition, and hygiene education. The planning effort required to cover these

PHC elements should be denoted as "health planning", as opposed to "health care planning", which remains the responsibility of the Health sector. The concept of "health planning", then, involves, in particular, the manipulation and modification of technical and social determinants of health within the scope of water resources development activities.

"Environmental planning" and "development planning" should be simultaneous processes. Elements of environmental planning coinciding with project development stages are:

<u>PROJECT STAGE</u>	<u>ENVIRONMENTAL PLANNING ELEMENT</u>
identification	environmental assessment (EA)
design/feasibility	environmental impact assessment (EIA)/ environmental plan of action (EPA)
selection	environmental action protocol (EAP)
implementation	implementation of EPA
operation	environmental monitoring information system (EMIS)
evaluation	environmental impact statement (EIS)

Institutional arrangements have to be developed for all these stages, at the project, sector and national level.

A systems approach to the (imaginary) water resources development (WRD) sector may lead to the identification of eight components: planning, institutions, legislation, financing, manpower, technology, community participation, and information. From a substantial planning perspective, institutional arrangements to facilitate health planning in the WRD sector can be analysed by sector component, leading to an inventory of "what" has to be planned. To achieve the incorporation of health planning the WRD sector, a general understanding of mechanisms of intersectoral coordination and collaboration is needed. Institutional arrangements, in this respect, will primarily concern the agricultural, public works, and health sectors.

The processes of water allocation, distribution, application and drainage perform a key role in achieving benefits in terms of both agricultural production and prevention of disease. Institutional arrangements should, therefore, concern all factors affecting these processes, including the existing project organization and farmer/water user associations, and take account of technical features, socio-cultural, economic and political constraints. In a systems view of an irrigation project (input, transformation and output systems within an environment), the people (human resources) system is important because of the central role of farmers in achieving project objectives. The fact that an irrigation project cannot draw in an unrestricted manner on its environment is reflected by discerning an acquisition situation and a demand system. Key variables determining the input-output process of the irrigation organization are the goals, instruments and environment.

Table 3 lists examples of some planning elements derived from this systems approach which concern the incorporation of safeguards in different project states, while Table 4 lists decision variables in planning an appropriate management structure.

<u>Project stage</u>	<u>Planning elements</u>
<u>Preparation</u>	<p><u>Pre-feasibility (Identification)</u></p> <ol style="list-style-type: none"> 1. Forecasting vector-borne disease implications * 2. Planning for management structure 3. Choice of technology 4. Pilot area development (environmental management measures) * <p><u>Feasibility</u></p> <ol style="list-style-type: none"> 5. Recruitment for "people system" 6. Adequate staffing complementary services i.e. for the PHC-provisions (depending on 2 and 3) <p><u>Design</u></p> <ol style="list-style-type: none"> 7. Incorporation of environmental management topics 8. Flexibility for general infrastructural items (e.g. alternative on-farm irrigation/drainage and due attention to tertiary unit arrangement)
<u>Construction</u>	<ol style="list-style-type: none"> 1. In stages with size adapted to recruitment for "people system". 2. Provision of complete infrastructure. 3. According to high standards with respect to earthwork. *
<u>Operation</u>	<ol style="list-style-type: none"> 1. Strict separation of functions with respect to operation and maintenance. 2. Use of functional diagrams. 3. Upgrading "people system" by training (subject approach i.e. environmental management). 4. Preparation of subject matter manuals. 5. Taxing of water to promote efficiency of irrigation * 6. Application of "sanctions" to promote efficiency of irrigation and excellent maintenance. *
<u>Monitoring and Evaluation</u>	<ol style="list-style-type: none"> 1. Use of environmental monitoring information system (EMIS) * 2. Environmental impact statement (EIS) *

* Elements liable for legislation

Table 3. Health and Environmental Safeguards in Water Resources Development Projects: examples of planning elements.

Socio-cultural system

1. Farmers' participation.
2. Traditional leadership.
3. Principle of small-scale.

Selection of options type of organization

1. Irrigation settlement project.
(Provision of PHC and general health care services directly through organization.)
2. Public irrigation scheme.
(It should be part of an autonomous or national institution dealing with the management of irrigation projects; general health care services are not specifically included.)
3. Mixed control schemes, as 2. above, but with control of farmers at tertiary unit level.
4. Irrigation association (to ensure input of PHC and general health care, special coordination at regional or national level necessary between Board and relevant agency).
5. Multi-purpose public irrigation scheme (special services added). As 2. or 3.: for example, irrigation extension, PHC.

Choice against background of:

Project size (large - medium - small).

Type of farm (settlers - established small holders).

Skill in agriculture (low - high).

Skill in irrigation (low - high).

Strong agricultural extension service (no - yes).

Table 4. Health Safeguards in Water Resources Development Projects:
decision variables in planning an appropriate management structure.

In the discussion that followed, the Panel stressed both the importance of the required institutionalization, and its complexity. It was felt that the selection of irrigation projects as an illustration of possible institutional arrangements provided an acceptable basis for discussion; the comprehensive conditions resulting from such projects, which embrace aspects of social, economic and environmental aspects, create a very suitable paradigm. At the same time, the Panel was of the opinion that other types of water resources development projects, which may bring about somewhat different problems, should not be overlooked.

With regard to the "irrigation associations" mentioned above, and shown in Table 1, the Panel drew attention to the fact that such associations have a very wide range of competence in management. Often, the newer community-based schemes with very little formal structure have not developed the management skills required for appropriate levels of project efficiency. They have certainly not attained the standards and knowledge necessary to ensure health and environmental protection.

The Panel, therefore, felt that schemes of this type must receive support for these responsibilities within a far broader framework, probably within overall rural development programmes, and that any "ideal" institutional arrangements should reflect this.

The Panel recognized that the "ideal" concept will vary from one place to the other, and that it is a dynamic concept, which will change in time. Such aspects as legislation and regulation will therefore also have to vary from place to place, and with time.

The role of efficiency of water use in irrigation schemes in the control of vector-borne diseases was discussed; the Panel felt that a direct relation exists between these two phenomena, and that this is of particular relevance for the subject matter.

The question of manpower requirements for the incorporation of health and environmental safeguards was raised by the Panel. In most of the ideal institutional arrangements listed, it would be difficult to recruit teams for the disciplines which are needed. Training engineers to develop their awareness of the health and environmental aspects, and to transfer knowledge on preventive environmental management measures, is important and will contribute to minimizing adverse effects.

An important issue discussed by the Panel was whether health benefits, resulting from environmental management, should be considered as primary or as secondary benefits. From the economic point of view, it is clear that, as long as the proper methods for evaluating the socio-economic value of good health are lacking, these benefits will be considered secondary. The health component (cost of preventive measures, and benefits of good health) is not included in the economic feasibility computations. The fact that adverse health effects are not taken into account leads to an over-estimation in the resulting "internal rate of return".

However, the above picture represents a one-sided economic interpretation and the Panel was of the opinion that health benefits should be considered as complementary to the primary economic and water distribution goals and, consequently, need to be classified among the primary benefits. It was, therefore, suggested that consideration be given to the provision of a joint budget, with firm earmarking for the introduction of health and environmental safeguards at all developmental stages of a given project, and this in a continuing scenario of optimizing benefits.

In addition, it was observed by the Panel that health benefits data should not be solely expressed in terms of disease vector densities and parasite infection rates. Health research should include observations on ill

health and morbidity. Only such information will put health problems in their proper perspective. Another point raised, concerning information obtained from health studies, referred to the importance of adequate feedback to the community. This mechanism can be very instrumental in the creation of more awareness, and will stimulate the farmers and other members of the community to actively cooperate with vector control efforts. In this sense, health research will, aside from its primary epidemiological objectives, also serve as an incentive in the process of motivating the community.

3. The experience of the Tennessee Valley Authority¹

The Tennessee Valley Authority (TVA) was created as a regional development agency in 1933 by an Act of the United States Congress. It functions as a government-owned corporation with a three-member Board of Directors. As an independent agency, not being part of any Federal cabinet department, it operates with a reasonable degree of autonomy and with the flexibility of a private corporation. The administrative freedom to meet the special requirements of its programme was laid down in the TVA Act. The Board, which decides upon major TVA programmes, its organizational structures and administrative relationships, appoints a General Manager. Three major offices handle day-to-day operations: (1) Power and Engineering, (2) Natural Resources and Economic Development, and (3) Agricultural and Chemical Development.

TVA serves an area made up of parts of seven states in the southeast of the USA. The rivers and streams which make up the Tennessee River (TR) drainage basin constitute the heart of this area. The TR watershed includes 125 counties; the area covers 41,000 square miles, and its population amounts to 4,800,000.

TVA began its life during the "Great Depression" of the 1930's. The river system, the fifth largest in the USA, had for a long time tantalized regional and national leaders with its undeveloped potential. Five important purposes were served by the establishment of TVA: (a) development of a reliable, navigable waterway; (b) reservoir storage and flood control; (c) power generation; (d) reforestation; and (e) development of the agricultural potential of the region. The overall objective, of which the above-mentioned purposes are the components, was to take the region out of its state of underdevelopment, a condition which was deeply rooted in the daily life of its people. One might say that this state of affairs makes the TVA experience relevant to the conditions that exist in many parts of the world today, where the lack of economic and social development is often a national heritage.

Malaria transmission existed in the region, and, from the very beginning, it was clear that TVA had to establish a programme to control this severe health problem. Depressions in the flood plain along the major streams held water following floods or heavy rains, thus creating favourable conditions for breeding of Anopheles quadrimaculatus, the major malaria vector in the southeast.

Since the early 1900s, state regulations existed with respect to permits and conditions for water impoundments, as well as specifications and guidelines for certain vector control measures, environmental in nature. TVA was therefore legally obligated to take action and prepared a series of vector control specifications for each of its planned reservoirs. These were equal to, or surpassed, state requirements and contributed to the further formulation of legislative requirements, which served to ensure that vector

¹ Document EPO/PE/WP/84.2: TVA: Institutional Arrangements for Health and Environmental Protection in Water Resources Management, by Ralph H. Brooks, TVA, Knoxville, Tennessee, USA.

control was incorporated into the impoundment plans of all water resources development projects. In addition, TVA regional programmes in solid waste and water management were set up to provide technical assistance to communities, and help eliminate local vector breeding places. Another opportunity to reduce the potential for mosquito breeding was provided in section 26a of the TVA Act, dealing with safeguards against pollutant discharges into the Tennessee River System.

These legislative requirements were further complemented by requirements developed by TVA itself. Administrative codes were defined, stating agency policy and delegating responsibility to the appropriate programme organization within TVA. These statements specifically stipulate that vector control will be an integral part of the planning and operation of all water resources projects. In this way, vector control has the clear support of TVA at its highest managerial levels. TVA's commitments to conduct vector control operations, in accordance with environmentally acceptable practices, were documented in the environmental impact statements published in 1972, after endorsement by federal and State agencies.

Habitat control formed the first line of defense against mosquitos, against the background of reservoir construction and operation. The components of this approach are well-known: tree-clearing, shore-line filling, shore-line maintenance, water level manipulation and management of aquatic plants.

After impoundment, a programme of water level manipulation was initiated, consisting of weekly fluctuation of the main reservoir levels, and the gradual summer and fall drawdown from the tributary reservoirs. Annual operating schedules for water level manipulation are established each year by a special committee; also, prior to implementation of new management schemes, public hearings are organized.

Insecticides are applied in selected areas only when the desired level of control is not reached by combined environmental efforts. Only those compounds approved by the Environmental Protection Agency are used, and their application follows the regulations laid down in the Federal Environmental Pesticide Control Act (FEPCA, 1972).

In conclusion, it can be stated that the successful implementation of a vector control programme is not an easy task. It requires complex interactions of many elements, and a firm commitment by state and national authorities. In the Tennessee Valley, the inherent flexibility of administrative policies, and organizational autonomy, provided by the TVA Act, were major assets in the success in vector control. TVA is in a position to execute cooperative agreements with other agencies, and it has the flexibility for independent action, so that adequate institutional structures could be created to support an effective programme.

The Panel observed that TVA represented a great effort and a true success story. It was a story of national need, governmental commitment, infrastructure development, personal devotion and individual effort. Yet, the situation which led to TVA's creation (economic depression and unemployment, coupled with the need to develop the Tennessee Valley area) had been unique, which explained why it had not been duplicated elsewhere in the United States.

The Panel felt that it might be useful if a document could be prepared in which parallels with problems in the tropical countries today were identified, and solutions, extrapolated from the TVA example, formulated. On a global scale, certainly, similar areas existed, and, in situations of unemployment, policies for an effective use of this manpower should be formulated.

4. The experience in the Philippines¹

4.1 Water Resources Development

4.1.1 Current Development Plan

In the Philippines, water resources development continues to be a major part of the overall national effort to address the needs of the fast-growing population and expanding needs fundamental to the social and economic growth of the country. The current Five-Year Development Plan stipulates that an investment of some US \$4.34 billion for the implementation of water resources development programmes over the period 1983-1987 is required.

4.1.2 Agencies involved in water resources development

(a) National Water Resources Council (NWRC)

There are at least 20 agencies in the Philippines which are, directly or indirectly, involved in the development of water resources, and, in 1974, the National Water Resources Council was created to coordinate the increasing activities of these agencies in this sector. Its principal objective is to achieve an orderly and scientifically sound development and management of all water resources in the country, consistent with the principles of optimum utilization, conservation and protection, to meet future needs.

To achieve these objectives, the Council has various categories of powers:

- executive power, including the identification, planning, coordination and integration of water resources development;
- regulatory power for the formulation and promulgation of criteria, methods and standards, and of rules and regulations;
- advisory power, including recommendations to the National Economic and Development Authority (NEDA) on all matters relating to water resources development.

The Council is composed of nine members: ministers, and the heads of agencies mostly concerned with water resources development.

(b) National Irrigation Administration (NIA)

The National Irrigations Administration (NIA) was established as a major government owned and controlled corporation in 1964. NIA is attached to the Ministry of Public Works and Highways to ensure that irrigation development programmes are consistent with the national infrastructure development plan. Other relevant ministries and agencies (Ministry of Agriculture, National Economic and Development Authority, and the National Power Corporation) are represented on the NIA Board.

At present NIA is implementing:

- 31 irrigation projects, which receive financial support from abroad, mainly from major international banking institutions;

¹ Document EPO/PE/WP/84.3: Health and environmental programmes: institutional arrangements of implementation in water resources development projects in the Philippines, by Cesar L. Tech, Administrator, National Irrigation Administration, Philippines.

- 17 locally-funded national irrigation projects; and
- 288 locally-funded communal irrigation projects.

The total service area of the irrigation projects being carried out is about 616,000 hectares, consisting of about 166,000 hectares of existing service areas, where rehabilitation is taking place, and 450,000 hectares of new areas. The NIA currently operates and maintains 127 national irrigation systems servicing over 549,000 hectares. The total service area of all types of operating irrigation systems together in the Philippines is about 1.4 million hectares, representing about 44% of total potential irrigable land area of the Philippines' territory.

(c) Other Government Agencies and Institutions

There are at least 20 other government agencies and institutions either directly or indirectly involved in water resources development in the country. One of these is, for example, the Farm Systems Development Corporation (FSDC), which develops only communal, and other small-scale, irrigation projects. There are also other government agencies, with specific sectoral functions in water resources development, including the National Power Corporation and the National Electrification Administration for Hydropower; the Metropolitan Waterworks and Sewerage Systems (MWSS); the Local Water Utilities Administration (LWUA); and the Rural Waterworks Development Corporation (RWDC) for water supply; as well as the MPWH for flood control, drainage and rural water supply.

Furthermore, in order to strengthen regional development efforts of the government, Integrated Area Development (IAD) institutions were organized. Foremost of these is the National Council on Integrated Area Development (NACIAD), with the Prime Minister of the Republic of the Philippines as chairman.

4.2 Health and Environmental Services

4.2.1 Current structure and programme of the Ministry of Health

While, in the past, public health efforts were limited to sanitation and to disease prevention and control, today, these have a broader scope, and include a wide range of environmentally-related matters, such as provision of drinking water supply, installation of a proper solid waste and sewage disposal system, housing facilities, adequate nutrition, and family planning programmes. At present, the objectives of the Ministry of Health (MOH) include, therefore, among others: the prevention and control of communicable diseases, such as malaria and schistosomiasis, and provision of adequate health services in the rural areas. To attain these goals, the government has created six major bureaus with the Ministry of Health: the Bureaus of Health Services, Medical Services, Dental Services, Research and Laboratories, Quarantine, and Food and Drugs. Two other Ministry of Health offices were created specifically to carry out vector-borne disease control programmes. These are the Malaria Eradication Services (MES) and the Schistosomiasis Control and Research Services (SCRS).

4.2.2 Control of vector-borne diseases

Schistosomiasis and malaria are the two most important vector-borne diseases in the Philippines, with a particularly high prevalence in the rural areas, where most irrigation activities take place. The species responsible for the former is Schistosoma japonicum, which uses snails of the species Oncomelania quadrasi as its intermediate host. More than a million

inhabitants of the Philippines, mostly farmers and their families in Southern Luzon, Visayas and Mindanao, are at risk of becoming infected, while the estimated number of cases amounts to 199,000. The known area of snail infestation covers about 22,780 hectares.

Malaria is a major public health problem, especially in the Cagayan Valley and the islands of Palawan and Solu. The vector is Anopheles minimus flavirostris, which breeds in fresh, slow-flowing water, such as can be found in creeks and springs. The number of confirmed cases in 1982 was 97,531.

4.2.3 Schistosomiasis control and research

Research and control of schistosomiasis has a long and distinguished history in the Philippines, which dates back to 1906, when the occurrence of S. japonicum was first described. A milestone was reached when, in 1951, the Division of Schistosomiasis was created within the Department of Health. Research carried out over the years has led to the implementation of the four-pronged approach for schistosomiasis control, consisting of case detection and treatment, health education, environmental sanitation, and snail control through agro-engineering and the application of molluscicides. The responsibility for research and control lies with the upgraded version of the Division of Schistosomiasis, the Schistosomiasis Control and Research Services (SCRS). In carrying out its tasks, the SCRS organized Schistosomiasis Control Teams (SCT) in all endemic areas. In early 1984, a reorganization within the Ministry of Health became effective. In the new structure, the role of the SCRS has been limited. The Provincial Health Offices are now responsible for the implementation of the programme, and they now supervise all of the SCT's.

4.2.4 The Schistosomiasis Control Council

The need for a multi-agency coordinated and concerted effort in schistosomiasis control in the Philippines prompted the government to create the Schistosomiasis Control Council (SCC). This council is primarily responsible for the coordination and integration of all schistosomiasis control programmes, projects and activities of relevant government agencies and instrumentalities. The governing body of the council is a Board of Directors, with the Minister of Health as Chairman; it also includes the Ministers of Public Works and Highways, Local Government and Community Development, Agriculture, and Education and Culture; the President of the Philippines Medical Association; and the Administrator of the National Irrigation Administration. An Executive Committee, headed by the Council's Executive Director, reviews and recommends national programmes on the control of schistosomiasis to the Board of Directors. The National Economic and Development Authority, the Ministry of Social Services and Development, and the Ministry of Budget are represented in the Executive Committee. All approved activities are carried out by the technical staff, under the supervision of the Executive Director.

4.2.5 Malaria control and research

Organized efforts in the Philippines to study the epidemiology of malaria, and to carry out programmes to control the disease, date back to 1926. In 1966, the Malaria Eradication Service (MES) was created by Republic Act 4832; the Act provided the MES with the necessary legal authority and financial support. Central direction and control by a separate, major office within the Ministry of Health, and implementation of control programmes by an adequate field staff were provided for. The functions of this office were described as follows: formulation of schemes and adoption of unified and coordinated measures for the eradication of malaria; assignment, or re-assignment, of malaria personnel and other resources, whenever required; adoption of measures relating to spraying of buildings and other premises with

insecticides; carrying out treatment-linked malaria surveys; determination of the malarial and non-malarial areas; and adoption of any other measures considered necessary for the eradication of malaria.

Since early 1984, the role of the MES in the Ministry of Health has been limited to general administration, while the Provincial Health Offices now have direct responsibility for the operation of the 33 malaria units in the country.

4.3 Irrigation development and the control of vector-borne diseases

4.3.1 The schistosomiasis control programme in irrigation projects

The development of water resources for irrigation in the Philippines is likely to enhance the transmission of schistosomiasis. It is, for this reason, that schistosomiasis control programmes are incorporated in irrigation development projects in those service areas which are endemic to the disease, or where a serious risk of introduction exists.

At present, NIA has ten on-going projects, and one completed project, with health and environmental components. These projects receive financial assistance either from the Asian Development Bank or from the World Bank. Eight of them, including the completed project, have a schistosomiasis control programme incorporated; in two, general health services are provided, and one has a malaria control component.

The schistosomiasis control component in irrigation projects is usually divided into two categories, engineering and health services.

The engineering category consists of: improvement of existing drainage channels and construction of new ones; implementation of improved water management schemes; construction of footbridges; construction of Barangay Health Centres; and development of rural water supply.

The health services category consists of: health education; diagnosis and treatment; environmental sanitation; and snail control, through the use of chemicals.

4.3.2 Programme implementation and institutional arrangements

The way a schistosomiasis control programme is implemented in an irrigation project area depends on whether it will be a component of an Integrated Area Development Project or a component of an Irrigation Development Project. In an I.A.D. project, such as the Philippine Rural Development Project (PRDP), NACIAD is the principal executing agency responsible for the implementation of the programme, and NIA and MPWH are just cooperating agencies (see Figure 5). On the other hand, when the programme is part of an I.D. project, NIA is the principal executing agency responsible for the implementation of the programme, and MOH and MPWH are the cooperating agencies.

In the latter case, before the start of project implementation, NIA prepares a Memorandum of Agreement with the MOH to formally establish the duties and responsibilities of both agencies in relation to the schistosomiasis control programme. Usually MOH is responsible for all the health services activities of the programme, and NIA for the engineering aspects, except those relating to rural water supply, which are the responsibility of the MPWH. A similar Memorandum of Agreement between NIA and MPWH is usually prepared to ensure that the responsibilities with respect to the latter are properly looked after. In addition to its responsibilities, NIA also provides logistic support to both MOH and MPWH, such as procurement

Figure 5. Institutional structure of the implementation of the Schistosomiasis Control Programme for the Philippine Rural Development Project (An Example for Integrate Area Development)

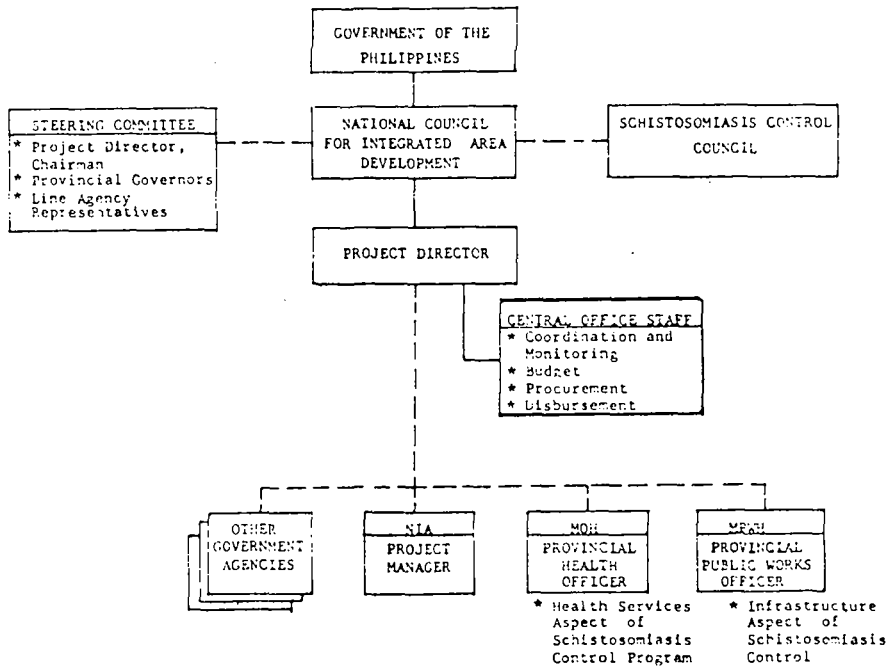
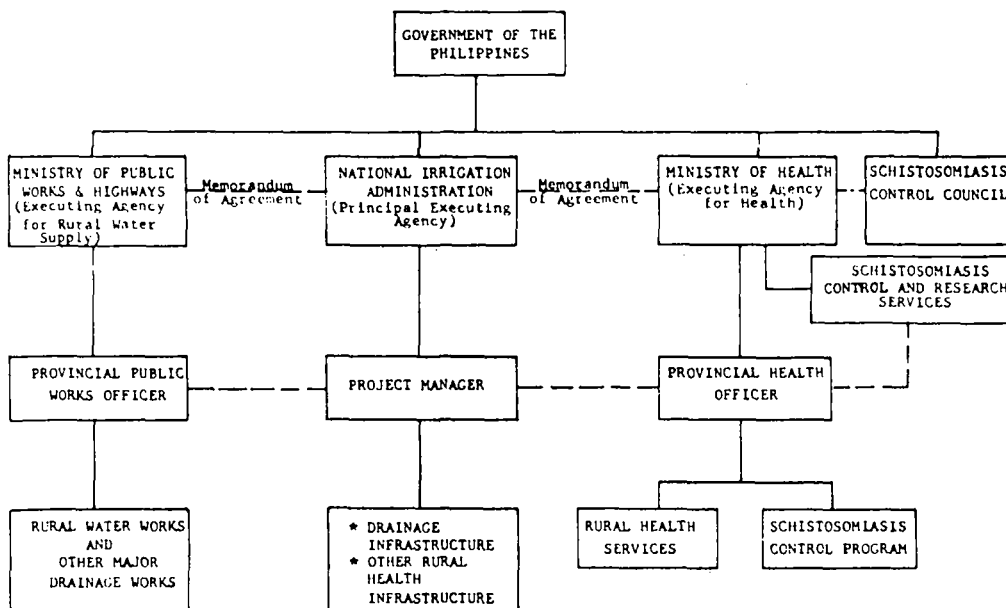


Figure 6. Existing institutional structure for the implementation of Schistosomiasis Control Programme in Irrigation Projects



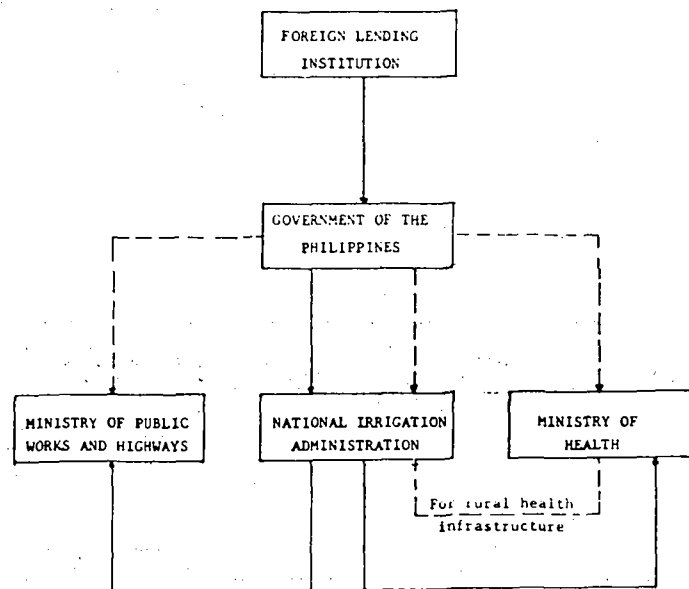
of supplies and materials, and providing vehicles and field personnel. It further provides incentives in the form of honoraria to MOH and MPWH employees attached to the programme.

The NIA carries out its programme duties and responsibilities through its project offices with the Project Managers (Regional Irrigation Directors in some projects) as the main responsible persons. The MOH, on the other hand, implements the programme through the SCRS and PHOs. Since the reorganization of the MOH in 1984, the PHOs have become directly responsible for the implementation of schistosomiasis control programmes, and the schistosomiasis control teams report to them. Figure 6 shows the present institutional arrangements.

The MPWH implements its component of the programme through its District Offices, with the District Engineers as the directly responsible persons.

As concerns the disbursement and management of health programme funds in irrigation projects, NIA administratively controls the foreign component of the financial requirements of the programme. On the other hand, the MOH controls the government local counterpart budget for health services, and the MPWH, the rural water supply and large drainage works component. The existing arrangement is shown in Figure 7.

Figure 7. Present flow of financial support for the implementation of irrigation projects with health and environmental component



LEGEND:

- FOREIGN COMPONENT OF PROJECT COST
- - - - - LOCAL COMPONENT OF PROJECT COST

4.3.3 The malaria control programme in the Philippine medium scale irrigation projects

As elsewhere, the construction and subsequent operation of irrigation projects in the Philippines can have both ecologically negative and positive effects in relation to malaria transmission. In the process of construction, some breeding sites of important vector species may be destroyed. Also, new sites may also be created. The movement of workers and their families from non-malarial to malarial areas, or vice-versa, may further disturb the ecological balance of the factors related to malaria transmission.

The inclusion of the malaria control programme as an integral component of the Philippines Medium Scale Irrigation Project (PMSIP) is in recognition of the possible adverse impact of the project on the spread of malaria. Although the MOH already implements malaria control in practically all irrigation project areas where malaria is endemic, and surveillance in those areas where a serious risk of introduction of the disease exists, these measures have, in practice, proven to be rather ineffective, because of limited financial support from the government. The control measures presently being implemented in PMSIP aim at strengthening the ongoing programme of the Malaria Eradication Service of MOH, which, by itself, encompasses a broad range of activities. Some of these are: residual DDT spraying of houses; Ultra Low Volume (ULV) spraying of selected areas; weekly larviciding of selected breeding places; introduction of biological measures (larvivorous fish); passive and active case detection and treatment; health education and information campaigns; and clearing of rivers and creeks.

4.3.4 Implementation and institutional arrangements

The NIA is directly responsible for all integrated components of irrigation projects, including the malaria control and eradication programme. However, the agency does not have the technical capacity to carry out the programme and it, therefore, delegates implementation to the MES, maintaining only a coordinating function. This division of labour is officially controlled by a Memorandum of Agreement between the two agencies. This agreement states that the MES is directly responsible for the present implementation of the malaria control programme. The NIA, through its project offices, provides logistic support, in particular the recruitment of personnel, procurement of equipment, supplies and materials and the disbursement of programme funds. As a result of the reorganization in early 1984, the Provincial Health Offices now perform the executive role.

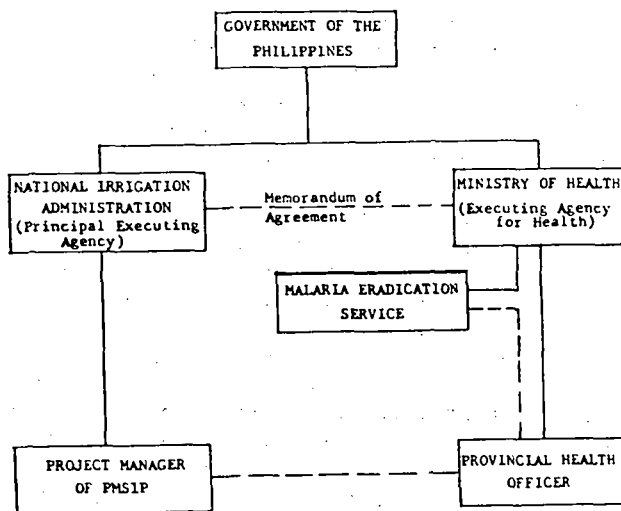
Since it was launched in 1980, the Malaria Control Programme in the Philippines Medium Scale Irrigation Project has functioned smoothly, except for some problems encountered in the procurement of supplies and materials from abroad, and other minor internal problems. This indicates that the existing institutional arrangements (Figure 8) for the implementation of the programme are satisfactory.

4.4 Other related health and environmental safeguards: the environmental impact assessment

Irrigation projects, particularly those that require the building of dams and reservoirs, are among the most sensitive of all development projects which could cause changes in the environment. While such projects are generally important to national economic development, their adverse impact on the environment have, in the past, often not been taken into account in the planning stage.

In the Philippines, environmental impact assessment gained impetus after the enactment into law of the Philippine environmental policy decree, otherwise known as P.D. No. 1151. Section 4 of the aforementioned decree stipulates that project proponents, whether from the public or private

Figure 8. Present institutional structure for the implementation of Malaria Control Programme as component of the Philippine Medium Scale Irrigation Project (PMSIP)



sectors, shall prepare, file and include in every action, project or undertaking which significantly affects the quality of the environment, a detailed environmental impact statement. The rules and regulations implementing this Presidential Decree became effective in June 1978. In 1979, Presidential Decree No. 1586 scaled down the scope of coverage of the impact assessment system by specifying that only those projects and/or areas which are environmentally critical will automatically fall within the provision of the above requirements. Presidential Proclamation No. 2146, issued in 1981, identified three types of environmentally critical projects (i.e., infrastructure projects, heavy industries, and resource extractive industries) and twelve kinds of environmentally critical areas (e.g., bodies of water, recharge areas of aquifers, etc.). Significant steps have already been taken towards establishing the institutional framework required for the implementation of the environmental impact assessment system in water resources development projects. Since 1980, the different major water resources agencies in the Philippines have been meeting, and have agreed on coordinating, with each other in implementing the system in their respective projects. NIA is responsible for the assessment of the environmental impacts of proposed foreign assisted irrigation projects, as required by the foreign financing institutions. The assessment system, however, is not as comprehensive as in the case of the environmental impact assessment system required by the Philippine environmental policy. In compliance with this policy, NIA is strengthening its capability for conducting environmental impact assessment; this is being carried out by an Environmental Adviser training selected agency personnel.

The task of monitoring the implementation of the environmental impact assessment programmes in all development projects, and the consequent review of their results, are the responsibility of the National Environmental Protection Council (NEPC), created by virtue of Presidential Decree No. 1121.

4.5 Conclusions and recommendations

In the Philippines, the implementation of the health and environmental programmes as components of irrigation development projects has generally been successful. The present institutional arrangements, with NIA, MOH and MPWH as the principal agencies involved, seem to be functioning in a satisfactory way,

as demonstrated by the ongoing foreign-assisted irrigation projects, at least during the projects' construction. Some problems, however, may emerge when projects are completed. Experience has shown that drainage channels constructed as part of the schistosomiasis control programme in some of the irrigation projects are left unmaintained, due to lack of funds. To prevent such a situation, and to ensure the continuation of some important activities related to the control of schistosomiasis in the period beyond project implementation, it is very important that the national government give priority financing to such activities, so as not to waste the important investments that have already been made. Closer cooperation among the member agencies of the SCC, in such cases, is very important. An arrangement wherein the MOH is involved, even during project planning and packaging, should further improve the implementation of the programme. The enactment into law of the Philippine environmental policy in 1977 has contributed significantly to the incorporation of health and environmental safeguards in irrigation development projects planned and implemented since then. Experience, however, shows that incorporation of health and environmental safeguards in irrigation projects without foreign assistance is very difficult. As a matter of fact, only projects with foreign assistance have a comprehensive health and environmental component. This is primarily due to unavailability of funds. To ensure the incorporation of health and environmental safeguards, particularly the control of vector-borne disease, in all types of irrigation projects, whether small or large, and foreign-assisted or not, the Minister of Health should be made a member of the NWRC and the NEPC.

The Panel considered the situation in the Philippines to be a very good working example as it included valuable information about intersectoral linkages. The importance of the case-study material was stressed, and it was agreed that this should be used to convince government authorities of the participating agencies' member states of the significance of proper institutional arrangements. Several Panel members paid special attention to one example the author of the paper had presented, when he mentioned that a particular urgent measure for improvement of the drainage situation had to be cancelled. Flexibility in planning and action are thus required and alternatives will have to be sought and applied in such emergency situations to obtain the incorporation of necessary safeguards as originally planned.

5. The experience in Sri Lanka¹

5.1 The Mahaweli Development Programme

The Mahaweli River is the longest river in Sri Lanka and flows through the intermediate and dry zones, which include two thirds of the country's territory. The development of the irrigation potential of this river is, therefore, important for the further development of agriculture in Sri Lanka.

Though the intermediate and dry zones receive a substantial volume of rainfall during the major monsoon season, their climate is characterized by drought for the greater part of the year. This makes the creation of irrigation facilities a prerequisite for the expansion of farming activities in these areas. This expansion will also allow for re-settlement of farmers from other parts of the country.

¹ Document EPO/PE/WP/84.4: Institutional arrangements to ensure the incorporation of health and environmental safeguards in water resources development projects - the Mahaweli Development Programme, Sri Lanka, by Lalit Godamunne, Secretary General, Mahaweli Authority of Sri Lanka, Colombo, Sri Lanka.

The Master Plan for the development of the irrigation and power potential of the Mahaweli and its tributaries was drawn up by UNDP and FAO in 1966, and many of the detailed plans made subsequently are set within the framework for development proposed in that report. The UNDP/FAO study envisaged the development of 900,000 acres of land in the Mahaweli and adjacent basins (including 246,000 acres of existing agricultural lands), and the producing of 508 MW of hydropower; according to the original time frame, the programme was to be completed in thirty years. Work on the first project under the Mahaweli Development Programme was started in 1972.

The present government, which assumed office in 1977, decided to implement the basic Mahaweli Development Programme on an accelerated basis, in order to bring down the unemployment rate, increase domestic food production (thus saving on the country's balance of payments), and to meet the rapid increase in the demand for energy.

The various components of the accelerated programme with respect to the irrigation of agricultural land, settlement of farm families, and the generation of hydropower are shown in Tables 5 and 6. Several foreign governments and UN agencies have made financial assistance available for both headworks and downstream development.

Table 5. Accelerated Mahaweli Programme - Development of Agricultural Land and Settlement

System	Gross Areas (HA)	Net Irrigable Areas		Target number of farm families	Progress of settlement as at 31.3.84	Total capital costs (Rs. M)
		Existing areas improved (HA)	New Areas (HA)			
A	106,000	Nil	14,000	14,000	nil	not available
B	135,000	1,506	40,420	35,690	2,790	7,055
C	66,000	4,070	22,800	20,370	7,520	3,746
D	61,000	Nil	15,340	15,300	nil	not available
G	6,324	2,180	2,990	2,950	1,210	256
H	43,000	6,570	23,480	23,480	22,770	1,895

Source : Mahaweli Authority and MEA.

TABLE 6

ACCELERATED MAHAWELI PROGRAMME
POWER GENERATION

Reservoir and Headworks	Date of Completion	Gross storage capacity (m.c.u.m.)	Power generation (MW)	Total capital cost (Rs. M)	Foreign concessional financing (Rs. M)
Victoria	1984	728.0	210	7983.7	4647.1
Kotmale	1984	174.0	134	8755.0	6031.0
Maduru Oya	1983	586.5	7.5	2631.3	1441.8
Randeniçala	1983	860.0	126	4450.1	3567.7

Source: Mahaweli Authority.

5.2 Administrative arrangements

The implementation of the Mahaweli Development Programme was begun in 1978 by the Ministry of Mahaweli Development. However, it soon became evident that the administrative procedures of a government Ministry were less than ideal when implementing a development programme of such a size on an accelerated basis. Therefore, the Mahaweli Authority, a government Corporation, was set up in 1979 by an Act of Parliament, which gave it responsibility for implementation of the Mahaweli Ganga Development Programme.

This Act first provided for the Minister in charge of the Mahaweli Development Programme to declare, with presidential approval, any area which could be developed with the water resources of Mahaweli Ganga, or any other major river, as a "special area", after which the Authority could exercise all, or any, of its powers, duties and functions in this area.

The Authority's functions were designated in the Act as comprising:

- (a) planning and implementing the Mahaweli Ganga Development Scheme, including the construction and operation of reservoirs, irrigation distribution systems and installations for the generation and supply of electrical energy;
- (b) fostering and maintaining the full and integrated development of any special area;
- (c) optimizing agricultural productivity and employment potential, and generating and securing economic and agricultural development within any special area;
- (d) conserving and maintaining the physical environment within any special area;
- (e) furthering the general welfare and cultural progress of the communities within any special area, and administering the affairs of such area;
- (f) promoting and arranging the participation of private capital, both internal and external, in the economic and agricultural development of any special area;
- (g) promoting and arranging the cooperation of government departments, state institutions, local authorities, public corporations and other persons, whether private or public, in the planning and implementation of the Mahaweli Ganga Development Scheme and in the development of any special area.

The mandate of the Mahaweli Authority includes, inter alia: (a) the construction, maintenance and operation of dams, channels, drainage systems and other irrigation works and structures for the purpose of achieving its objectives; (b) construction of such hydropower installations as may be necessary for the purpose of the generation and supply of electrical energy; (c) taking such measures as may be necessary for watershed management and control of soil erosion; (d) promoting of and assisting in the settlement of persons on lands, farms and properties in any special area, and paying for or contributing to the expenses of or, in any other way, assisting persons in settling, farming, or otherwise developing, lands, farms and properties in any special area; (e) providing advisory and farmer training services to improve cultivation techniques, water and soil management, and conservation of the physical environment; (f) managing and operating a scheme of supervised credit to farmers; (g) providing agricultural inputs to farmers; (h) carrying out research relating to the development of agriculture and agro-based or related industries; (i) promoting, undertaking and

participating in agro-based or related industrial or commercial enterprises; and (j) providing marketing services for the purchase, storage, processing and sale of farm and other produce.

The Act by which the Mahaweli Authority was created also provides for it to give special or general directions to government departments or corporations so that these entities will perform any functions and duties which are determined necessary by the Authority in any of the special areas.

Furthermore, the Act provides for the possibility of establishing departments or agencies under the control of the Authority, for the purpose of discharging any of its functions. Making use of this provision, the Mahaweli Economic Agency was set up in 1981 to take charge of settlement and post-settlement activities, such as agricultural development in the Mahaweli areas. From the time the Mahaweli Development Programme was launched, the Mahaweli Development Board (now the Mahaweli Engineering and Construction Agency) has been in charge both of the construction and of the settlement activities in the downstream areas. However, with the launching of the Accelerated Programme in the late 1970's, it was felt that the resources of the MDB would be inadequate to undertake the increased workload insofar as the supervision of the settlement and development of these areas was concerned, since that body was heavily oriented towards engineering activities. MECA's construction work and supervision of construction in the downstream areas includes not only the irrigation and drainage network, but also roads, social infrastructure facilities, such as schools and hospitals, and administrative buildings for government agencies and housing for the staff of the Mahaweli Authority. Therefore, the Mahaweli Economic Agency is now responsible for settlement and post-settlement management in downstream areas, including the arrangements for delivery of health care, and for matters pertaining to the environment.

5.3 Institutional arrangements for the delivery of health care services to the Mahaweli areas

In Sri Lanka, the Ministry of Health has primary responsibility for both preventive and curative health services, and the special areas of the Mahaweli Development Programme are no exception to this rule. The health care delivery system is, therefore, uniform throughout the country.

In 1980, the government of Sri Lanka signed the Charter for Health Development with WHO, and thereby endorsed the concept of Health for All by the Year 2000. In accordance with this strategy, the health care delivery system which prevailed until 1980 is being altered to meet the requirements of the Primary Health Care system. For the next two decades, the health care delivery system will aim at (a) establishment of a number of grass-roots level Gramodaya Health Centres - one for every 3000 inhabitants - to ensure that essential health care will be available to all people; (b) strengthening of higher-level health units so as to ensure logistic, supervisory and referral support to the Gramodaya Health Centres; (c) promotion of community participation for both health and sanitation; and (d) gradual functional integration of curative and preventive care, with emphasis on the latter component. The benefits of the PHC system will accrue to settlers in the Mahaweli areas as much as to persons residing in the other rural areas of the country.

As mentioned above, the Mahaweli Economic Agency (MEA) is responsible for health care delivery activities in the downstream areas. In this role, the MEA has, in a very useful manner, supplemented the efforts of the Ministry of Health with respect to the delivery of preventive and curative services, including health education. The Ministry of Health has appointed a Deputy Director to liaise with the Mahaweli agencies for health care delivery. The MEA deals with this officer mainly on matters relevant to the construction of

health infrastructure facilities and the assignment of health personnel to the Mahaweli areas. A standing committee on health, on which MEA, MECA and the MOH are represented, meets periodically to resolve outstanding issues.

The health education programmes organized by the MEA, which are geared to the familiarization of settlers and their families with basic sanitary and hygienic requirements, play a significant role in the programmes of prevention and control of disease. In addition, these programmes, which use volunteers residing in the Mahaweli areas themselves, fit structurally in the basic philosophy of the PHC system. The Ministry of Health provides inputs into these programmes, by training MEA staff and health volunteers, and by conducting other educational programmes complementary to those organized by MEA.

One health volunteer has been named for every 25 families in the Mahaweli areas. Usually, it is a young man or woman, chosen in consultation with the communities they will serve. As already mentioned above, these volunteers carry out the health education programmes of the MEA, for which they receive special training from the Health Education Bureau of the MOH. They are also provided with simple medicines, which they are taught to dispense as required.

The nutrition education programme is another important facet of the health education work undertaken by the MEA. In most cases, a separate set of volunteers is recruited to staff this programme; these are trained by the MOH and the MEA. This education programme serves to disseminate information on general nutrition, infant and child nutrition, and nutritional requirements during pregnancy and lactation. A nutrition supplement, "thriposha", is distributed by the volunteers to children below five years of age, and to pregnant and nursing women. At the so-called Home Development Centres, a series of special courses are being organized for young women who have left school; the courses include information on health and sanitation.

With respect to the services provided by MEA in the area of preventive and curative health services, mention should be made of programmes designed to ensure a safe drinking water supply, proper sanitation, and nutrition supplements. Programmes for malaria control, eradication of helminthiasis, immunization, and diagnosis and treatment of anaemia are the responsibility of the Ministry of Health.

Since 1981, MEA has been implementing its own programme for the construction of wells for household water supply use. Much of MECA's earlier construction programme, which envisaged one large well for 20 families, was found to be unsatisfactory. The new programme, therefore, aims at constructing one well for every six families. Through this same agency, an on-going latrine construction programme is under implementation in all the Mahaweli areas. The health education programmes of MEA make a serious attempt to stimulate the settlers to use these latrines in order to ensure less environmental contamination and better health. Finally, the fact that the Mahaweli Authority has been instrumental in arranging assistance from the World Food Programme for the Mahaweli settlers during the initial 15 months of settlement deserves mention.

The Ministry of Health operates out-patient clinics which look after the needs of the Mahaweli settlers with respect to weighing of infants, immunization, treatment of helminthiasis, and other relevant matters. It also operates a spraying programme for malaria vector control. This is another area in which health education has been found to be of great importance. The settlers are normally unwilling to have their houses sprayed with malathion because of its unpleasant smell, and therefore tend to resist spraying. This resistance can only be broken by creating a greater awareness of the benefits of the malaria control programme. MEA plans to enforce its supervision of the spraying programme starting in late 1984.

5.4 Environmental problems and remedial measures

At present, the Mahaweli Authority deals with environmental issues in the special areas through the MEA. The government created a special authority for the environment in 1980, the Central Environment Authority, but its involvement in the activities in Mahaweli areas have been minimal.

In 1981 the Mahaweli Authority drew up an environmental action plan, based on the findings of various environmental impact studies. In this action plan an interim set of planning guidelines was presented, concerning forestry planning and management, watershed management, wildlife conservation, water resources research and monitoring, fisheries development, health care and sanitation planning, water and soil management, and land use planning. The agencies which would be responsible for implementing the components of the plan, and the sources of funding for many of the programmes, were also identified.

In the same year, a Technical Subcommittee on Forestry was created, including in its membership the Forest Department, the State Timber Corporation, the Ministry of Lands and Land Development, and the Department of Wild Life Conservation. This Subcommittee provides technical guidance and advice on forestry programmes in the downstream areas, and on the management of watersheds.

In 1982, a Technical Subcommittee on the Environment was created, with representation from various governmental and non-governmental organizations connected with environmental protection, to advise the Mahaweli Authority on its action plan and other matters related to the environment. The Central Environment Authority is a member of this Subcommittee. In addition, an environment unit has been created within MEA, with as its primary function being the coordination of planning, implementation and monitoring of environmental aspects in the Mahaweli areas. Environmental education is an important component in this arrangement. Much of the work of the Mahaweli Authority, and of the MEA, has, until now, been concentrated on the areas of forest conservation, reforestation, and wildlife conservation.

The Panel felt that the experience of Sri Lanka contained very valuable information, and pointed specifically to the tremendous tasks of the Mahaweli Authority and the great number of duties for which it was responsible. The question arose as to what the future position of the various ministries would be; these, at present, have delegated part of their responsibilities to the Mahaweli Authority. It appeared that a difficult situation might arise, yet the Mahaweli Authority is aware of this problem, and will tackle it once the settlement stage is past.

6. The experience in Kenya and Ethiopia¹

In the previous three chapters, an example of institutional arrangements in an industrialized country (USA) was given, while the other two referred to the situation in two developing countries in Asia. It was thought meaningful by the PEEM Secretariat to have a report prepared, as well, on the situation in two African countries; the two countries selected for this purpose were Kenya and Ethiopia. A member of the Secretariat paid a visit to each of these countries during 1984, and this report is based on the information gathered during these short visits.

¹ Document EPO/PE/WP/84.6: The status of institutional arrangements in relation to the incorporation of health and environmental safeguards in water resources development projects in two selected African countries: a report based on short visits to Kenya and Ethiopia, by Dr R. Bos, Associate Expert, Equipment, Planning and Operations, Division of Vector Biology and Control, World Health Organization, Geneva.

6.1 Some essential background information

6.1.1 Irrigation

Being neighbouring countries, located in the East of Africa, Kenya and Ethiopia are very similar insofar as their climatic and geophysical conditions are concerned. They consist, for a large part, of arid and semi-arid plains, which makes irrigation a potentially important tool in agricultural production.

River basins with perennial waterflow can provide the water needed for irrigation (in Kenya: the Tana River Basin; in Ethiopia: the Awash River Basin), yet, because of high investment requirements, the development of irrigation schemes is not the first priority in the agricultural policies of these countries' governments.

In Kenya, several irrigation schemes have been completed over the past thirty years, the oldest of which is Mwea Tebere, 150 km north-east of Nairobi. This scheme, affecting a population of 3229 families, or roughly 20,000 people, has a total irrigated area of 14,486 acres, where rice cultivation takes place. Another area of importance for its irrigated rice cultivation can be found in the Kano Plains of Western Kenya, south of Kisumu on Lake Victoria. Two pilot schemes have been established here, first, the Ahero Pilot Irrigation Scheme (840 hectares, with 519 families in six villages) in 1968, while the West Kano Pilot Irrigation Scheme (900 hectares, 553 families in five villages) became operational in 1975. Other minor irrigation schemes in Kenya are: the Perkerra Irrigation Scheme (approximately 125 hectares), for onion and red pepper production; the Hola Irrigation Scheme in the Lower Tana River Basin (approximately 875 hectares), producing cotton; and the Bunyala Irrigation Scheme (approximately 200 hectares), for rice cultivation. In the south, the Bura Irrigation Scheme is under construction.

In Ethiopia, irrigation is most intensively practiced in the Awash River valley, which is the country's most important area for cultivation of crops other than coffee. A total of 27 irrigation schemes can be distinguished, of which the first one (Wonji) already became operational in 1951. Relevant information on the characteristics of these irrigation schemes is given by Kloos, H. and Lemma, A. (1974). Ethiop. Med. J. 12, 157.

At present, pre-feasibility studies are being carried out for possible development of irrigation schemes in the Omo River Basin. When looking at the organizational structures of irrigation, these can be classified as integrated management organizations, according to the definition in the first working paper: in Kenya in the form of irrigation settlement projects, in Ethiopia, in the form of state farms.

6.1.2 Vector-borne diseases

Vector-borne diseases constitute a major public health problem in both Kenya and Ethiopia, and the transmission pattern is, with few exceptions, quite similar in the two countries. Special units within the respective ministries of health are responsible for vector control operations. Lack of manpower and sufficient funds result in a level of surveillance and of evaluation of the control measures which is still far from optimal.

Of the vector-borne diseases, malaria and schistosomiasis (caused by either S. mansoni or S. haematobium) are the most important. Visceral and cutaneous leishmaniasis occur in both countries, but the transmission of lymphatic filariasis is confined to the coastal areas of Kenya. Of human trypanosomiasis, only small foci can be found (one in Kenya, a few in Ethiopia), and onchocerciasis can be found in the west of Ethiopia. Finally, many fever-causing arbo-viruses are circulating in Kenya and Ethiopia.

6.2 Institutional Arrangements in Kenya

The planning and implementation of water resources development projects in Kenya are the responsibility of three Development Authorities, which are the:

Tana and Athi River Development Authority;
Lake Basin Development Authority; and
Kerio Valley Development Authority.

These are semi-autonomous bodies, which are involved in all kinds of development activities (agricultural, industrial, creation of settlements, etc.). Their role is to carry out pre-feasibility and feasibility studies, for which they actively collect data, and carry out all further pre-execution phase activities. Once an irrigation scheme becomes operational, it falls under the authority of the National Irrigation Board of Kenya. This board was established in 1966 with a mandate to develop, construct and operate irrigation schemes in the country. Its first task, at the start of a scheme, is to re-settle landless, unemployed or underemployed people, who are given a plot of land of between three and four acres for cultivation. The farmers receive financial and technical support from the NIB. They, in turn, sell their harvest to the Board, which takes care of milling and marketing of the final product. Out of the money they earn, they pay a contribution to the NIB for services rendered. These services not only consist of the aforementioned financial and technical support, but also of research (mainly testing of new varieties of crops), training, maintenance of the irrigation works and construction and maintenance of the necessary infrastructure, and provision of some preventive health measures. Of a total annual expenditure, during the period 1979/1980, of K 2,084,386, an amount of K 15,625 (0.75%) was spent on the public health component (1 K = 1.33 US\$).

There is no legislation in Kenya which obliges the Development Authorities to carry out health impact assessments for water resources projects during their planning stage. However, the approach, in the case of industrial development projects, provides an interesting example of what would theoretically be possible. All industrial development in Kenya is subject to an environmental impact assessment; this is a generally implemented government policy, even though there is no legal basis for it.

For this purpose, an inter-ministerial committee has been formed (the so-called Interministerial Committee on Environmental Impact Assessment of Industries), with the participation of representatives from the Ministries of Health, Water Resources, and Industry, the Government Chemist, the University of Nairobi, the Ministry of Lands, as well as local authorities from the area for which development is proposed. This committee scrutinizes each proposal, and special funds have been put at its disposal to carry out the necessary studies. It applies guidelines, which were specifically developed for this purpose in order to standardize the environmental impact which industries are allowed to have. The Secretariat for National Environment and Human Settlement, one of the three branches of the Ministry of Natural Resources, serves as the secretariat of this body. In this case, the extra costs for the measures to restrict undesirable effects on the environment are borne by the industries. However, monitoring of the implementation of the recommendations made by the committee poses a problem, because of the lack of qualified manpower and insufficient funds.

A similar arrangement could be envisaged for water resources development activities: the composition of the interministerial committee would be slightly different, but it could operate within similar terms of reference, preferably with sufficient funds made available to cover the necessary studies, and also to monitor the correct implementation of its recommendations.

A possible alternative, put forward during the third annual PEEM meeting (Rome, 1983), is to expand the terms of reference of an existing national committee (the National Action Committees, set up for the promotion of the International Drinking Water Supply and Sanitation Decade (IDWSSD) were specifically mentioned), thus avoiding the creation of yet another national body to deal with this matter.

If an interministerial committee, similar to that for Environmental Impact Assessment of Industries, were to be established, the provision of adequate arrangements for coordination between this committee and the NAC would be ensured, since the supply of safe water and sanitation is an integral part of the implementation of health safeguards in any new scheme. One way to achieve this would be to establish this interministerial committee as a subcommittee of the NAC.

As mentioned above, certain preventive health measures are carried out by the National Irrigation Board in the existing irrigation schemes under its authority. These consist of the regular treatment of irrigation canals with molluscicide, and distribution of anti-malaria tablets to all children below ten years of age and to pregnant women, the latter on a voluntary basis. In each irrigation scheme, some technicians have been appointed to perform these tasks, under the supervision of a professional located at the head office in Nairobi, who regularly visits the schemes. Unfortunately, these activities are not supported by routine surveillance activities for malaria and schistosomiasis, nor is there any vector surveillance or evaluation of the effectiveness of the mollusciciding going on. The Mwea Tebere Scheme has, apart from molluscicide treatment and drug distribution, a programme for health education. It should also be mentioned that the Kenyan Medical Research Institute has launched two projects in Mwea, one being a schistosomiasis survey, of which the provision of health education, latrines, safe drinking water and drug treatment form the control component, while the other is a study on the control of malaria in pregnant women, and its effect on the birth weight of newborn children. The population of the irrigation schemes has to go to the health centres of the Ministry of Health outside of the schemes for all other medical care. The Ministry of Health is represented in the NIB by its Permanent Secretary, but, in practice, the intersectoral collaboration does not seem to be optimal. A final factor of importance is the annual migration pattern of temporary labour, which, even in the case of the control of vector-borne diseases becoming effective, would play an unstabilizing role. Because of the population movement, introduction of the pathogen continues to take place, while, as a secondary effect, overcrowding caused by the influx into the schemes renders existing sanitary facilities completely insufficient. No arrangements exist between the National Irrigation Board of Kenya and the Ministry of Health to effectively deal with the health aspects of these migration patterns. A coordinated approach will be necessary to overcome the present situation.

6.3 Institutional Arrangements in Ethiopia

In recent years, a structurally very adequate set of institutional arrangements have been created in Ethiopia, providing an integrated coverage for all the aspects related to water resources development projects, from the planning to the operational phase.

In 1981, the National Water Resources Commission of Ethiopia was established. It reports directly to the Chairman's Office, yet does not have the status of a Ministry. The Commission has been subdivided into four bodies, three of which are authorities with an executive function, and one of which is an agency with an advisory function. These are: the Water Supply and Sanitation Authority (WSSA), the Water Resources Development Authority (WRDA), the Water Works Construction Authority (WWCA) and the Meteorological Services Agency (MSA). There is a well-defined division of labour between the

three executive bodies. In the case of water supply and sanitation: for example, the WSSA is responsible for the pre-feasibility and feasibility studies; the WRDA carries out the design; and the WWCA is responsible for actual construction. After completion of the construction works, the WSSA takes over maintenance, since this body is in charge of all the urban and rural water supply and sanitation facilities (Addis Ababa not included).

In the case of irrigation or hydropower projects, the WRDA takes care of the planning and the feasibility studies, as well as local reconnaissance. Within the WRDA, a special environmental health unit has been created, which assesses the environmental and health hazards which may result from the projects. Based on these assessments, it makes recommendations for preventive measures, monitors the correct implementation of these measures, and sometimes even takes care of the initial surveillance activities during the operational phase. Generally, however, irrigation projects are immediately handed over to the authority of the Ministry of State Farms and the responsibility for health surveillance is transmitted to the Ministry of Health.

At present, the activities of the environmental health unit focus on new developments in the Omo River Basin. Here, routine environmental and epidemiological studies are carried out in order to identify local health problems, to identify disease vectors, to investigate the social situation, and to predict the impact of environmental changes caused by the introduction of irrigation on the health status of the population.

The Ethiopian authorities have succeeded in creating institutional arrangements which are conducive to the incorporation of environmental and health safeguards in water resources development projects, at least in the planning stage. However, at the moment when a project is finished, there is no guarantee of the maintenance of the preventive measures which have been built in.

The interest of the Ministry of State Farms is basically limited to matters of agricultural production, and the Ministry of Health does not have any special programme aiming at the prevention of the specific health hazards in irrigation schemes; it provides mainly curative medical care.

To improve the situation in already existing irrigation schemes, an interesting initiative was undertaken by a few medical research institutes and some other government bodies. These included: the Ministry of Health (Central Laboratory and Research Institute, Communicable Disease Control Division, and the Health Education Division); the Water Resources Development Authority (Amibara Irrigation Project, and the Public and Environmental Health Planning Department); the Relief and Rehabilitation Commission (Health Department); and the Addis Ababa University (Faculty of Medicine, the Institute of Pathobiology).

An informal agreement was reached between representatives of these institutions to carry out an integrated control programme for urinary schistosomiasis in the Amibara Irrigation Scheme in the Middle Awash River Valley. This inter-institutional collaborative effort was subsequently carried out in 1981 and 1982, and consisted of an initial health education approach to get the population acquainted with the background and objectives of the project; a schistosomiasis survey, with drug treatment of those found to be infected; a follow-up to evaluate the results of this drug treatment; and a vector control programme, applying chemical control and environmental management. For this purpose, three teams were formed: a health education team, a clinical team and an environmental health team. It is noteworthy that, in the field of environmental management, the latter team came up with technical recommendations to eliminate a potential breeding place for the snail intermediate host (*B. abyssinicus*) of schistosomiasis in that area, by improving the drainage at the end of the irrigation scheme with a special

canal to carry the surplus water back to the river. This recommendation was implemented and paid for by the irrigation project, with significant results.

The impact of this collaborative effort has proven the value of a multi-disciplinary approach. The informal basis on which this activity was carried out needs to be transformed into more formal institutional arrangements, which will guarantee continuous surveillance of existing irrigation schemes and implementation and maintenance of necessary environmental management measures.

6.4 Improvement of the Institutional Arrangements

6.4.1 Kenya

Even though there is a great awareness among the relevant Kenyan authorities of the health risks involved in water resources development, no adequate institutional arrangements have been created to effectively ensure the incorporation of environmental and health safeguards in such activities. During the planning stage, not much attention was paid to these aspects, while the preventive measures which are being taken in the operational irrigation schemes are insufficient and cannot guarantee a long term solution to the existing problems. The following recommendations may serve to improve this situation.

- (a) A proposal for clear and adequate legislation should be prepared, in which the incorporation of environmental and health safeguards in any water resources development project is made obligatory.
- (b) An interministerial committee for the assessment of environmental and health risks involved in water resources development projects should be established, consisting of representatives of the relevant ministries, other government bodies and research institutions, using the already existing Interministerial Committee on Environmental Impact Assessment of Industries as a model. This committee should be responsible for the execution of the activities as indicated in the legislation under 1.1. Adequate institutional arrangements should be made to ensure the coordination between this committee and the NAC for the IDWSSD.
- (c) Task forces should be set up by the Ministry of Health and the National Irrigation Board to carry out detailed surveys of the epidemiological and entomological/malacological aspects of the vector-borne disease situation in the existing irrigation schemes, based on which action plans can be developed for adequate and effective control of these diseases.
- (d) In order to eliminate migration as a destabilizing factor in the health situation, facilities should be created to check temporary labour for possible infections by pathogens which are transmitted by vectors, and, if necessary, to provide treatment prior to their entry into the scheme.
- (e) The intersectoral collaboration between the Ministry of Health and the National Irrigation Board should be improved in order to better coordinate vector control activities in and around the irrigation schemes.

6.4.2 Ethiopia

The organizational structure in Ethiopia, consisting of the National Water Resources Commission, is, in theory, adequate to ensure the incorporation of health and environmental safeguards in water resources development projects. However, it is questionable if, under the present

circumstances, with the lack of well-trained manpower and funds, these bodies can do something practical in this regard. For the improvement of the negative health impact in already existing schemes, the interesting initiative by the above-mentioned collaborative group of institutions should be considered. In order for it to continue its valuable efforts, it will be necessary to institutionalize the present informal framework and strengthen the group with sufficient funds to enable it to continue its work. The following are some concrete recommendations.

- (a) The Public and Environmental Health Unit within the Water Resources Development Authority should be strengthened by training manpower and provision of funds. In order to achieve this, perhaps the training component in the budget of some irrigation projects supported by foreign donors can be used. In the present calculation of the cost of new irrigation projects, sufficient money should be allocated to make a meaningful contribution by this unit possible.
- (b) Part of any new irrigation scheme should be the establishment of a local branch of the Public and Environmental Health Unit of the WRDA, which coordinates with the local health centre of the Ministry of Health, and is specifically responsible for the maintenance of environmental management measures, surveillance of water-associated vector-borne diseases and health education about prevention of these diseases.
- (c) The collaboration of the informal group of institutions which worked in the Amibara Irrigation Scheme should be institutionalized as an official assessment and advisory body.

6.5 In conclusion

The examples of Kenya and Ethiopia show the differences, as they exist, between these two African countries as concerns the status of institutional arrangements in ensuring the incorporation of environmental and health safeguards in water resources development projects. In one, the awareness of the need to incorporate preventive health measures in water resources schemes lacks the framework necessary to channel the efforts of the various government bodies working in this field in an efficient and coordinated way. In the other, the existing institutional arrangements need further support in order to be translated into a practical approach for implementation of the necessary measures.

In both countries, continued outside support is needed, not only to reach the objectives as described, but also to provide a general strengthening, both financially and manpower-wise, to guarantee a strong foundation for a long-term strategy.

The Panel discussed the increased emphasis on irrigation in parts of the highlands of Ethiopia, and the possible creation of a large number of dispersed community schemes. These will be of a type which do not feature highly developed management skills, and will, therefore, need some form of support from centralized services in order to establish a programme for the incorporation of health safeguards.

It was considered very relevant that, in Ethiopia, the responsibility for the planning and construction of major projects remains with the Water Resources Development Authority, under the National Water Resources Commission, and that operation is usually the responsibility of the state farms. For small projects, however, responsibility lies with the Ministry of Agriculture, which, at present, has only a rudimentary irrigation unit and must, in the long term, rely on a highly decentralized system of project management. This is an example of the need for flexibility in institutional arrangements to meet changing development priorities.

The Panel observed a similar state of affairs in Kenya; on one hand, there is the NIB; on the other, the Small-Scale Irrigation Unit of the Ministry of Agriculture. It was felt very strongly that the involvement of the Ministry of Health, in this connection, has to be institutionalized, but it recognized that this would be a difficult task, in view of the wide geographical dispersion of the projects.

The Panel finally referred to the question of baseline studies on epidemiology within potential major water resources development schemes in Ethiopia. The Environmental Health Unit of the WRDA is available for such studies, but limitations in manpower and funds mean that they need further support and assistance to meet the expanding workload involved in these studies, in report preparation, and in contributing to the design and planning of projects in collaboration with engineers, agronomists and economists, as was done in the recent FAO/UNDP feasibility study for the Weito River in the Gamu Gofa region.

7. A pragmatic approach¹

The term, "pragmatic", limits the scope of this chapter to problem solutions predominantly selected for the practical effect they could have on the incorporation of "safeguards". Pragmatism can be envisaged at various policy levels. At the national level, for example, long-term planning and legislative action are very important assets. One wonders whether pragmatic solutions can be offered to such a large variety of situations, given the different countries, peoples, water and development projects, and ecological conditions. However, the facts are as follows:

- similar water resources development projects have been, and are being, implemented in various countries;
- if these countries are situated in tropical zones, many problems of the same nature can be identified, and, regardless which country is concerned, call for the same solutions. This is also the case for health problems;
- at the government level, institutional arrangements may differ from one country to another, depending on the political system of each country. There may also be great differences in the level of awareness of people about protecting their own interests; but, at the local or regional level, institutional arrangements frequently follow similar patterns.

7.1 Possible institutional arrangements

7.1.1 Necessity for a positive policy related to environmental problems

At present, most new dams and irrigation schemes are being constructed in tropical developing countries, where vector-borne diseases still constitute a major public health problem. These countries are hard-pressed to produce food and other agricultural products for their own requirements (hence the

¹ Document EPO/PE/WP/84.5: A pragmatic approach to the incorporation of health and environmental safeguards in water resources development projects by Jean Fauchon, Consultant, Ornex, France.

multiplication of irrigation schemes) and require energy to sustain the local development of industry (hence the increased construction of dams). Usually, priority is given to rapid construction of a project and its efficient exploitation to the detriment of the long-term interests of the country insofar as well-being and environment protection are concerned. Fortunately, many countries have begun to react and sometimes only agree to the launching of large water resources development projects if protection for the local population is foreseen by the promoters in the project. Some basic elements of institutional arrangements are then necessary, for instance:

- (1) the existence of adequate legislation on sanitation and the environment;
- (2) technically sound, and financially strong, government services to support and guide the economic and social development of a given region;
- (3) a system of planning and studies, which forecasts the impact resulting from a water resources development project, and which recommends suitable preventive measures; and
- (4) financial resources to carry out these studies, and to implement the recommendations.

7.1.2 The importance of legislation on environment

Many countries have promulgated legislation on environment; this covers a great number of varied problems, in industrial, as well as rural, areas. With respect to water resources development projects, which are usually located in rural, and sometimes even remote, areas, this legislation is frequently difficult to apply. One of the following situations may exist:

- (a) there is strong legislation and it is possible to implement it, since financial and technical resources are available to do so;
- (b) there is no legislation at all and water management schemes can be planned, constructed and operated without any legal restrictions;
- (c) legislation exists, but is ineffective because of the weakness of government services, which lack the financial or technical capacity to apply it.

The situation under (a) is the one that exists in most industrialized countries. The state has enough authority to force the agencies responsible for implementation and operation of a scheme to apply the rules, as set forth in existing legislation. Other democratic structures can also play a great role in this connection.

With this type of organizational structure, the body in charge of construction and operation of a given project also has the responsibility to provide solutions for any negative side-effects the project may have.

With respect to vector-borne diseases, this means that the project management is responsible for continuously monitoring the transmission level of these diseases.

The situation under (b) is not very common, since most countries have already promulgated environmental legislation. However, when no legislation exists, it usually also means that the country does not have the financial means to sustain the development of water resources, and that government services are weak and ineffective. In such a case, any project will be executed with help from an assistance agency or some other outside financial institution, and the responsibility for the incorporation of environmental and health safeguards lies with these bodies.

An effort should be made to assist such countries in the preparation of adequate and applicable legislation, and in the strengthening of the relevant government organizations and services. This should include the creation of necessary health structures capable of coping with the needs forecasted to arise during the construction and operational phases of the project.

The situation under (c) is probably the most common in the developing countries: environmental legislation exists, but the possibility to enforce it is lacking, either because of financial or technical constraints, or because the existing government services fail to act outside of their established routine.

At a local level, the political and economic weight of the organization responsible for a water resources development project is often such that it will have a considerable influence on the course of events. This is often the case of large electricity programmes which are a powerful force in the country, at all levels of their activity. Much will then depend on two factors: the role and importance of government services, and the existence of financial means for environment protection and improvement.

7.1.3 The role of government services

Most countries have developed a network of government services through specialized ministries including a Ministry of Public Health and Hygiene. At the lower administrative levels (provinces, districts), a government representative supervises local specialized services in a proportion which may vary according to the real importance of these services and their technical capacity. There may also exist semi-autonomous institutions or organizations to complete these government services. These can become particularly important when the creation of a large development project is not funded from the national budget, but with outside support.

In some cases, the semi-autonomous body may even absorb the tasks of the government services to a large extent, and transform itself into a regional development organization covering all aspects and needs of the local population. This is acceptable when the project covers the complete renovation of a region which originally had very scanty resources, in which a new population is settled. However, it should be planned from the very beginning that regular government services will gradually replace the provisional structures thus created. This situation generally does not concern the health services, which often have strong links with their headquarters, the Ministry of Health.

7.1.4 Importance of financial provisions for environment protection and improvement

Many governments and assistance agencies which undertake large projects recognize the need to make financial provisions for the environmental and health aspects of the projects. This tendency is quite important, since the national budgets are too limited to support compensatory measures for damages to the environment originating from a specific project. A fixed percentage (between 5 and 10%) should be added to the capital investment funds foreseen for the actual feasibility studies, construction and operation of a scheme, as it is difficult to estimate exactly, from the very beginning, the overall expenses needed for environmental protection. This sum should definitely be included in the total budget of the project, and in the request for loans made by the government to assistance agencies; mechanisms must be established to use these funds for environmental purposes in the most effective way.

7.4 Sequence of operations and institutional mechanisms

As far as health problems, and, in particular, vector-borne disease problems, are concerned, two different phases can be distinguished in each water resources development project:

- (a) important modifications in environmental conditions (with repercussions on sanitation and health) occur during the construction of the scheme - this is a temporary situation;
- (b) once the project is fully operative, the newly created environmental conditions make a continuous monitoring process necessary - this is a permanent situation.

7.4.1 Temporary mechanisms

During the installation and construction phase of the project, rapid assessment and fast decision-making are essential, in order to be able to deal with any unexpected problem in an adequate way, while avoiding delays in the construction work proper. In order to achieve this, it is necessary that all environmental parameters be monitored in a coordinated manner during the entire period of planning, construction and early operation of the scheme. The monitoring body would consist of representatives of the local communities, all local services involved, the organization which has the overall responsibility for the scheme, and the funding agency supporting the project. It should be placed under the authority of a high level administrator, who could be called "Director of Environment", reporting directly to the regional or national authorities, and having a mandate to give instructions to all technical services insofar as they are dealing with specific problems of the scheme. He would have administrative powers to handle necessary expenses within the general framework of the budget foreseen for the solution of environmental problems.

Specific health problems of a temporary nature can occur. There is the problem of the migration of workers to and from the construction site. They can bring with them their own diseases into an ecosystem where they may not have occurred before (this is especially true for sexually transmitted diseases), and they can take other diseases back with them to their region of origin. It is most important to monitor the health of these migrants; the local health services are the organizations which should take responsibility for this operation. They should also look after the public hygiene situation, the quality of water and food, the maintenance of dormitories and latrines, etc. A clinic equipped for first aid, in case of accidents and for all necessary controls of incoming workers, should be established on the project site.

In this context, institutional arrangements are important. Financial support for these activities should come from the general budget of the project, but the management of the clinic and the recruitment of medical professionals should be an integral part of the territorial competence of the local health services. These measures would remain in effect as long as the scheme is under construction, and would therefore have a temporary character. However, should the project become a "focal point for development", then these arrangements could become more permanent.

7.4.2 Temporary versus permanent measures

For the sake of clarity, a distinction has been made between temporary arrangements and permanent arrangements. With regard to health, and, more particularly, to the transmission of vector-borne diseases, this distinction is appreciable. During the temporary period of construction, certain specific problems, such as labour accidents or sexually transmitted diseases, will have

priority; during the permanent period, changes in water conditions may result in extensive propagation of vectors and intermediate hosts taking place. Health services will probably have to act rapidly, and with great flexibility, during the first period; during the second, the question of prevention, through appropriate investments, will receive priority. Institutional arrangements will have to correspond to these different problems and preoccupations.

7.4.3 Permanent institutional arrangements

In a permanent situation, local government services (irrigation, agriculture, forestry, finance, public works, health, etc.) must be ready and capable to tackle any problem resulting from the operation of the scheme. In that context, they should receive the necessary funds (allocated from the financial provisions mentioned above) and technical support staff.

A realistic view of the situation underlines the necessity of appointing a responsible official (Director of Environment) to handle all matters resulting from the operation of the project (but not the operation itself), and to act as a coordinator and a promotor in all matters concerning the scheme at various levels. His tasks will include:

- coordination between the government and the project organization;
- coordination between the technical services and the management of the scheme, in the case of specific problems; and
- coordination between the government services themselves for the solution of specific problems.

This official would have authority over local services insofar as they affect the specific problem areas of the scheme. He would have the right to distribute financial resources among the various services implementing relevant activities in accordance with existing legislation. In carrying out his tasks, he would be assisted by a local council to advise him on all problems of the communities living in the project area.

This proposal for nominating a Director of Environment takes into consideration the various solutions described in the previous working papers; however, it differs in the following ways: it aims at strengthening existing local services, and at avoiding creating an umbrella organization which would short-circuit the work of these services; it respects the technical competence and authority of each and every local service, in particular the health services, which should have extensive responsibilities corresponding to the needs of the project; it clearly separates the authority for managing the project from the authority for dealing with the related environmental problems.

Promotion and coordination are the key words which characterize the Director of Environment's activities. Much will depend upon his diplomacy and energy, the selection of the person to fill this post will be a crucial process.

7.5 Some concluding remarks

In previous chapters, two ways in which the authorities of a country can give shape to the necessary institutional arrangements are indicated. One is represented by the Tennessee Valley Authority (TVA): the creation of an autonomous body which deals with all aspects of water resources development in a certain area. The Mahaweli Development Programme in Sri Lanka follows a similar pattern, through the creation of the Mahaweli Authority, which has extensive powers in the whole project area. In the Philippines, a second possibility has been proposed: specialized national bodies were created to

control malaria (Malaria Eradication Services - MES) and schistosomiasis (Schistosomiasis Control and Research Services - SCRS), a network of local offices in the country was set up to carry out these Services' functions locally.

The establishment of a large water resources development project is important to economic and social development, but also results in perturbation. Local institutions must adapt quickly and dynamically to the new situation. This is especially true for health problems. The creation of a Regional Development Authority may provide the only suitable framework to formulate solutions to the many, and sometimes unexpected, problems which a region has to face, but there is certainly a dilemma: is the creation of an Authority the permanent and final answer, or will the period of project establishment lead to the strengthening of the local services on which the local administration is based and to sustaining community life?

As far as river basins shared by two or more countries are concerned, the Panel pointed out the need for setting up international regulations, with particular reference to vector-borne diseases and pollution. The Panel observed that allocating a budget for environmental research and management, based on a percentage of total investment costs, could be a dangerous approach, since an underestimation can easily occur. The Panel requested particular attention to be paid to institutional arrangements relating to the schistosomiasis and malaria risks involved in the construction of small dams since these are presently being constructed in very large numbers.

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ANNEX I

List of Members

- Dr Mahmoud Abu-Zeid, Chairman, Water Research Center, Ministry of Irrigation, Cairo, Egypt
- Professor A. N. Alekseev, Head, Department of Medical Entomology and Chief, Division of Toxicology and Biological Control, Martsinovskiy Institute of Medical Parasitology and Tropical Medicine, Moscow, USSR
- Dr Waldemar F. Almeida, Department of Preventive and Social Medicine, University of Campinas, Campinas, Brazil
- Dr Teklemariam Ayele, Director, Institute of Pathobiology, University of Addis Ababa, Addis Ababa, Ethiopia
- Professor D. J. Bradley, Director, Ross Institute of Tropical Hygiene, London School of Hygiene and Tropical Medicine, London, UK
- Dr Ralph H. Brooks, Assistant Director, Division of Air and Water Resources, Tennessee Valley Authority, Knoxville, Tennessee, USA
- Professor H. J. Collins, Professor of Irrigation and Drainage, Leichtweiss Institute, Technical University of Braunschweig, Federal Republic of Germany
- Dr A. A. El Gaddal, Manager, Blue Nile Health Project, Ministry of Health, Wad Medani, Sudan
- Dr M. D. El Khalifa, Director, Institute of Environmental Studies, Khartoum, Sudan
- Dr A. M. Fakhro, Minister of Higher Education and Science, Ministry of Higher Education and Science, Manama, Bahrain
- Dr M. Falkenmark, Executive Secretary, Committee for Hydrology, Swedish Natural Science Research Council, Stockholm, Sweden, Member of Board of International Water Resources Association
- Mr S. E. Frick-Meijer, Member of FIDIC Executive Committee, Managing Director of VBB and Chairman of the Board of SWECO Consulting Engineers and Architects, Stockholm, Sweden
- Mr F. E. Gartrell, Consulting Engineer, Jackson, Mississippi, USA
- Dr Chamlong Harinasuta, Coordinator, SEAMEO-TROPED Project, TROPED Central Office, Bangkok, Thailand
- Dr L. Herath, Director, South-Asia Cooperative Environment Programme, Colombo, Sri Lanka
- Professor M. Holy, Director, Institute for Irrigation and Drainage, Technical University, Prague, Czechoslovakia
- Professor A. M. A. Imevbore, President, Nigerian Committee on Large Dams, Director, Institute of Ecology, University of Ife, Ile-Ife, Nigeria

- Dr Amir Kassam, Agricultural Consultant, London, UK
- Dr B. Kay, Head, Arthropod-Borne Disease Epidemiology Unit and Director, Vector Control, State Health Department, Queensland Institute of Medical Research, Brisbane, Queensland, Australia
- Dr J. G. Kiano, Managing Director, Industrial Development Bank Ltd., Nairobi, Kenya (former Minister for Water Development, Kenya Government)
- Dr Koentjaraningrat, Professor of Anthropology, University of Indonesia, Jakarta, Indonesia
- Dr R. J. H. Kruisinga, Member of the Senate and Chairman of the Senate Committee on Agriculture, Fisheries and Nature Preservation, The Netherlands (former Secretary of State for Health and the Environment)
- Professor E. Laing, Chairman, Health Committee on Water Resources Development, Department of Botany, University of Ghana, Legon, Ghana
- Dr M. M. Law, Assistant Deputy Minister, Health and Welfare Canada, Health Services and Promotion Branch, Ottawa, Ontario, Canada
- Professor Lu Bao Lin, Director, Department of Vector Biology and Control, Institute of Microbiology and Epidemiology, Beijing, People's Republic of China
- Mr Y. A. Mageed, Managing Director, Associated Consultants, Khartoum, Sudan (former Minister of Irrigation)
- Mr H. A. Rafatjah, Consultant Sanitary Engineer, former Chief, Equipment, Planning and Operations, Division of Vector Biology and Control, WHO, Geneva, Switzerland
- Professor V. Ramalingaswami, Director-General, Indian Council of Medical Research, New Delhi, India
- Dr M. Sasa, President, Toyama Medical and Pharmaceutical University, Toyama City, Japan
- Professor W. A. Schmid, Institute for Land Improvement and Water Management, Federal Institute of Technology, Zurich, Switzerland
- Professor H. I. Shuval, Director, Environmental Health Laboratory, The Hebrew University, Hadassah Medical School, Jerusalem, Israel
- Mr C. L. Tech, Assistant Administrator for Project Development and Implementation, National Irrigation Administration, Quezon City, Philippines
- Mr D. W. Westcot, Chief, Agricultural Operations, California Water Quality Control Board, Central Valley Region, Sacramento, California, USA
- Professor T. Yoshida, Professor of Soil Microbiology, Institute of Applied Biochemistry, University of Tsukuba, Ibaraki-Ken, Japan
- Dr Rodrigo Zeledón, Chief, Department of Medical Ecology, National University, Heredia, and President, Council of Science and Technology of Costa Rica (CONICIT), Zapote, Costa Rica

ANNEX II

TERMS OF REFERENCE OF THE STEERING COMMITTEE OF THE
WHO/FAO/UNEP PANEL OF EXPERTS ON ENVIRONMENTAL MANAGEMENT
FOR VECTOR CONTROL

1. Functions¹

The Steering Committee will have the following functions:

- 1.1 To follow up with members and in conjunction with the Secretariat, progress in the implementation of the Panel's recommended activities and projects.
- 1.2 To analyse the discussions of the Panel during its annual meeting and, based on this, to formulate recommendations, which will be submitted to the Panel for its approval.
- 1.3 To devise a long-term strategy to achieve the Panel's objectives, which will serve as a framework for year-to-year planning of activities.
- 1.4 To assist the Secretariat in those areas where high level contacts are required.
- 1.5 To coordinate, guide and encourage fund-raising efforts being made by individual Panel members.

2. The size of the Steering Committee

The Steering Committee will consist of five members, one of whom will serve as the Committee's Chairman, selected by the Panel.

3. The period of tenure

The Steering Committee members will be designated as such by the Panel for a period of two years, with the possibility of re-election for a second term.

4. Activities

- 4.1 The Steering Committee members will meet periodically, whenever the opportunity arises and subject to the availability of funds, or communicate by correspondence to exchange views and carry out decisions on matters assigned to the Committee. They will meet at least once a year, one day prior to the Panel meeting.
- 4.2 There will be a continuous and reciprocal coordination between the Steering Committee and the Secretariat, in order to provide mutual assistance in the implementation of activities recommended by the Panel.
- 4.3 The Steering Committee will be provided with the administrative facilities needed to adequately carry out its tasks by the Secretariat of the Panel.

¹ Function 1.3 will be omitted from the Terms of Reference if no additional funding for Steering Committee meetings is allocated by the participating organizations.



WHO



FAO



UNEP

JOINT WHO/FAO/UNEP PANEL OF EXPERTS
ON ENVIRONMENTAL MANAGEMENT FOR VECTOR CONTROL

CORRIGENDUM

Annex III, page 79, Insert:

VBC/84.5

Figure 1

A Checklist for the Review of PEEM's Impact

	<u>Yes</u>	<u>Somewhat</u>	<u>No</u>	<u>Do not know</u>	<u>N.A.</u>
1. Has the existence of PEEM, together with its objectives, become known to the authorities for health, land and water development and environmental protection in your country and/or region?	7	4	1	-	-
Has promotion of environmental management for vector control by PEEM led to an increased discussion of this topic by these authorities, either intra-sectoral or intersectoral?	4	2	2	4	-
2. In your opinion, are PEEM documents (reports and newsletters) reaching the right target readership?	4	-	5	3	-
Do the readers find the information provided in these documents generally interesting?	9	-	-	2	1
Do they consider the technical discussions useful and relevant to local problems?	7	2	2	1	-
3. Have PEEM's promotional activities created an increased recognition of the important of intersectoral collaboration between public health, land and water development and environmental protection authorities in your country/region?	5	3	3	1	-
Has this increased awareness resulted in any steps being taken to establish institutional or other arrangements that would facilitate intersectoral collaboration to tackle the vector borne problems that may result from development projects?	2	2	3	-	5
4. Has PEEM's impact been felt at the level of planners and decision-makers?	3	2	5	2	-
Has this resulted in a greater awareness among them of the vector borne disease risks of water resources development projects, and in their being prepared to consider incorporating environmental management measures for vector control into project-designs to provide health and environmental safeguards?	4	1	-	-	7
Are there any specific projects being planned which will include such safeguards in your country/region?	7	-	2	3	-
5. Have you noticed an increase in the attention of bilateral and/or multi-lateral assisting agencies to the vector borne disease implications of projects funded by them?	7	-	3	2	-
Are they now more aware that the application of environmental management for vector control is an investment that will produce long-term effects and which may eventually lead to satisfactory vector control more economically than by the use of chemical control alone?	7	-	1	4	-
Are they taking any steps to ensure incorporation of health safeguards in their projects?	7	-	1	4	-
6. Has dissemination of information by PEEM resulted in an increased knowledge among engineers of the vector borne disease aspects of water resources development and of the available environmental management measures for vector control?	5	-	4	3	-
Would they be interested in attending short courses on this subject?	9	-	-	3	-
7. If there is a national malaria, filariasis and/or schistosomiasis control programme in your country, is the use of simple environmental management measures for vector control (as advocated by PEEM) considered as a component of an integrated vector control strategy?	8	-	0	1	1

ANNEX III

ASSESSMENT OF THE PANEL'S IMPACT AND THE MEMBERS' EXPERIENCE

Introduction

During the third annual meeting of the Panel in September 1983, it was decided to include a review of the Panel's impact and a discussion on Panel members' experience as a separate point on the agenda of the fourth annual PEEM meeting.

The Secretariat complied with this decision by designing a questionnaire which would permit an adequate collection and subsequent analysis of data regarding the Panel's impact, and this was forwarded to all Panel members and to the six WHO Regional Offices.

The questionnaire was designed with the objective of obtaining the broadest possible insight in the individual Panel member's perception of the nature, scope and depth of the Panel's impact, while leaving sufficient room for a short description of their experience and for suggestions for the improvement of the Panel's performance.

Several questions referred to the primary objective of the Panel, i.e., the promotion of environmental management for vector control. The majority of the questions focused on the activities with relation to the vector-borne disease implications of water resources development projects and the incorporation of environmental management measures as health safeguards in these projects.

Another cluster of questions aimed at obtaining the members' evaluation of the level of information dissemination and the relative importance of this activity for the impact of the Panel.

General response to the questionnaire

The questionnaire was sent to all Panel members, a total of 31 at the time it was prepared, and a response was received from 14 of them, which means a response rate of 45%. All but two responses consisted of fully completed forms.

At the time of preparation of the questionnaire the Secretariat considered designing two separate versions: one for members from industrialized countries and one for members from developing countries. It is obvious that the problems for which the Panel tries to find solutions (i.e. the transmission of vector-borne diseases in general and the aggravation of this phenomenon by water resources development projects) are almost exclusively problems of developing countries. However, this rule cannot be applied totally, and, moreover, even if the industrialized countries may in most cases not be confronted with vector-borne disease problems in their own territory, their role as a donor country for international assistance programmes still requires an awareness among responsible officials of the environmental impact resulting from development projects, and of the way this can lead to an exacerbation of the vector-borne disease situation.

Based on these considerations, it was thought impractical to develop two versions of the questionnaire. Yet this matter may have played a role, since relatively less completed forms were returned by members from industrialized countries rather than by members from developing countries: 5 out of 17 from the former, and 7 out of 14 from the latter.

Outcome of the self-evaluation by the Panel members

The results of this exercise are presented in figure 1.

Two members referred, in their replies, to the impact of the Panel in their respective countries in other respects. Brazil raised the example of the incorporation of lectures on health aspects in the regular engineering curriculum. In the United States the promotional activities of the Panel have resulted in the preparation of study material for lectures on environmental management for vector control and promotion of their use through institutions of higher learning, through training organizations or public health agencies, and through professional societies' continuing education programmes.

Asked for a comprehensive answer with respect to the scope of the Panel's impact, the general feeling among Panel members was that its impact had been most tangible at the professional level, only intermediately at the level of government officials and practically nonexistent at community level.

The members' experience in the promotion of PEEM's objectives was described as encouraging and satisfactory. Many members reported that they used their professional and other contacts for promotional purposes. The most difficult threshold to cross was obviously the transformation of the ideas and concepts, which are generally well-received and easily accepted, into concrete action and willingness to give financial support for these activities.

In the last question, the members were asked for specific suggestions to improve PEEM's effectiveness. Most of the suggestions were aimed at improving the local impact of the Panel. An example of this is the idea of establishing a greater representation on the Panel from various groups within the United States, in order to increase the Panel's promotional capacity. This might be achieved by forming a satellite group of which a cross-section of various groups with vector control interest forms a part, and which would be represented in the Panel by one member. Similarly, the member from Sri Lanka thought it would be desirable to form a National Committee on vector-borne diseases in which, apart from officials of the Ministry of Health, various disciplines would be represented, to try and promote PEEM's objectives on a national basis. Such an initiative would ultimately lead to the incorporation of health safeguards in water resources development projects. As this member pointed out clearly, such initiatives for local expansion of PEEM's activities are basically the responsibility of each individual Panel member.

Other suggestions related to PEEM'S role in the promotion of environmental management at an international level. An intensification of the contacts with the international development banks was considered necessary, both for financial support of the Panel's programme and for the incorporation of measures recommended by the Panel in the projects which are financed by them. The Egyptian Panel member suggested that Panel meetings should preferably be organized in the Panel members' countries. Finally, the Brazilian member felt that periodic fact-finding missions by short-term consultants to projects under development would increase PEEM's effectiveness.

Experience in the Regional Offices

From the replies received it is obvious that the Regional Offices until now have only been marginally involved in the promotion of PEEM's objectives. The experience of the regional VBC officers is restricted to distribution of the PEEM Newsletter, exchange of memoranda regarding the designation of new Panel members and collaborating centres, and positive verbal agreements with national officials, but very little concrete implementation. Suggestions for improvement of PEEM's effectiveness consisted of the following:

- improvement of the selection of new members, using the direct influence of potential members on the national vector control programmes as an important criterion;

- strengthening of the existing network of collaborating centres and placing more emphasis on the implementation of the Panel's programme of work through these collaborating centres;
- a more frequent evaluation of the Panel's impact on country programmes with on-site assessment.

The conclusions drawn from this self-evaluation exercise and the Panel's discussion on this subject are included in Part I of this report.

ANNEX IV

FIFTH MEETING OF THE JOINT WHO/FAO/UNEP PANEL OF EXPERTS
ON ENVIRONMENTAL MANAGEMENT FOR VECTOR CONTROL

PROPOSED AGENDA

1. Opening of the meeting
2. Election of officers - Chairman, Vice-chairman and Rapporteurs
3. Adoption of the agenda
4. Review of the Annual Report for 1984/1985
5. Report of the Steering Committee
6. In-depth review and evaluation of the Panel's performance 1981-1985:
draft report to the Executive Heads of the participating organizations
7. Proposed programme of work
8. Project proposals
9. Technical discussion
10. Next annual meeting
11. Other business
12. Adoption of report
13. Closure of meeting

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